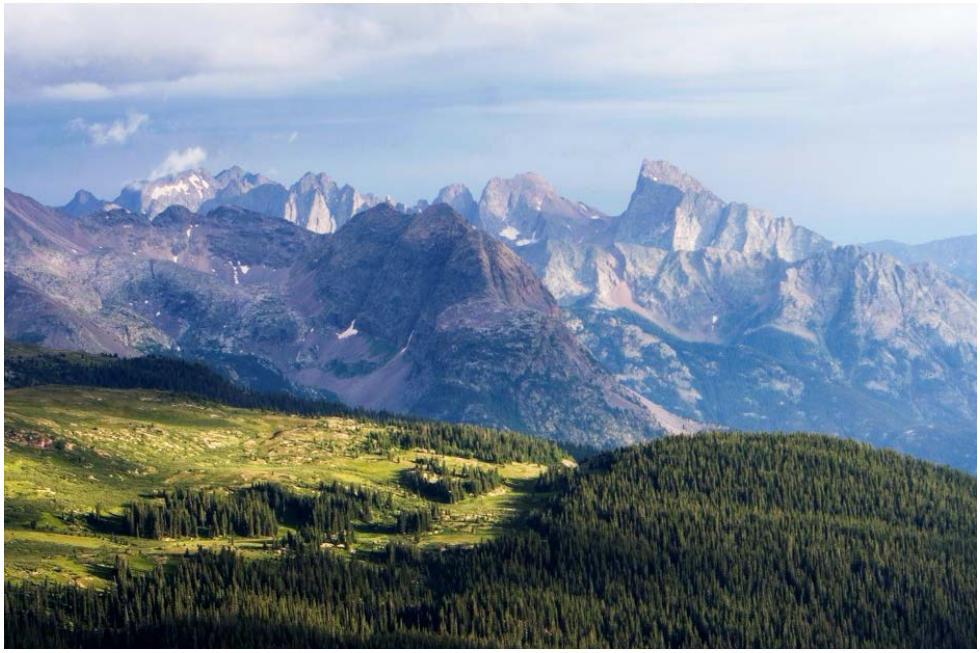
2020 American Control Conference

FINAL PROGRAM



Sheraton Denver Downtown Hotel

Denver, CO
July 1–July 3, 2020

Sponsoring Organization

The American Automatic Control Council, in cooperation with IFAC

Member Societies

2020 American Control Conference
Sheraton Denver Downtown Hotel
Denver, CO, USA

http://acc2020.a2c2.org/

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WELCOME TO THE ACC 2020

THE AMERICAN AUTOMATIC CONTROL COUNCIL

The American Control Conference is organized under the auspices of the American Automatic Control Council (AACC), which is an association of nine professional societies:

- American Institute of Aeronautics and Astronautics (AIAA)
- American Institute of Chemical Engineers (AIChE)
- American Society of Civil Engineers (ASCE)
- American Society of Mechanical Engineers (ASME)
- Institute of Electrical and Electronics Engineers (IEEE)
- Institute for Operations Research and the Management Sciences Applied Probability Society (INFORMS APS)
- International Society of Automation (ISA)
- Society for Industrial and Applied Mathematics (SIAM)
- Society for Modeling and Simulation International (SCS)

AACC represents the United States to the global control community and supports the mission of the individual member societies in enhancing the role and contributions of automation for the benefit of humankind. AACC is also the US National Member Organization (NMO) of the International Federation of Automatic Control (IFAC), a multinational federation of NMOs, each representing the engineering and scientific societies concerned with automatic control in its country. AACC helps arrange for IFAC events in the U.S. and provides delegates for IFAC committees and leadership.

Organizing the annual, 3-day, cross-disciplinary ACC is the principal technical activity of AACC. The conference typically attracts about 1,300 participants and features about 1,000 refereed papers. The ACC is an internationally recognized control conference with substantial participation from outside the US. Academia, industry, and government are all well-represented. Additionally, AACC offers several annual awards to recognize and honor individuals who have made substantial contributions to control theory and practice. These awards are presented during the annual AACC Awards Ceremony, held at the ACC. AACC also supports control education from K-12 through post-graduate studies. AACC provides opportunities for personal and professional development and recognition to its large cast of volunteers, on whom it is crucially dependent for its operations and success.

The activities of the AACC are governed by a Board of Directors. Each AACC member society appoints a director. Operational responsibilities for the AACC rest with five officers, who report to the Board. Operating committees for ACCs, awards committees, etc., report to the officers. All directors, officers, and committee members are volunteers.

To learn more about AACC please visit www.a2c2.org.

GREETINGS FROM THE AACC PRESIDENT

On behalf of the American Automatic Control Council (AACC), I am pleased to welcome you to the 2020 American Control Conference (ACC) in Denver. ACC attracts participants from academia, industry, and government; from around the world; and, from a wide range of disciplines including all the engineering and control-relevant branches of applied mathematics.

AACC is a federation of nine professional societies: American Institute of Aeronautics and Astronautics (AIAA), American Institute of Chemical Engineers (AIChE), American Society of Civil Engineers (ASCE), American Society of Mechanical Engineers (ASME), Institute of Electrical and Electronics Engineers (IEEE), the International Society for Automation (ISA), the Society for Modeling & Simulation International (SCS), the Society for Industrial and Applied Mathematics (SIAM), and Applied Probability Society as a subdivision of the Institute for Operations Research and the Management Sciences (INFORMS APS). The mission of the AACC is to promote cooperation among the various segments of the automatic control profession within the U.S. and to represent the U.S. in international activities. To this end, AACC manages the ACCs, supports control-related workshops and symposia, represents the U.S. in the International Federation of Automatic Control (IFAC), provides volunteers for IFAC activities, and undertakes other initiatives that promote and coordinate developments in the automatic control field.

AACC was founded more than sixty years ago in 1957 and had its first organizational meeting that year in Chicago. Among the various AACC activities, the largest single activity is ACC organization, which begins about five years in advance. The American Control Conference has had two name changes in its history. The first conference – the National Automatic Control Conference – was held in 1959 in Dallas. The very next year the conference was renamed the Joint Automatic Control Conference, which ran until 1981. AACC decided to change the conference name to the American Control Conference during an operational change in which the conference went from being organized each year by one of its member societies (which would rotate among the societies) to being organized by an operating committee whose members are drawn from multiple societies. Each operating committee is led by a General Chair and a Program Chair. These positions as well as the operating committee members change each year.

AACC is an organization led and run by volunteers. The governing body of the AACC is its Board of Directors. Each member society appoints one Board member. The Board provides overall governance of AACC and elects the Chairs of various committees, the ACC General and Program Chairs, and the Officers who are responsible for operations and recommendations to the Board.

Each ACC is both a presentation of the latest research results in and a celebration of automatic control. In addition to the peer-reviewed papers in the conference proceedings, each ACC features workshops, special sessions, exhibits, and social events which include a banquet, opening and closing receptions, and the annual AACC Awards Ceremony.

Please join me in thanking the General Chair Santosh Devasia, the operating and program committees, the AACC Board and Officers, and many others for their volunteer contributions.

I extend my best wishes to all conference participants for an enjoyable, stimulating, and productive ACC.

Jay A. Farrell
AACC President, 2019-2020

GREETINGS AND THANKS FROM THE GENERAL CHAIR

On behalf of the Operating Committee, it is my great pleasure to welcome you to the 2020 American Control Conference in Denver, Colorado. The success of any conference depends first and foremost on its participants, and thus we thank you sincerely for choosing ACC as a forum for disseminating your work. As part of a vital community of colleagues and friends, we are also extremely grateful for your companionship in Denver.

The 2020 ACC Operating Committee (OpComm) has brought together their diverse collective experience to develop new innovations for the conference. These include: (i) the Rapid Interactive (RI) sessions that enable participants to present to a large portion of the attendees and for attendees to get a sampling of the many research results in an area, which has been popular at other conferences, e.g., in the Robotics Community; (ii) the fifty or so late-breaking poster presentations (without the need to submit a full paper) that is becoming an increasingly preferred way to communicate emerging ideas in conferences; and (iii) incorporating Federal funding from NSF (through the efforts of our Vice-Chair for Student Affairs, Kira Barton) to increase the diversity of students participating in ACC. We welcome your remarks and comments on the effectiveness of these and potential ways to improve further.

ACC is our conference, managed by volunteers from our societies. Hence, I am very thankful to the large community of dedicated volunteers that support ACC activities, including but not limited to the conference OpComm (each of whom played a key role to 2020 ACC's success), the review team (including the Program Chair Martha Grover, the reviewers, the program committee, the Associate Editors, and the Conference Editorial Board) for maintaining the high quality of the ACC program, the American Automatic Control Council (its officers as well as the Steering Committee) for sharing their collective wisdom on the mechanics of putting together a conference, and the current and past OpComms for being generous in sharing their ideas, time, and knowledge. Finally, thanks to Bob Judd, to whom I am indebted to for helping with the hotel and site selection process and the many contracts, and in this special year for renegotiating with the hotel as we transitioned to a fully online conference.

It was heartwarming to find the strong interest in the conference from our community, in spite of the Covid-19 situation. Most of the authors of the more than 800+ papers felt sufficient value to submit their final papers to ACC and registering, while paying the full conference fees. Due to the volunteer spirit in our community, we were able to lower the overall registration rates, and refund a substantial portion of the fees back to the registrants. I am very grateful to the support and guidance from the OpComm members and the AACC board and officers all through this transition process.

We are anticipating strong participation in ACC 2020 from our community, and we hope to try and hold most of the typical events. You should expect your attendance to be both informative and enjoyable. I hope to see you online in July.

Santosh Devasia
General Chair, 2020 American Control Conference

TECHNICAL PROGRAM OVERVIEW

Welcome to the 2020 American Control Conference. We are excited to bring together control researchers from a range of disciplines to discuss theoretical developments of common interest and diverse applications in engineering and science. This year we are proud to feature a new presentation format in the morning Rapid Interactive (RI) sessions. On each of the three mornings of the conference, there will be two parallel RI sessions. The intent of the RI sessions is to increase the visibility of your work and to promote more in-depth discussions and interactions between authors and conference attendees. Specifically, each presenter in an RI session will be presenting to a large audience of half the conference. Each of the six sessions will begin with a keynote presentation, selected from the highly rated contributed papers. Next, 21 papers will be presented back-to-back in a rapid three-minute format. In the subsequent interactive portion of the session, authors will further share their ideas and results through a digital poster session, with large monitors provided for each presenter to promote discussion and engagement with the audience. The six RI sessions are entitled Optimization and Optimal Control, Control of Energy and Automotive Systems, Predictive Control, Control of Robotic Systems, Learning, and Control of Biological and Aerospace Systems.

The conference will also feature five plenary seminars: three morning plenaries, as well as two evening plenaries on Tuesday and Wednesday, with diverse topics on control in science and engineering. The plenary programs commence with a plenary lecture on **Control Challenges for the Laser Interferometer Gravitational-wave Observatory (LIGO), by Dennis Coyne, and wraps up with the Friday morning plenary by Eckman Award winner Na Li on Distributed Decision Making in Network Systems.**

The 2020 ACC received 1239 paper submissions, 46 invited session proposals, 5 tutorial session proposals, and 11 pre-conference workshop proposals. After a tremendous and conscientious effort by the Society Review Chairs, the Associate Editors, and the Program Committee, together with the eleven auditors and all of the reviewers, 835 papers were selected for presentation at the conference, for an acceptance rate of 67%. In addition, 27 papers were nominated for the Student Best Paper Competition. This year the papers were reviewed in a double-blind process to reduce bias in evaluation. We encourage you to attend the Student Best Paper Session on Wednesday from 4-6 pm to hear the presentations of the five outstanding finalists for the award. Also, we encourage you to engage with the poster presenters in our Late-Breaking Results poster session, during the breaks throughout the conference.

The program was assembled in Atlanta in January, thanks to the dedication of Amir Aghdam, Santosh Devasia, Kam Leang, Ardalan Vahidi, George Chiu, Kristi Morgansen, Bonnie Ferri and Fumin Zhang, as well as the sacrifice of a large number of Post-Its. Amir's attention to detail is remarkable, and when he finally approved the program schedule, we all were confident that it was time to celebrate. The Operating Committee for the ACC has been dedicated and effective, and I appreciate their contributions to assemble all the critical pieces into the complex conference system. You can find their names in the final program and on the conference website. Please do thank them for their service when you see them online. I also gratefully acknowledge our General Chair Santosh Devasia for his leadership and vision, as well as his cheerfulness at all times.

Many thanks for your dedication to the 2020 American Control Conference, and enjoy the conference!

Martha Grover

GREETINGS FROM THE IFAC PRESIDENT

It is my great pleasure as president of the International Federation of Automatic Control (IFAC) to "welcome" you to the American Control Conference organized by the American Automatic Control Council (AACC) and co-sponsored by IFAC.

By now, it seems already standard that a welcome is independent of the location of the person "being welcomed" and the location of the person "welcoming" -- and it applies to a virtual meeting room, a virtual lecture or – you guessed it – a virtual conference. This welcome reaches you probably in an electronic version and you are not holding the usual ACC booklet in your hands. Most likely, this is one of the smaller changes that you witness when comparing this year's ACC to your past ACC experiences. The spread of the SARS-CoV-2 virus and the associated disease COVID-19 has turned many things upside down and radically changed how we participate in conferences - at least for the rest of the year and most probably way beyond. This statement is not based on my predictions on the future of the SARS-CoV-2 virus (I would not dare…), but based on my opinion that this pandemic brings lasting changes, some of which might even be for the better.

It is clear that seeing the current pandemic purely as a chance would not do justice to the many tragic losses and the restrictions we have to accept for our daily lives. No question, the spread of the SARS-CoV-2 virus is the worst disaster of worldwide impact that mankind has seen since many decades, and my greatest wish with all my heart is that you, your families and friends stay healthy. Let us try anyways to not only minimize the horrible consequences of this pandemic, but also to think beyond the crisis, actively shaping this change by envisioning a better and possibly more sustainable future.

Within IFAC, we certainly try to adapt this mindset and we are constantly thinking about change for the better of the community – especially in this difficult situation. Already the IFAC constitution states that IFAC's primary objective is to serve all those concerned with the theory and application of automatic control and systems engineering, wherever they are situated. A recent project in this respect is for example the initiative of the 'Corona Control Community Project (C3P) Website', a joint effort with IEEE CSS that you've probably already heard about (https://covid.ifac-control.org). Serving the community, of course, also includes our 'daily business': organizing and sponsoring more than 50 technical meetings every year, the publication of eight prestigious archival journals, recognizing great achievements and talent through IFAC Awards, promoting the benefits of automatic control among the public at large and many more initiatives that are carried out thanks to all the IFAC boards, committees and volunteers.

Finally, and most importantly, I want to thank the organizers of the American Control Conference, who have done a tremendous job in adapting to the difficult COVID-19 imposed circumstances in such a professional way. Even though, or maybe even because of the changes the spread of the SARS-CoV-2 virus forces on us, this ACC will be a new and exciting experience. Next to the technical program of high scientific level, it will certainly be a fruitful conference that inspires new ideas and sparks new collaborations, despite the difficult time the conference takes place in.

Last but not least, I wish us all interesting sessions, presentations and discussions, and I hope to meet many of you, at least virtually, in one or the other session over the next couple of days.

Frank Allgöwer
President of the International Federation of Automatic Control

PLENARY SESSIONS

Plenary Lecture

Control Challenges for the Laser Interferometer Gravitational-Wave Observatory (LIGO)

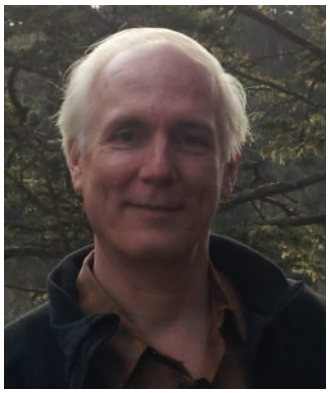
Dennis Coyne
California Institute of Technology, USA

Tuesday, June 30, 6:15 PM – 7:15 PM
Ballroom 1

In September 2015, the Laser Interferometer Gravitational-wave Observatory (LIGO) initiated the era of gravitational wave astronomy (a new window on the universe) with the first direct detection of gravitational waves (ripples in the fabric of space-time) resulting from the merger of a pair of black holes into a single larger black hole. In August 2017 the LIGO and VIRGO collaborations announced the first direct detection of gravitational waves associated with a gamma ray burst and the electromagnetic emission (visible, infrared, radio) of the afterglow of a kilonova -- the spectacular collision of two neutron stars. This marks the beginning of multi-messenger astronomy. The kilonova discovery was made using the U.S.-based LIGO; the Europe-based Virgo detector; and 70 ground- and space-based observatories.

The Advanced LIGO gravitational wave detectors are second generation instruments designed and built for the two LIGO observatories in Hanford, WA and Livingston, LA. These two identically designed instruments employ coupled optical cavities in a specialized version of a Michelson interferometer with 4 kilometer long arms. Resonant optical cavities are used in the arms to increase the interaction time with a gravitational wave, power recycling is used to increase the effective laser power and signal recycling is used to improve the frequency response. In the most sensitive frequency region around 100 Hz, the displacement sensitivity is 10^-19 meters rms, or about 10 thousand times smaller than a proton. In order to achieve this unsurpassed measurement sensitivity Advanced LIGO employs a wide range of cutting-edge, high performance technologies, including an ultra-high vacuum system; an extremely stable laser source; multiple stages of active vibration isolation; super-polished and ion milled optics, high performance multi-layer dielectric coatings; wavefront sensing; active thermal compensation; very low noise analog and digital electronics; complex, nonlinear multi-input, multi-output control systems; a custom, scalable and easily re-configurable data acquisition and state control system; and squeezed light. The principles of operation, the numerous control challenges and future directions in control will be discussed.

More information is available at https://www.ligo.caltech.edu/



Dennis Coyne is the Chief Engineer for the LIGO Laboratory at the California Institute of Technology (Caltech) in Pasadena, California. Over the last 24 years he has led the LIGO engineering team's efforts in design and implementation of first and second generation instruments. The Laser Interferometer Gravitational-wave Observatory (LIGO) is a first of its kind instrument, capable of measuring the sub-atomic stretching of space due to cataclysmic cosmological events. The LIGO founders were awarded the Nobel Prize in Physics in 2017 for the direct detection of gravitational waves which were predicted by Albert Einstein. LIGO is now an operating observatory enabling multi-messenger astronomy. Prior to joining Caltech, Dennis worked for Kaman Sciences Corp. and Bell Laboratories. Dennis received a BSME from UMass and an MSME from UC Berkeley. He is a fellow of the ASME, a fellow of the APS, recipient of the 2018 AAS Lancelot M. Berkeley Prize, OSA's 2016 Forman Team Engineering Excellence Award and the 2016 Breakthrough Prize in fundamental physics. More information is available at https://labcit.ligo.caltech.edu/~coyne/

Plenary Lecture

Lots to Be Done: Towards Data-Informed, Real-time Coordination Algorithms That Scale Up

Sonia Martinez
University of California at San Diego

Wednesday, July 1, 8:00 AM – 9:00 AM
Ballroom 1

Networked and robotic systems in emerging applications are required to operate safely, adaptively, and degrade gracefully while coordinating a large number of nodes. Distributed algorithms have consolidated as a means for robust coordination, overcoming the challenges imposed by the limited capabilities of each agent. However, plenty of problems still exist to break down the barriers of fast computation, make effective use of measured data, and understand large-scale limit effects. In this talk, I will present ongoing work in the control of infrastructure networks and large-swarm coordination, along with a discussion on modeling approaches, analysis tools, and architectural trade-offs going from small to large-sized robotic networks.

Sonia Martínez is a Professor at the Department of Mechanical and Aerospace Engineering at the University of California, San Diego. Prof. Martínez received her Ph.D. degree in Engineering Mathematics from the Universidad Carlos III de Madrid, Spain, in May 2002. Following a year as a Visiting Assistant Professor of Applied Mathematics at the Technical University of Catalonia, Spain, she obtained a Postdoctoral Fulbright Fellowship and held appointments at the Coordinated Science Laboratory of the University of Illinois, Urbana-Champaign during 2004, and the Center for Control, Dynamical systems and Computation (CCDC) of the University of California, Santa Barbara during 2005. From January 2006 to June 2010, she was an Assistant Professor with the department of Mechanical and Aerospace Engineering at the University of California, San Diego. From July 2010 to June 2014, she was an Associate Professor with the Department of Mechanical and Aerospace Engineering at the University of California, San Diego.

Dr Martínez' research interests include networked control systems, multi-agent systems, and nonlinear control theory with applications to robotics and cyber-physical systems. In particular, she has focused on the modeling and control of robotic sensor networks, the development of distributed coordination algorithms for groups of autonomous vehicles, and the geometric control of mechanical systems. For her work on the control of underactuated mechanical systems she received the Best Student Paper award at the 2002 IEEE Conference on Decision and Control. She was the recipient of an NSF CAREER Award in 2007. For the paper "Motion coordination with Distributed Information," co-authored with Jorge Cortés and Francesco Bullo, she received the 2008 IEEE Control Systems outstanding paper award. She is a Senior Editor of the IEEE Transactions on Control of Networked Systems and an IEEE Fellow of the class of 2018.

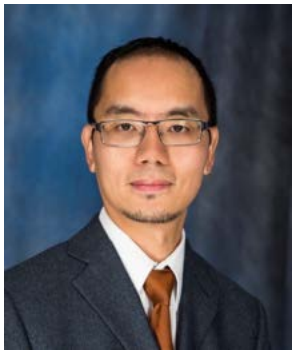
Plenary Lecture

Advances and Opportunities of AI and Machine Learning in Industrial Process Monitoring and Control

Leo H. Chiang
Dow, Inc.

Wednesday, July 1, 6:15 PM – 7:15 PM
Ballroom 1

To ensure safety, reliability, and productivity of industrial processes, artificial intelligence (AI) and machine learning techniques have been widely used in process industries for decades. The benefits of process monitoring and control are well documented and employed routinely in manufacturing. This talk will go over historical perspective and recent AI and machine learning successes in the areas of real-time analytics, deep learning, reinforcement learning, visualization, and feature engineering. Complex interaction between human decision and automated control will be discussed. Humans grow expertise by quickly adapting to abnormal conditions and using domain knowledge to generate creative solutions. However, reproducing human decisions across the enterprise is a challenge. A common misconception is that AI is to replace human decision. The talk will emphasize how AI and control systems must be complementary to make human decisions as efficient and consistent as possible. Human decision will remain a center piece of how to operate industrial processes in a safe, reliable, and productive manner.



Leo H. Chiang is Technology Director at Dow Inc., leading Chemometrics and AI implementations for Manufacturing. Leo has developed and implemented several data analytics techniques to solve complex manufacturing problems, resulting in 11 Dow Manufacturing Technology Center Awards. In 2016 he received the Dow R&D Excellence in Science Award in recognition of his scientific achievement in industrial research.

Leo has a B.S. degree from University of Wisconsin at Madison and M.S. and Ph.D. degrees from the University of Illinois at Urbana-Champaign, all in Chemical Engineering. Leo has contributed to over 40 externally refereed journal/proceedings papers and has given over 100 conference presentations and university lectures. Leo has co-authored two books published by Springer Verlag. His textbook Fault Detection and Diagnosis in Industrial Systems is available in English and Chinese and has received over 2,100 citations according to Google Scholar.

Leo has a long history of supporting American Institute of Chemical Engineers (AIChE), having served as 2014-2016 Computing and Systems Technology (CAST) director, 2016 CAST 10E programming chair, 2017-2018 spring meeting program chair (MPC), and recently elected to serve the 2019-2022 Executive

Board of the Program Committee (EBPC). Leo was instrumental in setting up the Big Data Analytics Topical Conference (2015 to 2017) and Industry 4.0 Topical Conference (2018-2020) at the AIChE spring meeting. He was recognized by the AIChE with the 2016 Herbert Epstein Award for his leadership on Big Data Analytics technical programming and 2016 Computing Practice Award for his world-class leadership in the development and application of methodologies in analytics for batch and continuous processes known as Big Data.

Leo is also active in the broader engineering and control community, currently serves as 2019-2021 Computer Aids for Chemical Engineering (CACHE) trustee, 2021 International Symposium on Advanced Control of Chemical Processes (ADCHEM) industry co-chair, and 2022 American Control Conference (ACC) vice chair for industrial applications.

Plenary Lecture

Control of Complex Energy and Power Systems for Electrified Mobility

Andrew Alleyne
University of Illinois, Urbana-Champaign

Thursday, July 2, 8:00 AM – 9:00 AM
Ballroom 1

Electrification of mobility and transport is a global megatrend that has been underway for decades. The mobility sector encompasses cars, trucks, busses and aircraft. These systems exhibit complex interactions of multiple modes of power flow. These modes can be thermal, fluid, electrical, or mechanical. A key challenge in working across various modes of power flow is the widely varying time scales of the subsystems which makes centralized control efforts challenging. This talk will present a particular distributed controller architecture for managing the flow of power based on on-line optimization. A hierarchical approach allows for systems operating on different time scales to be coordinated in a controllable manner. It also allows for different dynamic decision making tools to be used at different levels of the hierarchy based on the needs of the physical systems under control. Additional advantages include the modularity and scalability inherent in the hierarchy. Additional modules can be added or removed without changing the basic approach.

In addition to the hierarchical control, a particularly useful graph-based approach will be introduced for the purpose of modeling the system interactions and performing early stage design optimization. The graph approach, like the hierarchy, has benefits of modularity and scalability along with being an efficient framework for representing systems of different time scales. The graph allows design optimization tools to be implemented and optimize the physical system design for the purpose of control. Recent results will be presented representing both generic interconnected complex systems as well as specific examples from the aerospace and automotive application domains.

Andrew Alleyne received his Mechanical and Aerospace Engineering B.S.E. from Princeton University in 1989. He received his M.S. and Ph.D. degrees in Mechanical Engineering in 1992 and 1994, respectively, from UC Berkeley. He joined the University of Illinois, Urbana-Champaign in 1994. He currently holds the Ralph M. and Catherine V. Fisher Professorship in the College of Engineering and is the Director for the NSF Engineering Research Center on Power Optimization for Electro-Thermal Systems (POETS). His research focuses on the modeling, simulation and control of nonlinear mechanical systems with a current focus on transient thermal systems. He developed a commercial simulation tool, ThermosysTM, for simulation of refrigeration

systems and worked with the Air Force Research Laboratory to develop the Aircraft Transient Thermal Modeling and Optimization (ATTMO) toolbox. His academic record includes supervision of over 80 M.S. and Ph.D. students and over 400 conference and journal publications. He is the recipient of an NSF CAREER award, has been an IEEE Distinguished Lecturer, and a National Research Council (NRC) Associate. He is a Fellow of IEEE and ASME. He has received the Gustus Larson Award, the Charles Stark Draper Award for Innovative Practice, The Yasundo Takahashi Education Award and the Henry Paynter Outstanding Investigator Award from ASME. The American Automatic Control Council awarded him the Control Engineering Practice Award. He was a Fulbright Fellow to the Netherlands and has held visiting Professorships at TU Delft, University of Colorado, ETH Zurich, and Johannes Kepler University. He has held several editorial positions for ASME, IEEE, and the International Federation of Automatic Control and been active in external advisory boards for universities, industry and government including the Scientific Advisory Board for the U.S. Air Force and the National Academies Board on Army Research and Development. He chaired the ASME Dynamic Systems and Controls Division and is a member of the IEEE Controls Systems Society Board of Governors. His record of campus service includes the Associate Dean for Research in the College of Engineering and the Associate Head for Undergraduate Programs in Mechanical Science and Engineering. In addition to research and service, he has a keen interest in education and has earned the UIUC College of Engineering Teaching Excellence Award, the UIUC Campus Award for Excellence in Undergraduate Education and the UIUC Campus Award for Excellence in Graduate Student Mentoring.

Plenary Lecture

Distributed Decision Making in Network Systems: Algorithms, Fundamental Limits, and Applications

Na Li
Harvard University

Friday, July 3, 8:00 AM – 9:00 AM
Ballroom 1

Recent radical evolution in distributed sensing, computation, communication, and actuation has fostered the emergence of cyber-physical network systems. Examples cut across a broad spectrum of engineering and societal fields. Regardless of the specific application, one central goal is to shape the network collective behavior through the design of admissible local decision-making algorithms. This is nontrivial due to various challenges such as the local connectivity, imperfect communication, model and environment uncertainty, and the complex intertwined physics and human interactions. In this talk, I will present our recent progress in formally advancing the systematic design of distributed coordination in network systems. We investigate the fundamental performance limit placed by these various challenges, design fast, efficient, and scalable algorithms to achieve (or approximate) the performance limits, and test and implement the algorithms on real-world applications.

Na Li is a Thomas D. Cabot associate professor in Electrical Engineering and Applied Mathematics of the J. Paulson School of Engineering and Applied Sciences at Harvard University. She received her Bachelor degree in Mathematics from Zhejiang University in 2007 and Ph.D. degree in Control and Dynamical systems from California Institute of Technology in 2013. She was a postdoctoral associate of the Laboratory for Information and Decision Systems at Massachusetts Institute of Technology 2013-2014. She has joined Harvard University since 2014. Her research lies in distributed learning, optimization, and control of cyber-physical networked systems. She received some paper awards, NSF career award (2016), AFSOR Young Investigator Award (2017), Harvard PSE Accelerator Award (2017), ONR Young Investigator Award (2019), Donald P. Eckman Award (2019).

RAPID INTERACTIVE KEYNOTE ADDRESSES

Sandra Hirche
Anticipating learning in stochastic optimal control

Authors: Alexandre Capone and Sandra Hirche

Sandra Hirche holds the TUM Liesel Beckmann Distinguished Professorship and heads the Chair of Information-oriented Control in the Faculty of Electrical and Computer Engineering at Technical University of Munich (TUM), Germany (since 2013). She received the diploma engineer degree in Aeronautical and Aerospace Engineering in 2002 from the Technical University Berlin, Germany, and the Doctor of Engineering degree in Electrical and Computer Engineering in 2005 from the Technische Universität München, Munich, Germany. From 2005-2007 she has been a PostDoc Fellow of the Japanese Society for the Promotion of Science at the Fujita Laboratory at Tokyo Institute of Technology, Japan. Prior to her present appointment she has been an Associate Professor at TUM.

Her main research interests include learning, cooperaOve, and networked control with applicaOons in human-robot interacOon, mulO-robot systems, and general roboOcs. She has published more than 200 papers in internaOonal journals, books and refereed conferences. She has received mulOple awards such as the Rohde & Schwarz Award for her PhD thesis, the IFAC World Congress Best Poster Award in 2005 and – together with students – Best Paper Awards of IEEE WorldhapOcs and IFAC Conference of Manoeuvring and Control of Marine Crae in 2009 and the Outstanding Student Paper Award of the IEEE Conference on Decision and Control 2018. In 2013 she has been awarded with an ERC StarOng Grant on the "Control based on Human Models" and in 2019 with the ERC Consolidator Grant on "Safe data-driven control for human-centric systems". She has just been elevated to IEEE Fellow.

Alexander Dowling
Making Money in Energy Markets: Probabilistic Forecasting and Stochastic Programming Paradigms

Authors: Xian Gao and Alexander W. Dowling

Alexander W. Dowling is an Assistant Professor in Chemical and Biomolecular Engineering at the University of Notre Dame (Indiana, USA). His research combines chemical engineering, computational optimization, and uncertainty quantification to enable principled molecular-to-systems engineering of sustainable energy and environmental technologies. Applications areas include energy markets and infrastructure, carbon sequestration, shale gas utilization, and advanced separations (membranes, ionic liquids). Prof. Dowling was recently honored with an NSF CAREER award (2020) to develop new novel Bayesian hybrid modeling paradigms for optimization and uncertainty quantification. Ongoing collaborative projects include the Institute for Advanced Design of Energy Systems (IDAES – DOE), Carbon Capture Simulation for Industrial Impact (CCSI2 – DOE) and Center for Innovative and Strategic Transformation of Alkane Resources (CISTAR – NSF). Prof. Dowling holds a B.S.E from the University of Michigan – Ann Arbor and Ph.D. from Carnegie Mellon University, all in chemical engineering. More information: dowlinglab.nd.edu.

Demetris Coleman
Backstepping Control of Gliding Robotic Fish for Trajectory Tracking in 3D Space

Authors: Demetris Coleman and Xiaobo Tan

Demetris Coleman is a PhD student in the Department of Electrical and Computer Engineering at Michigan State University. He earned bachelor's degrees in applied math and science from Berea College (2017) and in electrical engineering from Auburn University (2017), during which time he was inducted into the IEEE Eta Kapp Nu honor society and the Mortar Board honor society. His dissertation research is focused on control of underwater vehicles.

Helen Durand
Delaying Cyberattack Impacts Using Lyapunov-Based Economic Model Predictive Control

Authors: Helen Durand and Matthew Wegener

Helen Durand is an Assistant Professor in the Department of Chemical Engineering and Materials Science at Wayne State University. She received her B.S. in Chemical Engineering from UCLA, and upon graduation joined the Materials & Processes Engineering Department as an engineer at Aerojet Rocketdyne for two and a half years. She earned her M.S. in Chemical Engineering from UCLA in 2014 and her Ph.D. in Chemical Engineering from UCLA in 2017, and subsequently started at Wayne State. She received the Air Force Office of Scientific Research Young Investigator award, and her work has also received support from the National Science Foundation. She received a Faculty Research Excellence Award within the College of Engineering at Wayne State University and is serving as the Next-Gen Manufacturing Sessions Area Chair for the 2020 Annual Meeting of the American Institute of Chemical Engineers. Her research interests are in the area of process systems engineering with a focus on process control.

Fumin Zhang
Optimal Real-time Scheduling of Human Attention for a Human and Multi-Robot Collaboration System

Authors: Ningshi Yao and Fumin Zhang

Fumin Zhang is Professor in the School of Electrical and Computer Engineering at the Georgia Institute of Technology. He received the B.S. and M.S. degrees from Tsinghua University, Beijing, China, in 1995 and 1998, respectively. He received a PhD degree in 2004 from the University of Maryland (College Park) in Electrical Engineering, and held a postdoctoral position in Princeton University from 2004 to 2007. His research interests include mobile sensor networks, maritime robotics, control systems, and theoretical foundations for cyber-physical systems. He received the NSF CAREER Award in September 2009 and the ONR Young Investigator Program Award in April 2010. He is currently serving as the co-chair for the IEEE RAS Technical Committee on Marine Robotics, associate editors for IEEE Journal of Oceanic Engineering, Robotics and Automation Letters, IEEE Transactions on Automatic Control, and IEEE Transactions on Control of Networked Systems.

Yancy Diaz-Mercado
Multi-Agent Control Using Coverage Over Time-Varying Domains

Authors: Xiaotian Xu and Yancy Diaz-Mercado

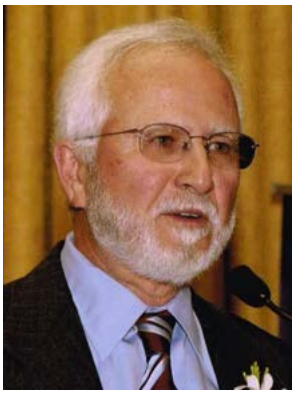
Yancy Diaz-Mercado earned a Ph.D. degree in Electrical Engineering from the Georgia Institute of Technology in 2016, and a M.S. degree in Electrical Engineering from the same institution in 2014. In 2011, he graduated with a B.S. degree in Electrical Engineering from the University of Puerto Rico at Mayaguez. In fall 2016, he became a senior professional engineer in the Advanced Concept Section of the Air and Missile Defense Sector at the Johns Hopkins University Applied Physics Laboratory. In fall 2018, he joined the faculty of the Department of Mechanical Engineering at the University of Maryland, College Park as an Assistant Professor. He is a member of the Maryland Robotics Center, and the director of Collaborative Controls and Robotics Laboratory. His research interests include the development of collaborative autonomy for multi-agent systems and facilitating human-robot swarm interactions using control theory. Park) in Electrical Engineering, and held a postdoctoral position in Princeton.

AACC AWARDS

The American Automatic Control Council sponsors five awards. These awards are given to recognize excellence in scientific, technological, or educational contributions to automatic control. Congratulations to this year's winners!

Richard E. Bellman Control Heritage Award
A. Galip Ulsoy, University of Michigan

Citation: For seminal research contributions with industrial impact in the dynamics and control of mechanical systems especially manufacturing systems and automotive systems



A. Galip Ulsoy is the C.D. Mote, Jr. Distinguished University Professor Emeritus of Mechanical Engineering (ME) and the William Clay Ford Professor Emeritus of Manufacturing at University of Michigan (UM), Ann Arbor, where he served as the ME Department Chair, Deputy Director of the National Science Foundation (NSF) Engineering Research Center for Reconfigurable Manufacturing Systems, and the Director of the USA Army Ground Robotics Reliability Center. He also served as Director of Civil and Mechanical Systems at NSF and the President of the American Automatic Control Council (AACC). He received the Ph.D. from University of California at Berkeley (1979), the M.S. degree from Cornell University (1975), and the B.S. degree from Swarthmore College (1973). His research interests are in the dynamics and control of mechanical systems, and he has published 4 books, holds 3 patents, and has published over 300 journal and conference papers. His work is highly-cited and has had major impact in industry. He has received numerous awards, including the AACC 1993 O. Hugo Schuck Best Paper Award, the 2003 and 2016 Rudolf Kalman Best Paper Awards from the J. Dynamic Systems, Measurement and Control, the 2008 Albert M. Sargent Progress Award from the Society of Manufacturing Engineers (SME), the 2008 Rufus T. Oldenburger Medal, the 2013 Charles Russ Richards Award from the American Society of Mechanical Engineers (ASME) and the 2014 Hideo Hanafusa Outstanding Investigator Award in Flexible Automation. He is a member of the USA National Academy of Engineering, received the 2012 Presidential Special Award from the Scientific and Technological Research Council of Turkey, and is a Fellow of ASME, SME, IEEE and the International Federation of Automatic Control (IFAC).

John R. Ragazzini Education Award
Naomi Leonard, Princeton University

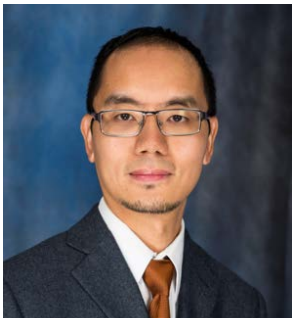
Citation: For outstanding contributions to control education through dedicated mentoring of undergraduate and graduate students, integration of research and education, and innovative curriculum development combining engineering and the arts.

Naomi Ehrich Leonard is the Edwin S. Wilsey Professor of Mechanical and Aerospace Engineering and Associated Faculty in the Program in Applied and Computational Mathematics at Princeton University. She is Director of Princeton's Council on Science and Technology and affiliated faculty member of the Princeton Neuroscience Institute and Program on Quantitative and Computational Biology. Leonard is a MacArthur Fellow, a member of the American Academy of Arts and Sciences, and Fellow of the IEEE, ASME, SIAM, and IFAC. She is Editor of the Annual Review of Control, Robotics, and Autonomous Systems. Previously, she was Senior Editor of IEEE Transactions on Control of Network Systems, Associate Editor of Automatica, and Associate Editor of SIAM Journal on Control and Optimization. She received the Hendrik W. Bode Lecture Prize (IEEE CSS, 2017), the Nyquist Lecture Award (ASME DSCD, 2014), and the Automatica Prize Paper Award (IFAC). She has also given plenary lectures at the SIAM Annual Meeting, IFAC World Congress, American Control Conference, and IEEE Conference on Robotics and Automation (ICRA).

Leonard received the B.S.E. degree in Mechanical Engineering from Princeton University in 1985 and the M.S. and Ph.D. degrees in Electrical Engineering from the University of Maryland in 1991 and 1994. From 1985 to 1989, she worked as an engineer in the electric power industry. Her current interests include decentralized control and decision making of dynamical systems on networks, autonomous vehicle and mobile robotic teams, collective animal behavior, human cognitive control, and intersections with dance. She led a multidisciplinary project that culminated in 2006 in a major field demonstration in Monterey Bay, CA of a first-of-its-kind automated and adaptive ocean observing system, featuring a coordinated network of autonomous underwater vehicles collecting data about the ocean.

Control Engineering Practice Award
Leo H. Chiang, The Dow Chemical Company

Citation: For the application of advanced data-driven algorithms for fault detection, fault diagnosis, and control in the chemical process industry



Leo H. Chiang is Technology Director at Dow Inc., leading Chemometrics and AI implementations for Manufacturing. Leo has developed and implemented several data analytics techniques to solve complex manufacturing problems, resulting in 11 Dow Manufacturing Technology Center Awards. In 2016 he received the Dow R&D Excellence in Science Award in recognition of his scientific achievement in industrial research.

Leo has a B.S. degree from University of Wisconsin at Madison and M.S. and Ph.D. degrees from the University of Illinois at Urbana-Champaign, all in Chemical Engineering. Leo has contributed to over 40 externally refereed

journal/proceedings papers and has given over 100 conference presentations and university lectures. Leo has co-authored two books published by Springer Verlag. His textbook Fault Detection and Diagnosis in Industrial Systems is available in English and Chinese and has received over 2,100 citations according to Google Scholar.

Leo has a long history of supporting American Institute of Chemical Engineers (AIChE), having served as 2014-2016 Computing and Systems Technology (CAST) director, 2016 CAST 10E programming chair, 2017-2018 spring meeting program chair (MPC), and recently elected to serve the 2019-2022 Executive Board of the Program Committee (EBPC). Leo was instrumental in setting up the Big Data Analytics Topical Conference (2015 to 2017) and Industry 4.0 Topical Conference (2018-2020) at the AIChE spring meeting. He was recognized by the AIChE with the 2016 Herbert Epstein Award for his leadership on Big Data Analytics technical programming and 2016 Computing Practice Award for his world-class leadership in the development and application of methodologies in analytics for batch and continuous processes known as Big Data.

Leo is also active in the broader engineering and control community, currently serves as 2019-2021 Computer Aids for Chemical Engineering (CACHE) trustee, 2021 International Symposium on Advanced Control of Chemical Processes (ADCHEM) industry co-chair, and 2022 American Control Conference (ACC) vice chair for industrial applications.

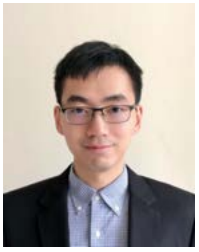
Donald P. Eckman Award
Samuel Coogan, Georgia Institute of Technology

Citation: For outstanding contributions to formal methods for control of autonomous systems with applications to transportation systems

Sam Coogan is an assistant professor at Georgia Tech with a joint appointment in the School of Electrical and Computer Engineering and the School of Civil and Environmental Engineering. He currently holds the Demetrius T. Paris Junior Professorship in the School of ECE. Prior to joining Georgia Tech in 2017, he was an assistant professor in the Electrical Engineering Department at UCLA from 2015 to 2017. He received the B.S. degree in Electrical Engineering from Georgia Tech and the M.S. and Ph.D. degrees in Electrical Engineering from the University of California, Berkeley. His research is in the area of dynamical systems and autonomy and focuses on developing scalable tools for verification and control of networked, cyber-physical systems with an emphasis on transportation systems. He received a Young Investigator Award from the Air Force Office of Scientific Research in 2018, a CAREER Award from the National Science Foundation in 2018, the IEEE Transactions on Control of Network Systems Outstanding Paper Award in 2017, and the best student paper award at the 2015 Hybrid Systems: Computation and Control conference.

O. Hugo Schuck Best Paper Awards: Theory
Junjie Qin, Sen Li, Kameshwar Poolla, and Pravin Varaiya

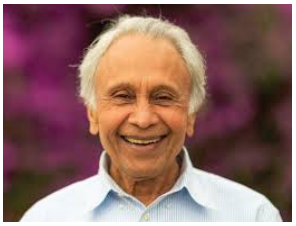
"Distributed Storage Investment in Power Networks"



Junjie Qin is a postdoctoral researcher at UC Berkeley, working with Prof. Kameshwar Poolla and Prof. Pravin Varaiya. He received a Bachelor of Engineering degree in Hydraulic and Hydropower Engineering and a Bachelor of Economics degree from Tsinghua University, Beijing, China. He obtained a Ph.D. degree in Computational and Mathematical Engineering (2018) from Stanford University, where he also received a M.S. degree in Civil and Environmental Engineering (2011) and a M.S. degree in Statistics (2017). His research interests include electric energy systems and transportation networks. He is a recipient of the Satre family fellowship on energy and sustainability and a finalist for the Best Student Paper Award at the 55th IEEE Conference on Decision and Control 2016.

Sen Li is an Assistant Professor of the Department of Civil and Environmental Engineering at The Hong Kong University of Science and Technology. Between 2017-2019, he was a postdoctoral fellow at The University of California, Berkeley, working with Prof. Kameshwar Poolla and Prof. Pravin Varaiya. He received his B.S. from Zhejiang University, and Ph.D. from The Ohio State University. Previously, he was an intern at the Pacific Northwestern National Laboratory, and a visiting student at Harvard University. Dr. Li's research interest lies in the intersection of control, optimization and game theory with applications in the smart city. He is particularly interested in renewable energy integration and intelligent transportation systems. He is a finalist of Best Student Paper Award at 2018 European Control Conference.

Kameshwar Poolla is the Cadence Distinguished Professor at UC Berkeley in EECS and ME. His current research interests include many aspects of future energy systems including economics, security, and commercialization. He served as the Founding Director of the IMPACT Center for Integrated Circuit manufacturing. Dr. Poolla co-founded OnWafer Technologies which was acquired by KLA-Tencor in 2007. He has served as a technology and mergers/acquisitions consultant for Cadence Design Systems. Dr. Poolla has been awarded a 1988 NSF Presidential Young Investigator Award, the 1993 Hugo Schuck Best Paper Prize, the 1994 Donald P. Eckman Award, the 1998 Distinguished Teaching Award of the University of California, the 2005 and 2007 IEEE Transactions on Semiconductor Manufacturing Best Paper Prizes, and the 2009 IEEE CSS Transition to Practice Award**.**



Pravin Varaiya is a Professor of the Graduate School in the Department of Electrical Engineering and Computer Sciences at the University of California, Berkeley. He has been a Visiting Professor at the Institute for Advanced Study at the Hong Kong University of Science and Technology since 2010. He has co-authored four books and 350+ articles. His current research is devoted to electric energy systems and transportation networks. Varaiya has held a Guggenheim Fellowship and a Miller Research Professorship. He has received three honorary

doctorates, the Richard E. Bellman Control Heritage Award, the Field Medal and Bode Lecture Prize of the IEEE Control Systems Society, and the Outstanding Researcher Award of the IEEE Intelligent Transportation Systems Society. He is a Fellow of IEEE, a Fellow of IFAC, a member of the National Academy of Engineering, and a Fellow of the American Academy of Arts and Sciences.

O. Hugo Schuck Best Paper Awards: Application
Chao Ning and Fengqi You

"Data-Driven Adaptive Robust Optimization Framework for Unit Commitment under Renewable Energy Generation Uncertainty"

Chao Ning received the B.Eng. degree in Automation from University of Electronic Science and Technology of China in 2012, and M.S. degree in Control Science and Engineering from Tsinghua University, China, in 2015. He is currently working toward the Ph.D. degree at Cornell University, USA. His research interests include data-driven optimization under uncertainty, learning for dynamics and control, big data analytics and machine learning, power systems operations, and renewable energy systems.

Fengqi You is the Roxanne E. and Michael J. Zak Professor at Cornell University (Ithaca, New York), and is affiliated with the Graduate Fields of Chemical Engineering, Electrical and Computer Engineering, Operations Research and Information Engineering, Systems Engineering, Mechanical Engineering, Civil and Environmental Engineering, and Applied Mathematics. He also serves as Chair of Cornell Systems Engineering PhD Studies and Associate Director of Cornell Energy Systems Institute. He earned a B.Eng. from Tsinghua University and received his Ph.D. from Carnegie Mellon University. Fengqi was on the faculty of Northwestern University from 2011 to 2016, and worked at Argonne National Laboratory as an Argonne Scholar from 2009 to 2011. He has published more than 150 peer-reviewed journal articles, and has an h-index of 57. Some of his research results have been editorially highlighted in Science and Nature, featured on multiple journal covers, and reported by major media outlets (e.g. The New York Times, BBC, BusinessWeek, and National Geographic). His recent awards include an NSF CAREER Award, W. Curtis McGraw Research Award from ASEE, Cornell Engineering Research Excellence Award, and ACS Sustainable Chemistry & Engineering Lectureship Award, as well as W. David Smith, Jr. Publication Award, Sustainable Engineering Research Excellence Award, Environmental Division Early Career Award, Computing and Systems Technology (CAST) Outstanding Young Researcher Award, and Excellence in Process Development Research Award from AIChE. He is currently an Editor of Computers & Chemical Engineering, an Associate Editor of AAAS Journal Science Advances, a Consulting Editor of AIChE Journal, and an editorial board member of several other journals. His research focuses on novel computational models, optimization algorithms, statistical machine learning methods, and multi-scale systems analytics tools for smart manufacturing, digital agriculture, energy systems, and sustainability. For more information about his research group: www.peese.org.

CONFERENCE INFORMATION

REGISTRATION

All conference attendees **must register**. Access to the online sessions will be available through Paperplaza based on registration. Registration-related questions during conference should be directed to either

- the ACC 2020 Slack workspace's #registrationdesk channel (monitored periodically between 8:00am-6:00pm Mountain Daylight Time), or
- the Registration Chair via acc2020.reg@gmail.com

Due to the transition to online, all registration fees have been substantially reduced and additional student registration support has been made available. Paper and poster upload and publication in the conference proceedings for authors is available only with Member and Non-Member registration; up to 4 papers and 2 posters can be uploaded for each registration.

Registration fees are shown in the table below. Registrants who are members of any of the American Automatic Control Council Societies (AIAA, AIChE, ASCE, ASME, IEEE, INFORMS APS, ISA, SCS and SIAM) may register at the Member rate. Receipts will be provided electronically around the time of the conference.

Registration Categories	Registration Fee	Paper/Poster Upload	Proceedings (via Paperplaza)	Conference Banquet
Member	$150	Included	Included	N/A
Non-Member	$250	Included	Included	N/A
Student/Retiree	$75	Not included	Included	N/A
One day registration	N/A	N/A	N/A	N/A

Workshop registration fees are shown in the table below.

Registration Categories	Registration	
	Regular	Student/Retiree
Two day workshop	N/A	N/A
Full day workshop	$120	$60
Half day workshop	$120	$60

EXHIBITS

Please take time during the conference to visit our exhibitors through the Zoom links listed in the online program on the ACC 2020 website.

COFFEE BREAKS

Coffee breaks will be held 9:00 AM – 9:30 AM and 3:30 PM – 4:00 PM on Wednesday, Thursday and Friday in the through the scheduled Zoom links provided in the online program on the ACC 2020 website.

PLENARY SESSIONS

Morning plenaries will be held 8:00 AM – 9:00 AM on Wednesday, Thursday, and Friday in Ballroom 1. Evening plenaries will be held 6:15 PM - 7:15 PM on Tuesday and Wednesday, in Ballroom 1.

RAPID INTERACTIVE SESSIONS

Rapid Interactive Sessions will be held 9:30 AM – 11:45 AM on Wednesday, Thursday, and Friday in Ballroom 1 and in Ballroom 2.

LATE-BREAKING POSTER SESSIONS

Late-breaking poster sessions will be held 9:00 AM – 9:30 AM on Wednesday, Thursday, and Friday in Ballroom 1.

AWARDS CEREMONY

All conference attendees are encouraged to attend the announcement of the annual ACC awards on Friday, July 3, 12:00 PM–1:30 PM, in Ballroom 1. Come celebrate accomplishments in our field!

VIRTUAL SESSIONS/COMMUNICATION: ZOOM AND SLACK

ACC 2020 will be hosted through the platform Zoom (https://zoom.us). Links to appropriate meeting room links are available through the online program found on the ACC website. For the best experience, attendees are encouraged to sign up for an account and familiarize themselves with Zoom. Tutorials can be found here: https://support.zoom.us/hc/en-us/articles/206618765-Zoom-Video-Tutorials.

A Slack workspace has been set up for the conference. Conference updates and announcements will be made through a Slack workspace. Sign up for the workspace at https://join.slack.com/t/acc-2020/shared_invite/zt-eg7cxcc1-l9SyE3vM4z~ZK2tEbxFhdA.
Tutorials are available at: https://slack.com/resources/slack-101.

Please feel free to take advantage of the workspace for conversations and to share information.

LOCAL INFORMATION

ACC 2020 was originally planned to take place in Denver. However, due to the impact of COVID-19, the conference will be fully online. If in the future you have an interest in traveling, do visit Denver! Denver is the capital city of Colorado with landmark 19th-century buildings and roots that date back to the Old West era. Located just east of the Front Range of the Rocky Mountains, the city's elevation of 5280 feet above sea level has earned it the nickname the Mile High City. Denver is known for sweeping views and easy access to the outdoors. In addition to the wide variety of available outdoor activities, Denver's downtown offers museums, art galleries, live music shows, water parks, restaurants and craft breweries for visitors to enjoy. Getting around downtown is easy through the free 16th Street Mall shuttle. Visit Larimer Square and the renovated Denver Union Station in historic Lower Downtown features restaurants, galleries, shops, bars, brewpubs and coffee houses. Denver Pavilions consist of shops, restaurants, bars and a movie theater.

Local Attractions: The Brookings Institution ranks Denver is one of the most walkable downtowns in the nation. A free shuttle bus on the 16th Street Mall is available for your convenience. Some popular places to visit include Union Station and the LoDo Historic District. You can stand 5,280 feet above sea level (one mile high!) on the west steps of the Colorado State Capitol, where a quick climb to the rotunda affords you panoramic views of snowcapped peaks to the west. Free tours are available on weekdays.

Other attractions include the Elitch Gardens Theme and Water Park and the family-owned Lakeside Amusement Park that's great for all ages. The legendary Coors Brewery in nearby Golden hosts 30-minute, self-paced tours of the brewhouse, malthouse and packaging complex. Their you'll see firsthand how more than 100 work teams make some of the most popular beer in the world. The Denver Zoo is an 80-acre zoological garden located in City Park of Denver, approximately three miles from the downtown. The Denver Zoo is the most popular paid attraction in the Denver metropolitan area, and it houses species from all over the world, including hoofed mammals, carnivorous mammals, primates, pachyderms, birds, reptiles, and fish. Laid out in a large loop, with exhibits both inside and outside the loop, the zoo's animal collection contains 3,500 specimens representing 550 unique species. For more attractions, please visit https://www.denver.org.

Museums: Less than a 10-minute walk from the Sheraton Hotel is the Denver Art Museum. The museum is made up of two architecturally stunning buildings – one a fortress-like structure from Italian architect Gio Ponti, the other, a structure that resembles a titanium crystal with peaks and shards designed by Daniel Libeskind. Inside, find the world's greatest collection of Native American art and 68,000 other art objects, including works from European masters, Old West classics and phenomenal traveling exhibits. Within three miles of downtown, the Denver Museum of Nature & Science is a municipal natural history and science museum. A variety of exhibitions, programs, and activities help museum visitors learn about the natural history of Colorado, Earth, and the universe. The 716,000-square-foot (66,519 m^2) building houses more than one million objects in its collections including natural history and anthropological materials, as well as archival and library resources.

Dining: Home to award-winning chefs and restaurateurs, Denver has emerged as one of the top dining locations in the country. Denver's local culinary scene is thriving, offering everything from farm-to-table bistros to classic steakhouses to historic Denver restaurants. Whether downtown on the 16th Street Mall or looking for a unique spot in Cherry Creek, visitors have a variety of great options to choose from. For example, some local favorites include Tavernetta, Jax Fish house in Lower Downtown, the Family Jones

Spirit House, Citizen Rail, Annette, El Five, Guard and Grace, to name a few. For families, the 12,000-square-foot gastohall, located in the hip River North Art District (RiNo), offers 10 stands vending everything from cheeseburgers and spaghetti to wood-fire pizzas, hand-crafted chocolates, sugar-studded pastries and Italian beef sandwiches. Complete with an ice cream shop, a coffeehouse, butcher shop, fish counter and bar that slings progressive cocktails (and mocktails), the Denver Central Market is headlined with foodstuffs to appease all age groups and every culinary persuasion. Each of the vendors has its own seating area, but the communal dining space—the market's focal point—is where everyone seems to congregate; there's a big-screen TV, too, that showcases sporting events. For more ideas on where to dine in Denver, see https://www.denver.org/restaurants/denver-dining/

EXHIBITORS AND SPONSORS

ACC 2020 thanks all of our sponsors for their generous support of our conference. Many of our sponsors will have exhibits at ACC 2020 that we encourage everyone to visit. Exhibits will be open, and links to Zoom virtual meeting rooms and Slack channels for you to interact with exhibitors will be provided in the online program on the ACC 2020 website. Please note that several of the Gold Sponsors are holding sponsored sessions, as listed in the Special Sessions section of the program.

GOLD SPONSORS

General Motors Co.

We envision a future of zero crashes, zero emissions and zero congestion, and we have committed ourselves to leading the way toward this future. General Motors has been pushing the limits of transportation and technology for over 100 years. Today, we are in the midst of a transportation revolution. And we have the ambition, the talent and the technology to realize the safer, better and more sustainable world we want. As an open, inclusive company, we're also creating an environment where everyone feels welcomed and valued for who they are. One team, where all ideas are considered and heard, where everyone can contribute to their fullest potential, with a culture based in respect, integrity, accountability and equality. Our team brings wide-ranging perspectives and experiences to solving the complex transportation challenges of today and tomorrow. At General Motors, innovation is our north star. As the first automotive company to mass-produce an affordable electric car, and the first to develop an electric starter and air bags, GM has always pushed the limits of engineering. We are General Motors. We transformed how the world moved through the last century. And we're determined to do it again as we redefine mobility to serve our customers and shareholders and solve societal challenges.

MathWorks

The MATLAB and Simulink product families are fundamental applied math and computational tools at the world's educational institutions. Adopted by more than 5000 universities and colleges, MathWorks products accelerate the pace of learning, teaching, and research in engineering and science. MathWorks products also help prepare students for careers in industry worldwide, where the tools are widely used for data analysis, mathematical modeling, and algorithm development in collaborative research and new product development. Application areas include data analytics, mechatronics, communication systems, image processing, computational finance, and computational biology.

Mitsubishi Electric Research Laboratory

Mitsubishi Electric Research Laboratory (MERL), located in Cambridge, MA, is the North American R&D organization for Mitsubishi Electric Corporation, a $40B global manufacturer of electrical products including elevator and escalators, HVAC systems, electrical power systems, satellites, factory automation equipment, automotive electronics and visual information systems. Controls researchers at MERL collaborate with corporate R&D

laboratories, business units in Japan and academic partners around the world to develop new control algorithms and control technologies that extend the performance envelope of these systems.

For students who are interested in pursuing an exciting summer of research, please check out our internship program and learn more at facebook, google, or @MERL_news.

- MERL interns work closely with top researchers, and gain valuable industry experience – an impressive 1:1 intern to researcher ratio.
- Internships are expected to lead to publications in major conferences and journals.
- We offer competitive compensation and relocation assistance.
- Boston is a fantastic student-oriented city, home to some of the best universities in the world.

The summer season is especially lively as MERL and Boston are teeming with interns and visitors from all over the world.

SILVER SPONSORS

dSPACE

dSPACE offers universities and research institutions flexible systems that provide all the options necessary for the model-based development of mechatronic controllers in an academic environment. From architecture-based system design and block-diagram-based function prototyping to automatic production code generation and hardware-in-the-loop (HIL) tests, dSPACE products are successfully being used in the classroom and in research projects at internationally renowned universities. To actively support high-end research at universities and the high-quality education of young talents, dSPACE offers its hardware and software products in special kits for universities at a very attractive price. Learn more at dspaceinc.com / offers for universities.

Quanser

Quanser is the world leader in mechatronics, robotics, and control platforms optimized for the academic setting. Our leadership in producing innovative lab solutions makes us a trusted partner with academic institutions to help strengthen their reputation with transformative research and teaching labs. The Quanser approach of innovation, collaboration and education has produced a number of notable technology firsts that pioneered many critical contemporary trends, including efficient validation platform for control research, and high-performance real-time control on common microcomputers.

SIAM

SIAM publishes textbooks and monographs in print and electronic format. Visit our booth to browse new and bestselling titles, all available at discounted conference pricing. If you're interested in writing a book, an editor is available to explain how SIAM partners with authors to publish books of outstanding quality and accessible pricing. More info: https://www.siam.org/Publications/Books

Springer Nature

At Springer Nature, our aim is to advance discovery. For over 175 years, we've dedicated ourselves to the academic community, creating value across the publishing process. We deliver an unmatched breadth and depth of quality information which spans top research publications (Nature), outstanding scientific journalism (Scientific American), highly specialized subject-specific journals across all the sciences and humanities, professional publications, databases, and the most comprehensive portfolio of academic books. We use our position and our influence to champion the issues that matter most to the research community – standing up for science, taking a leading role in open research, and being powerful advocates for the highest quality and ethical standards in research.

BRONZE SPONSORS

Halliburton

Founded in 1919, Halliburton is one of the world's largest providers of products and services to the energy industry. With 60,000 employees, representing 140 nationalities in more than 80 countries, the company helps its customers maximize value throughout the lifecycle of the reservoir – from locating hydrocarbons and managing geological data, to drilling and formation evaluation, well construction and completion, and optimizing production throughout the life of the asset. Halliburton's technology organization provides cutting edge research and innovative solutions to maximize asset value for our customers.

Processes

Processes (ISSN 2227-9717) provides an advanced forum for process/systems related research in chemistry, biology, materials and allied engineering fields. The journal publishes regular research papers, communications, letters, short notes and reviews. Our aim is to encourage researchers to publish their experimental, theoretical and computational results in as much detail as necessary. There is no restriction on paper length or number of figures and tables.

- Experimental, theoretical and computational research on process development and engineering
- Chemical and biochemical reaction processes
- Mass transfer, separation and purification processes
- Mixing, fluid processing and heat transfer systems
- Integrated process design and scaleup
- Process modeling, simulation, optimization and control

SPECIAL SESSIONS

In addition to the main technical program, the conference includes lunch-time and afternoon special sessions on industry, education, emerging topics, and funding opportunities.

WEDNESDAY NOON SPECIAL SESSIONS

An Overview of NSF Programs

Sponsor: **National Science Foundation**
Time: 12:00PM – 1:30 PM, Wednesday, July 1, 2020
Location: Denver
Organizer: Dr. Irina Dolinskaya

The National Science Foundation (NSF) offers a number of funding opportunities for investigators working in the field of controls, both within the disciplinary programs in Engineering and other directorates, and through cross-cutting initiatives that are foundation-wide. This presentation will describe opportunities that are relevant to the robotics, dynamics and controls communities. The presentation will also describe programs targeted toward junior investigators, as well as guidelines for proposal preparation and NSF's Intellectual Merit and Broader Impacts criteria. Question-and-answer session will follow the presentation.

Speakers:

Dr. Kishan Baheti handles the areas of Control and Sensor Networks in the Power, Controls and Adaptive Networks (PCAN) Program in ECS. Dr. Baheti received the B.S. and M.S. in Electrical Engineering in India from VRCE Nagpur, and from BITS Pilani, respectively. In 1970, he came to USA and received M.S. in Information and Computer Science from University of Oklahoma and Ph.D. in Electrical and Computer Engineering from Oregon State University. In 1976, Dr. Baheti joined the Control Engineering Laboratory of GE Corporate Research and Development Center in Schenectady, NY. His work focused on advanced multivariable control for jet engines, signal and image processing systems, computer- aided control system design, vision-based robots for precision welding, model-based fault identification and parallel implementation of Kalman filters. Dr. Baheti and his colleagues received IR-100 award for robotic welding vision system. He has organized a series of educational workshops for GE engineers that resulted in innovative product developments and contributed to enhance university collaborations with GE business divisions. In 1989, Dr.Baheti joined NSF as a Program Director in the Division of Electrical and Communications Systems. His contributions include the development of NSF initiatives on "Combined Research and Curriculum Development", "Semiconductor Manufacturing", and NSF/EPRI Initiative on "Intelligent Control". He was instrumental in the development of NSF Initiative on "Research Experience for Teachers" to involve middle and high school teachers in engineering research that can be transferred to pre-college classrooms. Recently he is involved in networked control systems, sensor and actuator networks, imaging and computational video, micro and nano systems, medical robotics, science of learning, and dynamics and control of biological and medical systems. He has served as associate editor for IEEE Transactions on Automatic Control, member of the Control Systems Board of Governors, chair for Public Information Committee, and awards chair for the American Automatic

Control Council (AACC). He received "Distinguished Member Award" from the IEEE Control Systems Society. In 1997, he was elected a Fellow of IEEE.

Dr. Jordan Berg is Program Director in the Division of Civil, Mechanical, and Manufacturing Innovation (CMMI), in the Engineering Directorate (ENG) of the US National Science Foundation (NSF). He is Emeritus Professor of Mechanical Engineering at Texas Tech University, where he served as Co- Director of the Nano Tech Center, and Associate Director of the DISCO (Dynamic Intelligent Systems, Control and Optimization) group. His research interests are in mechatronics, nonlinear control, and robotics. He received B.S.E. and M.S.E. degrees in Mechanical and Aerospace Engineering from Princeton University in 1981 and 1984, respectively. For several years he was an Attitude Control Analyst with RCA Astro-Electronics in East Windsor, NJ. He received a Ph. D. in Mechanical Engineering and an M. S. in Mathematics from Drexel University in 1992. He was a postdoctoral researcher at USAF Wright Laboratories in Dayton, OH, and at the Institute for Mathematics and its Applications in Minneapolis, MN. He has held numerous leadership positions, including Associate Editor of the ASME/IEEE Transactions on Mechatronics, the ASME Journal of Dynamic Systems, Measurement, and Control, and the IEEE Transactions on Automatic Control. He was Program Chair of the 2014 ASME Dynamic Systems and Control Conference, General Chair of the 2016 IEEE International Conference on Advanced Intelligent Mechatronics, and General Chair of the 2018 American Control Conference. He is a member of the Executive Committee of the ASME Dynamic Systems and Control Division. In 2008 he spent seven months in Sri Lanka as a Fulbright Scholar. He was selected a Fellow of the ASME in 2011. He arrived at NSF as an IPA rotator in May, 2014, and became a member of the permanent NSF staff in September 2018.

Dr. Irina Dolinskaya is a Program Director at the National Science Foundation (NSF) in the Division of Civil, Mechanical & Manufacturing Innovation (CMMI). Dr. Dolinskaya services Dynamics, Control and Systems Diagnostics (DCSD) program, as well as National Robotics Initiative (NRI 2.0) and Navigating the New Arctic (NNA) NSF's 10 Big Ideas. Prior to joining NSF, Irina Dolinskaya was a faculty in the Industrial Engineering and Management Sciences department at Northwestern University. She obtained M.S. and Ph.D. degrees in Industrial and Operations Engineering from the University of Michigan, and B.S. degree in Industrial Engineering from the University of Florida. Dr. Irina Dolinskaya's research is in the field of transportation science and logistics with focus on adaptive modeling and solution approaches to integrate dynamic real-time information. Her current primary applications are in humanitarian logistics, optimal vessel performance, and electric vehicle routing. Irina Dolinskaya is the winner of the INFORMS Transportation Science & Logistics Society Dissertation Prize and the 2008 recipient of the Bonder Scholarship for Applied Operations Research in Military Applications.

Dr. Robert G. Landers is a Curators' Distinguished Professor of Mechanical Engineering in the Department of Mechanical and Aerospace Engineering at the Missouri University of Science and Technology (formerly University of Missouri Rolla) and served as the department's Associate Chair for Graduate Affairs for eight years. He is currently a program manager at the National Science Foundation. He received his Ph.D. degree in Mechanical Engineering from the University of Michigan in 1997. His research interests are in the areas of modeling, analysis, monitoring, and control of manufacturing processes, and in the estimation and control of lithium ion batteries and hydrogen fuel cells. He has over 200 refereed technical publications and over $6M in research funding. He received the Society of Manufacturing Engineers' Outstanding Young Manufacturing Engineer Award in 2004 and the *ASME Journal of Manufacturing Science and Engineering* Best Paper Award in 2014. He is a Fellow of ASME, and a senior member of IEEE and SME.

Dr. Eduardo Misawa has a B.Sc. and M.Sc. degrees from University of Sao Paulo (1979 and 1983) and Ph.D. degree from the Massachusetts Institute of Technology (MIT, 1988), all in Mechanical Engineering with concentration in Dynamics and Control. He is currently a Program Director in the Directorate for Engineering at the National Science Foundation, where he manages the Engineering Research Centers (ERC) and Network for Computational Nanotechnology (NCN) programs. His research experience includes Nonlinear Dynamics, Nonlinear Control, Robust Control, Vibrations, Mechatronics, Nanotechnology, Precision Engineering, Vehicle Dynamics, Fluid Power Control, Bioinformatics, Biotechnology and Biomedical Engineering.

Women in Control Luncheon Meeting

Sponsor: **IEEE CSS Women in Control Committee**
Time: 12:00 – 1:30 Wednesday, July 1, 2020
Location: Ballroom F
Organizers: Dr. Linda Bushnell, University of Washington
Dr. Afef Fekih, University of Louisiana
Dr. Jacquelien M.A. Scherpen, University of Groningen

The IEEE CSS Women in Control committee is responsible for, but not limited to, promoting membership, gathering and disseminating appropriate information about women in IEEE CSS and the profession, and facilitating the development of mentoring and programs to promote the retention, recruitment, and growth of women IEEE CSS members. The IEEE WiC invites all ACC women attendees to join us for our traditional luncheon with interesting speakers on the first day of the conference, Wednesday, July 1st, 2020.

Research with Broad Scope and High Impact in an Industrial Laboratory

Sponsor: **Mitsubishi Electric (MERL)**
Time: 12:00 PM – 1:30 PM Wednesday, July 1, 2020
Location: Gold

Mitsubishi Electric Research Laboratories (MERL) is a leading research organization located in Cambridge,

Massachusetts, USA that conducts fundamental research for industrially-motivated problems. MERL is a subsidiary of Mitsubishi Electric Corporation, a $41B global manufacturer of a wide range of products including industrial robots, automotive electronics and equipment, HVAC (heating, ventilation, and air conditioning) systems, factory automation equipment, electrical power systems, elevators, satellites, and information visualization systems. MERL is an active and collaborative member of both the academic and industrial communities. MERL researchers collaborate with corporate laboratories and business units in Japan, as well as academic partners from around the world to develop novel solutions to challenging problems. In particular, several researchers at MERL develops new theoretical results in control and systems theory and apply them to a wide variety of products and applications.

In this talk we will present an overview of research activities at MERL, including fundamental controls research and the application of state-of-the-art control techniques to a variety of real-world systems. We will focus on fundamental research subjects including model predictive control and the control of constrained systems, estimation and motion planning for autonomous systems, and learning for control. In addition, we will describe how these fundamental research areas impact applications such as autonomous vehicles, spacecraft guidance and control, GNSS-based positioning, energy-efficient HVAC systems, high-precision manufacturing.

We encourage students, researchers and faculty interested in collaborating with MERL to attend this talk.

Speakers:

Dr. Karl Berntorp's research is on statistical signal processing, sensor fusion, and optimization-based control, with applications to automotive, aerospace, transportation, and communication systems. His work includes design and implementation of nonlinear filtering, constrained control, and motion-planning algorithms.

Dr. Claus Danielson's research interests are in model predictive control, constrained control, and networked control systems. His doctoral research was focused on exploiting symmetry in large-scale control and optimization problems.

Dr. Stefano Di Cairano's interests are model predictive control, constrained control, path planning, optimization algorithms, stochastic systems, and their applications to automotive, aerospace, and factory automation. Stefano is the Chair of IEEE CSS Technology Conferences Editorial Board, and the Vice-Chair of IFAC Technical Committee on Optimal Control.

Dr. Rien Quirynen's research interests are in model predictive control and moving horizon estimation, numerical algorithms for (nonlinear) dynamic optimization and real-time control applications. His doctoral research was focused on numerical simulation methods with efficient sensitivity propagation for real-time optimal control algorithms.

WEDNESDAY AFTERNOON SPECIAL SESSIONS

Women in Controls in Industry

Sponsor: **ASME Dynamic Systems and Control Division, Automotive and Transportation Systems Technical Committee and the Energy Systems Technical Committee**
Time: 1:30 PM – 3:30 PM, and 4:00 PM -6:00 PM, Wednesday, July 1, 2020
Location: Ballroom F
Organizers: Dr. Selina Pan, Toyota Research Institute
Dr. Marcello Canova, The Ohio State University
Dr. Mahdi Shahbakhti, University of Alberta
Dr. Yan Chen, Arizona State University
Dr. Carrie Hall, Illinois Institute of Technology

Academic research and industry development have a symbiotic relationship. The insights gleaned from academic research can be propagated into usable products and technologies by companies. The practical problems identified in industry can also inspire and develop new academic research topics and areas and these new areas of research and development can be explored jointly. This cycle and relationship is key for researchers to understand and to participate in. To facilitate these connections, every year, the ASME Dynamic Systems and Control Division organizes an industry special session at a major controls conference.

Nowadays, both academia and industry host increasingly diverse communities. These communities consist of researchers, engineers, teachers, programmers, and managers, and their members are thriving from many different backgrounds. A historically underrepresented group has been female engineers and engineers who identify as women. (For the purposes of brevity for this proposal, we will use the term "women" going forward.)

This session seeks to bring together both the importance of exposure to parallel work happening in industry, with the diverse people who are doing the work, to the American Control Conference. Academia is taking increasingly large strides to increase diversity in both its student population as well as its faculty. Industry is doing the same, in both similar and diverging ways, with efforts ranging from recruiting, changing hiring practices, evolving performance review processes, workshops in unconscious bias, employee resource groups, and setting diversity and inclusion as a company-wide initiative.

The speakers featured in this session have a variety of technical experiences and we aim to, first and

foremost, focus on their technical work and present a wide array of different career paths. The purpose of this is twofold: 1) to showcase some of the current cutting-edge work being done in industry in controls, and 2) to demonstrate examples and inspire junior women researchers who may be looking for a broader range of career paths. The session will feature both a series of technical talks, as well as a panel discussion that will be moderated and open to questions from the audience, in order to provide room to discuss potential non-technical topics unique to the experience of being a woman in controls in industry.

This special session is sponsored by the Automotive Transportation Systems and Energy Systems Technical Committee. The proposed list of speakers consists of engineers from the following companies: RightHook Robotics, Tesla, Applied Materials, Built Robotics, Waymo (Google), Ford, Toyota Research Institute, General Motors, and a stealth robotics startup.

Organization and Contribution

This session includes contributions from industry engineers who have been active in the areas of automotive, energy, and mechatronics research and development areas. The tentative list of speakers is compiled from the automotive, energy, robotics, and tech industries.

The session is roughly organized into two parts. The first part (1:30 – 4:50 PM) features technical talks from each speaker in their area of expertise. The speakers featured come from a variety of different companies. We propose to feature speakers from RightHook, Applied Materials, Waymo (Google), Tesla, Built Robotics, and Ford, with additional speakers pending company approval from Toyota, GM, and a stealth robotics startup. These companies are all leading the industry in the automotive, robotics, and controls areas.

The second part (4:50 PM – 5:30 PM) features a panel discussion with a subset of speakers, with Selina Pan (industry liaison from the Automotive Transportation Systems Technical Committee) as the moderator, welcoming questions from the audience. Being able to hear the speakers discuss their career and life experiences as women working in industry in controls has the potential to provide key insights and inspiration to aspiring junior engineers who are still seeking a career path in STEM, whether in research, academia, industry, or the start-up world. Because the session focuses on women in controls, we see great value in presenting the stories of established speakers behind their technical work.

Presentations:

Speaker: Dr. Madeline Goh, RightHook Robotics
Abstract: Highly Automated Driving Development and the Simulation Portability Problem - For the last several years, questions have swirled around how autonomous vehicles will be validated. The general consensus has come to a mix of on-road testing and simulation. With so many companies and stakeholders in the mix, how will standards be determined and met? We present ScenarioScript: an open, portable specification for describing scenarios used for developing, testing, and demonstrating automated vehicle systems.

Speaker: Dr. Caroline Le Floch, Tesla

Speaker: Dr. Raechel Tan, Applied Materials
Abstract: Advanced Control Applications in Semiconductor Processing Equipment - In semiconductor processing equipment, achieving the best device performance and yield requires minimal process variation.

Fast controls is also important, since this determines the rate at which wafers can be processed. At Applied Materials, the Common Solutions Group is working on advanced control solutions to enable greater precision and faster throughput.

Speaker: Dr. Sarah Thor, Built Robotics
Abstract: From Human Algorithms to Computer Algorithms: A High-Level Planning Problem - Built Robotics is building the future of construction by developing AI guidance systems to transform construction equipment into autonomous robots. The technology combines sensors, such as GPS, cameras and lidar with proprietary software, in order to make construction safer and more productive. Human operators already possess great skill in operating heavy construction machinery, such as bulldozers, excavators and skid steers. Before an operator begins moving dirt, he or she has an inherent algorithm in mind on how to take the current terrain and transform it to meet the job specifications. Our robots must also assess the current terrain and autonomously come up with a plan to accomplish the same job specifications. As robots have different capabilities to humans, the algorithm a human uses does not strictly overlap with the robot's algorithm. In this talk, we will go over some of the techniques and considerations human operators keep in mind for high-level planning of the job and discuss how Built Robotics tackles the high-level planning problem.

Speaker: Dr. Xin Zhou, Waymo (Google)
Abstract: This talk will focus on how individuals with training and expertise in control can branch into new technical disciplines, discover new research challenges at the interface of control and other fields, and explore different career options. Using my own experience, I will give several examples about how knowledge in control can help with many aspects of the development of driver-assist and autonomous driving technologies, including control and planning, object tracking, and deep learning. At the end of the talk, a brief introduction to Waymo will be given.

Speaker: Dr. Sara Dadras, Ford
Abstract: According to the National Highway Traffic Safety Administration (NHTSA), in 2017 alone, the NHTSA reported 34,247 fatal crashes in the United States with 37,133 fatalities. Furthermore, as of August 1, 2019, the California DMV has received 186 Autonomous Vehicle Collision Reports. Ford Motor Company aims to help society with not only providing the safest vehicles on the road but also making the vehicles more comfortable for the customers. Automated driving is one solution that significantly improves roadway safety. This talk gives an overview of Ford Greenfield Labs at Palo Alto, California, and reviews some areas of research in automated driving systems.

Panel Discussion
- **Dr. Madeline Goh**, RightHook Robotics
- **Dr. Raechel Tan**, Applied Materials
- **Dr. Sarah Thornton**, Built Robotics
- **Dr. Sara Dadras**, Ford

Speaker bios:
Dr. Madeline Goh left Minnesota and academia after earning her PhD in mathematics to pursue a career in industry. She is particularly inspired by solving problems that impact people's daily lives, from barcodes to self-driving vehicles. Currently she is a Machine Learning Expert and Senior Engineer at San Jose based startup, RightHook, Inc. RightHook provides a simulation platform for testing and development of

autonomous vehicles. Madeline is a people person and loves spending time with her siblings, urban exploration, puppies, and supporting women in technology.

Dr. Caroline Le Floch leads the development of the Autobidder software at Tesla, the first automated and algorithmic bidding platform for utility scale energy storage. I obtained a Master of Science in Applied Mathematics from Ecole Polytechnique (Paris, France), and PhD in Civil and Environmental Engineering at UC Berkeley. During my PhD in the Energy Controls and Applications Lab at UC Berkeley, I focused on Smart Charging optimization methods for large fleets of electric vehicles, including distributed optimization and Plug and Play model predictive Controls. After PhD I created a startup and sold smart charging software to automakers and aggregators. In May 2018 I joined the energy optimization team at Tesla, where I have focused on utility scale projects and the development of algorithmic bidding in energy markets. I am the leading engineer for Autobidder – the money making machine – that automates bidding of energy storage assets in electricity markets.

Dr. Raechel Tan is a controls engineering manager in the Mechatronics Center of Excellence at Applied Materials. She leads a team to develop advanced solutions for temperature, pressure, and motion control across the company. Before starting at Applied Materials, she obtained her Ph.D. in Mechanical Engineering at UC Berkeley, where she did research on automotive engine control.

Dr. Sarah Thornton received her Ph.D. in mechanical engineering at Stanford University in 2018. Her thesis was on designing autonomous vehicle motion planning algorithms with ethical considerations. She obtained her Master's in mechanical engineering from MIT in 2013 and her Bachelor's in mechanical engineering from UC Berkeley in 2011. She currently works as a Senior Robotics Engineer at Built Robotics, where she has worked on an array of projects ranging from designing parts of their safety system to designing high-level planning algorithms.

Dr. Xin Zhou received her PhD from the University of Michigan in Mechanical Engineering in 2017 with a focus on control, estimation, dynamic system modeling and identification. Prior to joining the University of Michigan, she received her Bachelor of Engineering in Machine Design, Manufacturing, and Automation from Huazhong University of Science and Technology, Wuhan, China, in 2012. Dr. Zhou joined Aptiv immediately after receiving her doctorate to develop object tracking algorithms for advanced driver-assistance systems. In 2018, she joined Waymo as a Software Engineer/Robotics Researcher focusing on perception of the autonomous vehicle. She is the lead author of six publications and a finalist for three best student paper awards and a best paper award.

Dr. Sara Dadras (IEEE Senior Member, 2018) is currently an Automated Driving Senior Research Engineer at Ford Motor Company. Prior to that, she was a research engineer working on research and development of Plug-in Hybrid Electric Vehicle systems with respect to energy management. Passionate about vehicles, she worked on various projects including battery management systems, wireless power transfer systems, model based system design for advanced HEVs and PHEVs. Her current research interest areas include autonomous vehicles, advanced driver assist systems, hybrid electric and electric vehicles, nonlinear systems and control, and application of fractional calculus in control of nonlinear systems. Dr. Dadras was the recipient of the 2019 Forest R. McFarland Award (SAE) and Ford 2018 R&A Technical Achievement Award (RARE Award). She is the Associate Editor of the IEEE Transactions on Control Systems Technology, IEEE Access, IEEE Transactions on Automation Science and Engineering, Asian Journal of Control and Conference Editorial Board member of IEEE.

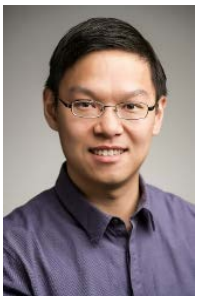
NREL's Control Research: Enabling a Clean Energy Future

Sponsor: **The Department of Energy National Renewable Energy Laboratory**
Time: 1:30 PM –3:00 PM Wednesday, July 1, 2020
Location: Gold

The National Renewable Energy Laboratory (NREL), located in Golden, Colorado, is the United States' primary laboratory for renewable energy and energy efficiency research and development. Control plays a crucial role in NREL's mission to advance the science and engineering of energy efficiency, sustainable transportation, renewable power technologies, and energy systems integration. This special session will provide an overview of NREL, followed by in-depth discussion of NREL's control research in various areas such as building, grid, wind, energy storage, and transportation. The goal of the session is to give the audience an opportunity to understand the typical control research projects at NREL and how to collaborate with NREL.

Presentations:

1. **Dr. Xin Jin, "**Model Predictive Control for Grid-Interactive Efficient Buildings and Communities"
2. **Dr. Andrey Bernstein, "**Learning to Optimally Control Grid-Interactive Efficient Buildings"
3. **Dr. Jennifer King and Dr. Christopher Bay, "**Autonomous Wind Farms: Distributed Optimization and Control for Wind"
4. **Dr. Ying Shi, "**Advanced Controls of Energy Storage Systems for Better Performance, Safety, and Life"
5. **Dr. Myungsoo Jun, "**Smart Electric Vehicle Charge Management for Demand Charge Mitigation"



Dr. Xin Jin is a Senior Research Engineer in the Buildings and Thermal Sciences Center at NREL. He is also the Sensors and Controls innovation area lead of NREL's Buildings program. His research focuses on building-to-grid integration, building control, machine learning with applications in buildings, and fault detection and diagnosis. Dr. Jin leads several research projects funded by the U.S. Department of Energy Building Technologies Office and Solar Energy Technologies Office. He is the lead developer of foreseeTM, a user-centric, cybersecure home energy management system. He received his Ph.D. in Mechanical Engineering from Pennsylvania State University. He has authored more than 50 peer reviewed technical publications and 10 software records and U.S. patent. He is an ASHRAE member and IEEE member, and is a recipient of the 2018 R&D 100 Award and 2017 NREL President Award.

Dr. Andrey Bernstein received his B.Sc., M.Sc. (both summa cum laude), and Ph.D. degrees in Electrical Engineering from the Technion - Israel Institute of Technology. Between 2010 and 2011, he was a visiting researcher at Columbia University. During 2011-2012, he was a visiting Assistant Professor at the Stony Brook University. From 2013 to 2016, he was a postdoctoral researcher at the Laboratory for Communications and Applications of Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland. Since October 2016 he has been a Senior Scientist at NREL. In February 2018, he became a group manager for the Energy Systems Control and Optimization Group. His research interests are in the decision and

control problems in complex environments and related optimization and machine learning methods, with particular application to power and energy systems.

Dr. Jennifer King is a Research Engineer at NREL working at the National Wind Technology Center on hybrid system modeling and control. This includes developing model and real-time distributed optimization capabilities for wind farm control, optimally designing and operating utility-scale hybrid power plants as well as developing a control framework for large-scale autonomous energy systems. Jennifer obtained her Ph.D. in Aerospace Engineering and Mechanics from the University of Minnesota in 2016 where her primary focus was on reduced-order modeling for wind farm control. Her current research focus areas are in reduced-order modeling, distributed control/optimization, and flow control.

Dr. Christopher Bay is a Research Engineer at NREL. His current work includes wind farm control and optimization, involving distributed control and layout design to improve performance and meet secondary objectives. He is also tackling multi-system problems through developing cooperative control between wind energy plants and buildings. Christopher received his Ph.D. in Mechanical Engineering from Texas A&M University in 2017 where his research centered around scalable, distributed control of building energy systems.

Dr. Ying Shi is a Senior Research Engineer in Power Systems Engineering Center at NREL. She has been working on lithium-ion battery systems testing, modeling, analysis and control to improve battery performance and life, increase pack utilization and reduce upfront and lifetime cost for stationary and automotive applications. Dr. Shi received a bachelor's degree in Mechanical Engineering from Shanghai Jiao Tong University in Shanghai, China in July 2008. She received dual master's degree in electrical engineering and mechanical engineering from Pennsylvania State University in University Park, PA, USA, in May 2012 and May 2013. She received her Ph.D. degree in mechanical engineering from Pennsylvania State University in December 2013, with focus on modeling, real-time identification and remediation of degradations in lead-acid batteries for hybrid locomotive applications

Dr. Myungsoo Jun has been performing research on vehicle electrification, EV charging station management, and smart transportation systems. He is currently actively conducting research on smart charge management and battery BMS for EV. He also led a project on smart intersection sensing systems. Before joining NREL in 2011, Dr. Jun had extensive experiences in the areas of autonomous ground vehicles and unmanned aerial vehicles including UAV/UGV trajectory planning, dynamic collision avoidance, and attitude estimation with vision camera sensors. He conducted projects on UAV/UGV funded by DARPA, AFRL, and JPL during his affiliation with Oshkosh Corp., University of Florida, and Cornell University.

Workshop for Elementary, Middle and High School Students and Teachers and Parents: The Power, Beauty and Excitement of the Cross-Boundaries Nature of Control, a Field that Spans Science, Technology, Engineering & Mathematics

Sponsor: **AACC, IEEE CSS, and IEEE CSS Technical Committee on Control Education**
Time: 1:30 PM – 3:30 Wednesday, July 1, 2020
Location: Silver
Organizers: Dr. Bozenna Pasik-Duncan, University of Kansas
Dr. Linda Bushnell, University of Washington
Dr. Tyrone Duncan, University of Kansas
Dr. Anthony Rossiter, University of Sheffield
Program Committee:
AACC Technical Comnittee on Education
IFAC Technical Committee on Control Education
IEEE CSS Technical Committee on Control Education

This outreach event is designed to increase the general awareness of the importance of systems and control technology and its cross-disciplinary nature among students and teachers. Control is used in many common devices and systems: cell phones, computer hard drives, automobiles, and aircraft, but is usually hidden from view. The control field spans science, technology, engineering and mathematics (STEM). The success of all STEM disciplines depends on attracting the most gifted young people to science and engineering professions. Early exposure to middle and high school students and their teachers is a key factor. The goal of these outreach efforts is to promote an increased awareness of the importance and cross-disciplinary nature of control and systems technology.

Workshop activities include presentations, informal discussions, and the opportunity for teachers and students to meet passionate researchers and educators from academia and industry. The talks are designed to be educational, interactive, motivating and inspirational showing the excitement of STEM education.

Presentations include:

Speaker: Dr. Daniel Abramovitch, Agilent Technologies
Title: What Is a Control System and Why Should I Care?
Abstract: After years of teaching coaching little league trying to explain control systems to biologist and computer scientist friends, I will try the ultimate test of explaining the topic to a group of bright and easily bored high school kids. We will go through examples of feedback in everyday life, and then tease out what is common to all these examples. We will talk about how the "control" is computed, even when we don't have a computer. And we will talk about the dreaded math of control systems, and explain why we use it and what it tells us. The talk will finish with some general lessons about science and engineering, and why anyone might want to learn these intense subjects.

Speaker: **Dr. Dominique Duncan**, University of Southern California
Title: Stepping Inside the Brain Using Virtual Reality
Abstract: The Epilepsy Bioinformatics Study for Antiepileptogenic Therapy (EpiBioS4Rx) is an ongoing

international, multi-site Center Without Walls that is collecting data from moderate-severe traumatic brain injury (TBI) patients and an animal model (Duncan et al., 2018a). We have been developing innovative methods to analyze the multimodal data with the goal to identify biomarkers of epileptogenesis, the development of epilepsy, after TBI. We are applying various machine learning methods as well as dimensionality reduction tools (Duncan et al., 2016), to the electrophysiology and imaging data. These theoretical techniques and associated models and optimization methods will be applicable not only to this dataset but to other multi-species or multi-domain transfer learning challenges that may arise in the context of health and medicine. We have partnered with several local high schools to hold educational workshops and research experience for K-12 students with this project. Furthermore, we have developed a virtual reality tool for visualizing neuroimaging data, including TBI lesions, and correcting segmentation errors that can be used as an educational neuroanatomy tool (Duncan et al., 2018b).

Speaker: Dr. Tembine Hamidou, New York University
Title: Risk-Aware Performance Metrics in STEM
Abstract: We live truly in a more and more interconnected and interactive world. In recent years, we have seen emerging technologies such as internet-of-everything, collective intelligence (including artificial intelligence), blockchains and next generation wireless networks. The quantities-of-interest in these systems involve uncertainties, volatilities and risk. In this talk we revisit how engineers and scientists incorporate, model, control and optimize societal problems under uncertainties.

Speaker: Dr. Richard M. Murray, California Institute of Technology
Title: How to Design a Self-Driving Car
Abstract: Building robots that can do things as well as humans has been the goal of scientists and engineers for decades. Despite what we see in the movies and on TV, getting a real robot to perform as well as a human can is still a challenge goal. Approximately 15 years ago, the US has sponsored a competition to spur advances in robotics, called the DARPA Grand Challenge. This competition paved the way for the advances that we see today in the development of autonomous cars. In this talk I will explain how these cars work and some of the engineering challenges that remain.
or
Title: Synthetic Biology: How to Program a Bacterium
Abstract: Synthetic biology is an emerging field that focuses on engineering biomolecular systems that are programmed via DNA to perform useful functions such as environmental bioremediation, diagnostics and therapeutics for human health, green manufacturing of chemicals, and production of engineered living materials and synthetic cells. In this talk I will give an introduction to synthetic biology and show how concept and tools from feedback control can help provide new methods for engineering biological systems.

Speaker: Dr. Lucy Pao, University of Colorado Boulder
Title: Efficient Wind Energy Systems—How Control Methods Can Enable a Clean Energy Future
Abstract: Wind energy is recognized worldwide as cost-effective and environmentally friendly and is among the fastest-growing sources of electrical energy. We will provide an overview of wind energy systems, discuss some of the challenges in the design and operation of wind turbines and wind farms, and highlight how control methods have improved the performance of these systems. We shall close by discussing continuing challenges and on-going and future research that can further facilitate the growth of wind energy.

Speaker: Dr. Ramla Qureshi, Women Engineers Pakistan (WEP)

Title: STEM is for Everyone!

Abstract: Within the domains of STEM education, numerous surveys across the globe have presented data where, up till grade 8, young girls have outperformed boys in science subjects. But fewer than 11% women worldwide are within engineering. This disparity begs to ask: what changes after grade 8th which makes the girls opt out of careers in engineering, technology, math, and physics? It is our belief that societal pressures and stereotypical fear of math and physics inhibits inclination to STEM education and consequent STEM careers for many young students across the globe. Planning and building games around math and physics problems helps dispel this fear, and encourages students to understand other, more complex systems in a fun manner that is easier to remember during exams and in general. The concept of game-based STEM learning sessions is not to teach rocket science in one day, rather it is to inculcate a sense of belonging within young students who feel inhibitions regarding their innate abilities in STEM subjects. This session is designed for middle school students.

Speaker bios:

Dr. Daniel Abramovitch earned degrees in Electrical Engineering from Clemson (BS) and Stanford (MS and Ph.D.). After a brief stay at Ford Aerospace, he worked at HP Labs for 11 1/2 years, studying control issues for optical and magnetic disk drives. He moved to Agilent Labs shortly after the spinoff from HP, where he has spent 20 years working on test and measurement systems. He is currently in Agilent's Mass Spectrometry Division working on improved real-time computational architectures for Agilent's mass spectrometers. Danny is a Senior Member of the IEEE and was Vice Chair for Industry and Applications for the 2004 American Control Conference (ACC), for Workshops at the 2006 ACC, for Special Sessions at the 2007 ACC, and for Industry and Applications for the 2009 ACC. He was Program Chair for the 2013 ACC and General Chair of the 2016 ACC in Boston. He has organized tutorial sessions on disk drives, atomic force microscopes, phase-locked loops, laser interferometry, and how business models and mechanics affect control design. He was Chair of the IEEE CSS History Committee from 2001 to 2010. Danny had the original idea for the clocking mechanism behind the DVD+RW optical disk format. He was on the team that prototyped Agilent's first 40Gbps Bit Error Rate Tester (BERT). He and Gene Franklin were awarded the 2003 IEEE Control Systems Magazine Outstanding Paper Award. He was a Keynote Lecturer at the 2015 MSC in Sydney. His recent work for Agilent was on high speed atomic force microscopes and high precision interferometers, and currently works on improving the real-time control, data collection, and signal processing chain on Agilent's Mass Spectrometers. He is part of the team that introduced the multi-award winning Ultivo Tandem Quad Mass Spec in 2017. He is the holder of over 20 patents and has published over 50 reviewed technical papers.

Dr. Dominique Duncan is an assistant professor of neurology at the Laboratory of Neuro Imaging of the USC Stevens Neuroimaging and Informatics Institute. Prior to her current position she was a postdoctoral scholar at the Mathematics Department at the University of California, Davis, a postdoctoral fellow at the Department of Neurology and Neurological Sciences at the Stanford University School of Medicine. She received her PhD in Electrical Engineering from Yale University in 2013 and a BS in Mathematics from the University of Chicago in 2007 as well as a BA in Polish Literature and minor in Computational Neuroscience. During her collaborating with neurologists and neuroscientists from the Yale University School of Medicine, and mathematicians, engineers, and computer scientists. She is a

recipient of a University of Chicago Scholarship, Yale University Faculty of Engineering Fellowship, NSF REU scholarship, summer undergraduate program in engineering research scholar at the University of California, Berkeley, several travel awards from the National Science Foundation (NSF), the National Institute of Health (NIH), and the Association for Women in Mathematics (AWM) Travel Award. She is passionate about teaching international students and about community and outreach service. She has an established record of holding leadership positions that include being the Chair of the University of California, Davis Postdoctoral Scholars Association, Council Member in the Stanford University Postdoctoral Association, senator representing engineering for the Yale University Graduate and Professional Student Senate, President of the University of Chicago Polish American Student Association, Chair of the University of Chicago Committee on Recognized Student Organizations, University of Chicago Student Government Executive Committee member, American Automatic Control Council (AACC) TC on Education member, IEEE Control System Society (CSS) TC on Control Education member, and appointed member of IFAC TC on Control Education. She has been a frequent speaker on "Math & Epilepsy" at workshops for elementary, middle and high school students and teachers.

Dr. Tembine Hamidou received the M.S. degree in Applied Mathematics from Ecole Polytechnique (Palaiseau, Paris, France) in 2006 and the Ph.D. degree in Computer Science from University of Avignon in 2009. His current research interests include evolutionary games, mean-field-type games and applications. In December 2014, Tembine received the IEEE ComSoc Outstanding Young Researcher Award for his promising research activities for the benefit of the society. He was the recipient of 10 best article awards in the applications of game theory. He is author of the book on "Distributed Strategic Learning for Wireless Engineers" (published by CRC Press, Taylor & Francis 2012), and co-author of the book "Game Theory and Learning in Wireless Networks" (Elsevier Academic Press). Tembine has been co-organizer of several scientific meetings on game theory in networking, wireless communications, smart energy and transportation systems. He is a Next Einstein Fellow.

Dr. Richard Murray received the B.S. degree in Electrical Engineering from California Institute of Technology in 1985 and the M.S. and Ph.D. degrees in Electrical Engineering and Computer Sciences from the University of California, Berkeley, in 1988 and 1991, respectively. He is currently the Thomas E. and Doris Everhart Professor of Control and Dynamical Systems and Bioengineering at Caltec. Murray's research is in the application of feedback and control to network systems with applications in biology and autonomy. Current projects include design of safety-critical control systems and synthetic biology.

Dr. Lucy Pao is the Palmer Endowed Chair Professor in the Electrical, Computer, and Energy Engineering Department at the University of Colorado Boulder. She earned B.S., M.S., and Ph.D. degrees in Electrical Engineering from Stanford University. Her research has primarily focused on engineering control systems, with applications ranging from atomic force microscopes to multi-megawatt wind energy systems. She is a Fellow of the IEEE and the International Federation of Automatic Control (IFAC). Selected recent awards include the 2012 IEEE Control Systems Magazine Outstanding Paper Award (with K. Johnson), the 2015 Society for Industrial and Applied Mathematics (SIAM) Journal on Control and Optimization Best Paper Prize (with J. Marden and H. P. Young), the 2017 Control Engineering Practice Award from the American Automatic Control Council, the Scientific Award 2017 from the

European Academy of Wind Energy, and the 2019 Nyquist Lecturer Award from the ASME Dynamic Systems & Control Division. Selected recent and current professional society activities include being a Fellow of the Renewable and Sustainable Energy Institute (2009-present), General Chair of the 2013 American Control Conference, member of the IEEE Control Systems Society (CSS) Board of Governors (2011-2013 and 2015), IEEE CSS Fellow Nominations Chair (2016-2018), member of the IFAC Fellow Selection Committee (2014-2017 and 2017-2020), and member of the IFAC Executive Board (2017-2020).

Dr. Ramla Qureshi, CEO of Women Engineers Pakistan (WEP), started WEP in 2013 as part of her unwavering commitment to empower women in STEM disciplines. She also asks for male participation at their university chapters. structural and earthquake engineering working on her thesis in structural damage, devising new methods for testing structural resilience against fire and earthquake hazards. WEP calls upon men to advocate for their friends and classmates–and the future. Her skills and areas of expertise include encouraging women and young professionals to pursue engineering. She received her B.S. from National University of Sciences and Technology in Pakistan. She is a Fulbright Scholar and PhD student in Citizen's Foundation-school initiative in Pakistan. Ramla was nominated by the University of Buffalo's School of Engineering She is currently involved with ERI, ACI student member, ASCE, Engineer-in-Training. She is drawn to and passionate about charitable organizations such as and Applied Sciences to represent the school at the Advancement of Science and Association of Public and Land-grant Universities' (AAAS) Catalyzing Advocacy in Science and Engineering (CASE) workshop in Washington DC.

THURSDAY NOON SPECIAL SESSIONS

Control Design for SuperCruise Automated Driving: Systems, Algorithms, Challenges and Solutions

Sponsor: **General Motors**
Time: 12:00 – 1:30 PM Thursday, July 2, 2020
Location: Room 51

Automated vehicles are computers that perform several functions necessary to understand the world and make driving decisions. Developing such systems is challenging, since driving is a multi-variable, multi-objective, nonlinear and sometimes uncertain task, in which multiple agents including drivers, pedestrians, devices and environment interact in real-time.

This talk provides a technical review of lateral controls in GM's SuperCruise, the industry's first hands-free driving technology for the highway. Several aspects of the system are discussed, including systems and components, hardware redundancy to ensure safety, hardware/software integration, and technical aspects in vehicle dynamics, sensing, fusion, path planning and controls.

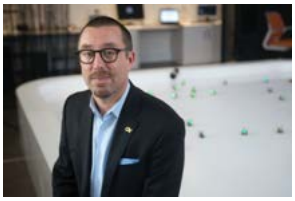
Specific case studies are provided which highlight application of controls techniques to develop various functionalities that enable operation of SuperCruise.

Dr. Reza Zarringhalam is Global Technical Lead for Lateral Controls at General Motors Canada Technical Center. He is currently leading the design of advanced lateral controls software at GM for various features including SuperCruise. Before joining GM Canada, Reza had more than 10 years of R&D experience in controls and automotive industry, including his MSc research on applications of AI for automated driving at K.N.T.U, Iran; and his PhD research on fault-tolerant estimation of vehicle states at University of Waterloo, Canada. Reza has made numerous contributions through patents and publications, is a reviewer of multiple international journals and has extensive teaching experience in Controls and Mechatronics. He is passionate about technology and innovation to build a better future, today.

Bridging the Theory-Practice Gap in Robotics on a Massive Scale in Georgia Tech's Robotarium

Sponsor: **Mathworks**
Time: 12:00 PM – 1:30 PM, Thursday, July 2, 2020
Location: Room 50

The Robotarium is a remotely accessible swarm robotics lab that allows users from all over the world to upload control code, written in MATLAB, and run experiments. Since its official launch in August 2017, over 5000 remote experiments have been conducted by users from all continents (except Antarctica). The impetus behind the Robotarium project is to provide broad, democratized access to a world-class research facility, and users span the gambit from robotics researchers to middle-school students. This talk will discuss the technical challenges associated with the Robotarium as well as a lessons learned in remote-access experimentation.



Dr. Magnus Egerstedt, Steve W. Chaddick School Chair and Professor in the School of Electrical and Computer Engineering at the Georgia Institute of Technology.

THURSDAY AFTERNOON SPECIAL SESSIONS

Promoting Access for Under-represented Groups in STEM Graduate Disciplines

Time: 1:30 PM – 3:30 PM, Thursday, July 2, 2020
Location: Silver

This session consists of four presentations that addresses successful academic and professional practices that support completion of a STEM graduate education and transition to the professoriate for under-

represented groups.

A motivation for the session is that the demographics in the U.S. is changing but noticeably, the number of graduate degrees in STEM disciplines remain unpopulated by this change. To meet this rising change, professional societies and academic institutions must embrace systematic and thoughtful changes in how access is provided, how practices are implemented, and what policies are crafted.

This session is intended to serve three purposes: (i) present the challenges faced by under-represented groups at the graduate level, (ii) provide examples of programs and/or procedures that bolster graduate education in STEM disciplines, and (iii) have an open dialogue about the difficulties of instituting systemic change at the professional society, academic institution, college, and department levels.

Outline of the session:

1. **Dr. Karlene Hoo** (Gonzaga University), "Brief Opening Remarks to Introduce the Topic"
2. **Dr. Bozenna Pasik-Duncan** (University of Kansas), "STEM Education of Tomorrow"
   A collaborative effort integrating scholarship, teaching, learning and broader impacts is the key to a success in STEM education. This collaborative effort needs to include academia, industry, government as well as teachers, parents, students and scholars. By working together as partners who are all learners in the process of STEM education, we can make a difference. Best practices in this effort are shared.
3. **Dr. Martha Grover** (Georgia Institute of Technology), "Graduate Training for Equality in Under-represented Academic Leadership"
   The need to fund students on research grants may provide an unnecessary barrier to retention of PhD students from non-traditional backgrounds. Here we discuss the details of a program in the School of Chemical & Biomolecular Engineering at Georgia Tech, funded by ACS-Bridge, to expand the number of students from under-represented groups earning a PhD in the chemical sciences. The MS thesis program is utilized as a bridge from the BS to the PhD through modifications in timeline and sequencing, as well as additional mentoring.
4. **Dr. Karlene Hoo** (Gonzaga University), "Pathways to Support STEM Graduate Education for Indigenous Communities"
   The NSF AGEP (Alliance for Graduate Education and the Professoriate) PNW COSMOS (Pacific NorthWest Collaborative Opportunities for Success in Mentoring of Students) Alliance's project was to address the scarcity of American Indian/Alaska Native (AI/AN) graduate students in STEM programs. In this presentation, two mentoring frameworks to promote retention and support of AI/AN graduate students will be described. The NSF-funded project resulted in the publication "Indigenous Communities and Access to Graduate Degrees in STEM," 2019 (eds: Hoo & Windchief) New Directions for Higher Education, No. 187.
5. **Dr. Bonnie Ferri** (Georgia Institute of Technology) and Leslie Sharp (Georgia Institute of Technology), "Hiring and Supporting a Diverse Faculty"
   This interactive session will explore some of the issues, challenges, and opportunities for hiring and supporting a diverse faculty in STEM disciplines. What are factors that influence the decision of under-represented groups to apply for and consider faculty positions? What are some policies, practices, and programs that support a healthy and productive culture among a diverse population?

Do our promotion and advancement practices need retuning? What contributions can a professional society have to support success? Finally, what can each of us do individually to support diversity, equity, and inclusion in the faculty ranks?

Note: Bonnie Ferri will conduct the session. Leslie Sharp (Associate Vice Provost for Graduate Education and Faculty Development, and CEO of the Library) will help to prepare the presentation materials and activities but will not be present at the session.

Dr. Bozenna Pasik-Duncan received M.S. degree in mathematics from University of Warsaw (Poland), and Ph.D. and D.Sc. (Habilitation Doctorate) degrees from Warsaw School of Economics (Poland). She is Professor of Mathematics; Courtesy Professor of EECS & AE; Investigator at ITTC; Affiliate Faculty at Center of Computational Biology, and Chancellors Club Teaching Professor at University of Kansas (Lawrence, KS). She is 2017-2018 IEEE Women in Engineering (WIE) Global Chair, founder of IEEE CSS Women in Control, founder and faculty advisor of Student Chapters of Association for Women in Mathematics (AWM) and Society for Industrial and Applied Mathematics (SIAM) at KU, founder and coordinator of KU and IEEE CSS Outreach Programs, a Life Fellow of IEEE, and Fellow of IFAC. She is recipient of many awards that include IREX Fellow, NSF Career Advancement Award, Louise Hay Award, Polish Ministry of Higher Education Award, H.O.P.E. Award, Kemper Fellowship, IEEE Educational Activities Board Meritorious Achievement Award, the IEEE Third Millennium Medal and IEEE Control Systems Society Distinguished Member Award. She is inducted to the KU Women's Hall of Fame. Her broad research interests are primarily in stochastic adaptive control and its applications to science and engineering, and in STEM education.

Dr. Karlene Hoo received her a B.S. degree from the University of Pennsylvania (Philadelphia, PA) and her M.S. and Ph.D. degrees from the University of Notre Dame (Notre Dame, IN). All her degrees are in chemical engineering. She is currently, Dean of the School of Engineering & Applied Science at Gonzaga University (Spokane, WA). She held prior academic administrative positions at Texas Tech University (Lubbock, TX) and at Montana State University (Bozeman, MT). She has government experience with the National Science Foundation (Engineering Directorate), NASA Johnson Space Center, and Sandia National Laboratories. She also has industrial experience with Exxon and DuPont. In 2009, she served as the General Chair of the American Control Conference (St Louis, MO). Her research interests are in sustainable chemical process designs, cardiovascular research, biofuel technologies, and graduate STEM education.

Dr. Bonnie Ferri received her a B.S. degree in electrical engineering from the University of Notre Dame (Notre Dame, IN), her M.S. degree in mechanical and aerospace engineering from Princeton (Princeton, NJ), and her Ph.D. degree in electrical engineering from Georgia Institute of Technology (Atlanta, GA). She is currently the vice provost for Graduate Education and Faculty Development at Georgia Institute of Technology. Her research interests are in embedded control systems, engineering education, and real-time computing. She has received many honors and awards including the 2017 IEEE Undergraduate Teaching Award and the 2016 Regent's Award for the Scholarship of Teaching and Learning. She was the co-chair of a campus-wide commission at Georgia Tech on the future of higher education, an invited speaker at a National Academy of Engineering workshop on education, and a keynote

speaker at the 2019 IFAC Advances in Control Education Symposium. She is the General Chair of the 2022 American Control Conference to be held In Atlanta, GA.

Dr. Martha Grover received her a B.S. degree from the University of Illinois (Champaign, IL) and her M.S. and Ph.D. degrees from the California Institute of Technology (Pasadena, CA). She is Professor and Associate Chair for Graduate Studies in Chemical & Biomolecular Engineering at Georgia Tech and co-leads the new Graduate Training for Equality in Underrepresented Academic Leadership Program funded by the American Chemical Society through the NSF INCLUDES Network. Her research interests are in control of molecular organization, with applications in feedback control of colloidal crystallization for photonic materials, chemical evolution in the origins of life, modeling and control of pharmaceutical and nuclear waste crystallization, and process-structure-property relationships in polymer organic electronics. Martha is the Program Chair of the 2020 American Control Conference and the General Chair for ACC in 2024. She also is the incoming chair for the AIChE Computing and Systems Technology Division and the IEEE CSS Liaison to the IEEE Women in Engineering (WIE) Committee.

Quantum Information Systems: Communication, Control and Computing

Time: 1:30 PM – 3:30 PM, Thursday, July 2, 2020
Location: Gold
Organizers: Drs. Mark Balas and James Steck

Quantum Information Systems and quantum computing are developing rapidly and will have a profound effect on Modeling, Operation, and Control of aerospace systems. Aerospace engineers need to be more aware of the new quantum systems as there is already a growing need for quantum systems engineers to deal with these new issues and to develop workable quantum machines and integrate them into the existing systems technology. In this session we will bring together prominent researchers currently working in communication and control of quantum systems and quantum computing.

Speakers: Dr. Matthew James, Australian National University; **Dr. Valeri Ugrinovskii**, University of New South Wales Canberra
Title: Applying Wiener Filtering to Quantum Communication Systems
Abstract: Quantum communication systems involve the transmission of classical and/or quantum information through a channel. Quantum key distribution is a well-known example, with significant security implications. Aspirational proposals for a quantum internet have been emerging, where a coherent network would allow the distribution of quantum states, including entangled states. Quantum signals, just like their classical counterparts, suffer loss and distortion as they pass through channels. This talk will examine the underlying problem of compensating for loss and distortion at a level below the abstraction of qubits and coding. In particular, we develop a general methodology that allows for the design of quantum filters that extends Wiener's well-known classical methods. This methodology involves a constrained nonlinear optimization problem, where the physical realization requirements of the filter impose non-trivial constraints. The talk will summarize the general features of the approach, and discuss some examples. Some recent experimental results will also be discussed.

Speakers: Dr. Ashkan Balouchi, Louisiana State University; **Dr. Kurt Jacobs,** University of Massachusetts Boston
Title: Coherent vs. Measurement-Based Feedback for Controlling A Single Qubit
Abstract: We compare the performance of continuous coherent feedback using a single-qubit controller to that of continuous measurement-based feedback for controlling a single qubit. Here the basic dynamical resource is the ability to couple the system to a traveling-wave field (for example, a transmission line) via a system observable. To obtain a fair comparison we acknowledge that the amplification involved in measurement-based control allows the controller to use macroscopic fields to apply feedback forces to the system, so it is natural to allow these feedback forces to be much larger than the mesoscopic coupling to the transmission line that mediates both the measurement for measurement-based control and the coupling to the mesoscopic controller for coherent control. Interestingly our numerical results indicate that under this assumption coherent feedback is able to exactly match the performance of measurement-based feedback given ideal controllers. We will also discuss various properties of, and control mechanisms for, coherent feedback networks.

Speakers: Drs. Hideo Mabuchi, Edwin Ng and **Ryotatsu Yanagimoto**, Edward L. Ginzton Laboratory,
Title: Quantum Feedback and the Coherent Ising Machine
Stanford University; **Dr. Tatsuhiro Onodera**, NTT Physics & Informatics Laboratories
Abstract: The Coherent Ising Machine (CIM) computational architecture is being investigated as a promising hybrid opto-electronic approach for solving hard instances of nonlinear optimization problems. Large-scale prototypes have been built in industrial laboratories and are being benchmarked against both conventional heuristic algorithms and commercial quantum annealers; current academic research focuses on elucidating the fundamental role of quantum physics in the operational principles of CIM and on exploring generalizations of the CIM architecture that could more substantially leverage quantum resources such as entanglement and interference of optimization trajectories. In this talk I will overview of the key role of real-time feedback in current and future CIM architectures, discuss some quantum input-output modeling challenges for CIM-type systems operating with broadband optical signals, and describe a novel feedback-based scheme for entanglement generation in next-generation CIMs.

Speakers: Drs. Murphy Yuezhen Niu and **Vadim Smelyanskiy**, Google
Title: Multi-qubit Gate in Frequency Tunable Xmon Qubits
Abstract: We propose a framework for realizing Multi-qubit gate using top-down design harnessing the structure of the system Hamiltonian energy levels. This framework allows us to design three-qubit and four-qubit gates that are important for quantum simulation and quantum error correction. We discuss the main challenges to be overcome in the practical realization of here proposed multi-qubit gate.

Speakers: Drs. James Steck, Elizabeth Behrman, and **Nathan Thompson**, Wichita State University
Title: Machine Learning for Programming Quantum Computers
Abstract: We apply machine learning to "program" quantum computers, both in simulation and in experimental hardware. A major difficulty in quantum computing is developing effective algorithms that can be programmed on a quantum device. Our approach is to apply machine learning to learn the quantum computer parameters that will yield the desired computation instead of choosing pre-made quantum gates to do the processing. As a proof of concept, we apply machine learning to a 16-qubit quantum gate computer developed by IBM and to a topological quantum computer by Microsoft. Preliminary results are shown of machine learning results both in software simulation and on the actual IBM quantum hardware. Microsoft

results are shown only using their simulation as hardware is still being built. A second demonstration is to then port quantum machine learning to a large SQUID array of 2000 qubits originally designed to solve binary optimization problems via quantum annealing. To demonstrate quantum machine learning on this larger scale, it is programmed via machine learning to anneal to various entangled and partially entangled states; investigating a basic building block of general quantum computing. Simulation results are presented along with a method to demonstrate in hardware on a superconducting flux qubit quantum annealing machine housed at the Quantum Artificial Intelligence Laboratory (QuAIL) at NASA's Advanced Supercomputing facility. Targeted entangled states are the relatively easy GHZ states, the EPR as well as the more difficult W and other states. Using machine learning instead of programming paves the way to greatly expanding the quantum computing capabilities of quantum computing hardware currently available.

Speaker: Dr. Mark Balas, Texas A&M University
Title: Reduction of Decoherence in Quantum Information Systems Using Direct Adaptive Control of Infinite Dimensional Systems
Abstract: Using Quantum Mechanical systems to store and retrieve information and use it in quantum computing is a new aspect of physical science. These quantum systems are inherently infinite dimensional systems and their dynamic behavior is not well known. What must be controlled, are the quantum gates that do all the computational work but should remain reversible because the gates are expected to be unitary operators in the Hilbert space of quantum system states. These gates will suffer some decoherence of this unitarity because they are open systems and subject to interaction/entanglement with other related quantum systems. Consequently, they will not operate as the ideal systems they are expected to be and will produce significant errors. Direct adaptive control does not use detailed information about the gates, but can still be used to reduce decoherence. Our overall direction is on using our research in adaptive control of infinite dimensional systems to explore how these feedback control ideas in conjunction with quantum gates and quantum error correction can reduce decoherence in quantum information and computing. It has been shown that there are decoherence -free subspaces in the Hilbert space of quantum states This presentation will focus on our current approach using adaptive control of infinite dimensional systems to guide quantum systems into these decoherence-free subspaces.

Getting Funded by NSF: Proposal Preparation and the Merit Review Process

Sponsor: **National Science Foundation**
Time: 4:00 PM – 6:00 PM, Thursday, July 2, 2020
Location: Denver

So, you think you have a great research idea, now how do you get funding from the National Science Foundation (NSF) to do the work? A well-scoped and written proposal is instrumental to successful submission. This session targets junior faculty and researchers who might be new to NSF and describes detailed guidelines and practical advice for proposal preparation. The presenter will go over NSF review process and Intellectual Merit and Broader Impacts criteria, as well as share most common mistakes made by the Primary Investigators when submitting a proposal. Question-and-answer session will follow the presentation.

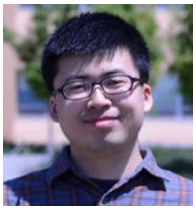
Dr. Irina Dolinskaya is a Program Director at the National Science Foundation (NSF) in the Division of Civil, Mechanical & Manufacturing Innovation (CMMI). Dr. Dolinskaya services Dynamics, Control and Systems Diagnostics (DCSD) program, as well as National Robotics Initiative (NRI 2.0) and Navigating the New Arctic (NNA) NSF's 10 Big Ideas. Prior to joining NSF, Irina Dolinskaya was a faculty in the Industrial Engineering and Management Sciences department at Northwestern University. She obtained M.S. and Ph.D. degrees in Industrial and Operations Engineering from the University of Michigan, and B.S. degree in Industrial Engineering from the University of Florida.

Dr. Dolinskaya's research is in the field of transportation science and logistics with focus on adaptive modeling and solution approaches to integrate dynamic real-time information. Her current primary applications are in humanitarian logistics, optimal vessel performance, and electric vehicle routing. Irina Dolinskaya is the winner of the INFORMS Transportation Science & Logistics Society Dissertation Prize and the 2008 recipient of the Bonder Scholarship for Applied Operations Research in Military Applications.

Student Career Advising Session

Time: 4:00 PM – 5:30 PM, Thursday, July 2, 2020
Location: Gold
Organizers: Ning Tian, Ting Cai, Dr. Alireza Goshtasbi

The session will be rotating roundtable discussions. The discussion panel features a diverse group of accomplished professionals from academia, national labs and industry. They will share insights and provide advice based on their successful careers in their respective fields. Students are encouraged to come with specific questions or simply listen in. Join us for an opportunity to network and learn more about shaping your career. Light refreshments will be provided.



Ning Tian is a Ph.D. candidate working with Dr. Huazhen Fang at the University of Kansas, Lawrence, KS. His research interests include control theory and its application to advanced battery management. He is currently a Student Liaison of the ASME DSCD Energy Systems Technical Committee. He received the B.Eng. and M.Sc. degrees in Thermal Engineering from Northwestern Polytechnic University, Xi'an, China, in 2012 and 2015, respectively.

Ting Cai is a Ph.D. candidate working with Dr. Jason Siegel and Dr. Anna Stefanopoulou at the University of Michigan. His research focuses on Li-ion battery control and safety, specifically the modeling and detection of battery faults. He is a recipient of the Energy Systems Technical Committee Best Paper Award in the 2018 ASME Dynamic Systems and Control Conference. He currently serves as a student liaison of the ASME DSCD Energy Systems Technical Committee. Ting received his B.S. in Mechanical Engineering from Xi'an Jiaotong University in 2016.

Dr. Alireza Goshtasbi is a Research Engineer at Ford Motor Company. His research interests include modeling, estimation, and control of electrochemical energy systems with special focus on fuel cells. Alireza served as a Student Liaison for the ASME DSCD Energy Systems Technical Committee from 2017 to 2019. He completed his PhD in Mechanical Engineering at the University of Michigan in 2019, where he also obtained his MS in Applied Mathematics and MS in Mechanical Engineering in 2019 and 2016, respectively.

Panelists:

Dr. Jason B. Siegel received his Bachelors of Electrical Engineering Summa Cum Laude from the University of Michigan in 2004 and Electrical Engineering Systems Ph.D. in 2010. After a two year post-doc, he joined the faculty as an Assistant Research Scientist in the Department of Mechanical Engineering at the University of Michigan in 2012. His research focuses on physics based modeling and control of energy storage and conversion systems including lithium-ion batteries and Proton Exchange Membrane fuel cells. Dr. Siegel was part of the team that received the 2016 IEEE Control Systems Technology Award, "for the development of an advanced battery management system accounting for electro-thermo-mechanical phenomena." He has co/authored more than 30 journal articles with an h-index of 16, and a chapter in the control systems handbook on the application of model predictive control to fuel cells. Dr. Siegel serves as the chair of the IEEE Technical Committee on Automotive Control.

Dr. Hamid Ossareh obtained his BASc in Electrical and Computer Engineering from the University of Toronto in 2008, and MASc (EE), MS (Mathematics), and PhD (EE) degrees from the University of Michigan, Ann Arbor in 2010, 2012, and 2013, respectively. He was a researcher at Ford Research and Advanced Engineering from 2013 to 2016, where he investigated advanced control of automotive powertrains. Since 2016, he has been an Assistant Professor in the Department of Electrical Engineering at the University of Vermont (UVM). His research interests lie in the area of control and, more specifically, constrained control, stochastic control, and nonlinear control with applications in automotive, aerospace, and power systems. He holds more than 35 patents and has been an author on more than 32 peer-reviewed publications, and has been a recipient of numerous awards, including the Chief Engineer's award and the Ford Technical Achievement award from Ford Motor Company, and the Faculty of the Year and Inventor of the Year awards from the IEEE GMS. He is the founding chair of the IEEE Control Systems Society Chapter of Vermont, an Associate Editor for the journal of Control Engineering Practice, and a member on the Conference Editorial Board of the IEEE CSS.

Dr. Helen Durand is an Assistant Professor in the Department of Chemical Engineering and Materials Science at Wayne State University. She received her B.S. in Chemical Engineering from UCLA, and upon graduation joined the Materials & Processes Engineering Department as an engineer at Aerojet Rocketdyne for two and a half years. She earned her M.S. in Chemical Engineering from UCLA in 2014 and her Ph.D. in Chemical Engineering from UCLA in 2017, and subsequently started at Wayne State. She received the Air Force Office of Scientific Research Young Investigator award, and her work has also received support from the National Science Foundation. She received a Faculty Research

Excellence Award within the College of Engineering at Wayne State University and is serving as the Next-Gen Manufacturing Sessions Area Chair for the 2020 Annual Meeting of the American Institute of Chemical Engineers. Her research interests are in the area of process systems engineering with a focus on process control.

Dr. Neera Jain is the Principal Investigator of the Jain Research Laboratory. She joined the School of Mechanical Engineering and Ray W. Herrick Laboratories at Purdue University as an assistant professor in January 2015. She has authored more than a dozen peer-reviewed articles on the topics of dynamic modeling and control of thermal energy systems. From May 2013 through May 2014, Dr. Jain was a visiting member of the research staff in the Mechatronics Group at Mitsubishi Electric Research Laboratories in Cambridge, MA where she designed advanced control algorithms for HVAC systems. Before earning her doctorate in Mechanical Engineering at the University of Illinois at Urbana-Champaign in 2013, she earned her S.B. from the Massachusetts Institute of Technology in 2006 and her M.S. from the University of Illinois at Urbana-Champaign in 2009, both in Mechanical Engineering. Dr. Jain is a recipient of the Department of Energy Office of Science Graduate Fellowship (2010-2013) and the ASME Graduate Teaching Fellowship (2011-2012).

Dr. Masoud Abbaszadeh received the B.Sc. degree from the Amirkabir University of Technology, Tehran, Iran, in 2000, the M.Sc. degree from the Sharif University of Technology, Tehran, Iran, in 2002, and the Ph.D. degree from the University of Alberta, Edmonton, AB, Canada, in 2008, all in electrical and computer engineering. He is currently a Senior Research Engineer at GE Research, Niskayuna, NY, USA and an Adjunct Professor at the ECSE Department, Rensselaer Polytechnic Institute, Troy, NY, USA. From 2011 to 2013, he was a Senior Research Engineer at the United Technologies Research Center, East Hartford, CT, USA. From 2008 to 2011, he was with Maplesoft, Waterloo, ON, Canada. He was the Principal Developer of MapleSim Control Design Toolbox and was a member of a research team working on Maplesoft-Toyota joint projects. Dr. Abbaszadeh is an Associate Editor of IEEE Transactions on Control Systems Technology and a member of IEEE Control Systems Society Conference Editorial Board. His current research interests include estimation and detection, robust and nonlinear filtering, and statistical machine learning with applications such as cyber-physical resilience and autonomous systems. He has published over 80 peer-reviewed papers and has over 40 issued/pending patents.

Mr. Rajiv Singh holds degrees in Aerospace (1998) and Mechanical (2000) Engineering and is currently a PhD candidate in Electrical Engineering at Northeastern University. His current research is focused on convex methods for nonlinear system identification. Since 2000, he has been with MathWorks where he leads the development of data based modeling software. He has been the lead developer of the System Identification Toolbox since 2010. He has also led the development effort behind launching the Predictive Maintenance Toolbox in 2018. Rajiv has authored numerous papers in the area of system identification and statistical modeling and hold 3 patents in related areas.

Dr. Leo H. Chiang is Technology Director at Dow Inc., leading Chemometrics and AI implementations for Manufacturing. Leo has developed and implemented several data analytics techniques to solve complex manufacturing problems, resulting in 11 Dow Manufacturing Technology Center Awards. In 2016 he received the Dow R&D Excellence in Science Award in recognition of his scientific achievement in industrial research. Leo has a B.S. degree from University of Wisconsin at Madison and M.S. and Ph.D. degrees from the University of Illinois at Urbana-Champaign, all in Chemical Engineering. Leo has contributed to over 40 externally refereed journal/proceedings papers and has given over 100 conference presentations and university lectures. Leo has co-authored two books published by Springer Verlag. His textbook Fault Detection and Diagnosis in Industrial Systems is available in English and Chinese and has received over 2,200 citations according to Google Scholar.

Leo has a long history of supporting American Institute of Chemical Engineers (AIChE), having served as 2014-2016 Computing and Systems Technology (CAST) director, 2016 CAST 10E programming chair, 2017-2018 spring meeting program chair (MPC), and recently elected to serve the 2019-2022 Executive Board of the Program Committee (EBPC). Leo was instrumental in setting up the Big Data Analytics Topical Conference (2015 to 2017) and Industry 4.0 Topical Conference (2018-2020) at the AIChE spring meeting. He was recognized by the AIChE with the 2016 Herbert Epstein Award for his leadership on Big Data Analytics technical programming and 2016 Computing Practice Award for his world-class leadership in the development and application of methodologies in analytics for batch and continuous processes known as Big Data. Leo is also active in the broader engineering and control community, currently serves as 2019-2021 Computer Aids for Chemical Engineering (CACHE) trustee, 2021 International Symposium on Advanced Control of Chemical Processes (ADCHEM) industry co-chair, and 2022 American Control Conference (ACC) vice chair for industrial applications.

Dr. Jennifer King (Annoni) received her PhD in Aerospace Engineering and Mechanics from the University of Minnesota in 2016. She is currently a research engineer at the National Renewable Energy Lab (NREL) at the National Wind Technology Center. Her research spans from engineering to policy. Her expertise includes control systems, flow control, system identification, and reduced-order modeling with application to wind farm control, with specific work done on mode decomposition, optimal estimation and control, robust control, and energy policy.

Dr. Alexander Scheinker received a MA in mathematics in 2008 and a PhD in nonlinear adaptive control theory in 2012 at the University of California, San Diego. Alex spent the last two years of his PhD as a Graduate Researcher at Los Alamos National Laboratory (LANL) and was hired as a staff member with the RF Control Group in 2011 where he continues theoretical and applied control theory research. While traditional Extremum Seeking (ES) approaches were for the optimization of the unknown outputs of known stable/controlled systems, Alex developed a new bounded form of ES for use as a direct feedback for the stabilization, optimization and control of unknown and unstable time-varying nonlinear systems. Alex has combined the ES feedback control method with machine learning (ML) techniques for adaptive ML of time varying systems. Alex has demonstrated this method in hardware for various particle accelerator applications: electron beam orbit control at the SLAC National Accelerator Laboratory SPEAR3 and the Brookhaven National Laboratory NSLS-II particle accelerator light sources,

beam loss minimization at the LANL LANSCE proton linear accelerator, automatic longitudinal phase space control and average pulse energy output maximization at the SLAC National Accelerator Laboratory Linac Coherent Light Source and the European X-ray free electron laser, trajectory and emittance control at CERN's plasma wakefield acceleration project AWAKE, and non-invasive longitudinal phase space diagnostics at the FACET plasma wakefield accelerator at SLAC national accelerator laboratory.

Dr. David Schoenwald is a Principal Member of the Technical Staff in the Electric Power Systems Research Department at Sandia National Laboratories. Dr. Schoenwald focuses on control system design to improve dynamic stability of electric power systems. He also develops performance standards for grid-scale energy storage applications. Before joining Sandia, he was with Oak Ridge National Laboratory, where he designed control systems for manufacturing applications. He was also an adjunct assistant professor in the Electrical Engineering Department, University of Tennessee, Knoxville, where he taught a graduate course on nonlinear control systems. Dr. Schoenwald received an R&D 100 award in 2017 for development of an inter-area oscillation damping controller for the western North American power grid. He received the 2017 Outstanding Engineer Award of the Albuquerque Section of the IEEE. He served as Technical Co-Chair of the 2017 Electrical Energy Storage Applications & Technologies (EESAT) Conference. Dr. Schoenwald received his Ph.D. degree in electrical engineering from The Ohio State University.

STUDENT PROGRAMS

The ACC supports students in a variety of ways. Students are offered lower registration rates and lower hotel room rates (for a limited room block). The ACC also coordinates a conference-wide Student Best Paper Award and provides Student Travel Grants.

STUDENT BEST PAPER AWARD

The 2020 ACC is pleased to continue the tradition of the Student Best Paper Award. All primary, first-listed authors of a regular contributed paper who were students at the time of submission were eligible. To be considered for the award, a blind version of the paper was nominated by the student's advisor. The nominated papers were reviewed by a special committee convened for the best study paper award competition. Based on these reviews, the following five papers were selected as finalists for the Student Best Paper Award competition.

- *"Homotopy Method for Finding the Global Solution of Post-Contingency Optimal Power Flow."* **SangWoo Park***, Elizabeth Glista, Javad Lavaei, Somayeh Sojoudi
- *"Accuracy Prevents Robustness in Perception-based Control."* **Abed AlRahman Al Makdah***, Vaibhav Katewa, Fabio Pasqualetti
- *"Coordinated Control of UAVs for Human-Centered Active Sensing of Wildfires."* **Esmaeil Seraj***, Matthew Gombolay
- *"Carrots or Sticks? The Effectiveness of Subsidies and Tolls in Congestion."* **Bryce L. Ferguson***, Philip N. Brown, Jason R. Marden
- *"A fully distributed motion coordination strategy for multi-robot systems with local information."* **Pian Yu***, Dimos V. Dimarogonas

The finalist papers will be presented on Wednesday, July 1st. The winner will be selected by the Best Student Paper Awards Committee and will be presented at the ACC Awards Ceremony on Friday, July 3rd, 2020.

STUDENT TRAVEL GRANTS

The 2020 American Control Conference Organizing Committee is pleased to provide student support for students registering for the virtual ACC 2020. The 2020 ACC thanks the generous sponsors who make this support possible. The option for student support was outlined on the website and sent in an email to all authors of papers accepted for the conference.

The application for student registration was made available on the 2020 ACC web site. Student eligibility conditions for support included the student status at the submission deadline (September 2019) and student registration for the conference. Support awards were in the form of complimentary student conference registration ($75).

For more information, please contact Prof. Kira Barton (bartonkl@umich.edu), ACC 2020 Vice Chair for Student Affairs.

TUTORIAL SESSIONS

Tutorial sessions showcase specific control topics that address real world control applications and how effective solutions are engineered by practicing engineers. This year we are pleased to offer four tutorial sessions.

WeB21 Cooperation in Pursuit-evasion Differential Games

Organizer: Eloy Garcia, Chair of IEEE Technical Committee on Manufacturing Automation and Robotic Control (MARC), Control Science Center of Excellence, Air Force Research Laboratory, Wright-Patterson AFB

Co-organizers: Isaac E. Weintraub, Aerospace Systems Directorate, Air Force Research Laboratory, Wright-Patterson AFB
Meir Pachter, Department of Electrical Engineering, Air Force Institute of Technology, Wright-Patterson AFB

Time: 13:30 – 15:30, Wednesday, July 1, 2020

Location: **Director's Row H**

This session will introduce the basics of pursuit-evasion problems. Pursuit-evasion problems provide a general framework that mathematically formalizes important applications in different areas such as surveillance, navigation, analysis of biological behaviors, and conflict and combat operations. Pursuit-evasion sets up two players or autonomous agents against each other; generalizations are typical in the sense of multiple players divided into two teams – the pursuer team against the evader team.

Strategy seeking in pursuit-evasion has been approached by imposing certain assumptions on the behavior of one player or team. However, many pursuit-evasion scenarios must address the presence of an intelligent adversary which does not abide by a restricted set of actions. The desire to design strategies that optimize a certain criteria against the worst possible actions of the opponent and that also provide robustness with respect to all possible behaviors implementable by the adversary led to the emergence of differential game theory. The central problem in pursuit evasion differential games is the synthesis of saddle-point strategies that provide guaranteed performance for each team regardless of the actual strategies implemented by the adversary. This is a challenging problem as it generalizes optimal control to simultaneously minimize and maximize a performance functional while satisfying implicit robustness requirements. Many questions and open problems remain in this area where the controls community has the potential for important breakthroughs and take differential games a leap forward both in theoretical and practical terms.

Presenters: Isaac E. Weintraub, Meir Pachter, and Eloy Garcia: **An introduction to pursuit-evasion differential games**
Shaunak D. Bopardikar: **k-Capture in Multi-agent Pursuit Evasion, or the Lion and the Hyenas**
Meir Pachter: **Multi-Player Pursuit-Evasion Differential Games**
Zachariah Fuchs: **Singular Surfaces within a Two Evader, One Pursuer Game**

ThB21 Control of Tokamak Fusion Plasmas

Organizers: Michael L. Walker, General Atomics

Co-organizers: Federico Felici, EPFL
Eugenio Schuster, Lehigh University
Peter De Vries, ITER

Time: 13:30 – 15:30, Thursday, July 2, 2020

Location: **Director's Row H**

Significant progress has been made in the last several decades since controlled magnetic fusion was envisioned as a potential commercial power source. The effort initially focused on achieving the necessary scientific understanding of fusion plasmas, and how best to produce energy generating fusion reactions within those plasmas. But as greater scientific understanding was gained, more attention gradually began to be paid to the technological issues associated with confining and controlling the plasmas creating these energy-producing reactions. Initial active control approaches consisted primarily of a small number of SISO PID controllers. More recently, as the number of plasma parameters desired to be controlled has increased, more sophisticated controllers have been designed, implemented, and tested on a number of experimental fusion devices worldwide.

Up to now, magnetic-fusion research devices have not been capable of hosting a plasma with the frequency of fusion reactions sufficient to produce more output power than is consumed in confining and controlling the plasma, a basic requirement for an energy-producing fusion reactor. This situation is about to change with the anticipated completion of the ITER tokamak currently under construction in southern France. ITER is projected to be able to produce approximately 10 times more energy output than it consumes when it is fully operational in approximately 20 years. Early operation of ITER will focus on learning how to produce and control plasmas that are far more energetic than in any existing magnetic-confinement device. The initial plasma control system is being designed now, including both the software architecture and the algorithms that will be used for control during ITER "first plasma" operation in approximately 2025. Energy content of plasmas produced during this phase of operation are small when compared with plasmas planned for later operation phases, which means that consequences of most possible control failures are similarly small. However, even during this early phase there are certain control failures that can lead to millions of dollars in device damage, so getting the control right is an important task.

Presenters: Michael Walker, **Introduction to Tokamak Plasma Control**
Federico Felici, **Control of magnetic fields and instabilities in tokamak fusion plasmas**
Eugenio Schuster, **Core Kinetic and Magnetic Control in Tokamak Plasmas**
Peter De Vries, **Exception handling by the Plasma Control Systems of Tokamaks**

ThC21 Control of Wafer Scanner: Methods and Developments

Chair: Marcel Heertjes, Eindhoven University of Technology

Organizer: Marcel Heertjes, Eindhoven University of Technology

Co-organizers: Hans Butler, ASML
Stan van der Meulen, ASML
Rahul Ahlawat, CYMER

Time: 16:00 – 18:00, Thursday, July 2, 2020

Location: **Director's Row H**

This tutorial session addresses control design aspects for wafer scanners, used in the semiconductor manufacturing industry, and the challenges for control design and development to meet the ever increasing demands on accuracy and speed. The mechatronic systems that will be discussed are: (a) the light source needed to generate the ultraviolet light that is used for wafer exposure, (b) the optical and metrology systems needed for accurate measurement and imaging, and (c) the reticle and wafer stage systems needed for accurate and fast positioning. The control challenges associated with these systems mainly involve dealing with: (a) rejection of high frequency aliased disturbances, (b) large-scale or fast-updated (state) reconstruction, (c) vibration control and isolation in view of structural vibrations and disturbances, (d) inherent design tradeoffs like Bode's sensitivity integral and gain-phase relationship, (e) multivariable plant identification of (quasi-static) deformations and structural dynamics for point-of-interest control, and (f) thermal modelling, model reduction, and the control of (local) time-varying deformation.

Presenters: Marcel Heertjes: **General introduction wafer scanners**
Rahul Ahlawat: **Light source: generation and control of light**
Hans Butler: **Optics: Isolation and control of vibration**
Marcel Heertjes: **Stages pt.1: control of motion**
Stan van der Meulen: **Stages pt.2: control of thermal-induced deformation**

FrB21 Learning and Control: Opportunities and Challenges

Chair: Mathukumalli Vidyasagar, Indian Institute of Technology, Hyderabad

Organizer: Mathukumalli Vidyasagar

Co-organizer: Behrouz Touri, University of California San Diego

Time: 13:30 – 15:30, Friday, July 3, 2020

Location: **Director's Row H**

The recent past has witnessed an explosion of activity in Artificial Intelligence (AI) and Machine Learning (ML). AI/ML is easily the most "disruptive" technology of contemporary society. Yet much of

the claimed progress rests on simulations that are not always repeatable, or fragile against small perturbations in parameters, or both. Consequently, the AI/ML community has begun to show some interest in developing some theoretical foundations for the subject. In response to this, the organizers of this tutorial session propose a session consisting of three forty-minute talks, all of them by leading experts in control and system theory who have also made substantial contributions to learning.
The objectives of the session are:

- To give the audience a sense of the opportunities for persons trained in control and system theory to contribute to the growth of AI/ML.
- To give a glimpse of the research frontier in these areas that can be successfully tackled using control / system theory, or allied approaches.

Presenters: Mathukumalli Vidyasagar, **Mathematical foundations of deep and reinforcement learning**
George Pappas and Manfred Morari, **Robustness analysis of neural networks via semidefinite programming**
Pramod Khargonekar, **Neuro-cognitive science inspired learning control architectures and algorithms**

WORKSHOPS

The ACC will offer workshops addressing current and future topics in automatic control from experts in academia, national laboratories, and industry. The workshops at ACC 2020 will take place prior to the conference on Monday June 29 and Tuesday June 30.

Conference registrants can sign up for the workshops directly through the registration site. *Please note that workshops are subject to cancellation due to lack of registrants.*

System Modeling and Control with Smooth Fuzzy Compositions

Half day (8:30am – 12:30pm)

Organizer: Ebrahim Navid Sadjadi, Universidad Carlos III de Madrid
Location: Room 26

The objective of this half-day workshop is to cover the state-of-the-art in smooth fuzzy modeling and control algorithms along their systemic properties and the applications. During the last years, we have witnessed major successes of fuzzy logic systems in the academia and industries. From beating professionals at games like chess, to fast detection of diseases like cancer, classification of complex images, and generation of captions for images in the personalized media of the incomplete and noisy information. In many AI fields, fuzzy systems could outperform all existing machine learning and model-based control methods. Three major aspects of fuzzy systems make the design methodology attractive. The first is the design formulation, that they can be understood, tuned, or improved by engineer's experiences and knowledge. The second aspect is the ability to handle the system disturbances and noises soft and smoothly, which facilitate the operation of industrial processes inside their margins and operational limits. The third aspect is the ability to perform on-line decision making for the processes, considering their affordable computational complexities. Hence, the purpose of providing this workshop is to provide a detailed introduction to the fundamental developments in this field for researchers, graduate students and practitioners. The main focus of the course is on the design of smooth fuzzy models for various applications which include control, modelling, and self-learning for the dynamical systems, as well as the comprehensive study of the new achievement in study of their structural properties.

Presenters: E. N. Sadjadi, Universidad Carlos III de Madrid; M. B. Menhaj, Amirkabir University of Technology

Prerequisite skills for participants: Linear algebra and basic knowledge of optimization and stabilization theories. No knowledge of fuzzy logic is required.

Secure State Estimation and Control of Cyber Physical Systems: An Unknown Input Observer Approach

Half day (1:30pm – 5:30pm)

Organizers: Stefen Hui, San Diego State University
Stanislaw Zak, Purdue University

Location: Room 27

In this workshop, the theory, design, and applications of estimators for the states and unknown inputs of control systems will be presented in a tutorial fashion. The workshop targets both practicing engineers and graduate students. The emphasis will be on design in order to show how uncertain system control theory fits into practical applications. Observation and measurement play essential roles in achieving control objectives in many control schemes. An observer is a deterministic dynamical system that can generate an estimate of the plant's states using that plant's inputs and outputs. Observers are utilized to augment or replace sensors in a control system. The early observers required full knowledge of the inputs of the controlled plant. Observers that do not require full knowledge of the inputs have also been developed and are collectively called Unknown Input Observers (UIO). Some uncertainties, nonlinearities, and delays in the system model can be treated as unknown inputs. Methods for the estimation of the unknown inputs have been developed. One important application of UIOs of current interest is in secure state estimation of network control systems corrupted by malicious packet drops both in the communication between the sensors and the controller and that between the controller and the actuators. Another area of application of UIOs is fault detection and isolation, which is also one of the topics of this workshop. We will present an unknown input estimator architecture that reconstructs sensor and actuator faults. Novel robust discrete-time (DT) observer architectures will also be presented. We will demonstrate how these observers are used in the synthesis of combined controller-observer compensators for continuous-time (CT) systems. The advantage of the compensator synthesis in the DT domain over the CT domain is that in many cases the condition for the existence of an UIO fails for a CT plant model while it holds for a discretized plant model. We will characterize a class of systems for which the existence condition for the UIO fails in the CT domain while it holds in the DT domain.

Prerequisite skills for participants: Basic knowledge of linear systems at the undergraduate level. No prior knowledge of observers is assumed.

Current Topics in Aerospace Control

Full day (8:30am – 5:30pm)

Organizers: Richard A. Hull, Collins Aerospace
Naira Hovakimyan, University of Illinois
Zhihua Qu, University of Central Florida
Ilya V. Kolmanovsky, University of Michigan
Heather Hussain, The Boeing Company
Venanzio Cichella, University of Iowa
Dimitra Panagou, University of Michigan
Amit Sanyal, Syracuse University
D. Brett Ridgely, Raytheon Missile Systems

Location: Room 28

This one-day workshop will focus on current control system topics that are having an impact in the aerospace industry. The workshop will be presented by leading control systems experts from industry and academia that are involved in some of the most exciting research and development efforts in the field of Aerospace. This workshop is intended for students and professors in search of current applications in need of solutions as well as industry and government professionals interested in potential solutions from

academia and adjacent branches of the aerospace industry. This workshop is sponsored and presented by members of the IEEE CSS Technical Committee on Aerospace Controls and their collaborators. The purpose of the technical committee is to help build an international scientific community and promote awareness of outstanding achievements in the field of Aerospace Controls. In this offering, the workshop will present a sample of current topics related to the intelligent control of cooperating groups of unmanned air vehicles, spacecraft, drones and miniature projectiles. Our experts will present the theoretical background, rigorous methods and experimental results that are creating an exciting new chapter in field of Aerospace Control. Recent advances in adaptive and nonlinear robust control theory are used to form the basis for safe, resilient and certifiable systems of co-operative platforms. Future directions for research are included in discussion of the roles of artificial intelligence and augmented and virtual reality, as well as emerging applications in Aerospace Control for adversarially robust cyber resistant systems. The workshop will offer opportunities for questions and answers and provide an open forum for discussion of applications for current theoretical advances and potential enabling technologies.

Please see http://aerospace-controls.ieeecss.org/home for additional information and agenda, follow the tab to TCAC Workshop on Aerospace Control – 2020 ACC.

Presenters: Richard A. Hull, Collins Aerospace; Naira Hovakimyan, University of Illinois; Zhihua Qu, University of Central Florida; Ilya V. Kolmanovsky, University of Michigan; Heather Hussain, The Boeing Company; Venanzio Cichella, University of Iowa; Dimitra Panagou, University of Michigan; Amit Sanyal, Syracuse University; D. Brett Ridgely, Raytheon Missile Systems; James Fisher, Raytheon Missile Systems

Prerequisite skills for participants: Solid foundation in classical and modern control methods plus an interest in Aerospace applications.

Practical Methods for Real World Control Systems

Full day (8:30am – 5:30pm)

Organizers: Daniel Abramovitch, Agilent Technologies
Sean Andersson, Boston University
Craig Buhr, Mathworks

Location: Room 29

A question one should ask of any advanced algorithm is, “How do we make that work in a real system?” A question one should ask of any industrial control system is, “How do we apply better algorithms to this problem?” The two questions are dual sides of the same “bridging the gap” problem that has hounded control for decades. This workshop will examine practical methods that address this problem from both sides: ways to implement advanced algorithms on real systems and ways to improve industrial control using advanced methods. We will examine which system identification methods work on which physical systems, as model-based control requires a model. We will discuss why so many industrial controllers are PIDs, present a universal framework for different PID implementations, describe how to tune the PID to the identified system model, and show how to augment these with higher order controller dynamics (a.k.a. filters). We will discuss how to make state-space models more useable in real-time systems. Speaking of which, we will explain how to program filters and PIDs in real-time control systems. We will discuss things to know about hardware implementation and tradeoffs with ADCs, DACs, and analog filters. We will talk

about the current set of real-time processing chips and the programming models that go along with them. Throughout we will offer hardware/software demonstrations of how tools like Matlab and Simulink can be used in these contexts. We won't bridge the gap in a day, but we can move the needle. A web page that holds the information from the brochure can be found here, and a PDF version of the workshop flyer can be found here.

Prerequisites skills for participants: Undergraduate level knowledge of feedback systems, sampled data systems, and programming. An honest interest in being able to translate control theory into physical control systems. The workshop is designed to be useful to industry practitioners wishing to apply more advanced control methods as well as academics wishing to make their algorithms more applicable to real world problems.

Confluence of Vision and Control

Full day (8:30am – 5:30pm)

Organizers: Ashwin Dani, University of Connecticut
Nicholas Gans, University of Texas at Arlington

Location: Room 30

The use of visual sensors in feedback control has been an active topic of research for decades. As the cost of hardware lowers and computational capabilities increase, vision-based control is reaching new levels of capability and application. Recent innovations in computer vision can provide greater capabilities to control applications such as autonomous vehicles and robots. At the same time, open problems in computer vision can be solved through control theory, such as nonlinear and adaptive control. We present eleven discussions on recent work in vision-based control, the application of control to computer vision, and topics in which vision and control are uniquely intertwined. We seek to highlight recent developments and open problems that exist at the intersection of vision and control and spur further research and development in the community. Further information on the workshop can be found at https://sites.google.com/view/2020accworkshop.

Presenters: Randy Beard, Brigham Young University; Ashwin Dani, University of Connecticut; Warren Dixon, University of Florida; Kaveh Fathian, Massachusetts Institute of Technology; Nicholas Gans, University of Texas at Arlington; Takeshi Hatanaka, Osaka University; Guoqiang Hu, Nanyang Technological University; Romeil Sandhu, Stony Brook University; Roberto Tron, Boston University; Eddie Tunstel, University of New Mexico; Patricio Vela, Georgia Institute of Technology.

Prerequisites skills for participants: A basic understanding of vision-based control/estimation, nonlinear and adaptive control is beneficial. For the registrants who do not have sufficient background in these topics, basic tutorial material will be provided prior to the workshop.

Exploring Interplay between Dynamical Systems and Function Spaces: A Unifying Presentation of Dynamics Mode Decomposition and Occupation Measures

Full day (8:30am – 5:30pm)

Organizers: Rushikesh Kamalapurkar, Oklahoma State University
Joel A. Rosenfeld, University of South Florida

Location: Room 31

Two different perspectives of casting problems for finite dimensional nonlinear dynamical systems into infinite dimensional linear problems have been gaining significant traction over the past decade. Specifically, these two approaches are that of Dynamic Mode Decomposition (DMD), which aims to establish "equation-free" models from snapshots of a dynamical system by exploiting properties of the Koopman operators over Hilbert function spaces, and that of Liouville operators and occupation kernels, where nonlinear optimal control problems are reformulated as infinite dimensional linear programs. The purpose of this workshop is to bring together practitioners of both fields together to enable a unifying discourse concerning nonlinear dynamical systems and their connections to infinite dimensional spaces. The presentations will include topics such as DMD, moment problems, Reproducing Kernel Hilbert spaces, and Lyapunov measures. The workshop will conclude with several talks connecting DMD with Liouville operators using newly introduced occupation kernels. This workshop aims to provide a comprehensive treatment of Dynamic Mode Decompositions and moment problems using Occupation Measures. The attendees will leave with a thorough understanding of how to cast finite dimensional nonlinear problems into infinite dimensional linear problems and will understand this approach from multiple perspectives. Attendees who are already familiar with both methods will be introduced to occupation kernels and Liouville operators which can be leveraged to blend DMD with the theory of occupation measures via a Reproducing Kernel Hilbert Space framework.

Presenters: Rushikesh Kamalapurkar, Oklahoma State University; Henning Lange, University of Washington; Jean B. Lasserre, LAAS-CNRS; Joel A. Rosenfeld, University of South Florida; Benjamin P. Russo, Farmingdale State College; Umesh Vaidya, Iowa State University; Ram Vasudevan, University of Michigan.

Prerequisite skills for participants: Experience with Banach and Hilbert space theory, including measure theory, kernel spaces, and operators as well as some experience with dynamic programming and optimization.

Extremum Seeking Control in Biomedical Applications

Full day (8:30am – 5:30pm)

Organizers: Nicholas Gans, University of Texas at Arlington
Saurav Kumar, University of Texas at Dallas
Robert Gregg, University of Michigan

Location: Room 32

Biomedical systems are notoriously difficult to model. This difficulty stems from the variation in physiology between subjects. Furthermore, an individual subject will often vary over the course of a day, a week, etc. This difficulty in modeling makes it difficult to implement optimal control solutions. Extremum Seeking Control (ESC) is a method of model-free adaptive control that modifies the arguments of a cost function to guide them to a local maximum or minimum. The versatility and model-free nature of ESC makes them very well suited for biomedical control applications. We will present nine recent results in applying ESC to a wide variety of biomedical problems, including powered prosthetics and orthotics, medication delivery, rehabilitation therapy, and assistive heart pumps. We seek to highlight the strengths of ESC in biomedical applications and spur further research and development in the community who may not have considered this powerful approach. The workshop will include an introductory session for those unfamiliar with ESC, and we will provide tutorial papers on the workshop webpage, https://sites.google.com/view/esc4biomed.

Presenters: Victor Duenas, Syracuse University; Hosam Fathy, University of Maryland; Nicholas Gans, University of Texas at Arlington; Robert Gregg, University of Michigan; Martin Guay, Queen's University; Saurav Kumar, University of Texas at Dallas; Peiman Naseradinmousavi, San Diego State University; Miroslav Krstic, University of California San Diego; Tiago Roux Oliveira, State University of Rio de Janeiro; Yan Ting, University of Melbourne.

Prerequisite skills for participants: A general knowledge of adaptive and nonlinear control will be helpful. The workshop will include an introductory session for those unfamiliar with ESC, and we will provide tutorial papers on the workshop webpage.

Task-Oriented Autonomous Vehicular and/or Manufacturing Operations

Full day (8:30am – 5:30pm)

Organizers: Xiang Chen, University of Windsor
Jay A. Farrell, University of California Riverside
Kok-Meng Lee, Georgia Institute of Technology
Fumin Zhang, Georgia Institute of Technology

Location: Room 33

This one-day workshop will focus on major problems facing the design framework for autonomous vehicular and manufacturing operation, involving the following topics:

- Modeling field sensing and perception such as visual, LIDAR, and soft sensor based on
- deformation and temperature field reconstruction,
- Smart actuator based on modular design and embedded field sensors,
- Visual sensor guided autonomous vehicular formation operations,
- Networked sensing and estimation for ground and underwater autonomous vehicular systems,
- Task-oriented autonomous unmanned aerial vehicular operations.

The presented talks by invited speakers are to provide updates of frontiers in these topics and to collectively present the design philosophy of task-oriented autonomous operations seen in vehicular and manufacturing systems.

Presenters: Kun Bai, Huazhong University of Science and Technology; Xiang Chen, University of Windsor; Jay Farrell, University of California Riverside; Jingjing Ji, Huazhong University of Science and Technology; Kok-Meng Lee, Georgia Institute of Technology; Hugh H. T. Liu, University of Toronto; Fumin Zhang, Georgia Institute of Technology.

Prerequisite skills for participants: Background in one or more areas of estimation, control, optimization, UAV, robotics, and field (visual, thermal, laser, etc.) sensing is preferred but not mandatory. Anyone interested in autonomous systems and operations is welcome to participate.

DAILY OVERVIEW

Tuesday Overview

Time	Key Events
18:15 – 19:15	Plenary Session (see *Plenary Sessions*) "Control Challenges for the Laser Interferometer Gravitational-Wave Observatory (LIGO)," Dennis Coyne, California Institute of Technology (Ballroom 1)

Please see the *Workshops* section for information on the many workshops on Tuesday.

Wednesday Overview

Time	Key Events
07:45 – 08:00	2020 ACC Opening Remarks (Ballroom 1)
08:00 – 09:00	Plenary Session (see *Plenary Sessions*) "Lots to Be Done: Towards Data-Informed, Real-Time Coordination Algorithms That Scale Up," Sonia Martinez, Univ. of California at San Diego (Ballroom 1)
09:00 – 09:30	Late Breaking Poster Session (Ballroom 1)
09:00 – 09:30	Coffee Break (See online program for details)
10:00 – 12:00	Rapid Interactive Sessions (Ballroom 1)
12:00 – 13:30	Noon Special Sessions (see *Special Sessions*) • An Overview of NSF Programs • Women in Control Luncheon Meeting • Research with Broad Scope and High Impact in an Industrial Laboratory (Mitsubishi Electric Research Laboratories)
13:30 – 15:30	Mid-Day Technical Sessions
13:30 – 15:30	Mid-Day Special Sessions (see *Special Sessions*) • Women in Controls in Industry • NREL's Control Research: Enabling a Clean Energy Future • Workshop for Elementary, Middle, and High School Students, Teachers, and Parents
15:30 – 16:00	Late Breaking Poster Session (Ballroom 1)
16:00 – 18:00	Late Afternoon Technical Sessions
16:00 – 18:00	Late Afternoon Special Sessions (see *Special Sessions*) • Women in Controls in Industry
18:15 – 19:15	Plenary Session (see *Plenary Sessions*) "Advances and Opportunities of AI and Machine Learning in Industrial Process Monitoring and Control," Leo Chiang, The Dow Chemical Company (Ballroom 1)

Thursday Overview

Time	Key Events
08:00 – 09:00	Plenary Session (see *Plenary Sessions*) "Control of Complex Energy and Power Systems for Electrified Mobility," Andrew Alleyne, University of Illinois at Urbana-Champaign (Ballroom 1)
09:00 – 09:30	Late Breaking Poster Session (Ballroom 1)
09:00 – 09:30	Coffee Break (See online program for details)
09:30 – 11:45	Rapid Interactive Sessions
12:00 – 13:30	Noon Special Sessions (see *Special Sessions*) • Control Design for SuperCruise Automated Driving: Systems, Algorithms, Challenges and Solutions (General Motors) • Bridging the Theory-Practice Gap in Robotics on a Massive Scale in Georgia Tech's Robotarium (Mathworks)
13:30 – 15:30	Mid-Day Technical Sessions
13:30 – 15:30	Mid-Day Special Sessions (see *Special Sessions*) • Promoting Access for Underrepresented Groups in STEM Graduate Disciplines • Quantum Information Systems: Communication, Control and Computing
15:30 – 16:00	Coffee Break (See online program for details)
16:00 – 18:00	Late Afternoon Technical Sessions
16:00 – 18:00	Late Afternoon Evening Sessions (see *Special Sessions*) • Getting Funded by NSF: Proposal Preparation and the Merit Review Process • Student Career Advising

Friday Overview

Time	Key Events
08:00 – 09:00	Plenary Session (see *Plenary Sessions*) "Distributed Decision Making in Network Systems: Algorithms, Fundamental Limits, and Applications," Na Li, Harvard University (Ballroom 1)
09:00 – 09:30	Late Breaking Poster Session (Ballroom 1)
09:00 – 09:30	Coffee Break (See online program for details)
09:30 – 11:45	Rapid Interactive Sessions
12:00 – 13:30	ACC Awards Ceremony (Ballroom 1)
13:30 – 15:30	Mid-Day Technical Sessions
15:30 – 16:00	Coffee Break (See online program for details)
16:00 – 18:00	Late Afternoon Technical Sessions
18:30 – 19:30	Closing Reception

2020 American Control Conference

TECHNICAL PROGRAM

Program at a Glance

ACC 2020 Technical Program Tuesday June 30, 2020

Track T1	Track T2
07:00-18:00 TuWT1 Workshops Workshops	07:00-18:00 TuWT2 Meetings TuWT2

18:15-19:15 TuP1 Ballroom 1 Control Challenges for the Laser Interferometer Gravitational-Wave Observatory (LIGO)

ACC 2020 Technical Program Wednesday July 1, 2020

Track 1	Track 2	Track 3	Track 4	Track 5	Track 6	Track 7	Track 8	Track 9	Track 10	Track 11	Track 12	Track 13	Track 14	Track 15	Track 16	Track 17	Track 18	Track 19	Track 20	Track 21	Track T3
08:00-09:00 WeP11 Ballroom 1 Lots to Be Done: Towards Data-Informed, Real-Time Coordination Algorithms That Scale Up																					
09:00-09:30 WeLBP-A01 Ballroom ABC Poster-WeA																					
09:00-09:30 WeLBP-A02 ACC Sponsors Meeting Space-WeA																					
09:30-10:58 WeA01 Ballroom 1 RI: Optimization and Optimal Control																					
09:30-10:58 WeA02 Ballroom 2 RI: Control of Energy and Automotive Systems																					
11:00-11:45 WeB1T1 RI Interactive Session 1 Posters 'RI: Optimization and Optimal Control'																					
11:00-11:45 WeB1T2 RI Interactive Session 2 Posters 'RI: Control of Energy and Automotive Systems'																					
12:00-13:30 WeLuT4 Meetings and WeLuT4																					
13:30-15:30 WeB01 Governor's SQ 12 Learning-Based Control of	13:30-15:30 WeB02 Ballroom ABC Modeling and Identification of Energy	13:30-15:30 WeB03 Governor's SQ 15 Multivehicle Systems	13:30-15:30 WeB04 Governor's SQ 14 Autonomous Vehicle Perception and	13:30-15:30 WeB05 Plaza Court 6 Modeling and Control of Additive	13:30-15:30 WeB06 Ballroom DE Smart Grid	13:30-15:30 WeB07 Plaza Court 7 Control for Healthcare and Medical	13:30-15:30 WeB08 Governor's SQ 10 Mechatronics I	13:30-15:30 WeB09 Governor's SQ 16 Adaptive Control I	13:30-15:30 WeB10 Governor's SQ 11 Autonomous Robots I	13:30-15:30 WeB11 Director's Row I Agent-Based Systems I	13:30-15:30 WeB12 Director's Row E Estimation I	13:30-15:30 WeB13 Plaza Court 1 Robust Control I	13:30-15:30 WeB14 Plaza Court 8 Estimation and Control of PDE Systems I	13:30-15:30 WeB15 Plaza Court 5 Stability of Nonlinear Systems I	13:30-15:30 WeB16 Governor's SQ 17 Cooperative Control I	13:30-15:30 WeB17 Director's Row J Decentralized Control	13:30-15:30 WeB18 Plaza Court 4 Constrained Control I	13:30-15:30 WeB19 Plaza Court 3 Optimal Control I	13:30-15:30 WeB20 Plaza Court 2 Hybrid Systems I	13:30-15:30 WeB21 Director's Row H Cooperation in Pursuit-Evasion	13:30-15:30 WeBT3 Meetings and WeBT3

Multi-Agent Systems	Storage Systems		Control	Manufacturing Systems		Systems I														Differential Games	
15:30-16:00 WeLBP-P01 Ballroom ABC Poster-WeP											15:30-16:00 WeLBP-P02 ACC Sponsors Meeting Space-WeP										
16:00-18:00 WeC01 Governor's SQ 12 Learning I	16:00-18:00 WeC02 Ballroom ABC Estimation and Diagnostics of Batteries	16:00-18:00 WeC03 Governor's SQ 15 Traffic Control	16:00-18:00 WeC04 Governor's SQ 14 Autonomous Vehicle Motion Planning	16:00-18:00 WeC05 Plaza Court 6 Security & Privacy of Cyber-Physical Systems	16:00-18:00 WeC06 Ballroom DE Autonomous Energy Systems: Optimization and Learning	16:00-18:00 WeC07 Plaza Court 7 Control for Healthcare and Medical Systems II	16:00-18:00 WeC08 Governor's SQ 10 Mechatronics II	16:00-18:00 WeC09 Governor's SQ 16 Adaptive Control II	16:00-18:00 WeC10 Governor's SQ 11 Autonomous Robots II	16:00-18:00 WeC11 Director's Row I Agent-Based Systems II	16:00-18:00 WeC12 Director's Row E Estimation II	16:00-18:00 WeC13 Plaza Court 1 Robust Control II	16:00-18:00 WeC14 Plaza Court 8 Estimation and Control of PDE Systems II	16:00-18:00 WeC15 Plaza Court 5 Stability of Nonlinear Systems II	16:00-18:00 WeC16 Governor's SQ 17 Cooperative Control II	16:00-18:00 WeC17 Director's Row J Delay Systems	16:00-18:00 WeC18 Plaza Court 4 Constrained Control II	16:00-18:00 WeC19 Plaza Court 3 Optimal Control II	16:00-18:00 WeC20 Plaza Court 2 Hybrid Systems II	16:00-18:00 WeC21 Director's Row H Best Student Paper Award Finalists	16:00-18:00 WeCT3 Meetings and WeCT3

18:15-19:15 WeP21
Ballroom 1
Advances and Opportunities of AI and Machine Learning in Industrial Process Monitoring and Control

19:30-21:30 WeBaT5
Meetings
WeBaT5

ACC 2020 Technical Program Thursday July 2, 2020

Traditional Track 1	Traditional Track 2	Traditional Track 3	Traditional Track 4	Traditional Track 5	Traditional Track 6	Traditional Track 7	Traditional Track 8	Traditional Track 9	Traditional Track 10	Traditional Track 11	Traditional Track 12	Traditional Track 13	Traditional Track 14	Traditional Track 15	Traditional Track 16	Traditional Track 17	Traditional Track 18	Traditional Track 19	Traditional Track 20	Traditional Track 21	Track T3
08:00-09:00 ThP1 Ballroom 1 Control of Complex Energy and Power Systems for Electrified Mobility																					
09:00-09:30 ThLBP-A01 Ballroom ABC Poster-ThA																					
09:00-09:30 ThLBP-A02 ACC Sponsors Meeting Space-ThA																					
09:30-10:58 ThA01 Ballroom 1 RI: Predictive Control																					
09:30-10:58 ThA02 Ballroom 2 RI: Control of Robotic Systems																					
11:00-11:45 ThB1T1 RI Interactive Session 1 Posters 'RI: Predictive Control'																					
11:00-11:45 ThB1T2 RI Interactive Session 2 Posters 'RI: Control of Robotic Systems'																					
12:00-13:30 ThLuT4 Meetings and ThLuT4																					
13:30-15:30 ThB01 Governor's SQ 12 Learning II	13:30-15:30 ThB02 Ballroom ABC Control and Estimation of	13:30-15:30 ThB03 Governor's SQ 15 Automotive Control	13:30-15:30 ThB04 Governor's SQ 14 Eco-Driving and	13:30-15:30 ThB05 Plaza Court 6 Robust and Optimal	13:30-15:30 ThB06 Ballroom DE Autonomous Energy System	13:30-15:30 ThB07 Plaza Court 7 Predictive Control System	13:30-15:30 ThB08 Governor's SQ 10 Robotics I	13:30-15:30 ThB09 Governor's SQ 16 Adaptive Control	13:30-15:30 ThB10 Governor's SQ 11 Autonomous System	13:30-15:30 ThB11 Director's Row I Networked Systems I	13:30-15:30 ThB12 Director's Row E Estimation III	13:30-15:30 ThB13 Plaza Court 1 Robust Control III	13:30-15:30 ThB14 Plaza Court 8 Estimation and Control of PDE	13:30-15:30 ThB15 Plaza Court 5 Nonlinear Output Feedba	13:30-15:30 ThB16 Governor's SQ 17 Cooperative Control	13:30-15:30 ThB17 Director's Row J Process Control I	13:30-15:30 ThB18 Plaza Court 4 Stochastic Optimal	13:30-15:30 ThB19 Plaza Court 3 Optimization Algorithms I	13:30-15:30 ThB20 Plaza Court 2 Switched Systems	13:30-15:30 ThB21 Director's Row H Control of Tokamak	13:30-15:30 ThBT3 Meetings and ThBT3

	Batteries	I	Energy Management of Connected and Automated Vehicles	Control for Building HVAC Systems	s: Estimation, Modeling, and Control	s		III	s I				Systems III	ck	III		Control			Fusion Plasmas	
15:30-16:00 ThLBP-P01 Ballroom ABC Poster-ThP											15:30-16:00 ThLBP-P02 ACC Sponsors Meeting Space-ThP										
16:00-18:00 ThC01 Governor's SQ 12 Learning III	16:00-18:00 ThC02 Ballroom ABC Cyber-Physical Privacy and Security in Energy Systems	16:00-18:00 ThC03 Governor's SQ 15 Automotive Control II	16:00-18:00 ThC04 Governor's SQ 14 Energy Management Optimization for Intelligent Vehicles	16:00-18:00 ThC05 Plaza Court 6 Oil and Gas Systems Modeling, Estimation, and Control	16:00-18:00 ThC06 Ballroom DE Autonomous Energy Systems: Optimal Power Flow and Power Systems	16:00-18:00 ThC07 Plaza Court 7 Fault Detection	16:00-18:00 ThC08 Governor's SQ 10 Robotics II	16:00-18:00 ThC09 Govenor's SQ 16 Control Applications I	16:00-18:00 ThC10 Governor's SQ 11 Autonomous Systems II	16:00-18:00 ThC11 Director's Row I Networked Systems II	16:00-18:00 ThC12 Director's Row E Estimation IV	16:00-18:00 ThC13 Plaza Court 1 Uncertain Systems I	16:00-18:00 ThC14 Plaza Court 8 Estimation and Control of PDE Systems IV	16:00-18:00 ThC15 Plaza Court 5 Observers for Nonlinear Systems	16:00-18:00 ThC16 Governor's SQ 17 Distributed Control I	16:00-18:00 ThC17 Director's Row J Process Control II	16:00-18:00 ThC18 Plaza Court 4 Stochastic Systems	16:00-18:00 ThC19 Plaza Court 3 Optimization Algorithms II	16:00-18:00 ThC20 Plaza Court 2 Discrete Event Systems	16:00-18:00 ThC21 Director's Row H Control of Wafer Scanner: Methods and Developments	16:00-18:00 ThCT3 Meetings and ThCT3

19:30-21:30 ThBaT5 Meetings ThBaT5

ACC 2020 Technical Program Friday July 3, 2020

Traditional Track 1	Traditional Track 2	Traditional Track 3	Traditional Track 4	Traditional Track 5	Traditional Track 6	Traditional Track 7	Traditional Track 8	Traditional Track 9	Traditional Track 10	Traditional Track 11	Traditional Track 12	Traditional Track 13	Traditional Track 14	Traditional Track 15	Traditional Track 16	Traditional Track 17	Traditional Track 18	Traditional Track 19	Traditional Track 20	Traditional Track 21	Track T3
08:00-09:00 FrP1 Ballroom 1 Distributed Decision Making in Network Systems: Algorithms, Fundamental Limits, and Applications																					
09:00-09:30 FrLBP-A01 Ballroom ABC Poster-FrA																09:00-09:30 FrLBP-A02 ACC Sponsors Meeting Space-FrA					
09:30-10:58 FrA01 Ballroom 1 RI: Control of Biological and Aerospace Systems																09:30-10:58 FrA02 Ballroom 2 RI: Learning					
11:00-11:45 FrB1T1 RI Interactive Session 1 Posters 'RI: Control of Biological and Aerospace Systems'																11:00-11:45 FrB1T2 RI Interactive Session 2 Posters 'RI: Learning'					
12:00-13:30 FrLuT4 Awards Ceremony and Meetings FrLuT4																					
13:30-15:30 FrB01 Governor's SQ 12 Learning IV	13:30-15:30 FrB02 Ballroom F Advanced Control of	13:30-15:30 FrB03 Governor's SQ 15 Smart Mobility	13:30-15:30 FrB04 Governor's SQ 14 Energy Management	13:30-15:30 FrB05 Plaza Court 6 Aerospace Systems I	13:30-15:30 FrB06 Ballroom DE Energy Systems I	13:30-15:30 FrB07 Plaza Court 7 Biosystems I	13:30-15:30 FrB08 Governor's SQ 10 Mechatronic System	13:30-15:30 FrB09 Governor's SQ 16 Control Applications II	13:30-15:30 FrB10 Governor's SQ 11 Modeling and Control	13:30-15:30 FrB11 Director's Row I Networked Systems III	13:30-15:30 FrB12 Director's Row E Filtering	13:30-15:30 FrB13 Plaza Court 1 Uncertain Systems II	13:30-15:30 FrB14 Plaza Court 8 Control and Estimation in	13:30-15:30 FrB15 Plaza Court 5 Nonlinear Systems	13:30-15:30 FrB16 Governor's SQ 17 Distributed Control	13:30-15:30 FrB17 Director's Row J Linear Systems I	13:30-15:30 FrB18 Plaza Court 4 Game Theory I	13:30-15:30 FrB19 Plaza Court 3 Optimization	13:30-15:30 FrB20 Plaza Court 2 Formal Verification I	13:30-15:30 FrB21 Director's Row H Learning and Control:	13:30-15:30 FrBT3 Meetings FrBT3

	Wind Turbines and Farms I	Systems	in Vehicle Systems				s		for Human-Robot Interaction				Flow Systems	Identification	II					Opportunities and Challenges	
15:30-16:00 FrLBP-P01 Ballroom ABC Poster-FrP											15:30-16:00 FrLBP-P02 ACC Sponsors Meeting Space-FrP										
16:00-18:00 FrC01 Governor's SQ 12 Iterative Learning Control	16:00-18:00 FrC02 Ballroom F Advanced Control of Wind Turbines and Farms II	16:00-18:00 FrC03 Governor's SQ 15 Safety and Security of Vehicle Systems	16:00-18:00 FrC04 Governor's SQ 14 Engine and Powertrain Control	16:00-18:00 FrC05 Plaza Court 6 Aerospace Systems II	16:00-18:00 FrC06 Ballroom DE Energy Systems II	16:00-18:00 FrC07 Plaza Court 7 Biosystems II	16:00-18:00 FrC08 Governor's SQ 10 Mechanical Systems	16:00-18:00 FrC09 Governor's SQ 16 Control Applications III	16:00-18:00 FrC10 Governor's SQ 11 Energy-Aware Robotics	16:00-18:00 FrC11 Director's Row I [Title not available]	16:00-18:00 FrC12 Director's Row E Identification	16:00-18:00 FrC13 Plaza Court 1 Lyapunov Methods	16:00-18:00 FrC14 Plaza Court 8 Sensor Fusion	16:00-18:00 FrC15 Plaza Court 5 Nonholonomic Systems	16:00-18:00 FrC16 Governor's SQ 17 Distributed Control III	16:00-18:00 FrC17 Director's Row J Linear Systems II	16:00-18:00 FrC18 Plaza Court 4 Game Theory II		16:00-18:00 FrC20 Plaza Court 2 Formal Verification II		16:00-18:00 FrCT3 Meetings [Title not available]

19:30-21:30 FrBaT5 Closing Reception FrBaT5

2020 American Control Conference

TECHNICAL PROGRAM

Detailed Program Listing

Detailed Program Listing

Technical Program for Tuesday June 30, 2020

TuWT1	Workshops
Workshops (Tutorial Session)	
07:00-18:00	TuWT1.1
W1: System Modeling and Control with Smooth Fuzzy Compositions, pp. 1-1.	
Sadjadi, Ebrahim Navid	Carlos III
07:00-18:00	TuWT1.2
W2: Secure State Estimation and Control of Cyber Physical Systems: An Unknown Input Observer Approach, pp. 2-2.	
Hui, Stefen	San Diego State University
Zak, Stanislaw H.	Purdue Univ
07:00-18:00	TuWT1.3
W3: Current Topics in Aerospace Control, pp. 3-3.	
Hull, Richard A.	Collins Aerospace
Hovakimyan, Naira	University of Illinois at Urbana-Champaign
Qu, Zhihua	Univ. of Central Florida
Kolmanovsky, Ilya V.	The University of Michigan
Hussain, Heather	MIT
Cichella, Venanzio	University of Iowa
Panagou, Dimitra	University of Michigan, Ann Arbor
Sanyal, Amit	Syracuse University
Ridgely, D. Brett	Raytheon Missile Systems
07:00-18:00	TuWT1.4
W5: Practical Methods for Real World Control Systems, pp. 4-4.	
Abramovitch, Daniel Y.	Agilent Technologies
Andersson, Sean B.	Boston University
Buhr, Craig	The MathWorks
07:00-18:00	TuWT1.5
W6: Confluence of Vision and Control, pp. 5-5.	
Dani, Ashwin	University of Connecticut
Gans, Nicholas	University of Texas at Arlington
07:00-18:00	TuWT1.6
W7: Exploring Interplay between Dynamical Systems and Function Spaces: A Unifying Presentation of Dynamics Mode Decomposition and Occupation Measures, pp. 6-6.	
Kamalapurkar, Rushikesh	Oklahoma State University
Rosenfeld, Joel A.	University of South Florida
07:00-18:00	TuWT1.7
W8: Extremum Seeking Control in Biomedical Applications, pp. 7-7.	
Gans, Nicholas	University of Texas at Arlington
Kumar, Saurav	University of Texas at Dallas
Gregg, Robert D.	University of Michigan
07:00-18:00	TuWT1.8
W9: Task-Oriented Autonomous Vehicular And/or Manufacturing Operations, pp. 8-8.	
Chen, Xiang	University of Windsor
Farrell, Jay A.	University of California Riverside
Lee, Kok-Meng	Georgia Inst. of Tech
Zhang, Fumin	Georgia Institute of Technology

TuWT2	Meetings
TuWT2 (Special Session)	
07:00-18:00	TuWT2.1
Meeting: Board of Governors (from 12Noon to 5pm), pp. 9-9.	
Cortes, Jorge	University of California, San Diego
07:00-18:00	TuWT2.2
Meeting: ASME DSCD ExComm Meeting (from 1.30pm to 5.30pm), pp. 10-10.	
Yi, Jingang	Rutgers University

TuP1	Ballroom 1
Control Challenges for the Laser Interferometer Gravitational-Wave Observatory (LIGO) (Plenary Session)	
Chair: Borrello, Michael A.	Philips Healthcare
18:15-19:15	TuP1.1
Control Challenges for the Laser Interferometer Gravitational-Wave Observatory (LIGO), pp. 11-11.	
Coyne, Dennis	Caltech

WeP11 Ballroom 1

Lots to Be Done: Towards Data-Informed, Real-Time Coordination Algorithms That Scale Up (Plenary Session)

Chair: Devasia, Santosh — Univ of Washington

08:00-09:00 WeP11.1

Lots to Be Done: Towards Data-Informed, Real-Time Coordination Algorithms That Scale Up, pp. 12-12.

Martinez, Sonia — University of California at San Diego

WeLBP-A01 Ballroom ABC

Poster-WeA (Late Breaking Poster Session)

09:00-09:30 WeLBP-A01.1

Overcoming the Obstacle of Fixed Eigenvalues in Decentralized Control, pp. 13-13.

Liu, Fengjiao — Yale University
Morse, A. Stephen — Yale Univ

09:00-09:30 WeLBP-A01.2

Distributed Autonomous Robotic Information Gathering under Communication Constraints, pp. 14-14.

Moon, Sangwoo — University of Colorado Boulder
Frew, Eric W. — University of Colorado, Bolder

09:00-09:30 WeLBP-A01.3

On-Board Capacity Fade Estimation Using Supervised Learning, pp. 15-15.

Manickam, Anandha Natarajan — The University of Texas at Dallas
Yurkovich, Stephen — University of Texas at Dallas

09:00-09:30 WeLBP-A01.4

Simulation-Guided Reachable Set Estimation for Neural Network Models of Nonlinear Dynamical Systems, pp. 16-16.

Xiang, Weiming — Augusta University

09:00-09:30 WeLBP-A01.5

SLS-MATLAB Toolbox: Do-It-Yourself System Level Synthesis, pp. 17-17.

Li, Jing Shuang — California Institute of Technology
Tseng, Shih-Hao — California Institute of Technology

09:00-09:30 WeLBP-A01.6

Controlled Microparticle Separation Using Whispering Gallery Mode Forces, pp. 18-18.

Chang, Yuhe — Boston University
Andersson, Sean B. — Boston University
Ekinci, Kamil L. — Boston University
Svitelskiy, Oleksiy — Gorden College
King, Alexander S. — Gorden College
Jordan, Nathan J. — Gorden College

09:00-09:30 WeLBP-A01.7

Efficient Path Generation and Tracking Control for Autonomous Vehicles, pp. 19-19.

Choi, Jinsuk — Postech
Baek, Seungmin — POSTECH
Lee, Hyoung-woong — Pohang University of Science and Technology
Han, Soohee — Pohang University of Science and Technology

WeLBP-A02 ACC Sponsors

Meeting Space-WeA

09:00-09:30 WeLBP-A02.1

Gold Sponsor: General Motors, pp. 20-20.

Eckman, Wendy — General Motors

09:00-09:30 WeLBP-A02.2

Gold Sponsor: Mathworks, pp. 21-21.

Rose, Jennifer — MathWorks
Ulusoy, Melda — Mathworks

09:00-09:30 WeLBP-A02.3

Gold Sponsor: Mitsubishi Electric Research Lab (MERL), pp. 22-22.

Thornton, Jay — Mitsubishi Electric Research Lab
Di Cairano, Stefano — Mitsubishi Electric Research Lab

09:00-09:30 WeLBP-A02.4

Silver Sponsor: Quanser, pp. 23-23.

Rahaman, Josie — Quanser Consulting
Wang, Gemma — Quanser

09:00-09:30 WeLBP-A02.5

Silver Sponsor: SIAM, pp. 24-24.

O'Neill, Kristin — SIAM

09:00-09:30 WeLBP-A02.6

Silver Sponsor: Cancelled, pp. 25-25.

Kelly, Claire — Wiley

09:00-09:30 WeLBP-A02.7

Silver Sponsor: DSPACE, pp. 26-26.

Johnson, Janice — DSpace

09:00-09:30 WeLBP-A02.8

Silver Sponsor: Springer Nature, pp. 27-27.

Tominich, Christopher — Springer
Jackson, Oliver — Springer

09:00-09:30 WeLBP-A02.9

Bronze Sponsor: Processes, pp. 28-28.

Xiang, Wency — Processes MDPI

09:00-09:30 WeLBP-A02.10

Bronze Sponsor: Halliburton, pp. 29-29.

Darbe, Robert — Halliburton

WeA01 Ballroom 1

RI: Optimization and Optimal Control (RI Session)

Chair: Grover, Martha — Georgia Institute of Technology
Co-Chair: Clayton, Garrett — Villanova University

09:30-09:55 WeA01.1

Optimal Real-Time Scheduling of Human Attention for a Human and Multi-Robot Collaboration System, pp. 30-35.

Yao, Ningshi — Georgia Institute of Technology
Zhang, Fumin — Georgia Institute of Technology

09:55-09:58 WeA01.2

Optimal Evasion against Dual Pure Pursuit, pp. 36-43.

Von Moll, Alexander — Air Force Research Laboratory
Fuchs, Zachariah E. — University of Cincinnati

Pachter, Meir	AFIT/ENG

09:58-10:01 WeA01.3

Extremum Seeking for Creating Optimal Feedback Controls of Unknown Systems by Tuning Basis Functions, pp. 44-49.

Scheinker, Alexander	Los Alamos National Lab
Scheinker, David	Massachusetts Institute of Technology

10:01-10:04 WeA01.4

Escaping Locally Optimal Decentralized Control Polices Via Damping, pp. 50-57.

Feng, Han	University of California, Berkeley
Lavaei, Javad	UC Berkeley

10:04-10:07 WeA01.5

Energy-Optimal Tours for Quadrotors to Scan Moth-Infested Trees in Densely-Packed Forests, pp. 58-63.

Aoun, Christoph	American University of Beirut
Shammas, Elie	American University of Beirut
Daher, Naseem	American University of Beirut

10:07-10:10 WeA01.6

Resilient Sparse Controller Design with Guaranteed Disturbance Attenuation, pp. 64-69.

Bahavarnia, MirSaleh	University of Maryland, College Park
Mousavi, Hossein K.	Lehigh University

10:10-10:13 WeA01.7

Cascading Structure Linear Quadratic Tracking Control for Dual-Stage Nanopositioning Systems, pp. 70-75.

Nagel, William	University of Utah
Leang, Kam K.	University of Utah

10:13-10:16 WeA01.8

An Iterative Method for Optimal Control of Nonlinear Quadratic Tracking Problems, pp. 76-81.

Ning, Nancy	Washington University in St.Louis
Bomela, Walter	Washington University in Saint Louis
Li, Jr-Shin	Washington University in St. Louis

10:16-10:19 WeA01.9

Fast UAV Trajectory Optimization Using Bilevel Optimization with Analytical Gradients, pp. 82-87.

Sun, Weidong	Xyz Robotics
Tang, Gao	UIUC
Hauser, Kris	University of Illinois at Urbana Champaign

10:19-10:22 WeA01.10

Continuous-Time Optimization of Time-Varying Cost Functions Via Finite-Time Stability with Pre-Defined Convergence Time, pp. 88-93.

Romero, Orlando	Rensselaer Polytechnic Institute
Benosman, Mouhacine	Mitsubishi Electric Research Laboratories

10:22-10:25 WeA01.11

CPCA: A Chebyshev Proxy and Consensus Based Algorithm for General Distributed Optimization, pp. 94-99.

He, Zhiyu	Shanghai Jiaotong University
He, Jianping	Shanghai Jiao Tong University
Chen, Cailian	Shanghai Jiao Tong University
Guan, Xin-Ping	Shanghai Jiao Tong University

10:25-10:28 WeA01.12

Maximum Observation of a Faster Non-Maneuvering Target by a Slower Observer, pp. 100-105.

Weintraub, Isaac	Air Force Research Labs
Von Moll, Alexander	Air Force Research Laboratory
Garcia, Eloy	Air Force Research Laboratory
Casbeer, David W.	Air Force Research Laboratory
Demers, Zachary	Air Force Research Laboratory
Pachter, Meir	AFIT/ENG

10:28-10:31 WeA01.13

On the Set of Possible Minimizers of a Sum of Known and Unknown Functions, pp. 106-111.

Kuwaranancharoen, Kananart	Purdue University
Sundaram, Shreyas	Purdue University

10:31-10:34 WeA01.14

A Generic Solver for Unconstrained Control Problems with Integral Functional Objectives, pp. 112-118.

Tseng, Shih-Hao	California Institute of Technology

10:34-10:37 WeA01.15

Direct Synthesis of Iterative Algorithms with Bounds on Achievable Worst-Case Convergence Rate, pp. 119-125.

Lessard, Laurent	University of Wisconsin-Madison
Seiler, Peter	University of Michigan, Ann Arbor

10:37-10:40 WeA01.16

Improved Sample Complexity for Stochastic Compositional Variance Reduced Gradient, pp. 126-131.

Lin, Tianyi	University of California, Berkeley
Fan, Chenyou	Google
Wang, Mengdi	Princeton University
Jordan, Michael I.	UC Berkeley

10:40-10:43 WeA01.17

On the Convergence of the Iterative Linear Exponential Quadratic Gaussian Algorithm to Stationary Points, pp. 132-137.

Roulet, Vincent	University of Washington
Fazel, Maryam	University of Washington
Srinivasa, Siddhartha	University of Washington
Harchaoui, Zaid	University of Washington

10:43-10:46 WeA01.18

Market Approach to Length Constrained Min-Max Multiple Depot Multiple Traveling Salesman Problem, pp. 138-143.

Scott, Drew	Research Assistant
Manyam, Satyanarayana Gupta	Air Force Research Labs
Casbeer, David W.	Air Force Research Laboratory
Kumar, Manish	University of Cincinnati

10:46-10:49 WeA01.19

Multi-Agent Coordination for Distributed Transmit Beamforming, pp. 144-149.

George, Jemin	U.S. Army Research Laboratory
Parayil, Anjaly	Indian Institute of Science
Yilmaz, Cemal Tugrul	North Carolina State University
Allik, Bethany	US Army Research Laboratory
Bai, He	Oklahoma State University
Chakrabortty, Aranya	North Carolina State University

10:49-10:52 WeA01.20

Increasing Efficiency of Grid Free Path Planning by Bounding the Path-Planning Search Region, pp. 150-155.

Tau, Seth	The Pennsylvania State University
Brennan, 16802-1400	Penn State University
Reichard, Karl	Penn State University
Pentzer, Jesse	The Pennsylvania State University
Gorsich, David	U.S. Army Tank Automotive \\ Res, Dev \& Engr Center (TARDEC)

10:52-10:55 WeA01.21

Design a High Efficiency and Low Ripple BLDC Motor Based on Multi-Objective Optimization Methods, pp. 156-161.

Karimi Shahri, Pouria	UNC Charlotte
izadi, Vahid	University of North Carolina Charlotte
Ghasemi, Amirhossein	University of North Carolina Charlotte

10:55-10:58 WeA01.22

Observer-Based Extremum Seeking Control of Static Maps with Delays, pp. 162-167.

Yilmaz, Cemal Tugrul	North Carolina State University
George, Jemin	U.S. Army Research Laboratory
Chakrabortty, Aranya	North Carolina State University

WeA02 Ballroom 2

RI: Control of Energy and Automotive Systems (RI Session)

Chair: Leang, Kam K.	University of Utah
Co-Chair: Devasia, Santosh	Univ of Washington

09:30-09:55 WeA02.1

Making Money in Energy Markets: Probabilistic Forecasting and Stochastic Programming Paradigms, pp. 168-173.

Gao, Xian	University of Notre Dame
Dowling, Alexander	University of Notre Dame

09:55-09:58 WeA02.2

Optimal Battery Dispatch and Real-Time State of Charge Tracking for Microgrid Applications, pp. 174-179.

Valibeygi, Amir	University of California, San Diego
de Callafon, Raymond A.	Univ. of California, San Diego

09:58-10:01 WeA02.3

Filter-Based Controller to Improve the Power Quality of Single-Phase Grid-Connected Inverters, pp. 180-185.

Alqatamin, Moath	University of Louisville
Hawkins, Nicholas	University of Louisville
McIntyre, Michael	University of Louisville

10:01-10:04 WeA02.4

A Risk Aware Two-Stage Market Mechanism for Electricity with Renewable Generation, pp. 186-191.

Dahlin, Nathan	University of Southern California
Jain, Rahul	University of Southern California

10:04-10:07 WeA02.5

Self-Synchronizing Current Control for Single-Stage Three-Phase Grid-Connected Photovoltaic Systems, pp. 192-197.

Alqatamin, Moath	University of Louisville
Bhagwat, Bhagyashri	University of Louisville
Hawkins, Nicholas	University of Louisville
Latham, Joseph	University of Louisville
McIntyre, Michael	University of Louisville

10:07-10:10 WeA02.6

Stochastic Resource Allocation for Electricity Distribution Network Resilience, pp. 198-203.

Chang, Derek	Massachusetts Institute of Technology
Shelar, Devendra	Massachusetts Institute of Technology
Amin, Saurabh	Massachusetts Institute of Technology

10:10-10:13 WeA02.7

Index Policies for Stochastic Deadline Scheduling with Time-Varying Processing Rate Limits, pp. 204-210.

Hao, Liangliang	Chinese University of Hong Kong
Xu, Yunjian	Chinese University of Hong Kong

10:13-10:16 WeA02.8

Adaptive Super-Twisting Sliding Mode Control for Ocean Current Turbine-Driven Permanent Magnet Synchronous Generator, pp. 211-217.

Tang, Yufei	Florida Atlantic University
Zhang, Yuantao	Chongqing University of Science and Technology
Hasankhani, Arezoo	Florida Atlantic University
VanZwieten, James	Florida Atlantic University

10:16-10:19 WeA02.9

Applying the Similarity Method on Pacejka's Magic Formula to Estimate the Maximum Longitudinal Tire-Road Friction Coefficient, pp. 218-223.

Bardawil, Carine	American University of Beirut
Daher, Naseem	American University of Beirut
Shammas, Elie	American University of Beirut

10:19-10:22 WeA02.10

A Lagrangian Policy for Optimal Energy Storage Control, pp. 224-230.

Xu, Bolun	Columbia University
Korpas, Magnus	Norwegian University of Science and Technology
Botterud, Audun	MIT
O'Sullivan, Francis	MIT

10:22-10:25 WeA02.11

Feature Selection for State-Of-Charge Estimation of LiFePO$_4$--Li$_4$Ti$_5$O$_{12}$ Batteries Via Electrochemical Impedance, pp. 231-236.

La Rue, Aleksei	Colorado School of Mines
Weddle, Peter	Colorado School of Mines
Kee, Bob	Colorado School of Mines
Vincent, Tyrone L.	Colorado School of Mines

10:25-10:28 WeA02.12

Machine Learning Control for Floating Offshore Wind Turbine Individual Blade Pitch Control, pp. 237-241.

Kane, Michael	Northeastern University

10:28-10:31 WeA02.13

Investigating the Effects of Mechanical Damage on Electrical Response of Li-Ion Pouch Cells, pp. 242-247.

Stacy, Andrew	Temple University
Gilaki, Mehdi	Temple University
Sahraei, Elham	Temple University

Soudbakhsh, Damoon	Temple University

10:31-10:34 WeA02.14

A Vehicle Coordination and Charge Scheduling Algorithm for Electric Autonomous Mobility-On-Demand Systems, pp. 248-255.

Boewing, Felix	ETH Zurich
Schiffer, Maximilian	Technical University of Munich, TUM School of Management
Salazar, Mauro	Stanford University
Pavone, Marco	Stanford University

10:34-10:37 WeA02.15

Wheel Slip Regulation Using an Optimal Reference Slip Estimation Framework, pp. 256-261.

Gaurkar, Pavel Vijay	Indian Institute of Technology Madras
R, Karthik	Indian Institute of Technology Madras
Challa, Akhil	IIT Madras
Subramanian, Shankar	Indian Institute of Technology Madras
Vivekanandan, Gunasekaran	Madras Engineering Industries Pvt. Ltd
Sivaram, Sriram	Madras Engineering Industries Pvt. Ltd

10:37-10:40 WeA02.16

Head-Controlled Racecar for Quadriplegics, pp. 262-267.

Direen, Harry	DireenTech Inc
Direen, Randal	DireenTech Inc
Direen, James	Reel FX

10:40-10:43 WeA02.17

Closed-Form Solutions for a Real-Time Energy-Optimal and Collision-Free Speed Planning with Limited Information, pp. 268-275.

Han, Jihun	Argonne National Laboratory
Karbowski, Dominik	Argonne National Laboratory
Kim, Namdoo	NIER

10:43-10:46 WeA02.18

A Cylinder Deactivation Control Framework for Gasoline Engines without Valve Deactivation, pp. 276-281.

Strange, Dakota	Tennessee Technological University
Chen, Pingen	Tennessee Technological University

10:46-10:49 WeA02.19

Ammonia Distribution Control for a Two-Cell SCR System in a New Configuration, pp. 282-287.

Yang, Kuo	Tennessee Technological University
Chen, Pingen	Tennessee Technological University

10:49-10:52 WeA02.20

A Port-Hamiltonian Approach to Complete Vehicle Energy Management: A Battery Electric Vehicle Case Study, pp. 288-294.

Padilla Cazar, G. P.	Eindhoven University of Technology
Flores Paredes, J. C.	Eindhoven University of Technology
Donkers, M.C.F.	Eindhoven University of Technology

10:52-10:55 WeA02.21

Uncertainty Quantification Using Generalized Polynomial Chaos for Online Simulations of Automotive Propulsion Systems, pp. 295-300.

Yang, Hang	University of Michigan
Kidambi, Narayanan	University of Michigan
Fujii, Yuji	Ford Motor Company
Gorodetsky, Alex	University of Michigan
Wang, Kon-Well	The University of Michigan

10:55-10:58 WeA02.22

Online Parameter Estimation for Human Driver Behavior Prediction, pp. 301-306.

Bhattacharyya, Raunak	Stanford University
Senanayake, Ransalu	Stanford University
Brown, Kyle	Stanford University
Kochenderfer, Mykel	Stanford University

WeLuT4 Meetings and

WeLuT4 (Special Session)

12:00-13:30 WeLuT4.1

Special Session: An Overview of NSF Programs, pp. 307-307.

Dolinskaya, Irina	National Science Foundation (NSF)

12:00-13:30 WeLuT4.2

Special Session: Research with Broad Scope and High Impact in an Industrial Laboratory, pp. 308-309.

Berntorp, Karl	Mitsubishi Electric Research Labs
Danielson, Claus	Mitsubishi Electric Research Labs
Di Cairano, Stefano	Mitsubishi Electric Research Labs
Quirynen, Rien	Mitsubishi Electric Research Laboratories (MERL)

12:00-13:30 WeLuT4.3

Women in Control Luncheon Meeting, pp. 310-310.

Bushnell, Linda	University of Washington
Fekih, Afef	University of Louisiana at Lafayette
Scherpen, Jacquelien M.A.	University of Groningen

12:00-13:30 WeLuT4.4

Meeting: ASME DSCD TC Chairs Meeting (from 12Noon to 1PM), pp. 311-311.

Tan, Xiaobo	Michigan State University

12:00-13:30 WeLuT4.5

Meeting: TC Smart Cities (from 12Noon to 1.30PM), pp. 312-312.

Malikopoulos, Andreas A.	University of Delaware

12:00-13:30 WeLuT4.6

Meeting: ASME DSCD Vibration TC Meeting (from 12Noon to 1PM), pp. 313-313.

Zheng, Minghui	University at Buffalo

12:00-13:30 WeLuT4.7

Meeting: ASME DSCC 2021 OpComm Meeting (from 12Noon to 1PM), pp. 314-314.

Wang, Junmin	University of Texas at Austin

WeB01	Governor's SQ 12
Learning-Based Control of Multi-Agent Systems (Invited Session)	
Chair: Bai, He	Oklahoma State University
Co-Chair: George, Jemin	U.S. Army Research Laboratory
Organizer: Chakrabortty, Aranya	North Carolina State University
Organizer: Bai, He	Oklahoma State University
Organizer: George, Jemin	U.S. Army Research Laboratory

13:30-13:50 WeB01.1

Reinforcement Learning for Multi-Agent Systems with an Application to Distributed Predictive Cruise Control (I), pp. 315-320.

Mynuddin, Mohammed	Georgia Southern University
Gao, Weinan	Georgia Southern University
Jiang, Zhong-Ping	New York University

13:50-14:10 WeB01.2

Trading Dynamic Regret for Model Complexity in Nonstationary Nonparametric Optimization (I), pp. 321-326.

Bedi, Amrit	US Army Research Lab
Koppel, Alec	U.S. Army Research Laboratory
Rajawat, Ketan	Indian Institute of Technology Kanpur
Sadler, Brian	ARL

14:10-14:30 WeB01.3

A Distributed Primal-Dual Algorithm for Bandit Online Convex Optimization with Time-Varying Coupled Inequality Constraints (I), pp. 327-332.

Yi, Xinlei	KTH Royal Institute of Technology
Li, Xiuxian	Nanyang Technological University
Yang, Tao	Northeastern University
Xie, Lihua	Nanyang Tech. Univ
Chai, Tianyou	Northeastern University
Johansson, Karl H.	Royal Institute of Technology

14:30-14:50 WeB01.4

Approximate Equilibrium Computation for Discrete-Time Linear-Quadratic Mean-Field Games (I), pp. 333-339.

Zaman, Muhammad Aneeq uz	UIUC
Zhang, Kaiqing	University of Illinois at Urbana-Champaign (UIUC)
Miehling, Erik	University of Illinois at Urbana-Champaign
Basar, Tamer	Univ of Illinois, Urbana-Champaign

14:50-15:10 WeB01.5

Hierarchical Control of Multi-Agent Systems Using Online Reinforcement Learning (I), pp. 340-345.

Bai, He	Oklahoma State University
George, Jemin	U.S. Army Research Laboratory
Chakrabortty, Aranya	North Carolina State University

WeB02	Ballroom ABC
Modeling and Identification of Energy Storage Systems (Invited Session)	
Chair: Parvini, Yasha	Clemson University
Co-Chair: Moura, Scott	University of California, Berkeley
Organizer: Dey, Satadru	University of Colorado Denver
Organizer: Moura, Scott	University of California, Berkeley
Organizer: Lin, Xinfan	University of California, Davis
Organizer: Kim, Youngki	University of Michigan - Dearborn
Organizer: Fang, Huazhen	University of Kansas
Organizer: Donkers, M.C.F.	Eindhoven University of Technology
Organizer: Song, Xingyong	Texas A&M University, College Station
Organizer: Siegel, Jason B.	University of Michigan
Organizer: Choe, Song-Yul (Ben)	Auburn University
Organizer: Perez, Hector E.	University of California, Berkeley
Organizer: Lotfi, Nima	Southern Illinois University Edwardsville

13:30-13:50 WeB02.1

Optimization of Current Excitation for Identification of Battery Electrochemical Parameters Based on Analytic Sensitivity Expression (I), pp. 346-351.

Lai, Qingzhi	University of California, Davis
Ahn, Hyoung Jun	LG Chem
Kim, Geumbee	LG Chem
Joe, Won Tae	Battery R&D, LG Chem
Lin, Xinfan	University of California, Davis

13:50-14:10 WeB02.2

Robust Parameter Subset Selection and Optimal Experimental Design for Effective Parameterization of PEM Fuel Cell Models (I), pp. 352-358.

Goshtasbi, Alireza	University of Michigan
Chen, Jixin	University of Michigan
Waldecker, James	Ford Motor Company
Hirano, Shinichi	Ford Motor Company
Ersal, Tulga	University of Michigan

14:10-14:30 WeB02.3

Validation and Sensitivity Analysis of a Fractional Order Model of a Lithium Ion Battery Via Impedance Spectra and Temporal Duty Cycles (I), pp. 359-364.

Mirzaei, Hamidreza	Clemson University
Li, Zhan	Human Horizons Technology Co., Ltd
Parvini, Yasha	Clemson University

14:30-14:50 WeB02.4

A Novel Lithium-Ion Battery Pack Modeling Framework - Series-Connected Case Study (I), pp. 365-372.

Weaver, Trey	Stanford University
Allam, Anirudh	Stanford University
Onori, Simona	Stanford Univeristy

14:50-15:10 WeB02.5

Analysis of Online Parameter Estimation for Electrochemical Li-Ion Battery Models Via Reduced Sensitivity Equations (I), pp. 373-378.

Gima, Zachary	University of California, Berkeley
Kato, Dylan	UC Berkeley
Klein, Reinhardt	Robert Bosch LLC
Moura, Scott	University of California, Berkeley

15:10-15:30 WeB02.6

On the Structure of the Optimal Input for Maximizing Lithium-Ion Battery Thermal Parameter Identifiability, pp. 379-385.

Doosthosseini, Mahsa	University of Maryland

Fathy, Hosam K. — University of Maryland

WeB03 — Governor's SQ 15

Multivehicle Systems (Regular Session)

Chair: Sipahi, Rifat — Northeastern University
Co-Chair: Al Janaideh, Mohammad — Memorial University

13:30-13:50 — WeB03.1

Fault Detection, Localization, and Mitigation of a Network of Connected Autonomous Vehicles Using Transmissibility Identification, pp. 386-391.

Khalil, Abdelrahman — Memorial University of Newfoundland
Al Janaideh, Mohammad — Memorial University
Aljanaideh, Khaled — Jordan University of Science and Technolgoy
Kundur, Deepa — University of Toronto

13:50-14:10 — WeB03.2

Cooperative Air-Ground Vehicle Routing Using Chance-Constrained Optimization, pp. 392-397.

Du, Bin — Purdue University
Sun, Dengfeng — Purdue University
Manyam, Satyanarayana Gupta — Air Force Research Labs
Casbeer, David W. — Air Force Research Laboratory

14:10-14:30 — WeB03.3

Motion Prediction of Human-Driven Vehicles in Mixed Traffic with Connected Autonomous Vehicles, pp. 398-403.

Zhang, Linjun — Ford Motor Company
tseng, eric — Ford Motor Company

14:30-14:50 — WeB03.4

Stability Analysis of a Large-Scale Single-Lane Connected Vehicle Model with Multiple Sensing, Communication, and Human Reaction Delays, pp. 404-409.

Wang, Duo — NORTHEASTERN UNIVERSITY
Sipahi, Rifat — Northeastern University

14:50-15:10 — WeB03.5

Nonlinear Optimal Velocity Car Following Dynamics (I): Approximation in Presence of Deterministic and Stochastic Perturbations, pp. 410-415.

Nick Zinat Matin, Hossein — University of Illinois at Urbana Champaign
Sowers, Richard — University Fo Illinois

15:10-15:30 — WeB03.6

Nonlinear Optimal Velocity Car Following Dynamics (II): Rate of Convergence in the Presence of Fast Perturbation, pp. 416-421.

Nick Zinat Matin, Hossein — University of Illinois at Urbana Champaign
Sowers, Richard — University Fo Illinois

WeB04 — Governor's SQ 14

Autonomous Vehicle Perception and Control (Invited Session)

Chair: Hall, Carrie — Illinois Institute of Technology
Co-Chair: Malikopoulos, Andreas A. — University of Delaware
Organizer: Dadras, Sara — Company
Organizer: Ghasemi, Amirhossein — University of North Carolina Charlotte
Organizer: Lotfi, Nima — Southern Illinois University Edwardsville
Organizer: Hall, Carrie — Illinois Institute of Technology

13:30-13:50 — WeB04.1

Multi-Agent Control of Lane-Switching Automated Vehicles for Energy Efficiency (I), pp. 422-429.

Dollar, Robert Austin — Clemson University
Sciarretta, Antonio — IFP Energies Nouvelles
Vahidi, Ardalan — Clemson University

13:50-14:10 — WeB04.2

Lane Change Control with Optimal Time-Varying Sliding Mode in Automated Driving Vehicle, pp. 430-435.

Kim, Jin Sung — Hanyang University
Lee, Seung Hi — Hanyang University
Chung, Chung Choo — Hanyang University

14:10-14:30 — WeB04.3

Conditions for State and Control Constraint Activation in Coordination of Connected and Automated Vehicles (I), pp. 436-441.

Mahbub, A M Ishtiaque — University of Delaware
Malikopoulos, Andreas A. — University of Delaware

14:30-14:50 — WeB04.4

A Novel Vehicle Tracking Method for Cross-Area Sensor Fusion with Reinforcement Learning Based GMM (I), pp. 442-447.

Cao, Mingcong — Southeast University
Chen, Jiayi — University of Michigan
Wang, Junmin — University of Texas at Austin

14:50-15:10 — WeB04.5

Vehicle Speed Prediction for Connected and Autonomous Vehicles Using Communication and Perception (I), pp. 448-453.

Suh, Bohoon — University of Minnesota
Shao, Yunli — University of Minnesota
Sun, Zongxuan — University of Minnesota

15:10-15:30 — WeB04.6

Autonomous Vehicle Decision Making and Monitoring Based on Signal Temporal Logic and Mixed-Integer Programming (I), pp. 454-459.

Sahin, Yunus Emre — University of Michigan
Quirynen, Rien — Mitsubishi Electric Research Laboratories (MERL)
Di Cairano, Stefano — Mitsubishi Electric Research Labs

WeB05 — Plaza Court 6

Modeling and Control of Additive Manufacturing Systems (Invited Session)

Chair: Barton, Kira — University of Michigan, Ann Arbor
Co-Chair: Bristow, Douglas A. — Missouri University of Science & Technology
Organizer: Barton, Kira — University of Michigan, Ann Arbor
Organizer: Bristow, Douglas A. — Missouri University of Science & Technology
Organizer: Hoelzle, David — Ohio State University
Organizer: Mishra, Sandipan — Rensselaer Polytechnic Institute

13:30-13:50 WeB05.1

A Learning-Based Approach to Modeling and Control of Inkjet 3D Printing (I), pp. 460-466.

Inyang-Udoh, Uduak	Rensselaer Polytechnic Institute
Mishra, Sandipan	Rensselaer Polytechnic Institute

13:50-14:10 WeB05.2

An Experimental Study on Process Modeling for Selective Laser Melting (I), pp. 467-473.

Shkoruta, Aleksandr	Rensselaer Polytechnic Institute
Mishra, Sandipan	Rensselaer Polytechnic Institute
Rock, Stephen	Rensselaer Polytechnic Institute

14:10-14:30 WeB05.3

A Control-Oriented Model for Bead Cross-Sectional Geometry in Fused Deposition Modeling (I), pp. 474-480.

Aksoy, Doruk	University of Michigan
Balta, Efe C.	University of Michigan
Tilbury, Dawn M.	University of Michigan
Barton, Kira	University of Michigan, Ann Arbor

14:30-14:50 WeB05.4

A Layer-To-Layer Control-Oriented Model for Selective Laser Melting (I), pp. 481-486.

Wang, Xin	Missouri University of Science and Technology
Lough, Cody	Missouri University of Science and Technology
Bristow, Douglas A.	Missouri University of Science & Technology
Landers, Robert G.	Missouri University of Science and Technology
Kinzel, Edward	University of Notre Dame

14:50-15:10 WeB05.5

A Loop-Shaping Method for Frequency-Based Design of Layer-To-Layer Control for Laser Metal Deposition (I), pp. 487-491.

Gegel, Michelle	Missouri University of Science and Technology
Bristow, Douglas A.	Missouri University of Science & Technology
Landers, Robert G.	Missouri University of Science and Technology

15:10-15:30 WeB05.6

Inferential Methods for Additive Manufacturing Feedback, pp. 492-499.

Limoge, Damas	Nanotronics
Nouri Gooshki, Sadegh	Nanotronics
Hough, Fabian	Nanotronics
Nirmaleswaran, Aswin	Nanotronics
Pinskiy, Vadim	Nanotronics

WeB06 Ballroom DE

Smart Grid (Regular Session)

Chair: Li, Heng	Central South University
Co-Chair: Motee, Nader	Lehigh University

13:30-13:50 WeB06.1

Piggyback on TNCs for Electricity Services: Spatial Pricing and Synergetic Value, pp. 500-507.

Qin, Junjie	UC Berkeley
Porter, Jared	UC Berkeley
Poolla, Kameshwar	Univ. of California at Berkeley
Varaiya, Pravin	Univ. of California at Berkeley

13:50-14:10 WeB06.2

Delay-Aware Risk Analysis and Control in Smart Grid Networks with Corrupted Measurements, pp. 508-513.

Somarakis, Christoforos	Palo Alto Research Center
Motee, Nader	Lehigh University

14:10-14:30 WeB06.3

Simultaneous Allocation and Control of Distributed Energy Resources Via Kullback-Leibler-Quadratic Optimal Control, pp. 514-520.

CAMMARDELLA, NEIL	University of Florida
Busic, Ana	Inria
Meyn, Sean P.	Univ. of Florida

14:30-14:50 WeB06.4

Optimal Energy Management of Energy Internet: A Distributed Actor-Critic Reinforcement Learning Method, pp. 521-526.

Cheng, Yijun	Central South University
Peng, Jun	Central South University
Gu, Xin	Central South University
JIANG, FU	Central South University
Li, Heng	Central South University
Liu, Weirong	Central South University
Huang, Zhiwu	Central South University

14:50-15:10 WeB06.5

Flexibility Capacity of Thermostatically Controlled Loads with Cycling/lock-Out Constraints, pp. 527-532.

Coffman, Austin	University of Florida
CAMMARDELLA, NEIL	University of Florida
Barooah, Prabir	Univ. of Florida
Meyn, Sean P.	Univ. of Florida

15:10-15:30 WeB06.6

Capacity of Flexible Loads for Grid Support: Statistical Characterization for Long Term Planning, pp. 533-538.

Coffman, Austin	University of Florida
Guo, Zhong	University of Florida
Barooah, Prabir	Univ. of Florida

WeB07 Plaza Court 7

Control for Healthcare and Medical Systems I (Invited Session)

Chair: Rajamani, Rajesh	Univ. of Minnesota
Co-Chair: Ashrafiuon, Hashem	Villanova University
Organizer: Hahn, Jin-Oh	University of Maryland
Organizer: Zhang, Wenlong	Arizona State University
Organizer: Rajamani, Rajesh	Univ. of Minnesota
Organizer: Ashrafiuon, Hashem	Villanova University

13:30-13:50 WeB07.1

Online Model-Based Beat-By-Beat Heart Rate Estimation (I), pp. 539-544.

Albaba, Adnan	Uppsala University
Medvedev, Alexander V.	Uppsala University

13:50-14:10 WeB07.2

Adaptive Admittance Control of Hybrid Exoskeletons (I), pp.

545-550.

Cousin, 35401	University of Alabama

14:10-14:30 WeB07.3

Design and Nonlinear Control of a Haptic Glove for Virtual Palpation (I), pp. 551-556.

Galla, Matt	Southern Methodist University
Al Khatib, Ehab	Southern Methodist University
Hurmuzlu, Yildirim	Southern Methodist Univ
Richer, Edmond	SMU

14:30-14:50 WeB07.4

Human Learning and Coordination in Lower-Limb Physical Interactions (I), pp. 557-562.

Amatya, Sunny	Arizona State University
Rezayat Sorkhabadi, Seyed Mostafa	Arizona State University
Zhang, Wenlong	Arizona State University

14:50-15:10 WeB07.5

Model Predictive Control of Multi-Location Vagal Nerve Stimulation for Regulating Cardiovascular System, pp. 563-568.

Yao, Yuyu	Lehigh University
Kothare, Mayuresh V.	Lehigh University

15:10-15:30 WeB07.6

A Task-Invariant Learning Framework of Lower-Limb Exoskeletons for Assisting Human Locomotion, pp. 569-576.

Lv, Ge	Clemson University
Xing, Haosen	Carnegie Mellon University
Lin, Jianping	University of Michigan
Gregg, Robert D.	University of Michigan
Atkeson, Christopher G.	Carnegie Mellon University

WeB08 Governor's SQ 10

Mechatronics I (Invited Session)

Chair: Li, Perry Y.	Univ. of Minnesota
Co-Chair: Chen, Xu	University of Washington
Organizer: Oldham, Kenn	University of Michigan, Ann Arbor
Organizer: Chen, Xu	University of Washington

13:30-13:50 WeB08.1

AFM Tip Localization on Large Range Sample Using Particle Filter for MEMS Inspection, pp. 577-582.

Liu, Yi-Lin	National Taiwan University
Huang, Kuan-Wei	National Taiwan University
Huang, Ching - Chi	National Taiwan University
Chen, Huang-Chih	National Taiwan University
Fu, Li-Chen	National Taiwan University

13:50-14:10 WeB08.2

Optimal Control of Wheeled Mobile Robots: From Simulation to Real World (I), pp. 583-589.

Arab, Aliasghar	Rutgers University
Mousavi, Yashar	Department of Applied Science, School of Computing, Engineering

14:10-14:30 WeB08.3

Self-Sensing Dual Push-Pull Solenoids Using a Finite Dimension Flux-Observer (I), pp. 590-595.

Li, Perry Y.	Univ. of Minnesota

14:30-14:50 WeB08.4

High-Speed Large-Range Dynamic-Mode Atomic Force Microscope Imaging: Adaptive Multiloop Approach Via Field Programmable Gate Array (I), pp. 596-601.

Chen, Jiarong	Rutgers University
Zou, Qingze	Rutgers, the State University of New Jersey

14:50-15:10 WeB08.5

A New-Designed Non-Raster Scan and Precision Control for Increasing AFM Imaging Speed, pp. 602-607.

Chen, Huang-Chih	National Taiwan University
Fu, Li-Chen	National Taiwan University

WeB09 Governor's SQ 16

Adaptive Control I (Regular Session)

Chair: Oliveira, Tiago Roux	State University of Rio De Janeiro
Co-Chair: Nivison, Scott	Air Force Research Laboratory

13:30-13:50 WeB09.1

A Simplified Multivariable Gradient Extremum Seeking for Distinct Input Delays with Delay-Independent Convergence Rates, pp. 608-613.

Oliveira, Tiago Roux	State University of Rio De Janeiro
Tsubakino, Daisuke	Nagoya University
Krstic, Miroslav	University of California, San Diego

13:50-14:10 WeB09.2

Adaptive Parameter Estimation for Aerial Manipulation, pp. 614-619.

Baraban, Gabriel	Johns Hopkins University
Sheckells, Matthew	Johns Hopkins University
Kim, Soowon	Johns Hopkins University
Kobilarov, Marin	Johns Hopkins University

14:10-14:30 WeB09.3

Adaptive Output Servocontroller for MIMO System with Input Delay, pp. 620-625.

Nikiforov, Vladimir O.	ITMO University
Paramonov, Aleksei	ITMO University
Gerasimov, Dmitry	ITMO University

14:30-14:50 WeB09.4

Improved Adaptive Compensation of Unmatched Multisinusoidal Disturbances in Uncertain Nonlinear Plants, pp. 626-632.

Gerasimov, Dmitry	ITMO University
Pashenko, Artem	ITMO University
Nikiforov, Vladimir O.	ITMO University

14:50-15:10 WeB09.5

A Distributed Output Feedback Adaptive Controller for Leader-Follower Multiagent Systems with Stochastic Disturbances and Sensor-Actuator Attacks, pp. 633-638.

Jin, Xu	University of Kentucky
Haddad, Wassim M.	Georgia Inst. of Tech

15:10-15:30 WeB09.6

Improved Attention Models for Memory Augmented Neural Network Adaptive Controllers, pp. 639-646.

Muthirayan, Deepan	University of California at Irvine
Nivison, Scott	Air Force Research Laboratory
Khargonekar, Pramod	Univ. of California, Irvine

WeB10 Governor's SQ 11

Autonomous Robots I (Regular Session)

Chair: Panagou, Dimitra	University of Michigan, Ann Arbor
Co-Chair: Cheng, Teng-Hu	National Chiao Tung University

13:30-13:50 WeB10.1

Safe and Computational Efficient Imitation Learning for Autonomous Vehicle Driving, pp. 647-652.

Flavia, Acerbo	Siemens PLM Software
Herman, Van der Auweraer	Siemens PLM Software
Son, Tong	Siemens Digital Industries Software

13:50-14:10 WeB10.2

ROS Based Real-Time Motion Control for Robotic Visual Arts Exhibit Using Decawave Local Positioning System, pp. 653-658.

Gomaa, Mahmoud	Memorial University of Newfoundland
De Silva, Oscar	Memorial University of Newfoundland
Mann, George K. I.	Memorial University of Newfoundland
Gosine, Raymond G.	Memorial University of Newfoundland
Hengeveld, Robert	Memorial University of Newfoundland

14:10-14:30 WeB10.3

LIV-LAM: LiDAR and Visual Localization and Mapping, pp. 659-664.

Radmanesh, Reza	University of Michigan
Wang, Ziyin	Indiana University-Purdue University, Indianapolis
Chipade, Vishnu S.	University of Michigan, Ann Arbor
Tsechpenakis, Gavriil	Indiana University-Purdue University, Indianapolis
Panagou, Dimitra	University of Michigan, Ann Arbor

14:30-14:50 WeB10.4

A Nonlinear Optimal Control Method for the Ballbot Autonomous Vehicle, pp. 665-670.

Rigatos, Gerasimos	Industrial Systems Institute
Abbaszadeh, Masoud	GE Global Research
Pomares, Jorge	University of Alicante, Department of Systems Engineering

14:50-15:10 WeB10.5

An Active Perception Approach for Mid-Water Localization of Autonomous Underwater Vehicles, pp. 671-676.

Chang, Dongsik	University of Michigan
Johnson-Roberson, Matthew	University of Michigan
Sun, Jing	University of Michigan

15:10-15:30 WeB10.6

Cooperative Transportation of Drones without Inter-Agent Communication, pp. 677-682.

WU, PIN-XIAN	National Chiao Tung University
HUNG, HSIN-AI	National Chiao Tung University
Yang, ChengCheng	Department of Mechanical Engineering, National Chiao Tung Univer
Cheng, Teng-Hu	National Chiao Tung University

WeB11 Director's Row I

Agent-Based Systems I (Regular Session)

Chair: Mohammadi, Arash	Concordia University
Co-Chair: Ishii, Hideaki	Tokyo Institute of Technology

13:30-13:50 WeB11.1

An Optimal Control Approach to Flocking, pp. 683-688.

Beaver, Logan E.	University of Delaware
Kroninger, Christopher	U.S. Army Research Laboratory
Malikopoulos, Andreas A.	University of Delaware

13:50-14:10 WeB11.2

Safe Motion Planning under Partial Observability with an Optimal Deterministic Planner, pp. 689-694.

Johnson, Jeffrey Kane	Mapless AI, Inc

14:10-14:30 WeB11.3

Distributed Fast Flocking Control for Second-Order Multi-Agent Systems with Switching Communication Topology, pp. 695-700.

Wang, Fengchen	Arizona State University
Chen, Yan	Arizona State University

14:30-14:50 WeB11.4

A Dynamic Quasi-Taylor Approach for Distributed Consensus Problems with Packet Loss, pp. 701-706.

Mirali, Furugh	Hamburg University of Technology
Werner, Herbert	Hamburg University of Technology

14:50-15:10 WeB11.5

Dynamic Event-Triggered Formation Control for Multi-Agent Systems: A Co-Design Optimization Approach, pp. 707-712.

Amini, Amir	Concordia University
Asif, Amir	Concordia University
Mohammadi, Arash	Concordia University

15:10-15:30 WeB11.6

A Resilient Synchronization Protocol for Pulse-Coupled Oscillators Over Robust Networks (I), pp. 713-718.

Iori, Yugo	Tokyo Institute of Technology
Ishii, Hideaki	Tokyo Institute of Technology

WeB12 Director's Row E

Estimation I (Regular Session)

Chair: Wang, Jin	Auburn University
Co-Chair: Michalska, Hannah H.	McGill Univ

13:30-13:50 WeB12.1

Adaptive State Estimation with Subspace-Constrained State Correction, pp. 719-724.

Goel, Ankit	University of Michigan
Bernstein, Dennis S.	Univ. of Michigan

13:50-14:10 WeB12.2

A Variable Selection Method for Improving Variable Selection Consistency and Soft Sensor Performance, pp. 725-730.

Lee, Jangwon	AUBURN UNIVERSITY
Flores-Cerrillo, Jesus	Praxair
Wang, Jin	Auburn University
He, Qinghua	Auburn University

14:10-14:30 WeB12.3

Finite Interval Estimation of LTI Systems Using Differential Invariance, Instrumental Variables, and Covariance Weighting, pp. 731-736.

Ghoshal, Debarshi Patanjali — McGill University
Michalska, Hannah H. — McGill Univ

14:30-14:50 WeB12.4

Distributed Parameter Estimation in Randomized One-Hidden-Layer Neural Networks, pp. 737-742.

Wang, Yinsong — Texas A&M University
Shahrampour, Shahin — Texas A&M University

14:50-15:10 WeB12.5

State Estimation for Non-Linear Fully-Implicit, Index-1 Differential Algebraic Equation Systems, pp. 743-748.

Srinivasan, Neeraja — Indian Institute of Technology, Madras
Bhatt, Nirav — Indian Institute of Technology Madras
Narasimhan, Sridharakumar — IIT Madras

15:10-15:30 WeB12.6

Perfect Attackability of Linear Dynamical Systems with Bounded Noise, pp. 749-754.

Khazraei, Amir — Duke University
Pajic, Miroslav — Duke University

WeB13 Plaza Court 1

Robust Control I (Regular Session)

Chair: Bridgeman, Leila Jasmine — Duke University
Co-Chair: Matni, Nikolai — University of Pennsylvania

13:30-13:50 WeB13.1

Mixed Norm H_2/H_oo and Entropy Covariance Control: A Convex Optimization Approach, pp. 755-760.

Haddad, Wassim M. — Georgia Inst. of Tech
Chen, Yongxin — Georgia Institute of Technology
Lanchares, Manuel — Georgia Institute of Technology

13:50-14:10 WeB13.2

Reputation-Based Event-Triggered Formation Control and Leader Tracking with Resilience to Byzantine Adversaries, pp. 761-766.

Zegers, Federico — University of Florida
Hale, Matthew — University of Florida
Shea, John M. — University of Florida
Dixon, Warren E. — University of Florida

14:10-14:30 WeB13.3

Dual, Iterative H2-Conic Controller Synthesis, pp. 767-772.

Wu, Liangting — Duke University
Bridgeman, Leila Jasmine — Duke University

14:30-14:50 WeB13.4

The Heavy-Ball ODE with Time-Varying Damping: Persistence of Excitation and Uniform Asymptotic Stability, pp. 773-778.

Poveda, Jorge I. — University of Colorado at Boulder
Teel, Andrew R. — Univ. of California at Santa Barbara

14:50-15:10 WeB13.5

Robust Performance Guarantees for System Level Synthesis, pp. 779-786.

Matni, Nikolai — University of Pennsylvania
Sarma, Anish — California Institute of Technology

WeB14 Plaza Court 8

Estimation and Control of PDE Systems I (Invited Session)

Chair: Burns, John A — Virginia Tech
Co-Chair: Guo, Bao-Zhu — North China Electric Power University
Organizer: Demetriou, Michael A. — Worcester Polytechnic Institute
Organizer: Fahroo, Fariba — AFOSR

13:30-13:50 WeB14.1

A Causality-Free Neural Network Method for High-Dimensional Hamilton-Jacobi-Bellman Equations (I), pp. 787-793.

Nakamura-Zimmerer, Tenavi — University of California, Santa Cruz
Gong, Qi — University of California, Santa Cruz
Kang, Wei — Naval Postgraduate School

13:50-14:10 WeB14.2

A Min-Plus Fundamental Solution Semigroup for a Class of Approximate Infinite Dimensional Optimal Control Problems (I), pp. 794-799.

Dower, Peter M. — University of Melbourne
McEneaney, William M. — Univ. California San Diego

14:10-14:30 WeB14.3

Robust Error Feedback Control for Two Outputs Tracking of an Euler-Bernoulli Beam Equation (I), pp. 800-805.

Guo, Bao-Zhu — North China Electric Power University
Meng, Tingting — Academy of Mathematics and Systems Science

14:30-14:50 WeB14.4

Optimal Error Estimates for hp - Finite Element Approximations of Distributed Parameter LQR Control Problems (I), pp. 806-811.

Burns, John A — Virginia Tech
Cheung, James — Virginia Tech

14:50-15:10 WeB14.5

Boundary Prescribed-Time Stabilization of a Pair of Coupled Reaction-Diffusion Equations (I), pp. 812-817.

Steeves, Drew — University of California, San Diego
Camacho-Solorio, Leobardo — University of California, San Diego
Krstic, Miroslav — University of California, San Diego

15:10-15:30 WeB14.6

The Quadratic-Quadratic Regulator Problem: Approximating Feedback Controls for Quadratic-In-State Nonlinear Systems (I), pp. 818-823.

Borggaard, Jeff — Virginia Tech
Zietsman, Lizette — Virginia Tech

WeB15 Plaza Court 5

Stability of Nonlinear Systems I (Regular Session)

Chair: Surov, Maksim — Norges Teknisk-

	Naturvitenskapelige Universitet
Co-Chair: Fekih, Afef	University of Louisiana at Lafayette

13:30-13:50 WeB15.1

Discrete Finite-Time Stable Attitude Tracking Control of Unmanned Vehicles on SO(3), pp. 824-829.

Hamrah, Reza	Syracuse University
Sanyal, Amit	Syracuse University
Viswanathan, Sasi Prabhakaran	Akrobotix LLC

13:50-14:10 WeB15.2

Consensus Seeking Gradient Descent Flows on Boundaries of Convex Sets, pp. 830-835.

Markdahl, Johan	University of Luxembourg

14:10-14:30 WeB15.3

Constructing Transverse Coordinates for Orbital Stabilization of Periodic Trajectories, pp. 836-841.

Surov, Maksim	Norges Teknisk-Naturvitenskapelige Universitet
Gusev, Sergei V.	St. Petersburg State University
Freidovich, Leonid	Umeå University

14:30-14:50 WeB15.4

Stable Robust Controller Inspired by the Mammalian Limbic System for a Class of Nonlinear Systems, pp. 842-847.

Rubio Scola, Ignacio	Conicet - National University of Rosario
Garcia Carrillo, Luis Rodolfo	Texas A&M University - Corpus Christi
Hespanha, Joao P.	Univ. of California, Santa Barbara

14:50-15:10 WeB15.5

Finite Time Stabilization of Chameleon Hidden Hyperchaotic Flows, pp. 848-853.

Reyhani, Arezoo	University of Zanjan
Mobayen, Saleh	University of Zanjan
Fekih, Afef	University of Louisiana at Lafayette
Pujol, Gisela	Univ. Politecnica De Catalunya - BarcelonaTech

15:10-15:30 WeB15.6

State Barrier Avoidance Control Design Using a Diffeomorphic Transformation Based Method, pp. 854-857.

Tian, Dongzuo	Texas A&M University, College Station
Ke, Chong	Texas A&M University, College Station
Song, Xingyong	Texas A&M University, College Station

WeB16 Governor's SQ 17

Cooperative Control I (Regular Session)

Chair: Hoagg, Jesse B.	University of Kentucky
Co-Chair: Sanyal, Amit	Syracuse University

13:30-13:50 WeB16.1

Optimal Assignment of Collaborating Agents in Multi-Body Asset-Guarding Games, pp. 858-864.

Sin, Emmanuel	University of California, Berkeley
Arcak, Murat	University of California, Berkeley
Packard, Andrew K.	Univ. of California at Berkeley
Philbrick, Douglas	Uc Berkeley
Seiler, Peter	University of Michigan, Ann Arbor

13:50-14:10 WeB16.2

Output and Regulated Output Synchronization of Heterogeneous Multi-Agent Systems: A Scale-Free Protocol Design Using No Information about Communication Network and the Number of AgentsCommunication Network and the Number of Agents, pp. 865-870.

Nojavanzadeh, Donya	Washington State University
Liu, Zhenwei	Northeastern University
Saberi, Ali	Washington State Univ
Stoorvogel, Anton A.	University of Twente

14:10-14:30 WeB16.3

Leader-Following Formation Control with Time-Varying Formations and Bounded Controls for Agents with Double-Integrator Dynamics, pp. 871-876.

Lippay, Zachary	University of Kentucky
Hoagg, Jesse B.	University of Kentucky

14:30-14:50 WeB16.4

Finite-Time Attitude Consensus Control of a Multi-Agent Rigid Body System, pp. 877-882.

Maadani, Mohammad	University of Arizona
Butcher, Eric	University of Arizona
Sanyal, Amit	Syracuse University

14:50-15:10 WeB16.5

Formation Control for Fixed-Wing UAVs Modeled with Extended Unicycle Dynamics That Include Attitude Kinematics on SO(m) and Speed Constraints, pp. 883-888.

Heintz, Christopher	University of Kentucky
Hoagg, Jesse B.	University of Kentucky

15:10-15:30 WeB16.6

Distributed Consensus Protocols for Time-Varying Multi-Agent Networks with Improved Convergence Properties, pp. 889-896.

Buzorgnia, David	Concordia University
Aghdam, Amir G.	Concordia University

WeB17 Director's Row J

Decentralized Control (Regular Session)

Chair: Nguyen, Nam	Hanoi University of Science and Technology
Co-Chair: Bitar, Eilyan	Cornell University

13:30-13:50 WeB17.1

Scalable Coherence in Large Scale Second-Order Networks Using High-Gain Observer, pp. 897-902.

Chowdhury, Dhrubajit	Michigan State University
Khalil, Hassan K.	Michigan State Univ

13:50-14:10 WeB17.2

Fixed-Time Network Localization Based on Bearing Measurements, pp. 903-908.

Trinh, Minh Hoang	Hanoi University of Science and Technology (HUST)
Nguyen, Truong Thanh	Hanoi University of Science and Technology
Nguyen, Nam	Hanoi University of Science and Technology

Ahn, Hyo-Sung	Gwangju Institute of Science and Technology (GIST)

14:10-14:30 WeB17.3

A Consensus Strategy for Decentralized Kinematic Control of Multi-Segment Soft Continuum Robots, pp. 909-916.

Salimi Lafmejani, Amir	Arizona State University
Farivarnejad, Hamed	Arizona State University
Doroudchi, Azadeh	Arizona State University
Berman, Spring	Arizona State University

14:30-14:50 WeB17.4

Decentralized Control of Constrained Linear Systems Via Assume-Guarantee Contracts, pp. 917-924.

Lin, Weixuan	Cornell University
Bitar, Eilyan	Cornell University

14:50-15:10 WeB17.5

Practical Frequency Synchronization in Power Systems Using Extended High-Gain Observer under Unknown Time-Varying Power Demand, pp. 925-930.

Chowdhury, Dhrubajit	Michigan State University
Khalil, Hassan K.	Michigan State Univ

15:10-15:30 WeB17.6

On the Effects of Collision Avoidance on Emergent Swarm Behavior, pp. 931-936.

Taylor, Chris	George Mason University
Luzzi, Colin	Department of the Navy
Nowzari, Cameron	George Mason University

WeB18 Plaza Court 4

Constrained Control I (Regular Session)

Chair: Sanfelice, Ricardo G.	University of California at Santa Cruz
Co-Chair: Berntorp, Karl	Mitsubishi Electric Research Labs

13:30-13:50 WeB18.1

Lipschitzness of Minimal-Time Functions in Constrained Continuous-Time Systems with Applications to Reachability Analysis, pp. 937-942.

MAGHENEM, Mohamed Adlene	University of California Santa Cruz
Sanfelice, Ricardo G.	University of California at Santa Cruz

13:50-14:10 WeB18.2

Model-Free Learning for Safety-Critical Control Systems: A Reference Governor Approach, pp. 943-949.

Liu, Kaiwen	University of Michigan
Li, Nan	University of Michigan
Kolmanovsky, Ilya V.	The University of Michigan
Rizzo, Denise	US Army CCDC Ground Vehicle System Center (GVSC)
Girard, Anouck	University of Michigan, Ann Arbor

14:10-14:30 WeB18.3

Correct-By-Design Control Barrier Functions for Euler-Lagrange Systems with Input Constraints, pp. 950-955.

Shaw Cortez, Wenceslao	Royal Institute of Technology (KTH)
Dimarogonas, Dimos V.	KTH Royal Institute of Technology

14:30-14:50 WeB18.4

Learning-Based Parameter-Adaptive Reference Governors, pp. 956-961.

Chakrabarty, Ankush	Mitsubishi Electric Research Laboratories (MERL)
Berntorp, Karl	Mitsubishi Electric Research Labs
Di Cairano, Stefano	Mitsubishi Electric Research Labs

14:50-15:10 WeB18.5

Prescribed-Time Convergence with Input Constraints: A Control Lyapunov Function Based Approach, pp. 962-967.

Garg, Kunal	University of Michigan-Ann Arbor
Arabi, Ehsan	University of Michigan
Panagou, Dimitra	University of Michigan, Ann Arbor

15:10-15:30 WeB18.6

Achieving Performance and Safety in Large Scale Systems with Saturation Using a Nonlinear System Level Synthesis Approach, pp. 968-973.

Yu, Jing	California Institute of Technology
Ho, Dimitar	Caltech

WeB19 Plaza Court 3

Optimal Control I (Regular Session)

Chair: Dower, Peter M.	University of Melbourne
Co-Chair: Komaee, Arash	Southern Illinois University

13:30-13:50 WeB19.1

Guaranteed-Safe Approximate Reachability Via State Dependency-Based Decomposition, pp. 974-980.

Li, Anjian	Simon Fraser University
Chen, Mo	Simon Fraser University

13:50-14:10 WeB19.2

Inverse Optimal Control with Set-Theoretic Barrier Lyapunov Function for Handling State Constraints, pp. 981-986.

Deniz, Meryem	Missouri University of Science and Technology
Lakshnmidevinivas, Devi	Missouri University of Science and Technology
Balakrishnan, S.N.	Missouri University of Science and Technology

14:10-14:30 WeB19.3

Co-Design of Delays and Sparse Controllers for Bandwidth-Constrained Cyber-Physical Systems, pp. 987-992.

Negi, Nandini	North Carolina State University
Chakrabortty, Aranya	North Carolina State University

14:30-14:50 WeB19.4

A Two-Player Game Representation for a Class of Infinite Horizon Control Problems under State Constraints, pp. 993-998.

Basco, Vincenzo	Melbourne University
Dower, Peter M.	University of Melbourne

14:50-15:10 WeB19.5

Optimal Control of Linear Continuous-Time Systems in the Presence of State and Input Delays with Application to a Chemical Reactor, pp. 999-1004.

Moghadam, Rohollah	Missouri University of Science and Technology
Jagannathan, Sarangapani	Missouri Univ of Science & Tech

15:10-15:30 WeB19.6

Optimal Control of State-Affine Dynamical Systems, pp. 1005-

1010.

Komaee, Arash — Southern Illinois University

WeB20 — Plaza Court 2

Hybrid Systems I (Regular Session)

Chair: Sanfelice, Ricardo G. — University of California at Santa Cruz

Co-Chair: Danielson, Claus — Mitsubishi Electric Research Labs

13:30-13:50 — WeB20.1

A Reference Governor for Wheel-Slip Prevention in Railway Vehicles with Pneumatic Brakes, pp. 1011-1016.

Danielson, Claus — Mitsubishi Electric Research Labs

Di Cairano, Stefano — Mitsubishi Electric Research Labs

13:50-14:10 — WeB20.2

Design and Time-Optimal Control of a High-Speed High-TorqueDual-Motor Actuator, pp. 1017-1024.

Bell, John — Massachusetts Institute of Technology

Asada, H. Harry — Massachusetts Inst. of Tech

14:10-14:30 — WeB20.3

HyNTP: An Adaptive Hybrid Network Time Protocol for Clock Synchronization in Heterogeneous Distributed Systems, pp. 1025-1030.

Guarro, Marcello — University of California, Santa Cruz

Sanfelice, Ricardo G. — University of California at Santa Cruz

14:30-14:50 — WeB20.4

Regularity Properties of Reachability Maps for Hybrid Dynamical Systems with Applications to Safety, pp. 1031-1036.

MAGHENEM, Mohamed Adlene — University of California Santa Cruz

Altin, Berk — University of California, Santa Cruz

Sanfelice, Ricardo G. — University of California at Santa Cruz

14:50-15:10 — WeB20.5

Hybrid Predictive Control for Tracking in a Single-Phase DC/AC Inverter with an Unknown Load, pp. 1037-1042.

Gao, Haoyue — University of California, Santa Cruz

MAGHENEM, Mohamed Adlene — University of California Santa Cruz

Sanfelice, Ricardo G. — University of California at Santa Cruz

15:10-15:30 — WeB20.6

Graceful Transitions between Periodic Walking Gaits of Fully Actuated Bipedal Robots, pp. 1043-1048.

Murali, Vishal — Georgia Institute of Technology

Hyun, Nak-seung Patrick — Harvard University

Verriest, Erik I. — Georgia Inst. of Tech

WeB21 — Director's Row H

Cooperation in Pursuit-Evasion Differential Games (Tutorial Session)

Chair: Pachter, Meir — AFIT/ENG

Co-Chair: Weintraub, Isaac — Air Force Research Labs

Organizer: Garcia, Eloy — Air Force Research Laboratory

Organizer: Weintraub, Isaac — Air Force Research Labs

Organizer: Pachter, Meir — AFIT/ENG

13:30-13:31 — WeB21.1

An Introduction to Pursuit-Evasion Differential Games (I), pp. 1049-1066.

Weintraub, Isaac — Air Force Research Labs

Pachter, Meir — AFIT/ENG

Garcia, Eloy — Air Force Research Laboratory

13:31-14:30 — WeB21.2

Introduction To: Cooperation in Pursuit-Evasion Differential Games (I), pp. 1067-1067.

Garcia, Eloy — Air Force Research Laboratory

Weintraub, Isaac — Air Force Research Labs

Pachter, Meir — AFIT/ENG

14:30-14:50 — WeB21.3

*K-Capture in Multi-Agent Pursuit Evasion (I)**.

Bopardikar, Shaunak D. — Michigan State University

14:50-15:10 — WeB21.4

*Multi-Player Pursuit-Evasion Differential Games (I)**.

Pachter, Meir — AFIT/ENG

15:10-15:30 — WeB21.5

Singular Surfaces within Multi-Agent Differential Games (I), pp. 1068-1068.

Fuchs, Zachariah E. — University of Cincinnati

WeBT3 — Meetings and

WeBT3 (Special Session)

13:30-15:30 — WeBT3.1

Special Session: Women in Controls in Industry, pp. 1069-1070.

Pan, Selina — Toyota Research Institute

Canova, Marcello — The Ohio State University

Shahbakhti, Mahdi — University of Alberta

Chen, Yan — Arizona State University

Hall, Carrie — Illinois Institute of Technology

13:30-15:30 — WeBT3.2

Special Session: NREL's Control Research: Enabling a Clean Energy Future , pp. 1071-1072.

Jin, Xin — National Renewable Energy Laboratory

Bernstein, Andrey — National Renewable Energy Lab (NREL)

King, Jennifer — National Renewable Energy Laboratory

Bay, Christopher — National Renewable Energy Laboratory

Shi, Ying — National Renewable Energy Laboratory

Jun, Myungsoo — University of Florida

13:30-15:30 — WeBT3.3

Special Session: Workshop for Elementary, Middle and High School Students and Teachers and Parents , pp. 1073-1073.

Pasik-Duncan, Bozenna — Univ. of Kansas

Bushnell, Linda — University of Washington

Duncan, Tyrone E. — Univ. of Kansas

Rossiter, John Anthony — University of Sheffield

13:30-15:30 — WeBT3.4

NSF Program Manager Office Hours: Dr. Irina Dolinskaya, pp. 1074-1075.

Dolinskaya, Irina — National Science Foundation (NSF)

WeLBP-P01 — Ballroom ABC

Poster-WeP (Late Breaking Poster Session)

15:30-16:00 — WeLBP-P01.1

Extreme-Scale Wind Turbine Controller Field Validation, pp. 1076-1076.

Phadnis, Mandar — University of Colorado, Boulder
Zalkind, Daniel — University of Colorado Boulder
Pao, Lucy Y. — University of Colorado Boulder

15:30-16:00 — WeLBP-P01.2

Quality-Triggered Sampling for Control Systems, pp. 1077-1077.

Aldana-López, Rodrigo — Universidad De Zaragoza
Sagues, Carlos — Universidad De Zaragoza
Aragues, Rosario — Universidad De Zaragoza

15:30-16:00 — WeLBP-P01.3

Energy Cost Based Hybrid Vehicle Control and Analysis Technique, pp. 1078-1078.

Shutty, John — BorgWarner Inc
Mohon, Sara — BorgWarner
Kondipati, Naga Nithin Teja — Michigan Technological University
semenov, Dmitriy — BorgWarner

15:30-16:00 — WeLBP-P01.4

Maximal Power Output of a Stochastic Thermodynamic Engine, pp. 1079-1079.

Fu, Rui — University of California, Irvine
Movilla Miangolarra, Olga — UC Irvine
Taghvaei, Amirhossein — University of Illinois at Urbana-Champaign
Chen, Yongxin — Georgia Institute of Technology
Georgiou, Tryphon T. — University of California, Irvine

15:30-16:00 — WeLBP-P01.5

Noncontact Direction Control of Magnetic Objects by Permanent Magnet Manipulators, pp. 1080-1080.

Riahi, Nayereh — Southern Illinois University
Komaee, Arash — Southern Illinois University

15:30-16:00 — WeLBP-P01.6

Experimental Modeling of Magnetic Force Field, pp. 1081-1081.

Sneed, Terry-Ann — Southern Illinois University
Komaee, Arash — Southern Illinois University

15:30-16:00 — WeLBP-P01.7

Closed-Loop System Identification - an Iterative Approach, pp. 1082-1082.

Niemann, Henrik — Technical Univ. of Denmark

WeLBP-P02 — ACC Sponsors

Meeting Space-WeP

15:30-16:00 — WeLBP-P02.1

Gold Sponsor: General Motors, pp. 1083-1083.

Eckman, Wendy — General Motors

15:30-16:00 — WeLBP-P02.2

Gold Sponsor: Mathworks, pp. 1084-1084.

Rose, Jennifer — MathWorks
Ulusoy, Melda — Mathworks

15:30-16:00 — WeLBP-P02.3

Gold Sponsor: Mitsubishi Electric Research Lab (MERL), pp. 1085-1085.

Thornton, Jay — Mitsubishi Electric Research Lab
Di Cairano, Stefano — Mitsubishi Electric Research Lab

15:30-16:00 — WeLBP-P02.4

Silver Sponsor: Quanser, pp. 1086-1086.

Rahaman, Josie — Quanser Consulting
Wang, Gemma — Quanser

15:30-16:00 — WeLBP-P02.5

Silver Sponsor: SIAM, pp. 1087-1087.

O'Neill, Kristin — SIAM

15:30-16:00 — WeLBP-P02.6

Silver Sponsor: Cancelled, pp. 1088-1088.

Kelly, Claire — Wiley

15:30-16:00 — WeLBP-P02.7

Silver Sponsor: DSPACE, pp. 1089-1089.

Johnson, Janice — DSpace

15:30-16:00 — WeLBP-P02.8

Silver Sponsor: Springer Nature, pp. 1090-1090.

Tominich, Christopher — Springer
Jackson, Oliver — Springer

15:30-16:00 — WeLBP-P02.9

Bronze Sponsor: Processes, pp. 1091-1091.

Xiang, Wency — Processes MDPI

15:30-16:00 — WeLBP-P02.10

Bronze Sponsor: Halliburton, pp. 1092-1092.

Darbe, Robert — Halliburton

WeC01 — Governor's SQ 12

Learning I (Regular Session)

Chair: Antunes, Duarte — Eindhoven University of Technology, the Netherlands
Co-Chair: Kamalapurkar, Rushikesh — Oklahoma State University

16:00-16:20 — WeC01.1

Identifying Sparse Low-Dimensional Structures in Markov Chains: A Nonnegative Matrix Factorization Approach, pp. 1093-1098.

Ghasemi, Mahsa — The University of Texas at Austin
Hashemi, Abolfazl — University of Texas at Austin
Vikalo, Haris — University of Texas at Austin
Topcu, Ufuk — The University of Texas at Austin

16:20-16:40 — WeC01.2

Safety-Guaranteed, Accelerated Learning in MDPs with Local Side Information, pp. 1099-1104.

Thangeda, Pranay — University of Illinois at Urbana-Champaign

Ornik, Melkior	University of Illinois at Urbana-Champaign

16:40-17:00 WeC01.3

Mutual Learning: Part II --Reinforcement Learning, pp. 1105-1110.

Narendra, Kumpati S.	Yale Univ
Mukhopadhyay, Snehasis	Indiana-Purdue Univ

17:00-17:20 WeC01.4

Scheduling Dimension Reduction of LPV Models - a Deep Neural Network Approach, pp. 1111-1117.

Koelewijn, Patrick	Eindhoven University of Technology
Tóth, Roland	Eindhoven University of Technology

17:20-17:40 WeC01.5

Online Inverse Reinforcement Learning for Systems with Disturbances, pp. 1118-1123.

Self, Ryan	Oklahoma State University
Abudia, Moad	Oklahoma State University
Kamalapurkar, Rushikesh	Oklahoma State University

17:40-18:00 WeC01.6

Embedded Learning-Based Model Predictive Control for Mobile Robots Using Gaussian Process Regression, pp. 1124-1130.

Janssen, Niels	Eindhoven University of Technology
Kools, Laurens	Eindhoven University of Technology
Antunes, Duarte	Eindhoven University of Technology, the Netherlands

WeC02 Ballroom ABC

Estimation and Diagnostics of Batteries (Invited Session)

Chair: Dey, Satadru	University of Colorado Denver
Co-Chair: Lotfi, Nima	Southern Illinois University Edwardsville
Organizer: Dey, Satadru	University of Colorado Denver
Organizer: Moura, Scott	University of California, Berkeley
Organizer: Lin, Xinfan	University of California, Davis
Organizer: Kim, Youngki	University of Michigan - Dearborn
Organizer: Fang, Huazhen	University of Kansas
Organizer: Donkers, M.C.F.	Eindhoven University of Technology
Organizer: Song, Xingyong	Texas A&M University, College Station
Organizer: Siegel, Jason B.	University of Michigan
Organizer: Choe, Song-Yul (Ben)	Auburn University
Organizer: Perez, Hector E.	University of California, Berkeley
Organizer: Lotfi, Nima	Southern Illinois University Edwardsville

16:00-16:20 WeC02.1

Addressing the Observability Problem in Batteries: Algorithm Design for Electrode-Level Charge and Health Estimation (I), pp. 1131-1136.

Sattarzadeh, Sara	University of Colorado Denver
Dey, Satadru	University of Colorado Denver
Colclasure, Andrew	National Renewable Energy Laboratory
Smith, Kandler	National Renewable Energy Lab

16:20-16:40 WeC02.2

Li-Ion Battery Electrode Health Diagnostics Using Machine Learning (I), pp. 1137-1142.

Lee, Suhak	University of Michigan, Ann Arbor
Kim, Youngki	University of Michigan - Dearborn

16:40-17:00 WeC02.3

Battery Internal Short Detection Methodology Using Cell Swelling Measurements (I), pp. 1143-1148.

Cai, Ting	University of Michigan
Pannala, Sravan	University of Michigan
Stefanopoulou, Anna G.	University of Michigan
Siegel, Jason B.	University of Michigan

17:00-17:20 WeC02.4

Interval Observer for SOC Estimation in Parallel-Connected Lithium-Ion Batteries (I), pp. 1149-1154.

Zhang, Dong	University of California, Berkeley
Couto, Luis Daniel	Université Libre De Bruxelles
Gill, Preet	University of California Berkeley
Benjamin, Sebastien	Saft S.A
Zeng, Wente	Total S.A
Moura, Scott	University of California, Berkeley

17:20-17:40 WeC02.5

Individual Cell Fault Detection for Parallel-Connected Battery Cells Based on the Statistical Model and Analysis (I), pp. 1155-1160.

Song, Ziyou	University of Michigan, Ann Arbor
Pinto Delgado, Fanny Adriana	University of Michigan
Hou, Jun	University of Michigan
Hofmann, Heath	Univ. of Michigan
Sun, Jing	University of Michigan

17:40-18:00 WeC02.6

A Low-Cost MPC-Based Algorithm for Battery Power Limit Estimation, pp. 1161-1166.

Araujo Xavier, Marcelo	Ford Motor Company
Kawakita de Souza, Aloisio Henrique	University of Colorado at Colorado Springs
Plett, Gregory L.	University of Colorado Colorado Springs
Trimboli, Michael	University of Colorado, Colorado Springs

WeC03 Governor's SQ 15

Traffic Control (Regular Session)

Chair: Malikopoulos, Andreas A.	University of Delaware
Co-Chair: Mohajerpoor, Reza	CSIRO

16:00-16:20 WeC03.1

A Traffic Signal Control Strategy to Avoid Spillback on Short Links, pp. 1167-1172.

Mohajerpoor, Reza	CSIRO
cai, Chen	Data61, CSIRO

16:20-16:40 WeC03.2

Resilience of Dynamic Routing in the Face of Recurrent and Random Sensing Faults, pp. 1173-1178.

Xie, Qian	New York University

Jin, Li	New York University

16:40-17:00 WeC03.3

Variable Speed Limits Control in an Urban Road Network to Reduce Environmental Impact of Traffic, pp. 1179-1184.

Othman, Bassel	IFP Energies Nouvelles
De Nunzio, Giovanni	IFP Energies Nouvelles
Di Domenico, Domenico	IFP New Energy
Canudas de Wit, Carlos	CNRS, GIPSA-Lab

17:00-17:20 WeC03.4

Impact of Connected and Automated Vehicles in a Corridor, pp. 1185-1190.

Mahbub, A M Ishtiaque	University of Delaware
Malikopoulos, Andreas A.	University of Delaware
Zhao, Liuhui	University of Delaware

17:20-17:40 WeC03.5

On Robustness of the Generalized Proportional Controller for Traffic Signal Control, pp. 1191-1196.

Nilsson, Gustav	Georgia Institute of Technology
Como, Giacomo	Politecnico Di Torino

17:40-18:00 WeC03.6

Asymmetric Cell Transmission Model-Based, Ramp-Connected Robust Traffic Density Estimation under Bounded Disturbances, pp. 1197-1202.

Vishnoi, Suyash	The University of Texas at Austin
Nugroho, Sebastian Adi	The University of Texas at San Antonio
Taha, Ahmad	The University of Texas at San Antonio
Claudel, Christian G.	UT Austin
Banerjee, Taposh	University of Texas at San Antonio

WeC04 Governor's SQ 14

Autonomous Vehicle Motion Planning (Invited Session)

Chair: Borhan, Hoseinali	Cummins Inc
Co-Chair: Di Cairano, Stefano	Mitsubishi Electric Research Labs
Organizer: Borhan, Hoseinali	Cummins Inc
Organizer: Dadras, Sara	Company
Organizer: Lotfi, Nima	Southern Illinois University Edwardsville
Organizer: Hall, Carrie	Illinois Institute of Technology

16:00-16:20 WeC04.1

Integrated Obstacle Detection and Avoidance in Motion Planning and Predictive Control of Autonomous Vehicles (I), pp. 1203-1208.

Quirynen, Rien	Mitsubishi Electric Research Laboratories (MERL)
Berntorp, Karl	Mitsubishi Electric Research Labs
KAMBAM, KARTHIK	Mitsubishi Electric Research Laboratories
Di Cairano, Stefano	Mitsubishi Electric Research Labs

16:20-16:40 WeC04.2

Cooperation-Aware Lane Change Maneuver in Dense Traffic Based on Model Predictive Control with Recurrent Neural Network (I), pp. 1209-1216.

Bae, Sangjae	University of California, Berkeley
Saxena, Dhruv Mauria	The Robotics Institute, Carnegie Mellon University
Nakhaei, Alireza	Honda Research Institute
Choi, Chiho	Honda Research Institute USA
Fujimura, Kikuo	Honda Research Institute
Moura, Scott	University of California, Berkeley

16:40-17:00 WeC04.3

Autonomous Overtaking Assistant for Country Road Scenarios (I), pp. 1217-1222.

Sulejmani, Fisnik	Johannes Kepler University Linz
Reiterer, Florian	Nemak Linz GmbH
Assadi, Amin	Johannes Kepler University Linz
Del Re, Luigi	Johannes Kepler University Linz

17:00-17:20 WeC04.4

Receding Horizon Motion Planning for Automated Lane Change and Merge Using Monte Carlo Tree Search and Level-K Game Theory, pp. 1223-1228.

Karimi, Shahab	Clemson University
Vahidi, Ardalan	Clemson University

17:20-17:40 WeC04.5

Robust Preview-Based Tractor-Trailer Lateral Control for Lane Keeping (I), pp. 1229-1234.

Flores, Carlos	UC Berkeley
Lu, Xiao-Yun	Univ. of California at Berkeley

17:40-18:00 WeC04.6

Motion-Planning for Unicycles Using the Invariant-Set Motion-Planner (I), pp. 1235-1240.

Danielson, Claus	Mitsubishi Electric Research Labs
Di Cairano, Stefano	Mitsubishi Electric Research Labs
Berntorp, Karl	Mitsubishi Electric Research Labs
Weiss, Avishai	Mitsubishi Electric Research Labs

WeC05 Plaza Court 6

Security & Privacy of Cyber-Physical Systems (Invited Session)

Chair: Ruths, Justin	University of Texas at Dallas
Co-Chair: Hale, Matthew	University of Florida
Organizer: Ruths, Justin	University of Texas at Dallas

16:00-16:20 WeC05.1

Robust Software Rejuvenation for CPS with State Estimation and Disturbances, pp. 1241-1246.

Romagnoli, Raffaele	Carnegie Mellon University
Krogh, Bruce H.	Carnegie Mellon Univ
Sinopoli, Bruno	Washington University in St Louis

16:20-16:40 WeC05.2

Distributionally Robust Tuning of Anomaly Detectors in Cyber-Physical Systems with Stealthy Attacks (I), pp. 1247-1252.

Renganathan, Venkatraman	University of Texas at Dallas
Hashemi, Navid	University of Texas at Dallas
Ruths, Justin	University of Texas at Dallas
Summers, Tyler H.	University of Texas at Dallas

16:40-17:00 WeC05.3

The Dirichlet Mechanism for Differential Privacy on the Unit Simplex (I), pp. 1253-1258.

Gohari, Parham	The University of Texas at Austin
Wu, Bo	University of Texas at Austin
Hale, Matthew	University of Florida

Topcu, Ufuk	The University of Texas at Austin

17:00-17:20 WeC05.4

Parameter Privacy versus Control Performance: Fisher Information Regularized Control (I), pp. 1259-1265.

Ziemann, Ingvar	KTH Royal Institute of Technology
Sandberg, Henrik	KTH Royal Institute of Technology

17:20-17:40 WeC05.5

Secure Networked Control for Decentralized Systems Via Software Rejuvenation (I), pp. 1266-1273.

Griffioen, Paul	Carnegie Mellon University
Romagnoli, Raffaele	Carnegie Mellon University
Krogh, Bruce H.	Carnegie Mellon Univ
Sinopoli, Bruno	Washington University in St Louis

17:40-18:00 WeC05.6

Gain Design Via LMIs to Minimize the Impact of Stealthy Attacks (I), pp. 1274-1279.

Hashemi, Navid	University of Texas at Dallas
Ruths, Justin	University of Texas at Dallas

WeC06 Ballroom DE

Autonomous Energy Systems: Optimization and Learning (Invited Session)

Chair: Chakraborty, Indrasis	Lawrence Livermore National Laboratory
Co-Chair: Paoletti, Simone	Universita' Di Siena
Organizer: Bay, Christopher	National Renewable Energy Laboratory
Organizer: Annoni, Jennifer	National Renewable Energy Laboratory
Organizer: Bernstein, Andrey	National Renewable Energy Lab (NREL)
Organizer: Kroposki, Ben	National Renewable Energy Laboratory

16:00-16:20 WeC06.1

On the Greedy Placement of Energy Storage Systems in Distribution Grids (I), pp. 1280-1285.

Bucciarelli, Martina	University of Siena
Paoletti, Simone	Universita' Di Siena
Dall'Anese, Emiliano	University of Colorado Boulder
Vicino, Antonio	Univ. Di Siena

16:20-16:40 WeC06.2

On the Robust Implementation of Projected Dynamical Systems with Anti-Windup Controllers (I), pp. 1286-1291.

Hauswirth, Adrian	ETH Zurich
Dörfler, Florian	Swiss Federal Institute of Technology (ETH) Zurich
Teel, Andrew R.	Univ. of California at Santa Barbara

16:40-17:00 WeC06.3

Dynamics-Aware Continuous-Time Economic Dispatch and Optimal Automatic Generation Control (I), pp. 1292-1298.

Chakraborty, Pratyush	University of Utah
Dhople, Sairaj	University of Minnesota
Chen, Yu Christine	The University of British Columbia
Parvania, Masood	University of Utah

17:00-17:20 WeC06.4

Transient Safety Filter Design for Grid-Forming Inverters (I), pp. 1299-1304.

Kundu, Soumya	Pacific Northwest National Laboratory
Kalsi, Karan	Pacific Northwest National Lab

17:20-17:40 WeC06.5

Stochastic Virtual Battery Modeling of Uncertain Electrical Loads Using Variational Autoencoder (I), pp. 1305-1310.

Chakraborty, Indrasis	Lawrence Livermore National Laboratory
Nandanoori, Sai Pushpak	Pacific Northwest National Laboratory
Kundu, Soumya	Pacific Northwest National Laboratory
Kalsi, Karan	Pacific Northwest National Lab

17:40-18:00 WeC06.6

Quantification of Load Flexibility in Residential Buildings Using Home Energy Management Systems (I), pp. 1311-1316.

Munankarmi, Prateek	National Renewable Energy Laboratory
Jin, Xin	National Renewable Energy Laboratory
Ding, Fei	National Renewable Energy Laboratory
Zhao, Changhong	The Chinese University of Hong Kong

WeC07 Plaza Court 7

Control for Healthcare and Medical Systems II (Invited Session)

Chair: Hahn, Jin-Oh	University of Maryland
Co-Chair: Simaan, Marwan A.	University of Central Florida
Organizer: Hahn, Jin-Oh	University of Maryland
Organizer: Zhang, Wenlong	Arizona State University
Organizer: Rajamani, Rajesh	Univ. of Minnesota
Organizer: Ashrafiuon, Hashem	Villanova University

16:00-16:20 WeC07.1

Advantage of New Ventilation Method for Cardiopulmonary Resuscitation Qualitatively Captured by Simple Respiratory Mechanics Models (I), pp. 1317-1322.

Pigot, Henry	Lund University
Babiera Sancho, Carlos	Universitat Politècnica De València
Paskevicius, Audrius	Department of Cardiothoracic Surgery, Lund University and Skåne
Steen, Stig	Department of Cardiothoracic Surgery, Lund University and Skåne
Soltesz, Kristian	Lund University

16:20-16:40 WeC07.2

Impulsive Feedback Modeling of Levodopa Pharmacokinetics Subject to Intermittently Interrupted Gastric Emptying (I), pp. 1323-1328.

Runvik, Håkan	Uppsala University
Medvedev, Alexander V.	Uppsala University
Kjellsson, Maria	Dep of Pharmaceutical Biosciences, Uppsala Universitet

16:40-17:00 WeC07.3

Subspace Identification of a Glucose-Insulin Model Using

Meal Tracer Protocol Measurements (I), pp. 1329-1334.

Al-Matouq, Ali	Prince Sultan University
Alshahrani, Mohammed	King Fahd University of Petroleum and Minerals (KFUPM)
Novara, Carlo	Politecnico Di Torino

17:00-17:20 WeC07.4

Virtual Patient Generation Using Physiological Models through a Compressed Latent Parameterization (I), pp. 1335-1340.

Tivay, Ali	University of Maryland
Kramer, George	University of Texas Medical Branch
Hahn, Jin-Oh	University of Maryland

17:20-17:40 WeC07.5

Evaluating a Hardware-In-The-Loop System Intended for Testing Ventricular-Assist Device Control and Sensing Algorithms (I), pp. 1341-1346.

Rapp, Ethan	The University of Texas at Austin
Pawar, Suraj Rajendra	The University of Texas at Austin
Gohean, Jeffrey	Windmill Cardiovascular Systems
Larson, Erik	Windmill Cardiovascular Systems
Longoria, Raul	University of Texas at Austin

WeC08 Governor's SQ 10

Mechatronics II (Invited Session)

Chair: Rajamani, Rajesh	Univ. of Minnesota
Co-Chair: Zheng, Minghui	University at Buffalo
Organizer: Oldham, Kenn	University of Michigan, Ann Arbor
Organizer: Chen, Xu	University of Washington

16:00-16:20 WeC08.1

Electromagnetic Position Estimation Using Active Current Control and Nonlinear Observer (I), pp. 1347-1352.

Wang, Heng	University of Minnesota
Rajamani, Rajesh	Univ. of Minnesota

16:20-16:40 WeC08.2

An Optimization-Based Iterative Learning Control Design Method for UAV's Trajectory Tracking (I), pp. 1353-1359.

Adlakha, Revant	University at Buffalo
Zheng, Minghui	University at Buffalo

16:40-17:00 WeC08.3

Modeling, Identification, and Flow Control for a Microfluidic Device Using a Peristaltic Pump (I), pp. 1360-1366.

Smyth, Jason	University of Michigan
Smith, Kaylee	University of Michigan
Nagrath, Sunitha	University of Michigan
Oldham, Kenn	University of Michigan, Ann Arbor

17:00-17:20 WeC08.4

An Audio-Based Fault Diagnosis Method for Quadrotors Using Convolutional Neural Network and Transfer Learning (I), pp. 1367-1372.

Liu, Wansong	University at Buffalo
CHEN, ZHU	University at Buffalo
Zheng, Minghui	University at Buffalo

17:20-17:40 WeC08.5

Oriented Pedestrian Social Interaction Modeling and Inference (I), pp. 1373-1380.

Dong, Junyi	Cornell University
Zhu, Pingping	Cornell University
Ferrari, Silvia	Cornell University

17:40-18:00 WeC08.6

Time-Delayed Tuning of Vibration Absorbers for Non-Collocated Suppression (I), pp. 1381-1386.

Olgac, Nejat	Univ. of Connecticut
Jenkins, Ryan	University of Connecticut

WeC09 Govenor's SQ 16

Adaptive Control II (Regular Session)

Chair: Johnson, Jeffrey Kane	Maeve Automation
Co-Chair: Schuster, Eugenio	Lehigh University

16:00-16:20 WeC09.1

Adaptive Control of Discrete-Time Systems with Unknown, Unstable Zero Dynamics, pp. 1387-1392.

Islam, Syed Aseem Ul	University of Michigan
Nguyen, Tam Willy	University of Michigan
Kolmanovsky, Ilya V.	The University of Michigan
Bernstein, Dennis S.	Univ. of Michigan

16:20-16:40 WeC09.2

Active Noise Control for Harmonic and Broadband Disturbances Using RLS-Based Model Predictive Control, pp. 1393-1398.

Mohseni, Nima	University of Michigan, Ann Arbor
Nguyen, Tam Willy	University of Michigan
Islam, Syed Aseem Ul	University of Michigan
Kolmanovsky, Ilya V.	The University of Michigan
Bernstein, Dennis S.	Univ. of Michigan

16:40-17:00 WeC09.3

Adaptive Safety with Control Barrier Functions, pp. 1399-1405.

Taylor, Andrew	California Institute of Technology
Ames, Aaron D.	California Institute of Technology

17:00-17:20 WeC09.4

Recursive Least Squares with Matrix Forgetting, pp. 1406-1410.

Bruce, Adam	University of Michigan
Goel, Ankit	University of Michigan
Bernstein, Dennis S.	Univ. of Michigan

17:20-17:40 WeC09.5

Nonlinear Adaptive Burn Control and Optimal Control Allocation of Over-Actuated Two-Temperature Plasmas, pp. 1411-1416.

Graber, Vincent	Lehigh University
Schuster, Eugenio	Lehigh University

17:40-18:00 WeC09.6

The Colliding Reciprocal Dance Problem: A Mitigation Strategy with Application to Automotive Active Safety Systems, pp. 1417-1422.

Johnson, Jeffrey Kane	Mapless AI, Inc

WeC10 Governor's SQ 11

Autonomous Robots II (Regular Session)

Chair: Khalil, Hassan K.	Michigan State Univ
Co-Chair: Lee, Kooktae	New Mexico Tech

16:00-16:20 WeC10.1

A Fully Distributed Motion Coordination Strategy for Multi-Robot Systems with Local Information, pp. 1423-1428.

Yu, Pian — School of Electrical Engineering and Computer Science, KTH Royal
Dimarogonas, Dimos V. — KTH Royal Institute of Technology

16:20-16:40 WeC10.2

Robust Tracking of an Unknown Trajectory with a Multi-Rotor UAV: A High-Gain Observer Approach, pp. 1429-1434.

Boss, Connor J. — Michigan State University
Srivastava, Vaibhav — Michigan State University
Khalil, Hassan K. — Michigan State Univ

16:40-17:00 WeC10.3

Design of Robust Path-Following Control System for Self-Driving Vehicles Using Extended High-Gain Observer, pp. 1435-1440.

Al-Nadawi, Yasir — Michigan State University
Al-Qassab, Hothaifa — Michigan State University
Kent, Daniel — Michigan State University
Pang, Su — Michigan State University
Srivastava, Vaibhav — Michigan State University
Radha, Hayder — Michigan State University

17:00-17:20 WeC10.4

Feedback Linearizing Controllers on SO(3) Using a Global Parametrization, pp. 1441-1446.

Akhtar, Adeel — University of Waterloo
Saleem, Sajid — Georgia Institute of Technology
Waslander, Steven L. — University of Waterloo

17:20-17:40 WeC10.5

Receding-Horizon Ergodic Exploration Planning Using Optimal Transport Theory, pp. 1447-1452.

Kabir, Rabiul Hasan — New Mexico Institute of Mining and Technology
Lee, Kooktae — New Mexico Tech

17:40-18:00 WeC10.6

Testing-And-Evaluation Platform for Haptics-Based Aerial Manipulation with Drones, pp. 1453-1458.

KIM, DONGBIN — University of Nevada, Las Vegas
Oh, Paul — University of Nevada Las Vegas

WeC11 — Director's Row I

Agent-Based Systems II (Regular Session)

Chair: He, Jianping — Shanghai Jiao Tong University
Co-Chair: Marden, Jason R. — University of California, Santa Barbara

16:00-16:20 WeC11.1

Attack Detection of Nonlinear Distributed Control Systems, pp. 1459-1464.

Zhang, Xu — Penn State University
Lu, Yang — Pennsylvania State University
Zhu, Minghui — Pennsylvania State University

16:20-16:40 WeC11.2

Differentially Private Interval Observer Design with Bounded Input Perturbation, pp. 1465-1470.

Degue, Kwassi Holali — Ecole Polytechnique De Montreal and GERAD
Le Ny, Jerome — Polytechnique Montreal

16:40-17:00 WeC11.3

Unpredictable Trajectory Design for Mobile Agents, pp. 1471-1476.

Li, Jialun — Shanghai Jiao Tong University
He, Jianping — Shanghai Jiao Tong University
Li, Yushan — Shanghai Jiao Tong University
Guan, Xin-Ping — Shanghai Jiao Tong University

17:00-17:20 WeC11.4

Distributed Submodular Maximization with Parallel Execution, pp. 1477-1482.

Sun, Haoyuan — California Institute of Technology
Grimsman, David — UC Santa Barbara
Marden, Jason R. — University of California, Santa Barbara

17:20-17:40 WeC11.5

Resilient Distributed Hypothesis Testing with Time-Varying Network Topology, pp. 1483-1488.

Wu, Bo — University of Texas at Austin
Carr, Steven Paull — The University of Texas at Austin
Bharadwaj, Sudarshanan — University of Texas, Austin
Xu, Zhe — University of Texas, Austin
Topcu, Ufuk — The University of Texas at Austin

17:40-18:00 WeC11.6

An Algorithm for Multi-Objective Multi-Agent Optimization, pp. 1489-1494.

Blondin, Maude J — University of Florida
Hale, Matthew — University of Florida

WeC12 — Director's Row E

Estimation II (Regular Session)

Chair: Jorques Moreno, Carlos — Scania CV AB
Co-Chair: Daher, Naseem — American University of Beirut

16:00-16:20 WeC12.1

Analysis of Resilience for a State Estimator for Time-Discrete Linear Systems, pp. 1495-1500.

Kircher, Alexandre — Laboratoire Ampère, Ecole Centrale De Lyon
Bako, Laurent — Ecole Centrale De Lyon
Blanco, Eric — Ecole Centrale De Lyon
Benallouch, Mohamed — ECAM Lyon (École Catholique D'arts Et Métiers)
Korniienko, Anton — Ecole Centrale De Lyon, Laboratoire Ampère

16:20-16:40 WeC12.2

Toward Tractable Global Solutions to Bayesian Point Estimation Problems Via Sparse Sum-Of-Squares Relaxations, pp. 1501-1506.

Rodrigues, Diogo — University of California, Berkeley
Abdalmoaty, Mohamed — KTH
Hjalmarsson, Håkan — KTH Royal Inst. of Tech

16:40-17:00 WeC12.3

Bayesian Method for Fuel Mass Estimation of Short Pilot Injections Based on Its Misfire Probability, pp. 1507-1513.

Jorques Moreno, Carlos — Scania CV AB

Stenlåås, Ola — Scania CV AB
Tunestål, Per — Lund University, Faculty of Engineering

17:00-17:20 — WeC12.4

Pole and Residue Estimation from Impulse Response Data: New Error Bounding Techniques, pp. 1514-1519.

Maruf, Abdullah Al — Washington State University
Roy, Sandip — Washington State University

17:20-17:40 — WeC12.5

Accurate Real-Time Estimation of the Inertia Tensor of Package Delivery Quadrotors, pp. 1520-1525.

Dhaybi, Mohamad — American University of Beirut
Daher, Naseem — American University of Beirut

17:40-18:00 — WeC12.6

Fitting a Kalman Smoother to Data, pp. 1526-1531.

Barratt, Shane — Stanford University
Boyd, Stephen — Stanford University

WeC13 — Plaza Court 1

Robust Control II (Regular Session)

Chair: Abou Jaoude, Dany — American University of Beirut
Co-Chair: Islam, Shafiqul — Xavier University of Louisiana

16:00-16:20 — WeC13.1

Robust Data-Driven State-Feedback Design, pp. 1532-1538.

Berberich, Julian — University of Stuttgart
Koch, Anne — University of Stuttgart
Scherer, Carsten W. — University of Stuttgart
Allgöwer, Frank — University of Stuttgart

16:20-16:40 — WeC13.2

Optimal Selection of Basis Functions for Robust Tracking Control of Linear Systems Using Filtered Basis Functions, pp. 1539-1544.

Ramani, Keval — University of Michigan, Ann Arbor
Okwudire, Chinedum — University of Michigan

16:40-17:00 — WeC13.3

A Two-Step LMI Scheme for H2-H-Infinity Control Design, pp. 1545-1550.

He, Tianyi — Michigan State University
Zhu, Guoming — Michigan State University
Chen, Xiang — University of Windsor

17:00-17:20 — WeC13.4

Finite Horizon Robust Synthesis, pp. 1551-1556.

Buch, Jyot — University of Minnesota, Minneapolis
Seiler, Peter — University of Michigan, Ann Arbor

17:20-17:40 — WeC13.5

Guaranteed Output Bounds Using Performance Integral Quadratic Constraints, pp. 1557-1562.

Abou Jaoude, Dany — American University of Beirut
Farhood, Mazen — Virginia Tech

17:40-18:00 — WeC13.6

Robust Adaptive Finite-Time Tracking Control for Unmanned Aerial Vehicle with Uncertainty, pp. 1563-1568.

Islam, Shafiqul — Xavier University of Louisiana
Dias, Jorge — University of Coimbra
Xiros, Nikolas — University of New Orleans

WeC14 — Plaza Court 8

Estimation and Control of PDE Systems II (Invited Session)

Chair: Demetriou, Michael A. — Worcester Polytechnic Institute
Co-Chair: Heinke, Simon — Hamburg University of Technology
Organizer: Demetriou, Michael A. — Worcester Polytechnic Institute
Organizer: Fahroo, Fariba — AFOSR

16:00-16:20 — WeC14.1

Distributed Controller Design for Systems Interconnected Over Chordal Graphs (I), pp. 1569-1574.

Heinke, Simon — Hamburg University of Technology
Schug, Ann-Kathrin — Hamburg University of Technology
Werner, Herbert — Hamburg University of Technology

16:20-16:40 — WeC14.2

Adaptive Control of a Scalar 1-D Linear Hyperbolic PDE with Uncertain Transport Speed Using Boundary Sensing (I), pp. 1575-1581.

Anfinsen, Henrik — NTNU
Holta, Haavard — NTNU
Aamo, Ole Morten — NTNU

16:40-17:00 — WeC14.3

Functional Estimation of Perturbed Positive Real Infinite Dimensional Systems Using Adaptive Compensators (I), pp. 1582-1587.

Demetriou, Michael A. — Worcester Polytechnic Institute

17:00-17:20 — WeC14.4

Boundary Control of Coupled Hyperbolic PDEs for Two-Dimensional Vibration Suppression of a Deep-Sea Construction Vessel (I), pp. 1588-1593.

Wang, Ji — University of California, San Diego
Krstic, Miroslav — University of California, San Diego

17:20-17:40 — WeC14.5

Prescribed-Time Stabilization of the Linearized Schrödinger Equation (I), pp. 1594-1599.

Steeves, Drew — University of California, San Diego
Krstic, Miroslav — University of California, San Diego
Vazquez, Rafael — Univ. De Sevilla

17:40-18:00 — WeC14.6

Backstepping Control for a Class of Coupled Hyperbolic-Parabolic PDE Systems, pp. 1600-1605.

GHOUSEIN, Mohammad — University Grenoble Alpes
Witrant, Emmanuel — Cnrs - Gipsa Lab

WeC15 — Plaza Court 5

Stability of Nonlinear Systems II (Regular Session)

Chair: Hudon, Nicolas — Queen's University
Co-Chair: Li, Na — Harvard University

16:00-16:20 — WeC15.1

A Generalized Homotopy Operator Approach for Potential-Based Realization of Nonlinear Systems, pp. 1606-1611.

Guay, Martin — Queens University
Hudon, Nicolas — Queen's University

16:20-16:40 — WeC15.2

Exponential Stability of Primal-Dual Gradient Dynamics with Non-Strong Convexity, pp. 1612-1618.

Chen, Xin	Harvard University
Li, Na	Harvard University

16:40-17:00 WeC15.3

Continuous-Time Dynamic Realization for Nonlinear Stabilization Via Control Contraction Metrics, pp. 1619-1624.

Wang, Ruigang	The University of Sydney
Manchester, Ian R.	University of Sydney

17:00-17:20 WeC15.4

A System Level Approach to Discrete-Time Nonlinear Systems, pp. 1625-1630.

Ho, Dimitar	Caltech

17:20-17:40 WeC15.5

Exponential Stability Criteria for Neural Network-Based Control of Nonlinear Systems, pp. 1631-1636.

Jain, Ayush Kumar	Université Polytechnique Des Hauts-De-France
Fiter, Christophe	University of Lille / CRIStAL (UMR CNRS 9189)
BERDJAG, Denis	Université Polytechnique Hauts-De-France
POLET, Philippe	Université Polytechnique Hauts De France

17:40-18:00 WeC15.6

New Stability Conditions for Time Delay Control of Nonlinear Systems, pp. 1637-1644.

Reddy, Suresh B.	Caterpillar Inc

WeC16 — Governor's SQ 17

Cooperative Control II (Regular Session)

Chair: Gombolay, Matthew	Georgia Institute of Technology
Co-Chair: Koru, Ahmet	Penn State University

16:00-16:20 WeC16.1

Coordinated Control of UAVs for Human-Centered Active Sensing of Wildfires, pp. 1645-1652.

Seraj, Esmaeil	Georgia Institute of Technology
Gombolay, Matthew	Georgia Institute of Technology

16:20-16:40 WeC16.2

Planar Formation Control of a School of Robotic Fish, pp. 1653-1658.

Ghanem, Paul	University of Maryland College Park
Wolek, Artur	University of Maryland
Paley, Derek A.	University of Maryland

16:40-17:00 WeC16.3

On Cooperative Control of Linear Multiagent Systems Over Networks with Limited Bandwidth, pp. 1659-1664.

Koru, Ahmet Taha	Pennsylvania State University
Johnson, Eric	Pennsylvania State University
Yucelen, Tansel	University of South Florida
Sarsilmaz, Selahattin Burak	University of South Florida

17:00-17:20 WeC16.4

A Two-Team Linear Quadratic Differential Game of Defending a Target, pp. 1665-1670.

Garcia, Eloy	Air Force Research Laboratory
Casbeer, David W.	Air Force Research Laboratory
Pachter, Meir	AFIT/ENG
Curtis, J. Willard	Air Force Research Laboratory
Doucette, Emily	AFRL

17:20-17:40 WeC16.5

Cooperative Avoidance Control with Relative Velocity Information and Collision Sector Functions for Car-Like Robots, pp. 1671-1677.

Zhang, Wenxue	Harbin Institute of Technology
Stipanovic, Dusan M.	Univ of Illinois, Urbana-Champaign
Zhou, Di	Harbin Institute of Technology

17:40-18:00 WeC16.6

Robust Suboptimal Output Synchronization of Nonlinear Heterogeneous Agents, pp. 1678-1684.

Babazadeh, Reza	Concordia University
Roudneshin, Masoud	Concordia University
Selmic, Rastko	Concordia University
Aghdam, Amir G.	Concordia University

WeC17 — Director's Row J

Delay Systems (Regular Session)

Chair: Lin, Zongli	University of Virginia
Co-Chair: Lin, Wei	Case Western Reserve University

16:00-16:20 WeC17.1

Sampled-Data Estimator for Nonlinear Systems with Arbitrarily Fast Rate of Convergence, pp. 1685-1689.

Mazenc, Frederic	Inria Saclay
Malisoff, Michael	Louisiana State University
Niculescu, Silviu-Iulian	CNRS-Supelec

16:20-16:40 WeC17.2

Multiplicity-Induced-Dominancy Extended to Neutral Delay Equations: Towards a Systematic PID Tuning Based on Rightmost Root Assignment, pp. 1690-1695.

Ma, Dan	Northeastern University
Boussaada, Islam	Universite Paris Saclay, CNRS-CentraleSupelec-Universite Paris S
Bonnet, Catherine	Inria Saclay-Ile-De-France
Niculescu, Silviu-Iulian	CNRS-Supelec
Chen, Jie	Department of Electrical Engineering University of California Ri

16:40-17:00 WeC17.3

Sequential Predictors for Delay Compensation for Perturbed Discrete Time Systems, pp. 1696-1700.

Mazenc, Frederic	Inria Saclay
Malisoff, Michael	Louisiana State University

17:00-17:20 WeC17.4

Delay Independent Output Feedback Stabilization of Discrete-Time Linear Systems with Bounded Input Delay, pp. 1701-1706.

Wei, Yusheng	University of Virginia
Lin, Zongli	University of Virginia

17:20-17:40 WeC17.5

Robust Control of Time-Delay Uncertain Systems by Delay-Free Output Feedback, pp. 1707-1712.

Zhang, Xu — Beihang University
Lin, Wei — Case Western Reserve University

17:40-18:00 WeC17.6

Predictor-Based Stabilization of Multiple Differential-Wheeled Robots under Measurement Delays: Controller Gain Design for Fast Consensus, pp. 1713-1718.

Fan, Haonan — Northeastern University
Sipahi, Rifat — Northeastern University
Oguchi, Toshiki — Tokyo Metro. Univ

WeC18 Plaza Court 4

Constrained Control II (Regular Session)

Chair: Ghaffari, Azad — Wayne State University
Co-Chair: Zeng, Shen — Washington University in St. Louis

16:00-16:20 WeC18.1

Operational Safety Control for Unmanned Aerial Vehicles Using Modular Barrier Functions, pp. 1719-1724.

Ghaffari, Azad — Wayne State University

16:20-16:40 WeC18.2

A Model Predictive Control Strategy for Finite-Time Reference Synchronization in Multi-Agent Systems with Double-Integrator Dynamics, pp. 1725-1730.

Franze', Giuseppe — Universita' Della Calabria
Fedele, Giuseppe — University of Calabria

16:40-17:00 WeC18.3

Iterative Optimal Control Syntheses for Nonlinear Systems in Constrained Environments, pp. 1731-1736.

Vu, Minh — Washington University in St. Louis
Zeng, Shen — Washington University in St. Louis

17:00-17:20 WeC18.4

Barrier Functions in Cascaded Controller: Safe Quadrotor Control, pp. 1737-1742.

Khan, Mouhyemen — Georgia Institute of Technology
Chatterjee, Abhijit — Georgia Institute of Technology
Zafar, Munzir — Georgia Institute of Technology

17:20-17:40 WeC18.5

A Feedback-Planning Scheme for Synthesizing Control Functions, pp. 1743-1748.

Tasdighi Kalat, Shadi — Worcester Polytechnic Institute
Ghorbani Faal, Siamak — Worcester Polytechnic Institute

17:40-18:00 WeC18.6

Safety-Critical Adaptive Control with Nonlinear Reference Model Systems, pp. 1749-1754.

Arabi, Ehsan — University of Michigan
Garg, Kunal — University of Michigan-Ann Arbor
Panagou, Dimitra — University of Michigan, Ann Arbor

WeC19 Plaza Court 3

Optimal Control II (Regular Session)

Chair: Taheri, Ehsan — Auburn University
Co-Chair: Dower, Peter M. — University of Melbourne

16:00-16:20 WeC19.1

Adaptive Dynamic Programming for Optimal Synchronization of Kuramoto Oscillator, pp. 1755-1760.

Donge, Vrushabh — Veermata Jijabai Technical Institute, Mumbai
Kumar, Shalini — Veermata Jijabai Technological Institute
Kharade, Sonam — VJTI, Mumbai
Wagh, Sushama — Veermata Jijabai Technological Institute, Mumbai, India
Singh, Navdeep — Veermata Jijabai Technological Institute (VJTI)

16:20-16:40 WeC19.2

C-DOC: Co-State Desensitized Optimal Control, pp. 1761-1766.

Makkapati, Venkata Ramana — Georgia Institute of Technology
Maity, Dipankar — Georgia Institute of Technology
Dor, Mehregan — Georgia Tech
Tsiotras, Panagiotis — Georgia Institute of Technology

16:40-17:00 WeC19.3

Risk Aware SUAS Path Planning in an Unstructured Wildfire Environment, pp. 1767-1772.

Aggarwal, Rachit — The Ohio State University
Soderlund, Alexander — The Ohio State University
Kumar, Mrinal — Ohio State University
Grymin, David — Air Force Research Laboratory

17:00-17:20 WeC19.4

Optimal Control of Wave Energy Converters Using Epsilon-Trig Regularization Method, pp. 1773-1778.

Mall, Kshitij — Auburn University
Taheri, Ehsan — Auburn University

17:20-17:40 WeC19.5

Verification of Stationary Action Trajectories Via Optimal Control, pp. 1779-1784.

Dower, Peter M. — University of Melbourne
McEneaney, William M. — Univ. California San Diego

17:40-18:00 WeC19.6

Optimal Sample-Error/Ripple Tradeoff for Sampled-Data Systems with Harmonic Disturbances, pp. 1785-1790.

Mohseni, Nima — University of Michigan, Ann Arbor
Bernstein, Dennis S. — Univ. of Michigan

WeC20 Plaza Court 2

Hybrid Systems II (Regular Session)

Chair: Altin, Berk — University of California, Santa Cruz
Co-Chair: Goyal, Manish — University of North Carolina at Chapel Hill

16:00-16:20 WeC20.1

Model Predictive Control for Hybrid Dynamical Systems: Sufficient Conditions for Asymptotic Stability with Persistent Flows or Jumps, pp. 1791-1796.

Altin, Berk — University of California, Santa Cruz
Sanfelice, Ricardo G. — University of California at Santa Cruz

16:20-16:40 WeC20.2

Condensed Matter Physics, the Hybrid Second Law of Thermodynamics, and Hybrid Consensus Protocols for Network Systems, pp. 1797-1802.

Haddad, Wassim M. — Georgia Inst. of Tech
Chahine, Makram — Georgia Institute of Technology

16:40-17:00 WeC20.3

Spectral Uncertainty Propagation for Generalized Stochastic Hybrid Systems with Applications to a Bouncing Ball, pp. 1803-1808.

Wang, Weixin — George Washington University
Lee, Taeyoung — George Washington University

17:00-17:20 WeC20.4

Stability Analysis of Impulsive Switched Systems with Time Delays and State-Dependent Impulses, pp. 1809-1814.

Ren, Wei — KTH Royal Institute of Technology
Yu, Tao — University of Science and Technology of China
Xiong, Junlin — University of Science and Technology of China

17:20-17:40 WeC20.5

The Nearest Polytope Problem: Algorithms and Application to Controlling Hybrid Systems, pp. 1815-1822.

Wu, Albert — Massachusetts Institute of Technology
Sadraddini, Sadra — Massachusetts Institute of Technology
Tedrake, Russ — MIT

17:40-18:00 WeC20.6

Generating Longest Counterexample: On the Cross-Roads of Mixed Integer Linear Programming and SMT, pp. 1823-1829.

Goyal, Manish — University of North Carolina at Chapel Hill
Bergman, David — University of Connecticut
Duggirala, Parasara Sridhar — University of North Carolina at Chaoel Hill

WeC21 — Director's Row H

Best Student Paper Award Finalists (Regular Session)

Chair: Barton, Kira — University of Michigan, Ann Arbor
Co-Chair: Borrello, Michael A. — Philips Healthcare

16:00-16:20 WeC21.1

Homotopy Method for Finding the Global Solution of Post-Contingency Optimal Power Flow (I), pp. 1830-1837.

Park, SangWoo — UC Berkeley
Glista, Elizabeth — University of California, Berkeley
Lavaei, Javad — UC Berkeley
Sojoudi, Somayeh — UC Berkeley

16:20-16:40 WeC21.2

Accuracy Prevents Robustness in Perception-Based Control (I), pp. 1838-1844.

Al Makdah, Abed AlRahman — University of California Riverside
Katewa, Vaibhav — Indian Institute of Science Bangalore
Pasqualetti, Fabio — University of California, Riverside

16:40-17:00 WeC21.3

Coordinated Control of UAVs for Human-Centered Active Sensing of Wildfires, pp. 1845-1852.

Seraj, Esmaeil — Georgia Institute of Technology
Gombolay, Matthew — Georgia Institute of Technology

17:00-17:20 WeC21.4

Carrots or Sticks? the Effectiveness of Subsidies and Tolls in Congestion Games, pp. 1853-1858.

Ferguson, Bryce L. — University of California, Santa Barbara
Brown, Philip N. — University of Colorado, Colorado Springs
Marden, Jason R. — University of California, Santa Barbara

17:20-17:40 WeC21.5

A Fully Distributed Motion Coordination Strategy for Multi-Robot Systems with Local Information, pp. 1859-1864.

Yu, Pian — School of Electrical Engineering and Computer Science, KTH Royal
Dimarogonas, Dimos V. — KTH Royal Institute of Technology

WeCT3 — Meetings and

WeCT3 (Special Session)

16:00-18:00 WeCT3.1

Special Session: Part 2 Is Cancelled, pp. 1865-1866.

Pan, Selina — Toyota Research Institute
Canova, Marcello — The Ohio State University
Shahbakhti, Mahdi — University of Alberta
Chen, Yan — Arizona State University
Hall, Carrie — Illinois Institute of Technology

16:00-18:00 WeCT3.2

NSF Program Manager Office Hours: Dr. Kishan Baheti, pp. 1867-1868.

Baheti, Radhakisan — National Science Foundation

WeP21 — Ballroom 1

Advances and Opportunities of AI and Machine Learning in Industrial Process Monitoring and Control (Plenary Session)

Chair: Grover, Martha — Georgia Institute of Technology

18:15-19:15 WeP21.1

Advances and Opportunities of AI and Machine Learning in Industrial Process Monitoring and Control, pp. 1869-1870.

Chiang, Leo — The Dow Chemical Company

WeBaT5 — Meetings

WeBaT5 (Special Session)

19:30-21:30 WeBaT5.1

Meeting: IEEE CSS YP Meetup (from 5pm to 8pm), pp. 1871-1871.

Patel, Rushabh — Systems Technology, Inc

19:30-21:30 WeBaT5.2

Meeting: ASME DSCD Automotive Transportation System TC (from 6pm to 7pm), pp. 1872-1872.

Canova, Marcello — The Ohio State University

19:30-21:30 WeBaT5.3

Meetings: ASME DSCD Mechatronics TC Meeting (from 6pm to 7pm), pp. 1873-1873.

Clayton, Garrett — Villanova University

19:30-21:30 WeBaT5.4

Meeting: ASME DSCD General Meeting (from 7.30pm to 10pm), pp. 1874-1874.

Yi, Jingang — Rutgers University

ThP1 Ballroom 1

Control of Complex Energy and Power Systems for Electrified Mobility (Plenary Session)

Chair: Grover, Martha — Georgia Institute of Technology

08:00-09:00 ThP1.1

Control of Complex Energy and Power Systems for Electrified Mobility, pp. 1875-1876.

Alleyne, Andrew G. — Univ of Illinois, Urbana-Champaign

ThLBP-A01 Ballroom ABC

Poster-ThA (Late Breaking Poster Session)

09:00-09:30 ThLBP-A01.1

How Individual Pitch Control Can Be Used to Increase Wind Farm Power Production, pp. 1877-1877.

Frederik, Joeri Alexis — TU Delft
Doekemeijer, Bart Matthijs — Delft University of Technology
Mulders, Sebastiaan Paul — Delft University of Technology
van Wingerden, Jan-Willem — Delft University of Technology

09:00-09:30 ThLBP-A01.2

Learning the Globally Optimal Distributed LQ Regulator, pp. 1878-1878.

Furieri, Luca — ETH Zurich
Zheng, Yang — Harvard University
Kamgarpour, Maryam — Swiss Federal Institute of Technology

09:00-09:30 ThLBP-A01.3

Security Indices for Structured Systems, pp. 1879-1879.

Gracy, Sebin — KTH, Royal Institute of Technology
Milosevic, Jezdimir — KTH Royal Institute of Technology
Sandberg, Henrik — KTH Royal Institute of Technology

09:00-09:30 ThLBP-A01.4

Time-Invariant Extremum Seeking Control, pp. 1880-1880.

Kumar, Saurav — University of Texas at Dallas
Makarenkov, Oleg — Mr
Gregg, Robert D. — University of Michigan
Gans, Nicholas — University of Texas at Arlington

09:00-09:30 ThLBP-A01.5

Slow down or Take a Smaller Step? - Optimal Gaits for Biped Walking on Slippery Ground, pp. 1881-1881.

Chen, Tan — University of Notre Dame
Goodwine, Bill — University of Notre Dame

09:00-09:30 ThLBP-A01.6

Towards Dynamic Pricing for Shared Mobility on Demand, pp. 1882-1882.

Guan, Yue — Massachusetts Institute of Technology
Annaswamy, Anuradha M. — Massachusetts Inst. of Tech
tseng, eric — Ford Motor Company

09:00-09:30 ThLBP-A01.7

Continuous Authentication Security Games, pp. 1883-1883.

SARITAS, Serkan — KTH Royal Institute of Technology
Zaki, Ezzeldin — KTH Royal Institute of Technology
Sandberg, Henrik — KTH Royal Institute of Technology
Dán, György — KTH - Royal Institute of Technology

ThLBP-A02 ACC Sponsors

Meeting Space-ThA

09:00-09:30 ThLBP-A02.1

Gold Sponsor: General Motors, pp. 1884-1884.

Eckman, Wendy — General Motors

09:00-09:30 ThLBP-A02.2

Gold Sponsor: Mathworks, pp. 1885-1885.

Rose, Jennifer — MathWorks
Ulusoy, Melda — Mathworks

09:00-09:30 ThLBP-A02.3

Gold Sponsor: Mitsubishi Electric Research Lab (MERL), pp. 1886-1886.

Thornton, Jay — Mitsubishi Electric Research Lab
Di Cairano, Stefano — Mitsubishi Electric Research Lab

09:00-09:30 ThLBP-A02.4

Silver Sponsor: Quanser, pp. 1887-1887.

Rahaman, Josie — Quanser Consulting
Wang, Gemma — Quanser

09:00-09:30 ThLBP-A02.5

Silver Sponsor: SIAM, pp. 1888-1888.

O'Neill, Kristin — SIAM

09:00-09:30 ThLBP-A02.6

Silver Sponsor: Cancelled, pp. 1889-1889.

Kelly, Claire — Wiley

09:00-09:30 ThLBP-A02.7

Silver Sponsor: DSPACE, pp. 1890-1890.

Johnson, Janice — DSpace

09:00-09:30 ThLBP-A02.8

Silver Sponsor: Springer Nature, pp. 1891-1891.

Tominich, Christopher — Springer
Jackson, Oliver — Springer

09:00-09:30 ThLBP-A02.9

Bronze Sponsor: Processes, pp. 1892-1892.

Xiang, Wency — Processes MDPI

09:00-09:30 ThLBP-A02.10

Bronze Sponsor: Halliburton, pp. 1893-1893.

Darbe, Robert — Halliburton

ThA01 Ballroom 1

RI: Predictive Control (RI Session)

Chair: Grover, Martha — Georgia Institute of Technology
Co-Chair: Clayton, Garrett — Villanova University

09:30-09:55 ThA01.1

Mitigating Cyberattack Impacts Using Lyapunov-Based Economic Model Predictive Control, pp. 1894-1899.

Durand, Helen — Wayne State University
Wegener, Matthew — Fiat Chrysler Automobiles

09:55-09:58 ThA01.2

A Supervisory Model Predictive Control Framework for Dual Temperature Setpoint Optimization, pp. 1900-1906.

Plewe, Kaden	The University of Texas at Austin
Smith, Amanda	University of Utah
Liu, Mingxi	University of Utah

09:58-10:01 ThA01.3

Multistage Model Predictive Control Based on Data-Driven Distributionally Robust Optimization, pp. 1907-1912.

Lu, Shuwen	Cornell University
You, Fengqi	Cornell University

10:01-10:04 ThA01.4

Scheduling and Control Over Networks Using MPC with Time-Varying Terminal Ingredients, pp. 1913-1918.

Wildhagen, Stefan	University of Stuttgart
Allgöwer, Frank	University of Stuttgart

10:04-10:07 ThA01.5

Nonlinear Model Predictive Control Using Output Feedback, pp. 1919-1924.

Allen, Mathis	Michigan State University
Khalil, Hassan K.	Michigan State Univ

10:07-10:10 ThA01.6

Two Degrees of Freedom Control and B-Spline Functions As Tools for a Reduced Complexity Approach to MPC, pp. 1925-1930.

Orsini, Valentina	Università Politecnica Delle Marche
Jetto, L.	Università Politecnica Delle Marche
Romagnoli, Raffaele	Carnegie Mellon University

10:10-10:13 ThA01.7

Model Predictive Control of an Overactuated Roll Gap with a Moving Manipulated Variable, pp. 1931-1936.

Wehr, Matthias	RWTH Aachen University
Schaetzler, Sven	RWTH Aachen University
Abel, Dirk	RWTH Aachen University
Hirt, Gerhard	RWTH Aachen University

10:13-10:16 ThA01.8

A Stochastic Output-Feedback MPC Scheme for Distributed Systems, pp. 1937-1942.

Mark, Christoph	University of Kaiserslautern
Liu, Steven	University of Kaiserslautern

10:16-10:19 ThA01.9

Model Predictive Control with Guarantees for Discrete Linear Stochastic Systems Subject to Additive Disturbances with Chance Constraints, pp. 1943-1948.

Bethge, Johanna	Otto-Von-Guericke University Magdeburg
Yu, Shuyou	Jilin University
Findeisen, Rolf	OVG University Magdeburg

10:19-10:22 ThA01.10

Robust MPC with Reduced Conservatism Blending Multiples Tubes, pp. 1949-1954.

Koegel, Markus	OVG Univ. Magdeburg
Findeisen, Rolf	OVG University Magdeburg

10:22-10:25 ThA01.11

Nonlinear Model Predictive Control for the Transient Load Share Management of a Hybrid Diesel-Electric Marine Propulsion Plant, pp. 1955-1960.

PLANAKIS, NIKOLAOS	National Technical University of Athens
Karystinos, Vasileios	National Technical University of Athens
Papalambrou, George	National Technical University of Athens
Kyrtatos, Nikolaos	National Technical University of Athens

10:25-10:28 ThA01.12

Real-Time Nonlinear Model Predictive Control for the Energy Management of Hybrid Electric Vehicles in a Hierarchical Framework, pp. 1961-1967.

Schmitt, Lukas Rudolf	RWTH Aachen University
Keller, Martin	RWTH Aachen University
Abel, Dirk	RWTH Aachen University
Albin, Thivaharan	RWTH Aachen University, Institute of Automatic Control

10:28-10:31 ThA01.13

Multi-Criteria and Multivariate MPC Control Performance Assessment, pp. 1968-1973.

Domanski, Pawel D.	Warsaw University of Technology
Lawrynczuk, Maciej	Warsaw University of Technology

10:31-10:34 ThA01.14

Formulation of Economic Model Predictive Control to Address System Dynamics Over Multiple Time Scales, pp. 1974-1979.

Ellis, Matthew	University of California, Davis

10:34-10:37 ThA01.15

Lyapunov-Based Economic Model Predictive Control with Taylor Series State Approximations, pp. 1980-1985.

Kasturi Rangan, Keshav	Wayne State University
Durand, Helen	Wayne State University

10:37-10:40 ThA01.16

Efficient Greenhouse Temperature Control with Data-Driven Robust Model Predictive, pp. 1986-1991.

Chen, Wei-Han	Cornell University
You, Fengqi	Cornell University

10:40-10:43 ThA01.17

Theoretical Exploration of Irrigation Control for Stem Water Potential through Model Predictive Control, pp. 1992-1997.

Chen, Wei-Han	Cornell University
Shang, Chao	Tsinghua University
Zhu, Siyu	Cornell University
Haldeman, Kathryn	Cornell University
Santiago, Michael	FloraPulse Co
Stroock, Abraham	Cornell University
You, Fengqi	Cornell University

10:43-10:46 ThA01.18

Tube-Based Robust Model Predictive Control for a Distributed Parameter System Modeled As a Polytopic LPV, pp. 1998-2003.

Ismail, Jawad	The Institute of Control Systems, University of Kaiserslautern
Liu, Steven	University of Kaiserslautern

10:46-10:49 ThA01.19

Convexified Contextual Optimization for On-The-Fly Control of Smooth Systems, pp. 2004-2011.

P. Vinod, Abraham	The University of Texas at Austin

Israel, Arie	University of Texas, Austin
Topcu, Ufuk	The University of Texas at Austin

10:49-10:52 ThA01.20

Accurate Trajectory Following for Automated Vehicles in Dynamic Environments, pp. 2012-2017.

Febbo, Huckleberry	University of Michigan
Isele, David	Honda Research Institute USA

10:52-10:55 ThA01.21

Enhancing Practical Tractability of Lyapunov-Based Economic Model Predictive Control, pp. 2018-2023.

Durand, Helen	Wayne State University
Messina, Dominic	Wayne State University

10:55-10:58 ThA01.22

Task Decomposition for Iterative Learning Model Predictive Control, pp. 2024-2029.

Vallon, Charlott	University of California, Berkeley
Borrelli, Francesco	Unversity of California at Berkeley

ThA02 Ballroom 2

RI: Control of Robotic Systems (RI Session)

Chair: Leang, Kam K.	University of Utah
Co-Chair: Devasia, Santosh	Univ of Washington

09:30-09:55 ThA02.1

Multi-Agent Control Using Coverage Over Time-Varying Domains, pp. 2030-2035.

Xu, Xiaotian	University of Maryland College Park
Diaz-Mercado, Yancy	University of Maryland

09:55-09:58 ThA02.2

Model-Based Randomness Monitor for Stealthy Sensor Attacks, pp. 2036-2042.

Bonczek, Paul	University of Virginia
Gao, Shijie	University of Virginia
Bezzo, Nicola	University of Virginia

09:58-10:01 ThA02.3

Navigation of a Quadratic Potential with Star Obstacles, pp. 2043-2048.

Kumar, Harshat	University of Pennsylvania
Paternain, Santiago	University of Pennsylvania
Ribeiro, Alejandro	University of Pennsylvania

10:01-10:04 ThA02.4

A Model-Based Cascaded Control Concept for the Bionic Motion Robot, pp. 2049-2054.

Raisch, Adrian	University of Stuttgart
Mayer, Annika	University of Stuttgart
Müller, Daniel	University of Stuttgart
Hildebrandt, Alexander	Festo AG & Co. KG
Sawodny, Oliver	University of Stuttgart

10:04-10:07 ThA02.5

Adaptive Quasi-Static Control of Multistable Systems, pp. 2055-2060.

Bruce, Adam	University of Michigan
Mohseni, Nima	University of Michigan, Ann Arbor
Goel, Ankit	University of Michigan
Bernstein, Dennis S.	Univ. of Michigan

10:07-10:10 ThA02.6

Primal–Dual Gradient Dynamics for Cooperative Unknown Payload Manipulation without Communication, pp. 2061-2067.

Miyano, Tatsuya	Toyota Motor North America, Inc
Romberg, Justin	Georgia Tech
Egerstedt, Magnus	Georgia Institute of Technology

10:10-10:13 ThA02.7

Decentralized Collective Transport Along Manifolds Compatible with Holonomic Constraints by Robots with Minimal Global Information, pp. 2068-2075.

Farivarnejad, Hamed	Arizona State University
Berman, Spring	Arizona State University

10:13-10:16 ThA02.8

Dynamic Joint Probabilistic Data Association Framework for Target Tracking with Ground Robots, pp. 2076-2081.

Krishnaswamy, Sriram	The Ohio State University
Kumar, Mrinal	Ohio State University
Vitullo, Shane	The Ohio State University
Laidler, Will	The Ohio State University

10:16-10:19 ThA02.9

Expanding Humanoid's Material-Handling Capabilities Using Capture Point Walking, pp. 2082-2087.

Chagas Vaz, Jean	University of Nevada Las Vegas
Oh, Paul	University of Nevada Las Vegas

10:19-10:22 ThA02.10

Real-Time Python: Recent Advances in the Raspberry Pi Plus Arduino Real-Time Control Approach, pp. 2088-2093.

Krauss, Ryan	Grand Valley State University

10:22-10:25 ThA02.11

Energy-Aware Path Planning for Skid-Steer Robots Operating on Hilly Terrain, pp. 2094-2099.

Gruning, Veronica	The Pennsylvania State University
Pentzer, Jesse	The Pennsylvania State University
Brennan, Sean	The Pennsylvania State University
Reichard, Karl	Penn State University

10:25-10:28 ThA02.12

Impact-Aware Online Motion Planning for Fully-Actuated Bipedal Robot Walking, pp. 2100-2105.

Gao, Yuan	University of Massachusetts Lowell
Da, Xingye	Nvidia
Gu, Yan	University of Massachusetts Lowell

10:28-10:31 ThA02.13

Decentralized Partial-Consensus Control of Nonholonomic Vehicles Over Networks with Interconnection Delays, pp. 2106-2111.

MAGHENEM, Mohamed Adlene	University of California Santa Cruz
Loria, Antonio	CNRS
Nuño, Emmanuel	University of Guadalajara
Panteley, Elena	CNRS

10:31-10:34 ThA02.14

Game Theoretic Potential Field for Autonomous Water Surface Vehicle Navigation Using Weather Forecasts, pp. 2112-2117.

Krell, Evan	Texas A&M University - Corpus

	Christi
Garcia Carrillo, Luis Rodolfo	Texas A&M University - Corpus Christi
King, Scott A.	Texas A&M University - Corpus Christi
Hespanha, Joao P.	Univ. of California, Santa Barbara

10:34-10:37 ThA02.15

Distributed Command Filter Based Robust Tracking Control of Wave-Adaptive Modular Vessel with Uncertainty, pp. 2118-2123.

Dony, Md.	Univ of Texas Rio Grande Valley
Rafat, M.	UTRGV
Dong, Wenjie	The University of Texas Rio Grande Valley

10:37-10:40 ThA02.16

Bilateral Teleoperation of Soft Robots under Piecewise Constant Curvature Hypothesis: An Experimental Investigation, pp. 2124-2129.

Weerakoon, Weerakoon Mudiyanselage Lasitha Tharinda	University of Maryland
Chopra, Nikhil	University of Maryland, College Park

10:40-10:43 ThA02.17

A Norm-Regulation-Based Limit Cycle Control of Vertical Hoppers, pp. 2130-2136.

Lo, Chun Ho, David	The Chinese University of Hong Kong
CHU, Xiangyu	The Chinese University of Hong Kong
Au, Kwok Wai Samuel	CUHK

10:43-10:46 ThA02.18

Experimental Evaluation of an Explicit Model Predictive Controller for an Adhesion Vortex Actuated Climbing Robot, pp. 2137-2142.

Papadimitriou, Andreas	Luleå University of Technology
Andrikopoulos, George	Luleå University of Technology
Nikolakopoulos, George	Luleå University of Technology

10:46-10:49 ThA02.19

Safe and Coordinated Hierarchical Receding Horizon Control for Mobile Manipulators, pp. 2143-2149.

Leu, Jessica	UC Berkeley
Lim, Rachel	University of California, Berkeley
Tomizuka, Masayoshi	Univ of California, Berkeley

10:49-10:52 ThA02.20

A Geometric Controller for Fully-Actuated Robotic Capture of a Tumbling Target, pp. 2150-2157.

Mishra, Hrishik	German Aerospace Center (DLR)
De Stefano, Marco	German Aerospace Center (DLR)
Giordano, Alessandro Massimo	Technical University of Munich (TUM)
Lampariello, Roberto	DLR
Ott, Christian	German Aerospace Center (DLR)

10:52-10:55 ThA02.21

Reachability-Based Trajectory Optimization for Robotic Systems Given Sequences of Rigid Contacts, pp. 2158-2165.

Lee, Jaemin	The University of Texas at Austin
Ahn, Junhyeok	The University of Texas at Austin
Bakolas, Efstathios	The University of Texas at Austin
Sentis, Luis	The University of Texas at Austin

ThLuT4 Meetings and

ThLuT4 (Special Session)

12:00-13:30 ThLuT4.1

Special Session: Bridging the Theory-Practice Gap in Robotics on a Massive Scale in Georgia Tech's Robotarium , pp. 2166-2166.

Egerstedt, Magnus	Georgia Institute of Technology

12:00-13:30 ThLuT4.2

Special Session: Control Design for SuperCruise Automated Driving: Systems, Algorithms, Challenges and Solutions , pp. 2167-2167.

Zarringhalam, Reza	General Motors Canada

12:00-13:30 ThLuT4.3

NSF Program Manager Office Hours: Dr. Jordan Berg, pp. 2168-2169.

Berg, Jordan M.	Division of Civil, Mechanical, and Manufacturing Innovation

12:00-13:30 ThLuT4.4

NSF Program Manager Office Hours: Dr. Eduardo Misawa, pp. 2170-2171.

Misawa, Eduardo	National Science Foundation

12:00-13:30 ThLuT4.5

Meeting: WIC Advisory Board Meeting (from 11am to 12Noon), pp. 2172-2172.

Fekih, Afef	University of Louisiana at Lafayette

12:00-13:30 ThLuT4.6

Meeting: 2020/2021 ACC Joint OpCom Meeting (from 12Noon to 1.30pm), pp. 2173-2173.

Chiu, George T.-C.	Purdue University

12:00-13:30 ThLuT4.7

Meeting: IEEE CSS MAB (from 12Noon to 1pm), pp. 2174-2174.

Egerstedt, Magnus	Georgia Institute of Technology

12:00-13:30 ThLuT4.8

Meeting: IEEE CSS TAB (from 12Noon to 1pm), pp. 2175-2175.

Hespanha, Joao P.	Univ. of California, Santa Barbara

ThB01 Governor's SQ 12

Learning II (Regular Session)

Chair: Mehta, Prashant G.	Univ of Illinois, Urbana-Champaign
Co-Chair: Lamperski, Andrew	University of Minnesota

13:30-13:50 ThB01.1

Safe Off-Policy Reinforcement Learning Using Barrier Functions, pp. 2176-2181.

Marvi, Zahra	Michigan State University
Kiumarsi, Bahare	Michigan State University

13:50-14:10 ThB01.2

Inverse Differential Games with Mixed Inequality Constraints, pp. 2182-2187.

Awasthi, Chaitanya	University of Minnesota

Lamperski, Andrew	University of Minnesota

14:10-14:30 ThB01.3

Bio-Inspired Learning of Sensorimotor Control for Locomotion, pp. 2188-2193.

Wang, Tixian	University of Illinois at Urbana-Champaign
Taghvaei, Amirhossein	University of Illinois at Urbana-Champaign
Mehta, Prashant G.	Univ of Illinois, Urbana-Champaign

14:30-14:50 ThB01.4

For Matrix Recovery, Robust Uniform Boundedness Property Implies Robust Rank Null Space Property and the Robust Uniform Boundedness Property, pp. 2194-2196.

Ranjan, Shashank	IIT Hyderabad
Vidyasagar, Mathukumalli	Indian Institute of Technology Hyderabad

14:50-15:10 ThB01.5

Communication-Aware Distributed Gaussian Process Regression Algorithms for Real-Time Machine Learning, pp. 2197-2202.

Yuan, Zhenyuan	Pennsylvania State University
Zhu, Minghui	Pennsylvania State University

15:10-15:30 ThB01.6

Exact Completion of Rectangular Matrices Using Ramanujan Bigraphs, pp. 2203-2206.

Burnwal, Shantanu Prasad	Indian Institute of Technology Hyderabad
Vidyasagar, Mathukumalli	Indian Institute of Technology Hyderabad

ThB02 Ballroom ABC

Control and Estimation of Batteries (Invited Session)

Chair: Siegel, Jason B.	University of Michigan
Co-Chair: Lin, Xinfan	University of California, Davis
Organizer: Dey, Satadru	University of Colorado Denver
Organizer: Moura, Scott	University of California, Berkeley
Organizer: Lin, Xinfan	University of California, Davis
Organizer: Kim, Youngki	University of Michigan - Dearborn
Organizer: Fang, Huazhen	University of Kansas
Organizer: Donkers, M.C.F.	Eindhoven University of Technology
Organizer: Song, Xingyong	Texas A&M University, College Station
Organizer: Siegel, Jason B.	University of Michigan
Organizer: Choe, Song-Yul (Ben)	Auburn University
Organizer: Perez, Hector E.	University of California, Berkeley
Organizer: Lotfi, Nima	Southern Illinois University Edwardsville

13:30-13:50 ThB02.1

State of Charge Estimation of Parallel Connected Battery Cells Via Descriptor System Theory (I), pp. 2207-2212.

Zhang, Dong	University of California, Berkeley
Couto, Luis Daniel	Université Libre De Bruxelles
Benjamin, Sebastien	Saft S.A
Zeng, Wente	Total S.A
Coutinho, Daniel	Universidade Federal De Santa Catarina
Moura, Scott	University of California, Berkeley

13:50-14:10 ThB02.2

Ageing-Aware Charging of Lithium-Ion Batteries Using an Electrochemistry-Based Model with Capacity-Loss Side Reactions (I), pp. 2213-2218.

Khalik, Zuan	Eindhoven University of Technology
Bergveld, Hendrik Johannes	Eindhoven University of Technology
Donkers, M.C.F.	Eindhoven University of Technology

14:10-14:30 ThB02.3

Real-Time Range Maximisation of Electric Vehicles through Active Cell Balancing Using Model-Predictive Control (I), pp. 2219-2224.

Hoekstra, Feye Sietze Johan	University of Technology Eindhoven
Wulf Ribelles, Luis Alfredo	Eindhoven University of Technology
Bergveld, Hendrik Johannes	Eindhoven University of Technology
Donkers, M.C.F.	Eindhoven University of Technology

14:30-14:50 ThB02.4

Distributionally Robust Surrogate Optimal Control for Large-Scale Dynamical Systems (I), pp. 2225-2231.

Kandel, Aaron	University of California, Berkeley
Park, Saehong	University of California, Berkeley
Perez, Hector E.	University of California, Berkeley
Kim, Geumbee	LG Chem
Choi, Yohwan	LG Chem
Ahn, Hyoung Jun	LG Chem
Joe, Won Tae	Battery R&D, LG Chem
Moura, Scott	University of California, Berkeley

14:50-15:10 ThB02.5

Distributed Multi-Battery Coordination for Cooperative Energy Management Via ADMM-Based Iterative Learning, pp. 2232-2237.

Li, Yun	New York University
Zhang, Tao	New York University
Zhu, Quanyan	New York University

15:10-15:30 ThB02.6

Optimal Energy and Thermal Management of Hybrid Battery Packs Using Convex Optimization (I), pp. 2238-2243.

Freudiger, Danny	The Ohio State University
D'Arpino, Matilde	The Ohio State University
Canova, Marcello	The Ohio State University

ThB03 Governor's SQ 15

Automotive Control I (Regular Session)

Chair: Casavola, Alessandro	Universita' Della Calabria
Co-Chair: Zuo, Lei	Virginia Tech

13:30-13:50 ThB03.1

Handling of Tire Pressure Variation in Autonomous Vehicles: An Integrated Estimation and Control Design Approach, pp. 2244-2249.

Hegedűs, Tamás	Budapest University of

	Technology and Economics
Fenyes, Daniel	MTA SZTAKI
Nemeth, Balazs	SZTAKI Institute for Computer Science and Control
Gaspar, Peter	SZTAKI

13:50-14:10 ThB03.2

LPV-Based Autonomous Vehicle Control Using the Results of Big Data Analysis on Lateral Dynamics, pp. 2250-2255.

Fenyes, Daniel	MTA SZTAKI
Nemeth, Balazs	SZTAKI Institute for Computer Science and Control
Gaspar, Peter	SZTAKI

14:10-14:30 ThB03.3

Full-Car Multivariable Control Strategies for Energy Harvesting by Regenerative Suspension Systems, pp. 2256-2261.

Casavola, Alessandro	Universita' Della Calabria
Tedesco, Francesco	Università Della Calabria
Vaglica, Pasquale	University of Calabria

14:30-14:50 ThB03.4

A Rule-Based Damping Control for Mmr-Based Energy Harvesting Vehicle Suspension, pp. 2262-2267.

Xiong, Qiuchi	Virginia Polytechnic Institute and State University
Qin, Bonan	University of Science and Technology Beijing
Li, Xiaofan	Virginia Tech
Zuo, Lei	Virginia Tech

14:50-15:10 ThB03.5

Optimization-Based Control Allocation for Driving Braking Torque Vectoring in a Race Car, pp. 2268-2275.

KISSAI, Moad	ENSTA ParisTech
Monsuez, Bruno	ENSTA ParisTech
Mouton, Xavier	Group Renault
TAPUS, Adriana	ENSTA Paris

15:10-15:30 ThB03.6

Robust Cooperative Adaptive Cruise Control of Vehicles on Banked and Curved Roads with Sensor Bias, pp. 2276-2281.

Lan, Jianglin	Loughborough University
Zhao, Dezong	Loughborough University
Tian, Daxin	Beihang University

ThB04 Governor's SQ 14

Eco-Driving and Energy Management of Connected and Automated Vehicles (Invited Session)

Chair: HomChaudhuri, Baisravan	Illinois Institute of Technology
Co-Chair: Dadras, Soodeh	Utah State University
Organizer: HomChaudhuri, Baisravan	Illinois Institute of Technology
Organizer: Amini, Mohammad Reza	University of Michigan
Organizer: Dadras, Soodeh	Utah State University
Organizer: Hall, Carrie	Illinois Institute of Technology

13:30-13:50 ThB04.1

A Two-Layer Approach for Ecodriving under Traffic (I), pp. 2282-2287.

Obereigner, Gunda	Johannes Kepler University
Polterauer, Philipp	Johannes Kepler University Linz
Del Re, Luigi	Johannes Kepler University Linz

13:50-14:10 ThB04.2

Context Aware Control of ADAS (I), pp. 2288-2293.

Holzinger, Jakob	Johannes Kepler University
Tkachenko, Pavlo	Johannes Kepler University
Obereigner, Gunda	Johannes Kepler University
Del Re, Luigi	Johannes Kepler University Linz

14:10-14:30 ThB04.3

Synchronization of Pulse-And-Glide Operation in Vehicle Platooning Using Cooperative Adaptive Cruise Control (I), pp. 2294-2299.

Shieh, Su-Yang	University of Michigan
Ersal, Tulga	University of Michigan
Peng, Huei	Univ. of Michigan

14:30-14:50 ThB04.4

Optimizing Gap Tracking Subject to Dynamic Losses Via Connected and Anticipative MPC in Truck Platooning (I), pp. 2300-2305.

Ard, Tyler	Clemson University
Ashtiani, Faraz	Clemson University
Vahidi, Ardalan	Clemson University
Borhan, Hoseinali	Cummins Inc

14:50-15:10 ThB04.5

Improving Fuel Economy of Heavy-Duty Vehicles in Daily Driving (I), pp. 2306-2311.

He, Chaozhe	Navistar, Inc
Alan, Anil	University of Michigan
Molnar, Tamas Gabor	University of Michigan
Avedisov, Sergei S.	University of Michigan
Bell, A. Harvey	University of Michigan
Zukouski, Russell	Navistar, Inc
Hunkler, Matthew	Navistar, Inc
Yan, Jim	Navistar, Inc
Orosz, Gabor	University of Michigan

15:10-15:30 ThB04.6

A Predictive Control Design with Speed Previewing Information for Vehicle Fuel Efficiency Improvement (I), pp. 2312-2317.

Ozkan, Mehmet	Texas Tech University
Ma, Yao	Texas Tech University

ThB05 Plaza Court 6

Robust and Optimal Control for Building HVAC Systems (Invited Session)

Chair: Pavlak, Gregory	The Pennsylvania State University
Co-Chair: Ghaemi, Reza	General Electric
Organizer: Rasmussen, Bryan	Texas A&M University
Organizer: Stockar, Stephanie	The Ohio State University
Organizer: Bay, Christopher	National Renewable Energy Laboratory
Organizer: Shahbakhti, Mahdi	University of Alberta

13:30-13:50 ThB05.1

Scalable Optimal Flexibility Control, Modeling and Estimation of Commercial Buildings (I), pp. 2318-2325.

Ghaemi, Reza	General Electric
Kumar, Aditya	GE Global Research
Bonanni, Pierino	GE Global Research
Visnevski, Nikita	McMaster University

13:50-14:10 ThB05.2

Reinforcement Learning for Control of Building HVAC Systems (I), pp. 2326-2332.

Raman, Naren Srivaths	University of Florida
Devraj, Adithya M.	University of Florida
Barooah, Prabir	Univ. of Florida
Meyn, Sean P.	Univ. of Florida

14:10-14:30 ThB05.3

Optimizing HVAC Operations in Multi-Unit Buildings for Grid Demand Response (I), pp. 2333-2338.

Naqvi, Syed Ahsan Raza	Rensselaer Polytechnic Institute
Kar, Koushik	Rensselaer Polytechnic Institute
Bhattacharya, Saptarshi	Pacific Northwest National Laboratory
Chandan, Vikas	Pacific Northwest National Lab

14:30-14:50 ThB05.4

Two-Stage Stochastic Planning for Control of Building Thermal Energy Storage Portfolios with Transactive Controls (I), pp. 2339-2344.

Yu, Min Gyung	The Pennsylvania State University
Pavlak, Gregory	The Pennsylvania State University

14:50-15:10 ThB05.5

Fast Adaptation of Thermal Dynamics Model for Predictive Control of HVAC and Natural Ventilation Using Transfer Learning with Deep Neural Networks (I), pp. 2345-2350.

Chen, Yujiao	Harvard University
Zheng, Yang	Harvard University
Samuelson, Holly	Harvard University

15:10-15:30 ThB05.6

Dynamic Mode Decomposition and Robust Estimation: Case Study of a 2D Turbulent Boussinesq Flow (I), pp. 2351-2356.

Vijayshankar, Sanjana	University of Minnesota
Nabi, Saleh	Mitsubishi Electric Research Laboratories (MERL)
Chakrabarty, Ankush	Mitsubishi Electric Research Laboratories (MERL)
GROVER, PIYUSH	University of Nebraska-Lincoln
Benosman, Mouhacine	Mitsubishi Electric Research Laboratories

ThB06 Ballroom DE

Autonomous Energy Systems: Estimation, Modeling, and Control (Invited Session)

Chair: Bernstein, Andrey	National Renewable Energy Lab (NREL)
Co-Chair: Moura, Scott	University of California, Berkeley
Organizer: Bay, Christopher	National Renewable Energy Laboratory
Organizer: Annoni, Jennifer	National Renewable Energy Laboratory
Organizer: Bernstein, Andrey	National Renewable Energy Lab (NREL)
Organizer: Kroposki, Ben	National Renewable Energy Laboratory

13:30-13:50 ThB06.1

Estimation of Large-Scale Wind Field Characteristics Using Supervisory Control and Data Acquisition Measurements (I), pp. 2357-2362.

Sinner, Michael Nelson	University of Colorado Boulder
Pao, Lucy Y.	University of Colorado Boulder
Annoni, Jennifer	National Renewable Energy Laboratory

13:50-14:10 ThB06.2

Data-Driven Linear Parameter-Varying Modeling and Control of Flexible Loads for Grid Services (I), pp. 2363-2369.

Chen, Yue	National Renewable Energy Laboratory
Bernstein, Andrey	National Renewable Energy Lab (NREL)

14:10-14:30 ThB06.3

Distributed Minimization of the Power Generation Cost in Prosumer-Based Distribution Networks (I), pp. 2370-2375.

Cavraro, Guido	National Renewable Energy Laboratory
Bernstein, Andrey	National Renewable Energy Lab (NREL)
Carli, Ruggero	University of Padova
Zampieri, Sandro	Univ. Di Padova

14:30-14:50 ThB06.4

A Sum-Of-Squares Optimization Method for Learning and Controlling Photovoltaic Systems (I), pp. 2376-2381.

zhang, xinwei	University of Minnesota Twin Cities
Purba, Victor	University of Minnesota
Hong, Mingyi	Iowa State University
Dhople, Sairaj	University of Minnesota

14:50-15:10 ThB06.5

Mixed Voltage Angle and Frequency Droop Control for Transient Stability of Interconnected Microgrids with Loss of PMU Measurements (I), pp. 2382-2387.

Sivaranjani, S	University of Notre Dame
Agarwal, Etika	General Electric Research
Xie, Le	Texas A&M University
Gupta, Vijay	University of Notre Dame
Antsaklis, Panos J.	University of Notre Dame

15:10-15:30 ThB06.6

Inducing Human Behavior to Alleviate Overstay at PEV Charging Station (I), pp. 2388-2394.

Bae, Sangjae	University of California, Berkeley
Zeng, Teng	University of California, Berkeley
Travacca, Bertrand	UC BERKELEY
Moura, Scott	University of California, Berkeley

ThB07 Plaza Court 7

Predictive Control Systems (Regular Session)

Chair: Makarow, Artemi	TU Dortmund University
Co-Chair: Dubljevic, Stevan	University of Alberta

13:30-13:50 ThB07.1

Output-Feedback RLS-Based Model Predictive Control, pp. 2395-2400.

Nguyen, Tam Willy	University of Michigan

Islam, Syed Aseem Ul	University of Michigan
Bruce, Adam	University of Michigan
Goel, Ankit	University of Michigan
Bernstein, Dennis S.	Univ. of Michigan
Kolmanovsky, Ilya V.	The University of Michigan

13:50-14:10 ThB07.2

Linear Model Predictive Control for Time Delay Systems, pp. 2401-2406.

Humaloja, Jukka-Pekka	Tampere University
Dubljevic, Stevan	University of Alberta

14:10-14:30 ThB07.3

Indirect Adaptive MPC for Discrete-Time LTI System with Robust Constraint Satisfaction, pp. 2407-2412.

Dhar, Abhishek	Indian Institute of Technology Delhi
Bhasin, Shubhendu	Indian Institute of Technology Delhi

14:30-14:50 ThB07.4

Incorporating Structural Process Knowledge in Recurrent Neural Network Modeling of Nonlinear Processes, pp. 2413-2418.

Wu, Zhe	University of California, Los Angeles
Rincon, David	University of California, Los Angeles
Christofides, Panagiotis D.	Univ. of California at Los Angeles

14:50-15:10 ThB07.5

Single Degree of Freedom Model Predictive Control with Variable Horizon, pp. 2419-2425.

Makarow, Artemi	TU Dortmund University
Rösmann, Christoph	TU Dortmund University
Bertram, Torsten	TU Dortmund

15:10-15:30 ThB07.6

MPC Performances for Nonlinear Systems Using Several Linearization Models, pp. 2426-2431.

Igarashi, Yusuke	Tokyo Institute of Technology
Yamakita, Masaki	Tokyo Inst. of Tech
Ng, Jerry	Massachusetts Institute of Technology
Asada, H. Harry	Massachusetts Inst. of Tech

ThB08 Governor's SQ 10

Robotics I (Regular Session)

Chair: Caverly, Ryan James	University of Minnesota
Co-Chair: Saldana, David	Lehigh University

13:30-13:50 ThB08.1

Passivity-Based Control Allocation of a Redundantly-Actuated Parallel Robotic Manipulator with a Point-Mass Payload, pp. 2432-2437.

Hayes, Alex	University of Minnesota
Caverly, Ryan James	University of Minnesota

13:50-14:10 ThB08.2

Disassembly Sequence Planning Considering Human-Robot Collaboration, pp. 2438-2443.

Lee, Meng-Lun	University at Buffalo, Mechanical Engineering
Behdad, Sara	University at Buffalo
Liang, Xiao	University at Buffalo
Zheng, Minghui	University at Buffalo

14:10-14:30 ThB08.3

An Inverse Dynamics Approach to Control Lyapunov Functions, pp. 2444-2451.

Reher, Jenna	California Institute of Technology
Kann, Claudia	California Institute of Technology
Ames, Aaron D.	California Institute of Technology

14:30-14:50 ThB08.4

A Novel Path Following Scheme for Robot End-Effectors, pp. 2452-2457.

Wen, Yalun	Texas A&M University
Pagilla, Prabhakar R.	Texas A&M University

14:50-15:10 ThB08.5

Directional Compliance in Obstacle-Aided Navigation for Snake Robots, pp. 2458-2463.

Wang, Tianyu	Carnegie Mellon University
Whitman, Julian	Carnegie Mellon University
Travers, Matt	Carnegie Mellon
Choset, Howie	Carnegie Mellon University

15:10-15:30 ThB08.6

Modular Robot Formation and Routing for Resilient Consensus, pp. 2464-2471.

Yu, Xi	University of Pennsylvania
Shishika, Daigo	University of Pennsylvania
Saldana, David	Lehigh University
Hsieh, M. Ani	University of Pennsylvania

ThB09 Governor's SQ 16

Adaptive Control III (Regular Session)

Chair: Peherstorfer, Benjamin	New York University
Co-Chair: Yucelen, Tansel	University of South Florida

13:30-13:50 ThB09.1

Quasi-Optimal Sampling to Learn Basis Updates for Online Adaptive Model Reduction with Adaptive Empirical Interpolation, pp. 2472-2477.

Cortinovis, Alice	EPFL
Kressner, Daniel	EPF Lausanne
Massei, Stefano	EPFL
Peherstorfer, Benjamin	New York University

13:50-14:10 ThB09.2

Impedance Modulation for Negotiating Control Authority in a Haptic Shared Control Paradigm, pp. 2478-2483.

izadi, Vahid	University of North Carolina Charlotte
Bhardwaj, Akshay	University of Michigan
Ghasemi, Amirhossein	University of North Carolina Charlotte

14:10-14:30 ThB09.3

Neural Network Based Discrete Time Modified State Observer: Stability Analysis and Case Study, pp. 2484-2489.

Stumfoll, Jason	Missouri University of Science and Technology
Yao, Jie	Missouri University of Science and Technology
Balakrishnan, S.N.	Missouri University of Science and

	Technology
14:30-14:50	ThB09.4

Prob2Vec: Mathematical Semantic Embedding for Problem Retrieval in Adaptive Tutoring, pp. 2490-2495.

Su, Du	University of Illinois at Urbana-Champaign
Yekkehkhany, Ali	University of Illinois at Urbana-Champaign
Lu, Yi	University of Illinois at Urbana-Champaign
Lu, Wenmiao	University of Illinois at Urbana-Champaign

14:50-15:10	ThB09.5

On Asymptotic System Error Convergence of Model Reference Adaptive Control Architectures in the Presence of Unmeasurable Coupled Dynamics, pp. 2496-2501.

Dogan, Kadriye Merve	University of South Florida
Yucelen, Tansel	University of South Florida
Muse, Jonathan	Wright Patterson Air Force Base

ThB10	Governor's SQ 11
Autonomous Systems I (Regular Session)	
Chair: Zheng, Minghui	University at Buffalo
Co-Chair: Vamvoudakis, Kyriakos G.	Georgia Inst. of Tech

13:30-13:50	ThB10.1

Autonomous Water Surface Vehicle Metaheuristic Mission Planning Using Self-Generated Goals and Environmental Forecasts, pp. 2502-2507.

Krell, Evan	Texas A&M University - Corpus Christi
King, Scott A.	Texas A&M University - Corpus Christi
Garcia Carrillo, Luis Rodolfo	Texas A&M University - Corpus Christi

13:50-14:10	ThB10.2

Bounded Rational Unmanned Aerial Vehicle Coordination for Adversarial Target Tracking, pp. 2508-2513.

Kokolakis, Nick-Marios	Georgia Institute of Technology
Kanellopoulos, Aris	Georgia Institute of Technology
Vamvoudakis, Kyriakos G.	Georgia Inst. of Tech

14:10-14:30	ThB10.3

Row Alignment Via Hidden Markov Model Based Learning Control, pp. 2514-2519.

Dai, Andong	University of Central Florida
Xu, Yunjun	University of Central Florida

14:30-14:50	ThB10.4

Vision-Based Autonomous Driving: A Model Learning Approach, pp. 2520-2525.

Baheri, Ali	West Virginia University
Kolmanovsky, Ilya V.	The University of Michigan
Girard, Anouck	University of Michigan, Ann Arbor
tseng, eric	Ford Motor Company
Filev, Dimitre P.	Ford Motor Company

14:50-15:10	ThB10.5

Vehicle-Human Interactive Behaviors in Emergency: Data Extraction from Traffic Accident Videos, pp. 2526-2531.

Liu, Wansong	University at Buffalo
Luo, Danyang	University at Buffalo
Wu, Changxu	University of Arizona
Zheng, Minghui	University at Buffalo

15:10-15:30	ThB10.6

Navigation Functions with Non-Point Destinations and Moving Obstacles, pp. 2532-2537.

Chen, Chuchu	University of Delaware
Li, Caili	University of Delaware
Tanner, Herbert G.	University of Delaware

ThB11	Director's Row I
Networked Systems I (Regular Session)	
Chair: Tang, Choon Yik	University of Oklahoma
Co-Chair: Butail, Sachit	Northern Illinois University

13:30-13:50	ThB11.1

Distributed Algorithms for Solving Modular Congruences Over Networks, pp. 2538-2543.

Li, Xiang	University of Oklahoma
Tang, Choon Yik	University of Oklahoma

13:50-14:10	ThB11.2

Improving Network Robustness through Edge Augmentation While Preserving Strong Structural Controllability, pp. 2544-2549.

Abbas, Waseem	Vanderbilt University
Shabbir, Mudassir	Information Technology University
Jaleel, Hassan	Lahore University of Management Sciences
Koutsoukos, Xenofon	Vanderbilt University

14:10-14:30	ThB11.3

Network Reconstruction from a Single Information Cascade, pp. 2550-2555.

Chwistek, Katherine	Northern Illinois University
Butail, Sachit	Northern Illinois University

14:30-14:50	ThB11.4

Analysis, Online Estimation, and Validation of a Competing Virus Model, pp. 2556-2561.

Pare, Philip E.	KTH Royal Institute of Technology
Vrabac, Damir	KTH Royal Institute of Technology
Sandberg, Henrik	KTH Royal Institute of Technology
Johansson, Karl H.	Royal Institute of Technology

14:50-15:10	ThB11.5

Analysis of Free Recall Dynamics of an Abstract Working Memory Model (I), pp. 2562-2567.

Gianluca, Villani	University of Toronto
Jafarian, Matin	KTH Royal Institute of Technology
Lansner, Anders	KTH Royal Institute of Technology
Johansson, Karl H.	Royal Institute of Technology

15:10-15:30	ThB11.6

Stealthy Local Covert Attacks on Cyber-Physical Systems, pp. 2568-2573.

Mikhaylenko, Dina	University of Kaiserslautern
Zhang, Ping	University of Kaiserslautern

ThB12	Director's Row E

Estimation III (Regular Session)

Chair: Spall, James C.	Johns Hopkins Univ
Co-Chair: Mazenc, Frederic	Inria Saclay

13:30-13:50 ThB12.1

Control and Estimation for Mobile Sensor-Target Problems with Distance-Dependent Noise, pp. 2574-2579.

Nagy, Zoltan	Technical University of Cluj Napoca
Lendek, Zsofia	Technical University of Cluj-Napoca, VAT RO22736939
Busoniu, Lucian	Technical University of Cluj-Napoca

13:50-14:10 ThB12.2

Rigid Body Dynamics Estimation by Unscented Filtering Pose Estimation Neural Networks, pp. 2580-2586.

Avant, Trevor	University of Washington
Morgansen, Kristi A.	University of Washington

14:10-14:30 ThB12.3

Distributed Adaptive State Estimation and Tracking Scheme for Nonlinear Systems Using Active Passive Sensor Networks, pp. 2587-2592.

RAJ, AKHILESH	Missouri S & T
Jagannathan, Sarangapani	Missouri Univ of Science & Tech
Yucelen, Tansel	University of South Florida

14:30-14:50 ThB12.4

Nonlinear Attitude Estimation for Small UAVs with Low Power Microprocessors, pp. 2593-2598.

Kim, Sunsoo	Texas A&M University
Tadiparthi, Vaishnav	Texas A&M University
Bhattacharya, Raktim	Texas A&M

14:50-15:10 ThB12.5

Confidence Intervals with Expected and Observed Fisher Information in the Scalar Case, pp. 2599-2604.

Yuan, Xiangyu	Johns Hopkins University
Spall, James C.	Johns Hopkins Univ

15:10-15:30 ThB12.6

On Fixed-Time Interval Estimation of Discrete-Time Nonlinear Time-Varying Systems with Disturbances, pp. 2605-2610.

Dinh, Thach N.	CNAM Paris
Mazenc, Frederic	Inria Saclay
Wang, Zhenhua	Harbin Institute of Technology
Raïssi, Tarek	Conservatoire National Des Arts Et Métiers

ThB13 Plaza Court 1

Robust Control III (Regular Session)

Chair: Arcak, Murat	University of California, Berkeley
Co-Chair: Seiler, Peter	University of Minnesota

13:30-13:50 ThB13.1

Active Disturbance Rejection Control for Grasping Force Tracking, pp. 2611-2616.

zuo, wenyu	University of Houston
song, gangbing	University of Houston
Chen, Zheng	University of Houston

13:50-14:10 ThB13.2

Robust Controller Design for Automatic Voltage Regulation, pp. 2617-2622.

Mandali, Anusree	Cleveland State University
Dong, Lili	Cleveland State University
Morinec, Allen	FirstEnergy Corporation

14:10-14:30 ThB13.3

Design of ADRC for Second-Order Mechanical Systems without Time-Derivatives in the Tracking Controller, pp. 2623-2628.

Ramirez-Neria, Mario	Universidad Politécnica De Valle De Mexico
Madonski, Rafal	Jinan University
Luviano-Juarez, Alberto	UPIITA - IPN Mexico
Gao, Zhiqiang	Cleveland State Univ
Sira-Ramirez, Hebertt	CINVESTAV

14:30-14:50 ThB13.4

Data-Driven Reachable Set Computation Using Adaptive Gaussian Process Classification and Monte Carlo Methods, pp. 2629-2634.

Devonport, Alex	University of California, Berkeley
Arcak, Murat	University of California, Berkeley

14:50-15:10 ThB13.5

Rebalancing in Vehicle-Sharing Systems with Service Availability Guarantees, pp. 2635-2642.

Cap, Michal	CTU in Prague
Roun, Tomáš	CTU Prague

15:10-15:30 ThB13.6

Construction of an Uncertainty to Maximize the Gain at Multiple Frequencies, pp. 2643-2648.

Patartics, Bálint	Institute for Computer Science and Control, Hungarian Academy Of
Seiler, Peter	University of Michigan, Ann Arbor
Vanek, Balint	SZTAKI

ThB14 Plaza Court 8

Estimation and Control of PDE Systems III (Invited Session)

Chair: Demetriou, Michael A.	Worcester Polytechnic Institute
Co-Chair: Bentsman, Joseph	University of Illinois at Urbana-Champaign
Organizer: Demetriou, Michael A.	Worcester Polytechnic Institute
Organizer: Fahroo, Fariba	AFOSR

13:30-13:50 ThB14.1

Delayed Multivariable Extremum Seeking with Sequential Predictors (I), pp. 2649-2653.

Malisoff, Michael	Louisiana State University
Krstic, Miroslav	University of California, San Diego

13:50-14:10 ThB14.2

Optimal Communication Topology and Static Output Feedback of Networked Collocated Actuator/Sensor Pairs in Distributed Parameter Systems (I), pp. 2654-2660.

Demetriou, Michael A.	Worcester Polytechnic Institute
Hadjicostis, Christoforos N.	University of Cyprus

14:10-14:30 ThB14.3

Enthalpy-Based Output Feedback Control of the Stefan Problem with Hysteresis (I), pp. 2661-2666.

Chen, Zhelin	University of Illinois

Bentsman, Joseph — University of Illinois at Urbana-Champaign
Thomas, Brian G. — Colorado School of Mines

14:30-14:50 ThB14.4

PIETOOLS: A Matlab Toolbox for Manipulation and Optimization of Partial Integral Operators (I), pp. 2667-2672.

Shivakumar, Sachin — Arizona State University
Das, Amritam — Eindhoven University of Technology
Peet, Matthew M. — Arizona State University

14:50-15:10 ThB14.5

Adaptive Detection and Accommodation of Communication Attacks on Infinite Dimensional Systems with Multiple Interconnected Actuator/sensor Pairs (I), pp. 2673-2678.

Demetriou, Michael A. — Worcester Polytechnic Institute

15:10-15:30 ThB14.6

Sensor Planning for Model-Based Acoustic Source Identification, pp. 2679-2684.

Calkins, Luke — Duke University
Khodayi-mehr, Reza — Duke University
Aquino, Wilkins — Duke University
Zavlanos, Michael M. — Duke University

ThB15 Plaza Court 5

Nonlinear Output Feedback (Regular Session)

Chair: Khorrami, Farshad — NYU Tandon School of Engineering
Co-Chair: Su, Shanwei — Beihang University

13:30-13:50 ThB15.1

Control of Semilinear Dissipative Distributed Parameter Systems with Minimum Feedback Information, pp. 2685-2691.

Babaei Pourkargar, Davood — Kansas State University
Armaou, Antonios — The Pennsylvania State University

13:50-14:10 ThB15.2

Adding Virtual Measurements by PWM-Induced Signal Injection, pp. 2692-2698.

Surroop, Dilshad — Mines Paristech
Combes, Pascal — Schneider Electric
Martin, Philippe — MINES ParisTech, PSL Research University
Rouchon, Pierre — Mines ParisTech

14:10-14:30 ThB15.3

A Time-Delayed Lur'e Model with Biased Self-Excited Oscillations, pp. 2699-2704.

Paredes, Juan — University of Michigan
Islam, Syed Aseem Ul — University of Michigan
Bernstein, Dennis S. — Univ. of Michigan

14:30-14:50 ThB15.4

Prescribed-Time Output-Feedback Stabilization of Uncertain Nonlinear Systems with Unknown Time Delays, pp. 2705-2710.

Krishnamurthy, Prashanth — NYU Tandon School of Engineering
Khorrami, Farshad — NYU Tandon School of Engineering

14:50-15:10 ThB15.5

Asymptotic Tracking for Nonminimum-Phase Systems in Output Feedback Form, pp. 2711-2716.

Su, Shanwei — Beihang University
Lin, Wei — Case Western Reserve University

15:10-15:30 ThB15.6

Approximate Optimal Control Design for a Class of Nonlinear Systems by Lifting Hamilton-Jacobi-Bellman Equation, pp. 2717-2722.

Amini, Arash — Lehigh UNiversity
Sun, Qiyu — University of Central Florida
Motee, Nader — Lehigh University

ThB16 Governor's SQ 17

Cooperative Control III (Regular Session)

Chair: Lin, Zongli — University of Virginia
Co-Chair: Liu, Wei — The Chinese University of Hong Kong

13:30-13:50 ThB16.1

Distributed Non-Convex Optimization of Multi-Agent Systems Using Boosting Functions to Escape Local Optima, pp. 2723-2728.

Welikala, Shirantha — Boston University
Cassandras, Christos G. — Boston University

13:50-14:10 ThB16.2

Decentralised Collaborative and Formation Iterative Learning Control for Multi-Agent Systems, pp. 2729-2734.

Chen, shangcheng — University of Southampton
Freeman, Christopher T. — University of Southampton

14:10-14:30 ThB16.3

Adaptive Cooperative Manipulation with Rolling Contacts, pp. 2735-2740.

Verginis, Christos — Electrical Engineering, KTH Royal Institute of Technology
Shaw Cortez, Wenceslao — Royal Institute of Technology (KTH)
Dimarogonas, Dimos V. — KTH Royal Institute of Technology

14:30-14:50 ThB16.4

Almost Output Consensus of Nonlinear Multi-Agent Systems in the Presence of External Disturbances, pp. 2741-2746.

Meng, Tingyang — University of Virginia
Lin, Zongli — University of Virginia

14:50-15:10 ThB16.5

Multi-Player Pursuer Coordination for Nonlinear Reach-Avoid Games in Arbitrary Dimensions Via Coverage Control, pp. 2747-2753.

Rivera, Phillip — The Johns Hopkins University Applied Physics Laboratory
Diaz-Mercado, Yancy — University of Maryland
Kobilarov, Marin — Johns Hopkins University

ThB17 Director's Row J

Process Control I (Regular Session)

Chair: He, Qinghua — Auburn University
Co-Chair: Xu, Xiaodong — University of Texas at Austin

13:30-13:50 ThB17.1

Control Lyapunov-Barrier Function-Based Predictive Control of Nonlinear Systems Using Machine Learning Models, pp.

2754-2759.

Wu, Zhe	University of California, Los Angeles
Christofides, Panagiotis D.	Univ. of California at Los Angeles

13:50-14:10 ThB17.2

Data-Driven Plant-Model Mismatch Quantification for MIMO MPC Systems with Feedforward Control Path, pp. 2760-2765.

Xu, Xiaodong	University of Texas at Austin
Simkoff, Jodie	University of Texas at Austin
Baldea, Michael	The University of Texas at Austin
Chiang, Leo	The Dow Chemical Company
Castillo, Ivan	The Dow Chemical Company
Bindlish, Rahul	Dow Chemical Company
Ashcraft, Brian	Dow Chemical Company

14:10-14:30 ThB17.3

Closest Feasible Points Invariance: A System Property to Characterize Systems with Actuator Saturation, pp. 2766-2771.

Soroush, Masoud	Drexel University

14:30-14:50 ThB17.4

Detecting and Characterizing Nonlinearity-Induced Oscillations in Process Control Loops Based on Adaptive Chirp Mode Decomposition, pp. 2772-2777.

Chen, Qiming	Zhejiang University
Chen, Junghui	Chung-Yuan Christian University
Lang, Xun	Yunnan University
Xie, Lei	National Key Laboratory of Industrial Control Technology
Jiang, Chenglong	Zhejiang University
Su, Hongye	Zhejiang Univ

14:50-15:10 ThB17.5

Fast Model Predictive Control of Startup of a Compact Modular Reconfigurable System for Continuous-Flow Pharmaceutical Manufacturing, pp. 2778-2783.

Nikolakopoulou, Anastasia	Massachusetts Institute of Technology
von Andrian, Matthias	Massachusetts Institute of Technology
Braatz, Richard D.	Massachusetts Institute of Technology

15:10-15:30 ThB17.6

Using Channel State Information for Estimating Moisture Content in Woodchips Via 5 GHz Wi-Fi, pp. 2784-2789.

Suthar, Kerul	Auburn University
Wang, Jin	Auburn University
Jiang, zhihua	Auburn University
He, Qinghua	Auburn University

ThB18 Plaza Court 4

Stochastic Optimal Control (Regular Session)

Chair: Leung, Tim	University of Washington
Co-Chair: McEneaney, William M.	Univ. California San Diego

13:30-13:50 ThB18.1

Weakly Coupled Constrained Markov Decision Processes in Borel Spaces, pp. 2790-2795.

Gagrani, Mukul	University of Southern California
Nayyar, Ashutosh	University of Southern California

13:50-14:10 ThB18.2

Structural Results for Decentralized Stochastic Control with a Word-Of-Mouth Communication, pp. 2796-2801.

Dave, Aditya	University of Delaware
Malikopoulos, Andreas A.	University of Delaware

14:10-14:30 ThB18.3

LQ Non-Gaussian Control with I/O Packet Losses, pp. 2802-2807.

D'Angelo, Massimiliano	Università Di Roma "La Sapienza"
Battilotti, Stefano	Univ. La Sapienza
Cacace, Filippo	Università Campus Biomedico Di Roma
Germani, Alfredo	Universita' Dell'Aquila
Sinopoli, Bruno	Washington University in St Louis

14:30-14:50 ThB18.4

A Stochastic Control Approach to Futures Trading with Regime Switching, pp. 2808-2813.

Leung, Tim	University of Washington
Zhou, Yang	University of Washington

14:50-15:10 ThB18.5

Conversion of a Class of Stochastic Control Problems to Fundamental-Solution Deterministic Control Problems, pp. 2814-2819.

McEneaney, William M.	Univ. California San Diego
Dower, Peter M.	University of Melbourne

15:10-15:30 ThB18.6

Biased Kernel Density Estimators for Chance Constrained Optimal Control Problems, pp. 2820-2825.

Keil, Rachel	University of Florida
Miller, Alexander	University of Florida
Kumar, Mrinal	Ohio State University
Rao, Anil V.	University of Florida

ThB19 Plaza Court 3

Optimization Algorithms I (Regular Session)

Chair: Dall'Anese, Emiliano	University of Colorado Boulder
Co-Chair: Freris, Nikolaos M.	University of Science and Technology of China (USTC)

13:30-13:50 ThB19.1

Symplectic Accelerated Optimization on SO(3) with Lie Group Variational Integrators, pp. 2826-2831.

Sharma, Harsh	Virginia Polytechnic Institute and State University
Lee, Taeyoung	George Washington University
Patil, Mayuresh J.	Virginia Tech
Woolsey, Craig	Virginia Tech

13:50-14:10 ThB19.2

Online Distributed Optimization and Stabilization of Regularization Paths, pp. 2832-2837.

Richert, Dean	University of British Columbia, Okanagan
Leung, Henry	University of Calgary

14:10-14:30 ThB19.3

Fixed-Time Gradient-Based Extremum Seeking, pp. 2838-2843.

Poveda, Jorge I.	University of Colorado at Boulder
Krstic, Miroslav	University of California, San Diego

14:30-14:50 ThB19.4

D-SOP: Distributed Second Order Proximal Method for Convex Composite Optimization, pp. 2844-2849.

Li, Yichuan — University of Illinois Urbana Champaign
Freris, Nikolaos M. — University of Science and Technology of China (USTC)
Voulgaris, Petros G. — Univ of Illinois, Urbana-Champaign
Stipanovic, Dusan M. — Univ of Illinois, Urbana-Champaign

14:50-15:10 ThB19.5

Inexact Online Proximal-Gradient Method for Time-Varying Convex Optimization, pp. 2850-2857.

Ajalloeian, Amirhossein — University of Colorado Boulder
Simonetto, Andrea — IBM Research Ireland
Dall'Anese, Emiliano — University of Colorado Boulder

15:10-15:30 ThB19.6

Transient Growth of Accelerated First-Order Methods, pp. 2858-2863.

Samuelson, Samantha — University of Southern California
Mohammadi, Hesameddin — University of Southern California
Jovanovic, Mihailo R. — University of Southern California

ThB20 Plaza Court 2

Switched Systems (Regular Session)

Chair: Yuan, Chengzhi — University of Rhode Island
Co-Chair: Coogan, Samuel — Georgia Institute of Technology

13:30-13:50 ThB20.1

Stability of Nonlinear Switched Systems on Non-Uniform Time Domains with Application to Multi-Agents Consensus, pp. 2864-2869.

Taousser, Fatima Zohra — University of Tennessee
Djouadi, Seddik, M. — University of Tennessee
Tomsovic, Kevin — University of Tennessee

13:50-14:10 ThB20.2

Hybrid Boolean Systems Models for Cyberattacks, Faults, and Human Operators, pp. 2870-2875.

Fadali, Mohammed Sami — University of Nevada

14:10-14:30 ThB20.3

Bounding the State Covariance Matrix for Switched Linear Systems with Noise, pp. 2876-2881.

Klett, Corbin — Georgia Institute of Technology
Abate, Matthew — Georgia Institute of Technology
Yoon, Yongeun — Agency for Defense Development
Coogan, Samuel — Georgia Institute of Technology
Feron, Eric — King Abdullah University of Science and Technology

14:30-14:50 ThB20.4

Convergence Guarantees of Policy Optimization Methods for Markovian Jump Linear Systems, pp. 2882-2887.

Jansch-Porto, Joao Paulo — University of Illinois at Urbana-Champaign
Hu, Bin — University of Illinois at Urbana-Champaign
Dullerud, Geir E. — Univ of Illinois, Urbana-Champaign

14:50-15:10 ThB20.5

Switching Model Predictive Control of Switched Linear Systems with Average Dwell Time, pp. 2888-2893.

Yuan, Chengzhi — University of Rhode Island
Gu, Yan — University of Massachusetts Lowell
Zeng, Wei — South China University of Technology
Stegagno, Paolo — University of Rhode Island

15:10-15:30 ThB20.6

Uniform Exponential Stability in Switched Linear Systems: A Lagrange Duality Approach, pp. 2894-2900.

Najson, Federico — Sistema Nacional De Investigadores - ANII

ThB21 Director's Row H

Control of Tokamak Fusion Plasmas (Tutorial Session)

Chair: Walker, Michael L. — General Atomics
Co-Chair: Felici, Federico — EPFL
Organizer: Walker, Michael L. — General Atomics
Organizer: Felici, Federico — EPFL
Organizer: Schuster, Eugenio — Lehigh University
Organizer: De Vries, Peter — ITER Organization

13:30-13:31 ThB21.1

Introduction to Tokamak Plasma Control (I), pp. 2901-2918.

Walker, Michael L. — General Atomics
De Vries, Peter — ITER Organization
Felici, Federico — EPFL
Schuster, Eugenio — Lehigh University

13:31-14:30 ThB21.2

*Control of Magnetic Fields and Instabilities in Tokamak Fusion Plasmas (I)**.

Felici, Federico — EPFL

14:30-14:50 ThB21.3

*Integrated Core Kinetic and Magnetic Control in Tokamak Plasmas (I)**.

Schuster, Eugenio — Lehigh University

14:50-15:10 ThB21.4

*Exception Handling by the Plasma Control Systems of Tokamaks (I)**.

De Vries, Peter — ITER Organization

ThBT3 Meetings and

ThBT3 (Special Session)

13:30-15:30 ThBT3.1

Special Session: Promoting Access for Under-Represented Groups in STEM Graduate Disciplines , pp. 2919-2920.

Ferri, Bonnie — Georgia Inst. of Tech
Grover, Martha — Georgia Institute of Technology
Hoo, Karlene — Gonzaga University
Pasik-Duncan, Bozenna — Univ. of Kansas

13:30-15:30 ThBT3.2

Cancelled Special Session: Quantum Information Systems: Communication, Control and Computing , pp. 2921-2921.

Balas, Mark — Embry-Riddle Aeronautical University

Steck, James — Wichita State University

13:30-15:30 — ThBT3.3

NSF Program Manager Office Hours: Dr. Robert G. Landers, pp. 2922-2923.

Landers, Robert G. — Missouri University of Science and Technology

ThLBP-P01 — Ballroom ABC

Poster-ThP (Late Breaking Poster Session)

15:30-16:00 — ThLBP-P01.1

Dynamic Control Allocation of Redundantly-Actuated Cable-Driven Parallel Robots, pp. 2924-2924.

Cheah, Sze Kwan — University of Minnesota
Hayes, Alex — University of Minnesota
Caverly, Ryan James — University of Minnesota

15:30-16:00 — ThLBP-P01.2

Conic Controller Synthesis with Gain-Scheduled Internal Models for Robust Trajectory Tracking, pp. 2925-2925.

Chakraborty, Manash — University of Minnesota
Caverly, Ryan James — University of Minnesota

15:30-16:00 — ThLBP-P01.3

Handelman Representation As an Alternative to SOS for Safety Verification, pp. 2926-2926.

Morovati, Samaneh — University of Tennessee, Knoxville
Zhang, Yichen — Argonne National Laboratory
Djouadi, Seddik, M. — University of Tennessee
Tomsovic, Kevin — University of Tennessee

15:30-16:00 — ThLBP-P01.4

Controller Development for a Morphing, Underwater Robot, pp. 2927-2927.

Adibi, Sierra A. — University of Washington
Morgansen, Kristi A. — University of Washington

15:30-16:00 — ThLBP-P01.5

Analysis and Measurement of Heat Sources of Lithium-Ion Polymer Battery Using Electrochemical and Thermal Model and Calorimeter, pp. 2928-2928.

Song, Minseok — Auburn University
Hu, Yang — Auburn University
Choe, Song-Yul (Ben) — Auburn University

15:30-16:00 — ThLBP-P01.6

Time-Distributed Optimization for Real-Time Model Predictive Control, pp. 2929-2929.

Liao-McPherson, Dominic — The University of Michigan
Nicotra, Marco M — University of Colorado Boulder
Kolmanovsky, Ilya V. — The University of Michigan

15:30-16:00 — ThLBP-P01.7

A Vision-Based Lane Keeping System Using a Cascaded Adaptive Controller, pp. 2930-2930.

Bryan, William — Auburn University
Boler, Matthew — Auburn University
Bevly, David M. — Auburn University
Martin, Scott — Auburn University

ThLBP-P02 — ACC Sponsors

Meeting Space-ThP

15:30-16:00 — ThLBP-P02.1

Gold Sponsor: General Motors, pp. 2931-2931.

Eckman, Wendy — General Motors

15:30-16:00 — ThLBP-P02.2

Gold Sponsor: Mathworks, pp. 2932-2932.

Rose, Jennifer — MathWorks
Ulusoy, Melda — Mathworks

15:30-16:00 — ThLBP-P02.3

Gold Sponsor: Mitsubishi Electric Research Lab (MERL), pp. 2933-2933.

Thornton, Jay — Mitsubishi Electric Research Lab
Di Cairano, Stefano — Mitsubishi Electric Research Lab

15:30-16:00 — ThLBP-P02.4

Silver Sponsor: Quanser, pp. 2934-2934.

Rahaman, Josie — Quanser Consulting
Wang, Gemma — Quanser

15:30-16:00 — ThLBP-P02.5

Silver Sponsor: SIAM, pp. 2935-2935.

O'Neill, Kristin — SIAM

15:30-16:00 — ThLBP-P02.6

Silver Sponsor: Cancelled, pp. 2936-2936.

Kelly, Claire — Wiley

15:30-16:00 — ThLBP-P02.7

Silver Sponsor: DSPACE, pp. 2937-2937.

Johnson, Janice — DSpace

15:30-16:00 — ThLBP-P02.8

Silver Sponsor: Springer Nature, pp. 2938-2938.

Tominich, Christopher — Springer
Jackson, Oliver — Springer

15:30-16:00 — ThLBP-P02.9

Bronze Sponsor: Processes, pp. 2939-2939.

Xiang, Wency — Processes MDPI

15:30-16:00 — ThLBP-P02.10

Bronze Sponsor: Halliburton, pp. 2940-2940.

Darbe, Robert — Halliburton

15:30-16:00 — ThLBP-P02.11

Meeting: 2021 CDC OPCOM (from 3pm to 4pm), pp. 2941-2941.

Egerstedt, Magnus — Georgia Institute of Technology

ThC01 — Governor's SQ 12

Learning III (Regular Session)

Chair: Yong, Sze Zheng — Arizona State University
Co-Chair: Powell, Kody — University of Utah

16:00-16:20 — ThC01.1

Deep Learning for Control: A Non-Reinforcement Learning View, pp. 2942-2948.

Matei, Ion — Palo Alto Research Center
Minhas, Raj — PARC
Zhenirovskyy, Maksym — Palo Alto Research Center
de Kleer, Johan — Palo Alto Research Center
Rai, Rahul — University at Buffalo, SUNY

16:20-16:40 ThC01.2

Learning Physical Laws: The Case of Micron Size Particles in Dielectric Fluid, pp. 2949-2954.

Matei, Ion	Palo Alto Research Center
Zhenirovskyy, Maksym	Palo Alto Research Center
de Kleer, Johan	Palo Alto Research Center
Somarakis, Christoforos	Palo Alto Research Center
Baras, John S.	University of Maryland

16:40-17:00 ThC01.3

Dynamic Economic Optimization of a Continuously Stirred Tank Reactor Using Reinforcement Learning, pp. 2955-2960.

Machalek, Derek	University of Utah
Quah, Titus	University of Utah
Powell, Kody	University of Utah

17:00-17:20 ThC01.4

Learning Pose Estimation for UAV Autonomous Navigation and Landing Using Visual-Inertial Sensor Data, pp. 2961-2966.

Baldini, Francesca	California Institute of Technology
Anandkumar, Animashree	University of California, Irvine
Murray, Richard M.	California Inst. of Tech

17:20-17:40 ThC01.5

A Computational Model for Decision-Making and Assembly Optimization in Manufacturing, pp. 2967-2974.

Sundstrom, Andrew	Nanotronics
Kim, Eun-Sol	Nanotronics
Limoge, Damas	Nanotronics
Pinskiy, Vadim	Nanotronics
Putman, Matthew	Nanotronics

17:40-18:00 ThC01.6

Data-Driven Model Invalidation for Unknown Lipschitz Continuous Systems Via Abstraction, pp. 2975-2980.

Jin, Zeyuan	Arizona State University
Khajenejad, Mohammad	Arizona State University
Yong, Sze Zheng	Arizona State University

ThC02 Ballroom ABC

Cyber-Physical Privacy and Security in Energy Systems (Invited Session)

Chair: Lian, Jianming	Pacific Northwest National Laboratory
Co-Chair: Zhu, Minghui	Pennsylvania State University
Organizer: Lian, Jianming	Pacific Northwest National Laboratory
Organizer: Zhu, Minghui	Pennsylvania State University
Organizer: Lu, Yang	Pennsylvania State University

16:00-16:20 ThC02.1

On Data-Driven Attack-Resilient Gaussian Process Regression for Dynamic Systems (I), pp. 2981-2986.

Kim, Hunmin	University of Illinois Urbana-Champaign
Guo, Pinyao	Pennsylvania State University
Zhu, Minghui	Pennsylvania State University
Liu, Peng	Pennsylvania State University

16:20-16:40 ThC02.2

Zero-Parameter-Information FDI Attacks against Power System State Estimation (I), pp. 2987-2992.

Zhang, Zhenyong	Zhejiang Univesity
Deng, Ruilong	Zhejiang University
Yau, David	Singapore University of Technology and Design
Cheng, Peng	Zhejiang University
Chen, Jiming	Zhejiang University

16:40-17:00 ThC02.3

Actuator Security Index for Structured Systems (I), pp. 2993-2998.

Gracy, Sebin	KTH, Royal Institute of Technology
Milosevic, Jezdimir	KTH Royal Institute of Technology
Sandberg, Henrik	KTH Royal Institute of Technology

17:00-17:20 ThC02.4

Localizing Data Manipulators in Distributed Mode Shape Identification of Power Systems (I), pp. 2999-3004.

Kar, Jishnudeep	North Carolina State University
Chakrabortty, Aranya	North Carolina State University

17:20-17:40 ThC02.5

Privacy-Preserving Transactive Energy System (I), pp. 3005-3010.

Lu, Yang	Pennsylvania State University
Lian, Jianming	Pacific Northwest National Laboratory
Zhu, Minghui	Pennsylvania State University

17:40-18:00 ThC02.6

A Binary Decision Diagram Based Cascade Prognostics Scheme for Power Systems (I), pp. 3011-3016.

Chhokra, Ajay	Vanderbilt University
Hasan, Saqib	Vanderbilt University
Dubey, Abhishek	Vanderbilt University
Karsai, Gabor	Vanderbilt University

ThC03 Governor's SQ 15

Automotive Control II (Regular Session)

Chair: Mrochen, Michael Alexander	University of Stuttgart
Co-Chair: Rajamani, Rajesh	Univ. of Minnesota

16:00-16:20 ThC03.1

Joined Plant and Control Design for Continuous Variable Transmission Systems, pp. 3017-3022.

Fahdzyana, Chyannie	Eindhoven University of Technology
van raemdonck, stefan	Punch Powertrain
Vergote, Karel	Punch Powertrain
Hofman, Theo	Technische Universiteit Eindhoven

16:20-16:40 ThC03.2

Vehicle Lateral Velocity and Lateral Tire-Road Forces Estimation Based on Switched Interval Observers, pp. 3023-3028.

Ifqir, Sara	IBISC Laboratory, Paris-Saclay University
Ichalal, Dalil	Université d'Evry Val d'Essonne, IBISC Lab
Ait Oufroukh, Naima	IBISC, Université D'Evry
Mammar, Said	Université d'Evry IBISC

16:40-17:00 ThC03.3

Energy-Efficient Autonomous Vehicle Control Using Reinforcement Learning and Interactive Traffic Simulations, pp. 3029-3034.

Li, Huayi	University of Michigan, Ann Arbor
Li, Nan	University of Michigan
Kolmanovsky, Ilya V.	The University of Michigan
Girard, Anouck	University of Michigan, Ann Arbor

17:00-17:20 ThC03.4

Autonomous Parking of Vehicle Fleet in Tight Environments, pp. 3035-3040.

Shen, Xu	University of California, Berkeley
Zhang, Xiaojing	UC Berkeley
Borrelli, Francesco	Unversity of California at Berkeley

17:20-17:40 ThC03.5

Analysis and Control of Hybrid Powertrains Equipped with Dual-Clutch Transmissions, pp. 3041-3046.

Mrochen, Michael Alexander	University of Stuttgart
Sawodny, Oliver	University of Stuttgart

17:40-18:00 ThC03.6

Vehicle Motion Estimation Using a Switched Gain Nonlinear Observer, pp. 3047-3052.

Rajamani, Rajesh	Univ. of Minnesota
Jeon, Woongsun	University of Minnesota
Movahedi, Hamidreza	University of Minnesota
Zemouche, Ali	CRAN UMR CNRS 7039 & Inria: EPI-DISCO

ThC04 Governor's SQ 14

Energy Management Optimization for Intelligent Vehicles (Invited Session)

Chair: Kim, Youngki	University of Michigan - Dearborn
Co-Chair: Dadras, Sara	Ford Motor Company
Organizer: Amini, Mohammad Reza	University of Michigan
Organizer: Kim, Youngki	University of Michigan - Dearborn
Organizer: Dadras, Sara	Company
Organizer: Lotfi, Nima	Southern Illinois University Edwardsville
Organizer: Hall, Carrie	Illinois Institute of Technology

16:00-16:20 ThC04.1

Integrated Power and Thermal Management of Connected HEVs Via Multi-Horizon MPC (I), pp. 3053-3058.

Hu, Qiuhao	University of Michigan
Amini, Mohammad Reza	University of Michigan
Wang, Hao	University of Michigan
Kolmanovsky, Ilya V.	The University of Michigan
Sun, Jing	University of Michigan

16:20-16:40 ThC04.2

An Iterative and Hierarchical Approach to Co-Optimizing the Velocity Profile and Power-Split of Plug-In Hybrid Electric Vehicles (I), pp. 3059-3064.

Chen, Di	University of Michigan
Kim, Youngki	University of Michigan - Dearborn
Huang, Mike	Toyota Motor North America, R&D
Stefanopoulou, Anna G.	University of Michigan

16:40-17:00 ThC04.3

A Robust MPC-Based Hierarchical Control Strategy for Energy Management of Hybrid Electric Vehicles in Presence of Uncertainty (I), pp. 3065-3070.

Sotoudeh, Seyedeh Mahsa	Illinois Institute of Technology
HomChaudhuri, Baisravan	Illinois Institute of Technology

17:00-17:20 ThC04.4

MPC-Based Vibration Control and Energy Harvesting Using an Electromagnetic Vibration Absorber with Inertia Nonlinearity (I), pp. 3071-3076.

Chen, Kaian	Michigan State University
Li, Zhaojian	Michigan State University
Tai, Wei-Che	Michigan State University
Wu, Kai	Ford Motor Company
Wang, Yan	Ford Research and Advanced Engineerintg, Ford Motor Company

17:20-17:40 ThC04.5

Energy Management of Hybrid Electric Vehicles Via Deep Q-Networks (I), pp. 3077-3082.

Zhu, Zhaoxuan	The Ohio State University
Liu, Yuxing	The Ohio State University
Canova, Marcello	The Ohio State University

17:40-18:00 ThC04.6

Optimal Operation of a Plug-In Hybrid Vehicle with Battery Thermal and Degradation Model (I), pp. 3083-3090.

Kim, Jongho	Stanford University
Park, Youngsuk	Stanford University
Fox, John	Stanford University
Boyd, Stephen	Stanford University
Dally, William	Stanford University

ThC05 Plaza Court 6

Oil and Gas Systems Modeling, Estimation, and Control (Invited Session)

Chair: Shor, Roman	University of Calgary
Co-Chair: Chen, Dongmei	The University of Texas at Austin
Organizer: Song, Xingyong	Texas A&M University, College Station
Organizer: Zalluhoglu, Umut	Halliburton
Organizer: Chen, Dongmei	The University of Texas at Austin

16:00-16:20 ThC05.1

Self-Tuning Torsional Drilling Model for Real-Time Applications (I), pp. 3091-3096.

Auriol, Jean	CNRS, Centrale Supelec
Aarsnes, Ulf Jakob Flø	Norwegian Research Centre
Shor, Roman	University of Calgary

16:20-16:40 ThC05.2

Power-Preserving Interconnection of Single and Two-Phase Flow Models for Managed Pressure Drilling (I), pp. 3097-3102.

Abbasi, Mohammad Hossein	Eindhoven University of Technology
Bansal, Harshit	Eindhoven University of Technology
Zwart, Hans	University of Twente
Iapichino, Laura	Eindhoven University of Technology
Schilders, Wilhelmus	Eindhoven University of Technology

Van De Wouw, Nathan	Eindhoven University of Technology

16:40-17:00 ThC05.3

Control of Stick-Slip Vibration in Drillstrings with Multiple Frequencies (I), pp. 3103-3108.

Sun, Zhijie	Halliburton Energy Services
Huang, Sujian	Halliburton

17:00-17:20 ThC05.4

Down-Hole Directional Drilling Dynamics Modeling Based on a Hybrid Modeling Method with Model Order Reduction (I), pp. 3109-3113.

Ke, Chong	Texas A&M University, College Station
Tian, Dongzuo	Texas A&M University, College Station
Song, Xingyong	Texas A&M University, College Station

17:20-17:40 ThC05.5

Design of Online Pumping Schedules in Naturally Fractured Shale Formations to Enhance Total Fracture Surface Area (I), pp. 3114-3119.

Siddhamshetty, Prashanth	Texas A&M University
Bhandakkar, Parth	Texas A&M University
Kwon, Joseph	Texas A&M University

17:40-18:00 ThC05.6

Combining Formation Seismic Velocities While Drilling and a PDE-ODE Observer to Improve the Drill-String Dynamics Estimation (I), pp. 3120-3125.

Auriol, Jean	CNRS, Centrale Supelec
Kazemi, Nasser	University of Calgary
Innanen, Kristopher	University of Calgary
Shor, Roman	University of Calgary

ThC06 Ballroom DE

Autonomous Energy Systems: Optimal Power Flow and Power Systems (Invited Session)

Chair: Sojoudi, Somayeh	UC Berkeley
Co-Chair: Chen, Lijun	University of Colorado at Boulder
Organizer: Bay, Christopher	National Renewable Energy Laboratory
Organizer: Annoni, Jennifer	National Renewable Energy Laboratory
Organizer: Bernstein, Andrey	National Renewable Energy Lab (NREL)
Organizer: Kroposki, Ben	National Renewable Energy Laboratory

16:00-16:20 ThC06.1

Homotopy Method for Finding the Global Solution of Post-Contingency Optimal Power Flow (I), pp. 3126-3133.

Park, SangWoo	UC Berkeley
Glista, Elizabeth	University of California, Berkeley
Lavaei, Javad	UC Berkeley
Sojoudi, Somayeh	UC Berkeley

16:20-16:40 ThC06.2

Considering Integer Chance Constraints for Enforcing Flexible Line Flow Ratings (I), pp. 3134-3139.

Garifi, Kaitlyn	University of Colorado Boulder
Baker, Kyri	University of Colorado Boulder

16:40-17:00 ThC06.3

Model-Free Primal-Dual Methods for Network Optimization with Application to Real-Time Optimal Power Flow (I), pp. 3140-3147.

Chen, Yue	National Renewable Energy Laboratory
Bernstein, Andrey	National Renewable Energy Lab (NREL)
Devraj, Adithya M.	University of Florida
Meyn, Sean P.	Univ. of Florida

17:00-17:20 ThC06.4

Solving Optimal Power Flow for Distribution Networks with State Estimation Feedback (I), pp. 3148-3155.

Guo, Yi	University of Texas at Dallas
Zhou, Xinyang	National Renewable Energy Laboratory
Zhao, Changhong	The Chinese University of Hong Kong
Chen, Yue	National Renewable Energy Laboratory
Summers, Tyler H.	University of Texas at Dallas
Chen, Lijun	University of Colorado at Boulder

17:20-17:40 ThC06.5

Worst-Case Sensitivity of DC Optimal Power Flow Problems (I), pp. 3156-3163.

Anderson, James	Columbia University
Zhou, Fengyu	California Institute of Technology
Low, Steven	California Institute of Technology

17:40-18:00 ThC06.6

Dynamic Equivalence of Large-Scale Power Systems Based on Boundary Measurements (I), pp. 3164-3169.

tong, ning	University of Tennessee, Knoxville
jiang, zhihao	University of Tennessee, Knoxville
you, shutang	University of Tennessee, Knoxville
zhu, lin	University of Tennessee, Knoxville
deng, xianda	University of Tennessee, Knoxville
Xue, Yaosuo	Oak Ridge National Laboratory
Liu, Yilu	The University of Tennessee

ThC07 Plaza Court 7

Fault Detection (Regular Session)

Chair: Bollas, George	University of Connecticut
Co-Chair: Yuan, Chengzhi	University of Rhode Island

16:00-16:20 ThC07.1

Joint Decision and Fault Estimation for Formation Control of Interconnected UAVs, pp. 3170-3175.

Lee, Woo-Cheol	Korea Advanced Institute of Science and Technology
Choi, Han-Lim	KAIST

16:20-16:40 ThC07.2

Similar Fault Isolation of Discrete-Time Nonlinear Uncertain Systems Using Smallest Residual Principle, pp. 3176-3181.

Zhang, Jingting	University of Rhode Island
Yuan, Chengzhi	University of Rhode Island
Stegagno, Paolo	University of Rhode Island

16:40-17:00 ThC07.3

Least-Squares and Information-Theory-Based Inferential Sensor Design for Fault Diagnostics, pp. 3182-3187.

Hale, William	University of Connecticut
Bollas, George	University of Connecticut

17:00-17:20 ThC07.4

A Nonlinear Fault Detection Scheme for PV Applications, pp. 3188-3192.

Hawkins, Nicholas	University of Louisville
Jewell, Nicholas	LG&E-KU
Alqatamin, Moath	University of Louisville
Bhagwat, Bhagyashri	University of Louisville
McIntyre, Michael	University of Louisville

17:20-17:40 ThC07.5

Fault Detection and Isolation for a Class of Uncertain Nonlinear Systems: A Switching Approach, pp. 3193-3198.

Ouyang, Hupo	Beihang University
Lin, Yan	Beijing University of Aeronautics and Astronautics

ThC08 Governor's SQ 10

Robotics II (Regular Session)

Chair: Antunes, Duarte	Eindhoven University of Technology, the Netherlands
Co-Chair: Garofalo, Gianluca	German Aerospace Center (DLR)

16:00-16:20 ThC08.1

Density Functions for Guaranteed Safety on Robotic Systems, pp. 3199-3204.

Chen, Yuxiao	California Institute of Technology
Singletary, Andrew	Georgia Institute of Technology
Ames, Aaron D.	California Institute of Technology

16:20-16:40 ThC08.2

Model Predictive Tracking Controller for Quadcopters with Setpoint Convergence Guarantees, pp. 3205-3210.

Andrien, Alex Rudolf Petrus	Eindhoven University of Technology
Kremers, Demy	Eindhoven University of Technology
Kooijman, Dave	Eindhoven University of Technology
Antunes, Duarte	Eindhoven University of Technology, the Netherlands

16:40-17:00 ThC08.3

Optimal Trajectory Tracking for a Magnetically Driven Microswimmer, pp. 3211-3216.

Buzhardt, Jake	Clemson University
Tallapragada, Phanindra	Clemson University

17:00-17:20 ThC08.4

Performance Satisfaction in Midget, a Thruster-Assisted Bipedal Robot, pp. 3217-3223.

Dangol, Pravin	Northeastern University
Ramezani, Alireza	Northeastern University
Jalili, Nader	Northeastern University

17:20-17:40 ThC08.5

A Smooth Uniting Controller for Robotic Manipulators: An Extension of the Adaptive Variance Algorithm (AVA), pp. 3224-3229.

Garofalo, Gianluca	German Aerospace Center (DLR)
Mesesan, George	German Aerospace Center (DLR)

17:40-18:00 ThC08.6

Design of Smooth Path Based on the Conversion between η^3 Spline and Bezier Curve, pp. 3230-3235.

Hsu, Ting-Wei	Academia Sinica Institute of Information
Liu, Jing-Sin	Academia Sinica

ThC09 Govenor's SQ 16

Control Applications I (Regular Session)

Chair: You, Fengqi	Cornell University
Co-Chair: Pisu, Pierluigi	Clemson University

16:00-16:20 ThC09.1

A Novel Phasor Control Design Method: Application to MEMS Gyroscopes, pp. 3236-3241.

Saggin, Fabricio	Ecole Centrale De Lyon
Scorletti, Gerard	Ecole Centrale De Lyon
Korniienko, Anton	Ecole Centrale De Lyon, Laboratoire Ampère

16:20-16:40 ThC09.2

Smooth Actor-Critic Algorithm for End-To-End Autonomous Driving, pp. 3242-3248.

Song, Wenjie	Beijing Institute of Technology
Liu, Shixian	Beijing Institute of Technology
Li, Yujun	Shanghai Jiao Tong University
Yang, Yi	Beijing Institute of Technology
xiang, changle	Beijing Institute of Technology

16:40-17:00 ThC09.3

Control Performance Improvement of Engine Speed Controller Using Tracking Differentiator in the Crank-Angle Domain, pp. 3249-3254.

Wang, Runzhi	Harbin Engineering University
Li, Xuemin	Harbin Engineering University
Ahmed, Qadeer	The Ohio State University
Wang, Zhongwei	Harbin Engineering University
Ma, Xiuzhen	College of Power and Energy, Harbin Engineering University

17:00-17:20 ThC09.4

Optimal Operation of a Hybrid Hydraulic Electric Architecture (HHEA) for Off-Road Vehicles Over Discrete Operating Decisions, pp. 3255-3260.

Siefert, Jacob	University of Minnesota
Li, Perry Y.	Univ. of Minnesota

17:20-17:40 ThC09.5

Economically-Optimal Control of Electric Taxicab for Urban Driving Cycle, pp. 3261-3266.

Yao, Jiwei	Cornell University
You, Fengqi	Cornell University

17:40-18:00 ThC09.6

Real-Time False Data Injection Attack Detection in Connected Vehicle Systems with PDE Modeling, pp. 3267-3272.

A.Biroon, Roghieh	Clemson University
Abdollahi Biron, Zoleikha	University of Florida
Pisu, Pierluigi	Clemson University

ThC10 Governor's SQ 11

Autonomous Systems II (Regular Session)

Chair: Panagou, Dimitra — University of Michigan, Ann Arbor
Co-Chair: Richards, Christopher — University of Louisville

16:00-16:20 ThC10.1

More Consensus Is Not Always Beneficial, pp. 3273-3278.

Wang, Xuan — Purdue University
Mou, Shaoshuai — Purdue University

16:20-16:40 ThC10.2

On the Phase Margin of Networked Dynamical Systems and Fabricated Attacks of an Intruder, pp. 3279-3284.

Bhusal, Rajnish — The University of Texas at Arlington
Taner, Baris — University of Texas at Arlington
Subbarao, Kamesh — The University of Texas, Arlington

16:40-17:00 ThC10.3

Resilient Finite-Time Consensus: A Discontinuous Systems Perspective (I), pp. 3285-3290.

Usevitch, James — University of Michigan-Ann Arbor
Panagou, Dimitra — University of Michigan, Ann Arbor

17:00-17:20 ThC10.4

Tensor-Train-Based Algorithms for Aggregate State Estimation of Swarms with Interacting Agents, pp. 3291-3298.

Miculescu, David — Massachusetts Institute of Technology
Karaman, Sertac — Massachusetts Institute of Technology

17:20-17:40 ThC10.5

Dynamic Anti-Windup Compensation for Multi-Agent Systems with Input Saturation, pp. 3299-3304.

Richards, Christopher — University of Louisville
Zhang, Haopeng — University of Louisville

17:40-18:00 ThC10.6

Risk-Averse Planning under Uncertainty, pp. 3305-3312.

Ahmadi, Mohamadreza — California Institute of Technology
Ono, Masahiro — Jet Propulsion Laboratory, California Institute of Technology
Ingham, Michel D. — NASA Jet Propulsion Laboratory
Ames, Aaron D. — California Institute of Technology
Murray, Richard M. — California Inst. of Tech

ThC11 Director's Row I

Networked Systems II (Regular Session)

Chair: She, Zhikun — Beihang University
Co-Chair: Zhang, Meirong — Gonzaga University

16:00-16:20 ThC11.1

Edge Centrality Matrix: Impact of Network Modification on Gramian Controllability Metrics, pp. 3313-3318.

Chanekar, Prasad Vilas — University of California, San Diego
Cortes, Jorge — University of California, San Diego

16:20-16:40 ThC11.2

Semi-Global State Synchronization for Multi-Agent Systems Subject to Actuator Saturation and Unknown Nonuniform Input Delay, pp. 3319-3324.

Zhang, Meirong — Gonzaga University
Saberi, Ali — Washington State Univ
Stoorvogel, Anton A. — University of Twente

16:40-17:00 ThC11.3

Conic System Analysis of Network Control Systems with a Human Controller, pp. 3325-3330.

McCourt, Michael J. — University of Washington Tacoma
Doucette, Emily — AFRL
Curtis, J. Willard — Air Force Research Laboratory

17:00-17:20 ThC11.4

LMI-Based Output Feedback Control Design in the Presence of Sporadic Measurements, pp. 3331-3336.

Merco, Roberto — Clemson University
Ferrante, Francesco — GIPSA-lab/CNRS and Université Grenoble Alpes
Sanfelice, Ricardo G. — University of California at Santa Cruz
Pisu, Pierluigi — Clemson University

17:20-17:40 ThC11.5

Higher-Order Cluster Consensus in Continuous-Time Networks, pp. 3337-3342.

Develer, Ümit — Bogazici University
Akar, Mehmet — Bogazici University

17:40-18:00 ThC11.6

Achieving Output Consensus of Heterogeneous Network of Two Dimensional Agents Via Static Diffusive Controllers, pp. 3343-3348.

Liang, Quanyi — National University of Singapore
Ong, Chong-Jin — National University of Singapore
She, Zhikun — Beihang University

ThC12 Director's Row E

Estimation IV (Regular Session)

Chair: Xin, Ming — University of Missouri
Co-Chair: Yau, Stephen S.-T. — Tsinghua University

16:00-16:20 ThC12.1

Novel Classification of Finite Dimensional Filters with Non-Maximal Rank Estimation Algebra, pp. 3349-3354.

Dong, Wenhui — Tsinghua University
Chen, Xiuqiong — Tsinghua University
Yau, Stephen S.-T. — Tsinghua University

16:20-16:40 ThC12.2

Real-Time Cubature Kalman Filter Parameter Estimation of Blood Pressure Response Characteristics under Vasoactive Drugs Administration, pp. 3355-3362.

Tasoujian, Shahin — University of Houston
Salavati Dezfuli, Saeed — University of Houston
Grigoriadis, Karolos M. — Univ. of Houston
Franchek, Matthew A. — University of Houston

16:40-17:00 ThC12.3

Ground Vehicle Localization Using Road Profile Feature, pp. 3363-3368.

Gim, Juhui — Pusan National University
Ahn, Changsun — Pusan National University

17:00-17:20 ThC12.4

Positive Unknown Inputs Filters Design for Positive Linear Systems, pp. 3369-3374.

Ezzine, Montassar	Ecole Nationale Des Sciences De l'Informatique and Laboratoire D
Souley Ali, Harouna	Université De Lorraine, CRAN UMR 7039 CNRS
Darouach, Mohamed	Université De Lorraine, CRAN-CNRS UMR 7039
Messaoud, Hassani	Ecole Nationale d'Ingénieurs De Monastir

17:20-17:40 ThC12.5

Orbital Uncertainty Propagation Via Multi-Element Arbitrary Polynomial Chaos, pp. 3375-3380.

Jia, Bin	Intelligent Fusion Technology
Xin, Ming	University of Missouri

17:40-18:00 ThC12.6

An Efficient Solution to the Camera Velocity Estimationfrom Minimal Feature Points, pp. 3381-3386.

Zhang, Yujie	University of Texas at Dallas
Fathian, Kaveh	MIT
Gans, Nicholas	University of Texas at Arlington

ThC13 Plaza Court 1

Uncertain Systems I (Regular Session)

Chair: Sentis, Luis	The University of Texas at Austin
Co-Chair: Shames, Iman	The University of Melbroune

16:00-16:20 ThC13.1

Global Sensitivity Analysis for the Linear Assignment Problem, pp. 3387-3392.

Michael, Elad	University of Melbourne
Wood, Tony A.	University of Melbourne
Manzie, Chris	The University of Melbourne
Shames, Iman	The University of Melbourne

16:20-16:40 ThC13.2

Data-Driven Approach for Uncertainty Propagation and ReachabilityAnalysis in Dynamical Systems, pp. 3393-3398.

Ramapuram Matavalam, Amarsagar Reddy	Iowa State University
Vaidya, Umesh	Clemson University
Ajjarapu, Venkataramana	Iowa State University

16:40-17:00 ThC13.3

Stochastic Dynamic Optimization and Model Predictive Control Based on Polynomial Chaos Theory and Symbolic Arithmetic, pp. 3399-3404.

von Andrian, Matthias	Massachusetts Institute of Technology
Braatz, Richard D.	Massachusetts Institute of Technology

17:00-17:20 ThC13.4

Bayesian Optimization Objective-Based Experimental Design, pp. 3405-3411.

Imani, Mahdi	George Washington University
Ghoreishi, Seyede Fatemeh	University of Maryland

17:20-17:40 ThC13.5

Bayesian Optimization for Efficient Design of Uncertain Coupled Multidisciplinary Systems, pp. 3412-3418.

Ghoreishi, Seyede Fatemeh	University of Maryland
Imani, Mahdi	George Washington University

17:40-18:00 ThC13.6

Robust Estimator-Based Safety Verification: A Vector Norm Approach, pp. 3419-3424.

He, Binghan	The University of Texas at Austin
Thomas, Gray	University of Michigan
Sentis, Luis	The University of Texas at Austin

ThC14 Plaza Court 8

Estimation and Control of PDE Systems IV (Invited Session)

Chair: Ferrante, Francesco	GIPSA-Lab and Université Grenoble Alpes
Co-Chair: Yu, Huan	University of California San Diego
Organizer: Demetriou, Michael A.	Worcester Polytechnic Institute
Organizer: Fahroo, Fariba	AFOSR

16:00-16:20 ThC14.1

An Event-Based Approach for Model-Based Control and Parameter Identification in Networked Distributed Processes (I), pp. 3425-3430.

Zedan, Amr	University of California Davis
El-Farra, Nael H.	University of California, Davis

16:20-16:40 ThC14.2

Observer Design for Systems of Conservation Laws with Lipschitz Nonlinear Boundary Dynamics (I), pp. 3431-3436.

Ferrante, Francesco	GIPSA-lab/CNRS and Université Grenoble Alpes
Cristofaro, Andrea	Sapienza University of Rome

16:40-17:00 ThC14.3

Event-Triggered Boundary Control of Constant-Parameter Reaction-Diffusion PDEs: A Small-Gain Approach (I), pp. 3437-3442.

Espitia, Nicolas	CRIStAL, CNRS
Karafyllis, Iasson	National Technical University of Athens
Krstic, Miroslav	University of California, San Diego

17:00-17:20 ThC14.4

Simultaneous Stabilization of Traffic Flow on Two Connected Roads (I), pp. 3443-3448.

Yu, Huan	University of California San Diego
Auriol, Jean	CNRS, Centrale Supelec
Krstic, Miroslav	University of California, San Diego

17:20-17:40 ThC14.5

Optimal Control of a 1D Diffusion Process with a Team of Mobile Actuators under Jointly Optimal Guidance, pp. 3449-3454.

Cheng, Sheng	University of Maryland, College Park, MD
Paley, Derek A.	University of Maryland

17:40-18:00 ThC14.6

Discrete Output Regulator Design for a Coupled ODE-PDE System, pp. 3455-3460.

Ozorio Cassol, Guilherme	University of Alberta
Dubljevic, Stevan	University of Alberta

ThC15 Plaza Court 5

Observers for Nonlinear Systems (Regular Session)

Chair: McIntyre, Michael	University of Louisville
Co-Chair: Jerath, Kshitij	University of Massachusetts

Lowell

16:00-16:20 ThC15.1

Observability Variation in Emergent Dynamics: A Study Using Krylov Subspace-Based Model Order Reduction, pp. 3461-3466.

Yang, Zhaohui — Washington State University
Jerath, Kshitij — University of Massachusetts Lowell

16:20-16:40 ThC15.2

Nonlinear Control and Observation of a PMSG Wind Turbine through Unknown Wind Torque Characteristics, pp. 3467-3472.

Hawkins, Nicholas — University of Louisville
Alqatamin, Moath — University of Louisville
Bhagwat, Bhagyashri — University of Louisville
McIntyre, Michael — University of Louisville

16:40-17:00 ThC15.3

Generalized SVD Reduced-Order Observers for Nonlinear Systems, pp. 3473-3478.

Dada, Gbolahan Promise — Pennsylvania State University
Armaou, Antonios — The Pennsylvania State University

17:00-17:20 ThC15.4

Invariant-EKF Design for a Unicycle Robot under Linear Disturbances, pp. 3479-3484.

Coleman, Kevin — Oklahoma State University
Bai, He — Oklahoma State University
Taylor, Clark N. — Air Force Institute of Technology

17:20-17:40 ThC15.5

ISS Interval Observers for Nonlinear Switched Systems under Constrained Switching, pp. 3485-3490.

Tahir, Adam — University of Washington
Acikmese, Behcet — University of Washington

17:40-18:00 ThC15.6

Target Tracking in the Presence of Intermittent Measurements by a Sparsely Distributed Network of Stationary Cameras, pp. 3491-3496.

Harris, Christian — University of Florida
Bell, Zachary I. — University of Florida
Doucette, Emily — AFRL
Curtis, J. Willard — Air Force Research Laboratory
Dixon, Warren E. — University of Florida

ThC16 — Governor's SQ 17

Distributed Control I (Regular Session)

Chair: Tron, Roberto — Boston University
Co-Chair: Zheng, Ronghao — Zhejiang University, ZJU

16:00-16:20 ThC16.1

Distributed Adaptive Control of Uncertain Multiagent Systems with Coupled Dynamics, pp. 3497-3502.

Dogan, Kadriye Merve — University of South Florida
Yucelen, Tansel — University of South Florida
Ristevski, Stefan — University of South Florida
Muse, Jonathan — Wright Patterson Air Force Base

16:20-16:40 ThC16.2

Bearing-Only Consensus and Formation Control under Directed Topologies, pp. 3503-3510.

Karimian, Arman — Boston University
Tron, Roberto — Boston University

16:40-17:00 ThC16.3

Finite-Sample Analysis of Distributed Q-Learning for Multi-Agent Networks, pp. 3511-3516.

Heredia, Paulo — Purdue
Ghadialy, Hasan — Northrop Grumman Corporation
Mou, Shaoshuai — Purdue University

17:00-17:20 ThC16.4

On New Laplacian Matrix with a User-Assigned Nullspace in Distributed Control of Multiagent Systems, pp. 3517-3522.

Tran, Dzung — University of South Florida
Yucelen, Tansel — University of South Florida

17:20-17:40 ThC16.5

Distributed Control of Cooperative Multi-Target Enclosing by Ring-Coupled Unicycles, pp. 3523-3528.

Shi, Linlin — Zhejiang University
Zheng, Ronghao — Zhejiang University, ZJU
Liu, Meiqin — Zhejiang University
Zhang, Senlin — Zhejiang University

17:40-18:00 ThC16.6

Separating Controller Design from Closed-Loop Design: A New Perspective on System-Level Controller Synthesis, pp. 3529-3534.

Li, Jing Shuang — California Institute of Technology
Ho, Dimitar — Caltech

ThC17 — Director's Row J

Process Control II (Regular Session)

Chair: Detroja, Ketan P. — Indian Institute of Technology Hyderabad
Co-Chair: El-Farra, Nael H. — University of California, Davis

16:00-16:20 ThC17.1

Design an Optimal Blending Recipe Via Scenario-Based Chance-Constrained Optimization, pp. 3535-3540.

dela Rosa, Loren — California State University Long Beach
Chow, Tsz Yuet Matthew — University of Michigan, Ann Arbor
Yang, Yu — California State University Long Beach

16:20-16:40 ThC17.2

Real-Time Optimal Resource Allocation in an Industrial Symbiotic Network Using Transient Measurements (I), pp. 3541-3546.

Krishnamoorthy, Dinesh — Norwegian University of Science and Technology
Valli, Carlo — Politecnico Di Milano
Skogestad, Sigurd — Norwegian Univ. of Science & Tech

16:40-17:00 ThC17.3

Performance Characterization of Sampled-Data Systems with Measurement Delays and Actuator Faults: Implications for Fault Accommodation, pp. 3547-3552.

Allen, James — University of California, Davis
El-Farra, Nael H. — University of California, Davis

17:00-17:20 ThC17.4

Dynamic-Inner Canonical Correlation Analysis Based Process Monitoring, pp. 3553-3558.

Dong, Yining	University of Southern California
Qin, S. Joe	University of Southern California

17:20-17:40 ThC17.5

Integrating Deep Learning and Explicit MPC for Advanced Process Control, pp. 3559-3564.

katz, Justin	Texas A&M University
Pappas, Iosif	Texas A&M University
Avraamidou, Styliani	Imperial College London
Pistikopoulos, Efstratios N.	Texas A&M University

17:40-18:00 ThC17.6

K-Adj Dynamic Decoupling for Multivariable Processes, pp. 3565-3570.

Khandelwal, Shubham	Indian Institute of Technology Hyderabad
Detroja, Ketan P.	Indian Institute of Technology Hyderabad

ThC18 Plaza Court 4

Stochastic Systems (Regular Session)

Chair: Maldonado, Bryan	University of Michigan
Co-Chair: Halder, Abhishek	University of California, Santa Cruz

16:00-16:20 ThC18.1

Nonlinear Covariance Control Via Differential Dynamic Programming, pp. 3571-3576.

yi, zeji	Georgia Institute of Technology
Cao, Zhefeng	Zhejiang University
Theodorou, Evangelos A.	Georgia Institute of Technology
Chen, Yongxin	Georgia Institute of Technology

16:20-16:40 ThC18.2

Finite Horizon Density Steering for Multi-Input State Feedback Linearizable Systems, pp. 3577-3582.

Caluya, Kenneth	University of California, Santa Cruz
Halder, Abhishek	University of California, Santa Cruz

16:40-17:00 ThC18.3

Interval-Valued Markov Chain Abstraction of Stochastic Systems Using Barrier Functions, pp. 3583-3588.

Dutreix, Maxence	Georgia Institute of Technology
Santoyo, Cesar	Georgia Institute of Technology
Abate, Matthew	Georgia Institute of Technology
Coogan, Samuel	Georgia Institute of Technology

17:00-17:20 ThC18.4

Online Control of Process Variance Using Feedback, pp. 3589-3594.

Bieniek, Mitchell	University of Michigan - Ann Arbor
Maldonado, Bryan	Oak Ridge National Laboratory
Stefanopoulou, Anna G.	University of Michigan
Hoard, John	University of Michigan

17:20-17:40 ThC18.5

Greedy Finite-Horizon Covariance Steering for Discrete-Time Stochastic Nonlinear Systems Based on the Unscented Transform, pp. 3595-3600.

Bakolas, Efstathios	The University of Texas at Austin
Tsolovikos, Alexandros	The University of Texas at Austin

17:40-18:00 ThC18.6

Observability Notions for CSVIU and Stability in Connection with Some Norms, pp. 3601-3606.

Campos, Daniel	Univ. Estadual De Campinas
do Val, Joao B.R.	Unicamp - Feec

ThC19 Plaza Court 3

Optimization Algorithms II (Regular Session)

Chair: Granichin, Oleg	Saint Petersburg State University
Co-Chair: Speranzon, Alberto	Honeywell Aerospace - Advanced Technoloy

16:00-16:20 ThC19.1

A Novel Evolutionary Algorithm with Pareto Front Adaption for Many-Objective Optimization, pp. 3607-3612.

Li, Li	Guilin University of Electronic Technology
Sahoo, Avimanyu	Oklahoma State University
Chang, Liang	Guangxi Key Laboratory of Trusted Software, Guilin University Of

16:20-16:40 ThC19.2

The Crawling Phenomenon in Sequential Convex Programming, pp. 3613-3618.

Reynolds, Taylor Patrick	University of Washington
Mesbahi, Mehran	University of Washington

16:40-17:00 ThC19.3

Scalable Distributed Optimization with Separable Variables in Multi-Agent Networks, pp. 3619-3626.

Shorinwa, Ola	Stanford University
Halsted, Trevor	Stanford University
Schwager, Mac	Stanford University

17:00-17:20 ThC19.4

A Sequential Subspace Quasi-Newton Method for Large-Scale Convex Optimization, pp. 3627-3632.

Senov, Aleksandr	Saint Petersburg State University
Granichin, Oleg	Saint Petersburg State University
Granichina, Olga	Herzen State Pedagogical University

17:20-17:40 ThC19.5

Constrained and Sparse Switching Times Optimization Via Augmented Lagrangian Proximal Methods, pp. 3633-3638.

De Marchi, Alberto	Bundeswehr University Munich

17:40-18:00 ThC19.6

On Sensor Network Localization Exploiting Topological Constraints, pp. 3639-3646.

Speranzon, Alberto	Honeywell Aerospace - Advanced Technoloy
Shivkumar, Shashank	Honeywell Aerospace
Ghrist, Robert	Univ of Illinois, Urbana-Champaign

ThC20 Plaza Court 2

Discrete Event Systems (Regular Session)

Chair: Yin, Xiang	Shanghai Jiao Tong University
Co-Chair: Cervin, Anton	Lund University

16:00-16:20 ThC20.1

Controllability of a Class of Hybrid Systems, pp. 3647-3652.

Lin, Feng	Wayne State Univ
Wang, Le Yi	Wayne State University
Chen, Wen	Wayne State University
Polis, Michael P.	Oakland Univ

16:20-16:40 ThC20.2

Stability Analysis of a Chain of Integrators with Pulse-Width-Modulation Controller, pp. 3653-3658.

He, Shuaipeng	University of Texas at San Antonio
Qian, Chunjiang	University of Texas at San Antonio
Zou, Yunlei	Yangzhou University

16:40-17:00 ThC20.3

Bidirectional Dynamic Reconfiguration of Discrete-Event Systems, pp. 3659-3664.

Zhang, Jiachen	University of Toronto
Wonham, W. Murray	Univ. of Toronto

17:00-17:20 ThC20.4

Supervisory Control of Discrete-Event Systems for Infinite-Step Opacity, pp. 3665-3671.

Xie, Yifan	Shanghai Jiao Tong University
Yin, Xiang	Shanghai Jiao Tong University

17:20-17:40 ThC20.5

Tracking Controller Design for Petri Nets with Inputs and Outputs, pp. 3672-3677.

Fritz, Raphael	University of Kaiserslautern
Zhang, Ping	University of Kaiserslautern

17:40-18:00 ThC20.6

LQG-Optimal versus Simple Event-Based PID Controllers, pp. 3678-3684.

Cervin, Anton	Lund University
Thelander Andrén, Marcus	Lund University

ThC21 Director's Row H

Control of Wafer Scanner: Methods and Developments (Tutorial Session)

Chair: Heertjes, Marcel	Eindhoven University of Technology
Co-Chair: Butler, Hans	ASML
Organizer: Heertjes, Marcel	Eindhoven University of Technology
Organizer: Butler, Hans	ASML
Organizer: van der Meulen, Stan	ASML
Organizer: Ahlawat, Rahul	CYMER

16:00-16:01 ThC21.1

Introduction To: Control of Wafer Scanner: Methods and Developments (I), pp. 3685-3685.

Heertjes, Marcel	Eindhoven University of Technology
Butler, Hans	ASML
Dirkx, Nic	ASML
van der Meulen, Stan	ASML
Simonelli, James	ASML

16:01-16:40 ThC21.2

Control of Wafer Scanners: Methods and Developments (I), pp. 3686-3703.

Heertjes, Marcel	Eindhoven University of Technology
Ahlawat, Rahul	CYMER
Butler, Hans	ASML
Dirkx, Nic	ASML
van der Meulen, Stan	ASML
O'Brien, Kevin	Cymer Light Source LLC
Simonelli, James	ASML
Teng, Kuo-Tai	UCLA
Zhao, Yingbo	University of California, San Diego

16:40-17:00 ThC21.3

Light Source: Generation and Control of Light (I), pp. 3704-3704.

Ahlawat, Rahul	CYMER
O'Brien, Kevin	Cymer Light Source LLC
Simonelli, James	ASML
Teng, Kuo-Tai	ASML
Zhao, Yingbo	ASML

17:00-17:20 ThC21.4

Optics: Isolation and Control of Vibration (I), pp. 3705-3705.

Butler, Hans	ASML

17:20-17:40 ThC21.5

Stages Part 1: Control of Motion (I), pp. 3706-3706.

Heertjes, Marcel	Eindhoven University of Technology

17:40-18:00 ThC21.6

*Stages Part 2: Control of Thermal-Induced Deformation (I)**.

van der Meulen, Stan	ASML
Dirkx, Nic	ASML
Heertjes, Marcel	Eindhoven University of Technology

ThCT3 Meetings and

ThCT3 (Special Session)

16:00-18:00 ThCT3.1

Special Session: Student Career Advising Session , pp. 3707-3707.

Tian, Ning	University of Kansas
Cai, Ting	University of Michigan
Goshtasbi, Alireza	University of Michigan

16:00-18:00 ThCT3.2

Special Session: Getting Funded by NSF: Proposal Preparation and the Merit Review Process , pp. 3708-3708.

Dolinskaya, Irina	National Science Foundation (NSF)

ThBaT5 Meetings

ThBaT5 (Special Session)

19:30-21:30 ThBaT5.1

Meetings: TC Smart Grid (from 6pm to 7pm), pp. 3709-3709.

Hiskens, Ian	University of Michigan

19:30-21:30 ThBaT5.2

Meeting: TC Automotive Controls (from 6.30pm to 7.30pm), pp. 3710-3710.

Siegel, Jason B.	University of Michigan

FrP1 Ballroom 1

Distributed Decision Making in Network Systems: Algorithms, Fundamental Limits, and Applications (Plenary Session)

Chair: Devasia, Santosh — Univ of Washington

08:00-09:00 FrP1.1

Distributed Decision Making in Network Systems: Algorithms, Fundamental Limits, and Applications, pp. 3711-3711.

Li, Na — Harvard University

FrLBP-A01 Ballroom ABC

Poster-FrA (Late Breaking Poster Session)

09:00-09:30 FrLBP-A01.1

Scalable Reinforcement Learning of Localized Policies for Multi-Agent Networked Systems, pp. 3712-3712.

Qu, Guannan — Caltech
Wierman, Adam — California Institute of Technology
Li, Na — Harvard University

09:00-09:30 FrLBP-A01.2

Transition Motion Control of Hybrid Hydraulic Electric Architecture, pp. 3713-3713.

Chatterjee, Arpan — University of Minnesota
Li, Perry Y. — Univ. of Minnesota

09:00-09:30 FrLBP-A01.3

Multi-Robot Guided Policy Search for Decentralized Swarm Control, pp. 3714-3714.

Jiang, Chao — University of Wyoming
Guo, Yi — Stevens Institute of Technology

09:00-09:30 FrLBP-A01.4

Mechanisms for Ensuring Stability in Time-Distributed Optimization for Model Predictive Control, pp. 3715-3715.

Leung, Jordan — University of Michigan
Skibik, Terrence — University of Colorado Boulder
Liao-McPherson, Dominic — The University of Michigan
Kolmanovsky, Ilya V. — The University of Michigan
Nicotra, Marco M — University of Colorado Boulder

09:00-09:30 FrLBP-A01.5

Accelerated-Gradient-Based Flexible-Object Transport with Decentralized Robot Networks, pp. 3716-3716.

Gombo, Yoshua — University of Washington
Tiwari, Anuj — University of Washington
Devasia, Santosh — Univ of Washington

09:00-09:30 FrLBP-A01.6

Rapid Robust State Transitions in Consensus-Based Robotic Networks with A-DSR, pp. 3717-3717.

Tiwari, Anuj — University of Washington
Devasia, Santosh — Univ of Washington

09:00-09:30 FrLBP-A01.7

Bayesian Multimodal Fusion for Target Tracking in Clutter, pp. 3718-3718.

Kanlapuli Rajasekaran, Ramya — University of Colorado Boulder
Ahmed, Nisar — University of Colorado Boulder
Frew, Eric W. — University of Colorado, Bolder

09:00-09:30 FrLBP-A01.8

Safety and Stability Analysis of the FollowerStopper Traffic Wave Dampening Controller, pp. 3719-3719.

Kreienkamp, Chris — University of Notre Dame
Fishbein, Daniel — Missouri State University
Bhadani, Rahul — University of Arizona
Sprinkle, Jonathan — University of Arizona

FrLBP-A02 ACC Sponsors

Meeting Space-FrA

09:00-09:30 FrLBP-A02.1

Gold Sponsor: General Motors, pp. 3720-3720.

Eckman, Wendy — General Motors

09:00-09:30 FrLBP-A02.2

Gold Sponsor: Mathworks, pp. 3721-3721.

Rose, Jennifer — MathWorks
Ulusoy, Melda — Mathworks

09:00-09:30 FrLBP-A02.3

Gold Sponsor: Mitsubishi Electric Research Lab (MERL), pp. 3722-3722.

Thornton, Jay — Mitsubishi Electric Research Lab
Di Cairano, Stefano — Mitsubishi Electric Research Lab

09:00-09:30 FrLBP-A02.4

Silver Sponsor: Quanser, pp. 3723-3723.

Rahaman, Josie — Quanser Consulting
Wang, Gemma — Quanser

09:00-09:30 FrLBP-A02.5

Silver Sponsor: SIAM, pp. 3724-3724.

O'Neill, Kristin — SIAM

09:00-09:30 FrLBP-A02.6

Silver Sponsor: Cancelled, pp. 3725-3725.

Kelly, Claire — Wiley

09:00-09:30 FrLBP-A02.7

Silver Sponsor: DSPACE, pp. 3726-3726.

Johnson, Janice — DSpace

09:00-09:30 FrLBP-A02.8

Silver Sponsor: Springer Nature, pp. 3727-3727.

Tominich, Christopher — Springer
Jackson, Oliver — Springer

09:00-09:30 FrLBP-A02.9

Bronze Sponsor: Processes, pp. 3728-3728.

Xiang, Wency — Processes MDPI

09:00-09:30 FrLBP-A02.10

Bronze Sponsor: Halliburton, pp. 3729-3729.

Darbe, Robert — Halliburton

FrA01 Ballroom 1

RI: Control of Biological and Aerospace Systems (RI Session)

Chair: Grover, Martha — Georgia Institute of Technology
Co-Chair: Clayton, Garrett — Villanova University

09:30-09:55 FrA01.1

Backstepping Control of Gliding Robotic Fish for Trajectory

Tracking in 3D Space, pp. 3730-3736.

Coleman, Demetris	Michigan State University
Tan, Xiaobo	Michigan State University

09:55-09:58 FrA01.2

Noise Analysis in Biochemical Complex Formation from Stochastically Produced Components, pp. 3737-3742.

Xu, Zikai	University of Delaware
Ghusinga, Khem Raj	University of North Carolina at Chapel Hill
Singh, Abhyudai	University of Delaware

09:58-10:01 FrA01.3

SIS Epidemic Model under Mobility on Multi-Layer Networks, pp. 3743-3748.

Abhishek, Vishal	Michigan State University
Srivastava, Vaibhav	Michigan State University

10:01-10:04 FrA01.4

Prediction of Fitness in Bacteria with Causal Jump Dynamic Mode Decomposition, pp. 3749-3756.

Balakrishnan, Shara	University of California Santa Barbara
Hasnain, Aqib	University of California, Santa Barbara
Boddupalli, Nibodh	University of California Santa Barbara
Manjaly Joshy, Dennis	UC Santa Barbara
Egbert, Robert	University of Washington
Yeung, Enoch	University of California Santa Barbara

10:04-10:07 FrA01.5

Classifier-Based Supervisory Control with Application to Threat Engagement, pp. 3757-3762.

Schweidel, Katherine	UC Berkeley
Packard, Andrew K.	Univ. of California at Berkeley
Arcak, Murat	University of California, Berkeley
Seiler, Peter	University of Michigan, Ann Arbor
Philbrick, Douglas	Uc Berkeley

10:07-10:10 FrA01.6

On a Converse Theorem for Finite-Time Lyapunov Functions to Estimate Domains of Attraction, pp. 3763-3769.

Pandey, Ayush	California Institute of Technology
Ames, Aaron D.	California Institute of Technology

10:10-10:13 FrA01.7

Robust Strict Positive Real Control of Variable Stiffness Actuators, pp. 3770-3775.

Misgeld, Berno Johannes Engelbert	MedIT, RWTH Aachen University
Illian, Mathias	RWTH Aachen University
Liu, Lin	RWTH Aachen University
Leonhardt, Steffen	RWTH Aachen University

10:13-10:16 FrA01.8

Finite-Time Impact Time Guidance Using Deviated Pursuit against Maneuvering Targets, pp. 3776-3781.

Kumar, Shashi Ranjan	Indian Institute of Technology Bombay
Mukherjee, Dwaipayan	Indian Institute of Technology Bombay

10:16-10:19 FrA01.9

Three-Dimensional Nonlinear Impact Time Guidance for Stationary Targets, pp. 3782-3787.

Sinha, Abhinav	Indian Institute of Technology Bombay
Kumar, Shashi Ranjan	Indian Institute of Technology Bombay
Mukherjee, Dwaipayan	Indian Institute of Technology Bombay

10:19-10:22 FrA01.10

Non-Singular Trajectory Tracking Control of a Pitch-Constrained Quad-Rotorcraft Using Integral Barrier Lyapunov Function, pp. 3788-3795.

Dasgupta, Ranjan	TCS
Basu Roy, Sayan	Indraprastha Institute of Information Technology Delhi
Bhasin, Shubhendu	Indian Institute of Technology Delhi

10:22-10:25 FrA01.11

Deviated Pursuit Based Cooperative Simultaneous Interception against Moving Targets, pp. 3796-3801.

Sinha, Abhinav	Indian Institute of Technology Bombay
Mukherjee, Dwaipayan	Indian Institute of Technology Bombay
Kumar, Shashi Ranjan	Indian Institute of Technology Bombay

10:25-10:28 FrA01.12

Nonlinear Impact Time Guidance with Constrained Field-Of-View, pp. 3802-3807.

Mukherjee, Dwaipayan	Indian Institute of Technology Bombay
Kumar, Shashi Ranjan	Indian Institute of Technology Bombay

10:28-10:31 FrA01.13

Disturbance Estimation and Rejection for Aircraft Glideslope Regulation in Turbulence : A Matrix SOS Approach, pp. 3808-3813.

Misra, Gaurav	Rutgers University
Bai, Xiaoli	Rutgers, the State University of New Jer

10:31-10:34 FrA01.14

Invariant Sets for Integrators and Quadrotor Obstacle Avoidance, pp. 3814-3821.

Doeser, Ludvig	KTH Royal Institute of Technology
Nilsson, Petter	California Institute of Technology
Ames, Aaron D.	California Institute of Technology
Murray, Richard M.	California Inst. of Tech

10:34-10:37 FrA01.15

Improved Maneuverability for Multirotor Aerial Vehicles Using Globally Stabilizing Feedbacks, pp. 3822-3827.

Casau, Pedro	Instituto Superior Técnico, University of Lisbon
Cunha, Rita	Instituto Superior Técnico, Universidade De Lisboa
Silvestre, Carlos	Instituo Superior Técnico

10:37-10:40 FrA01.16

Quaternion Feedback Based Autonomous Control of a Quadcopter UAV with Thrust Vectoring Rotors, pp. 3828-3833.

Kumar, Rumit	University of Cincinnati

Bhargavapuri, Mahathi	IIT Kanpur
Deshpande, Aditya Milind	University of Cincinnati
Sridhar, Siddharth	University of Cincinnati
Cohen, Kelly	University of Cincinnati
Kumar, Manish	University of Cincinnati

10:40-10:43 FrA01.17

Quaternion Based Nonlinear Trajectory Control of Quadrotors with Guaranteed Stability, pp. 3834-3839.

Kang, Joo-Won	Georgia Institute of Technology
Sadegh, Nader	Georgia Inst. of Tech
Urschel, Chase	Georgia Institute of Technology

10:43-10:46 FrA01.18

Measures and LMIs for Lateral F-16 MRAC Validation, pp. 3840-3845.

Wagner, Daniel	Czech Technical University in Prague
Henrion, Didier	LAAS-CNRS
Hromcik, Martin	Czech Technical University, FEE

10:46-10:49 FrA01.19

Take-Off and Landing of an AWE System Using a Multicopter, pp. 3846-3851.

Schanen, Audrey	Grenoble-INP, Gipsa Lab, CNRS
Dumon, Jonathan	CNRS, Gipsa-Lab
Meslem, Nacim	GIPSA-LAB, CNRS
Hably, Ahmad	GIPSA-Lab

10:49-10:52 FrA01.20

Global Trajectory Tracking for a Quadrotor through Event-Triggered Control: Synthesis, Simulations, and Experiments, pp. 3852-3857.

ZHU, Xuan-Zhi	Instituto Superior Técnico, Universidade De Lisboa
Casau, Pedro	Instituto Superior Técnico, University of Lisbon
Silvestre, Carlos	Instituo Superior Técnico

10:52-10:55 FrA01.21

Integral Sliding Mode Based Model Reference FTC of an Over-Actuated Hybrid UAV Using Online Control Allocation, pp. 3858-3864.

Prochazka, Karl Frederik	Technische Universität Darmstadt
Stomberg, Gösta	Technische Universität Darmstadt

FrA02 Ballroom 2

RI: Learning (RI Session)

Chair: Leang, Kam K.	University of Utah
Co-Chair: Devasia, Santosh	Univ of Washington

09:30-09:55 FrA02.1

Anticipating the Long-Term Effect of Online Learning in Control, pp. 3865-3872.

Capone, Alexandre	Technical University of Munich
Hirche, Sandra	Technische Universität München

09:55-09:58 FrA02.2

Online, Model-Free Motion Planning in Dynamic Environments: An Intermittent, Finite Horizon Approach with Continuous-Time Q-Learning, pp. 3873-3878.

Kontoudis, George	Virginia Tech
Xu, Zirui	Georgia Institute of Technology
Vamvoudakis, Kyriakos G.	Georgia Inst. of Tech

09:58-10:01 FrA02.3

Transfer Learning for HVAC System Fault Detection, pp. 3879-3885.

Dowling, Chase	University of Washington
Zhang, Baosen	University of Washington

10:01-10:04 FrA02.4

Towards Nominal Stability Certification of Deep Learning-Based Controllers, pp. 3886-3891.

Nguyen, Hoang Hai	Otto-Von-Guericke University Magdeburg
Matschek, Janine	OvG University Magdeburg
Zieger, Tim	Otto-Von-Guericke University Magdeburg
Savchenko, Anton	OvG University Magdeburg
Noroozi, Navid	Otto Von Guericke Universität Magdeburg
Findeisen, Rolf	OVG University Magdeburg

10:04-10:07 FrA02.5

A Data-Driven Model of Human Driver Behavior Using Falsification, pp. 3892-3899.

Sohani, Nauman	University of Michigan
Oh, Geunseob	University of Michigan
WANG, XINPENG	University of Michigan

10:07-10:10 FrA02.6

Automata Guided Semi-Decentralized Multi-Agent Reinforcement Learning, pp. 3900-3905.

Sun, Chuangchuang	Ohio State University
Li, Xiao	Boston University
Belta, Calin	Boston University

10:10-10:13 FrA02.7

Extended Dynamic Mode Decomposition with Learned Koopman Eigenfunctions for Prediction and Control, pp. 3906-3913.

Folkestad, Carl	California Institute of Technology
Pastor, Daniel	California Institute of Technology
Mezic, Igor	University of California, Santa Barbara
Mohr, Ryan	University of California, Santa Barbara
Fonoberova, Maria	AIMDyn, Inc
Burdick, Joel W.	California Inst. of Tech

10:13-10:16 FrA02.8

On Robust Model-Free Reduced-Dimensional Reinforcement Learning Control for Singularly Perturbed Systems, pp. 3914-3919.

Mukherjee, Sayak	North Carolina State University
Bai, He	Oklahoma State University
Chakrabortty, Aranya	North Carolina State University

10:16-10:19 FrA02.9

Zap Q-Learning for Optimal Stopping, pp. 3920-3925.

Chen, Shuhang	University of Florida
Devraj, Adithya M.	University of Florida
Busic, Ana	Inria
Meyn, Sean P.	Univ. of Florida

10:19-10:22 FrA02.10

Regret Analysis for Learning in a Multi-Agent Linear-

Quadratic Control Problem, pp. 3926-3931.

Asghari, Seyed Mohammad	University of Southern California
Gagrani, Mukul	University of Southern California
Nayyar, Ashutosh	University of Southern California

10:22-10:25 FrA02.11

The Driver and the Engineer: Reinforcement Learning and Robust Control, pp. 3932-3939.

Bernat, Natalie	Caltech
Chen, Jiexin	California Institute of Technology
Matni, Nikolai	University of Pennsylvania
Doyle, John C.	Caltech

10:25-10:28 FrA02.12

Accuracy Prevents Robustness in Perception-Based Control, pp. 3940-3946.

Al Makdah, Abed AlRahman	University of California Riverside
Katewa, Vaibhav	University of California Riverside
Pasqualetti, Fabio	University of California, Riverside

10:28-10:31 FrA02.13

Confidence Regions for Simulations with Learned Probabilistic Models, pp. 3947-3952.

Lederer, Armin	Technical University of Munich
Hao, Qing	SAIC Volkswagen Automotive Co., Ltd
Hirche, Sandra	Technische Universität München

10:31-10:34 FrA02.14

Toward Resilient Multi-Agent Actor-Critic Algorithms for Distributed Reinforcement Learning, pp. 3953-3958.

Lin, Yixuan	Stony Brook University
Gade, Shripad	University of Illinois at Urbana Champaign
Sandhu, Romeil	Stony Brook University
Liu, Ji	Stony Brook University

10:34-10:37 FrA02.15

Robustifying Reinforcement Learning Agents Via Action Space Adversarial Training, pp. 3959-3964.

Tan, Kai Liang	Iowa State University
Esfandiari, Yasaman	Iowa State University
Lee, Xian Yeow	Iowa State University
-, Aakanksha	Amity University Uttar Pradesh
Sarkar, Soumik	Iowa State University

10:37-10:40 FrA02.16

Measuring Similarity of Interactive Driving Behaviors Using Matrix Profile, pp. 3965-3970.

Lin, Qin	Carnegie Mellon University
Wang, Wenshuo	Carnegie Mellon University
Zhang, Yihuan	Tongji University
Dolan, John	Carnegie Mellon University

10:40-10:43 FrA02.17

Exchangeable Input Representations for Reinforcement Learning, pp. 3971-3976.

Mern, John	Stanford University
Sadigh, Dorsa	Stanford University
Kochenderfer, Mykel	Stanford University

10:43-10:46 FrA02.18

Iterative Pre-Conditioning to Expedite the Gradient-Descent Method, pp. 3977-3982.

Chakrabarti, Kushal	University of Maryland
Gupta, Nirupam	Georgetown University
Chopra, Nikhil	University of Maryland, College Park

10:46-10:49 FrA02.19

Towards Scalable Koopman Operator Learning: Convergence Rates and a Distributed Learning Algorithm, pp. 3983-3990.

Liu, Zhiyuan	University of Colorado, Boulder
Ding, Guohui	University of Colorado Boulder
Chen, Lijun	University of Colorado at Boulder
Yeung, Enoch	University of California Santa Barbara

10:49-10:52 FrA02.20

Learning Minimum-Energy Controls from Heterogeneous Data, pp. 3991-3996.

Baggio, Giacomo	University of California, Riverside
Pasqualetti, Fabio	University of California, Riverside

10:52-10:55 FrA02.21

Learning and Optimization with Bayesian Hybrid Models, pp. 3997-4002.

Eugene, Elvis	University of Notre Dame
Gao, Xian	University of Notre Dame
Dowling, Alexander	University of Notre Dame

10:55-10:58 FrA02.22

Optimal Control Inspired Q-Learning for Switched Linear Systems, pp. 4003-4010.

Chen, Hua	Southern University of Science and Technology
Zheng, Linfang	Southern University of Science and Technology
Zhang, Wei	Southern University of Science and Technology

FrLuT4 Awards Ceremony and Meetings

FrLuT4 (Special Session)

12:00-13:30 FrLuT4.1

Awards Ceremony, pp. 4011-4011.

Barton, Kira	University of Michigan, Ann Arbor

12:00-13:30 FrLuT4.2

Meeting: Hybrid Systems TC (from 11.30am to 1pm), pp. 4012-4012.

Zamani, Majid	University of Colorado Boulder

12:00-13:30 FrLuT4.3

Meeting: ASME DSCD Energy Systems TC Meeting (from 12Noon to 1pm), pp. 4013-4013.

Moura, Scott	University of California, Berkeley

12:00-13:30 FrLuT4.4

Meeting: TC Power Generation (from 12Noon to 1pm), pp. 4014-4014.

Scruggs, Jeff	University of Michigan

12:00-13:30 FrLuT4.5

Meeting: MARC TC Meeting (from 12Noon to 1pm), pp. 4015-4015.

Garcia, Eloy	Air Force Research Laboratory

FrB01 Governor's SQ 12

Learning IV (Regular Session)

Chair: Li, Jr-Shin — Washington University in St. Louis
Co-Chair: Soroush, Masoud — Drexel University

13:30-13:50 FrB01.1

Availability-Resilient Control of Uncertain Linear Stochastic Networked Control Systems, pp. 4016-4021.

Bhowmick, Chandreyee — Missouri University of Science and Technology
Jagannathan, Sarangapani — Missouri Univ of Science & Tech

13:50-14:10 FrB01.2

Learning from Having Learned: An Environment-Adaptive Parking Space Detection Method, pp. 4022-4027.

Yang, Yi — Beijing Institute of Technology
Jiang, Sitan — Beijing Institute of Technology
Zhang, Lu — The Hong Kong University of Science and Technology
Wang, Jianhang — Beijing Institute of Technology

14:10-14:30 FrB01.3

Learning to Control Neurons Using Aggregated Measurements (I), pp. 4028-4033.

Yu, Yao-Chi — Washington University in St. Louis
Narayanan, Vignesh — Washington University in St. Louis
Ching, ShiNung — Washington University in St. Louis
Li, Jr-Shin — Washington University in St. Louis

14:30-14:50 FrB01.4

Reinforcement Learning for Elimination of Reentrant Spiral Waves in Excitable Media, pp. 4034-4039.

Senter, James — University of Tennessee
Wilson, Dan — University of Tennessee
Sadovnik, Amir — University of Tennessee

14:50-15:10 FrB01.5

Context-Aware Route Recommendation with Weight Learning through Deep Neural Networks, pp. 4040-4045.

Jia, Huiwen — University of Michigan, Ann Arbor
Fang, Jun — Didi Chuxing
Tan, Naiqiang — Didi Chuxing
Liu, Xinyue — Didi Chuxing
Huo, Zengwei — Didi Chuxing
Ma, Nan — Didi Chuxing
Wu, Guobin — Didi Chuxing
Chai, Hua — Didi Chuxing
Qie, Xiaohu — Didi Chuxing
Zhang, Bo — Didi Chuxing
Yin, Yafeng — University of Michigan
Shen, Siqian — University of Michigan

15:10-15:30 FrB01.6

Surrogate Modeling of Dynamics from Sparse Data Using Maximum Entropy Basis Functions, pp. 4046-4051.

Deshpande, Vedang M. — Texas A&M University
Bhattacharya, Raktim — Texas A&M

FrB02 Ballroom F

Advanced Control of Wind Turbines and Farms I (Invited Session)

Chair: van Wingerden, Jan-Willem — Delft University of Technology
Co-Chair: Bay, Christopher — National Renewable Energy Laboratory
Organizer: Doekemeijer, Bart Matthijs — Delft University of Technology
Organizer: Scholbrock, Andrew — National Renewable Energy Laboratory
Organizer: Bay, Christopher — National Renewable Energy Laboratory
Organizer: Fleming, Paul — National Renewable Energy Laboratory
Organizer: van Wingerden, Jan-Willem — Delft University of Technology

13:30-13:50 FrB02.1

Wind Farm Wake-Steering Exploration During Grid Curtailment (I), pp. 4052-4057.

Hoyt, Jordan — University of Minnesota Twin Cities
Seiler, Peter — University of Michigan, Ann Arbor

13:50-14:10 FrB02.2

Distributed Learning for Wind Farm Optimization with Gaussian Processes (I), pp. 4058-4064.

Andersson, Leif Erik — Norwegian University of Science and Technology
Bradford, Eric — Norwegian University of Science and Technology
Imsland, Lars — Norwegian University of Science and Technology

14:10-14:30 FrB02.3

A Distributed Reinforcement Learning Yaw Control Approach for Wind Farm Energy Capture Maximization (I), pp. 4065-4070.

Stanfel, Paul — Colorado School of Mines
Johnson, Kathryn — Colorado School of Mines
Bay, Christopher — National Renewable Energy Laboratory
Annoni, Jennifer — National Renewable Energy Laboratory

14:30-14:50 FrB02.4

Mobile Sensing for Wind Field Estimation in Wind Farms (I), pp. 4071-4076.

Pasley, David — University of Colorado Boulder
Nicotra, Marco M — University of Colorado Boulder
Pao, Lucy Y. — University of Colorado Boulder
King, Jennifer — National Renewable Energy Laboratory
Bay, Christopher — National Renewable Energy Laboratory

14:50-15:10 FrB02.5

Adaptive Fault Accommodation of Pitch Actuator Stuck Type of Fault in Floating Offshore Wind Turbines: A Subspace Predictive Repetitive Control Approach (I), pp. 4077-4082.

Liu, Yichao — Delft University of Technology
Frederik, Joeri Alexis — TU Delft
Fontanella, Alessandro — Politecnico Di Milano
Ferrari, Riccardo M.G. — Delft University of Technology
van Wingerden, Jan-Willem — Delft University of Technology

15:10-15:30 FrB02.6

Signed-Distance Fuzzy Logic Controller Adaptation Mechanism Based MRAS Observer for Direct-Drive PMSG Wind Turbines Sensorless Control, pp. 4083-4089.

BENZAOUIA, Soufyane	LGEM - Université Mohamed Premier - Oujda / MIS - Université De
rabhi, abdelhamid	MIS
ZOUGGAR, Smail	University Mohammed First Oujda

FrB03 Governor's SQ 15

Smart Mobility Systems (Invited Session)

Chair: Su, Rong	Nanyang Technological University
Co-Chair: Rastgoftar, Hossein	University of Michigan Ann Arbor
Organizer: Su, Rong	Nanyang Technological University
Organizer: Malikopoulos, Andreas A.	University of Delaware

13:30-13:50 FrB03.1

Decentralized Optimal Merging Control for Connected and Automated Vehicles with Optimal Dynamic Resequencing (I), pp. 4090-4095.

Xiao, Wei	Boston University
Cassandras, Christos G.	Boston University

13:50-14:10 FrB03.2

A Dynamic Optimization Model for Bus Schedule Design to Mitigate the Passenger Waiting Time by Dispatching the Bus Platoon (I), pp. 4096-4101.

Zhang, Yi	Nanyang Technological University
Su, Rong	Nanyang Technological University
Zhang, Yicheng	Nanyang Technological University

14:10-14:30 FrB03.3

Secure Traffic Networks in Smart Cities: Analysis and Design of Cyber-Attack Detection Algorithms (I), pp. 4102-4107.

Roy, Tanushree	University of Colorado, Denver
Dey, Satadru	University of Colorado Denver

14:30-14:50 FrB03.4

A Dynamical Game Approach for Integrated Stabilization and Path Tracking for Autonomous Vehicles (I), pp. 4108-4113.

Hashemi, Ehsan	University of Waterloo
He, Xingkang	KTH Royal Institute of Technology
Johansson, Karl H.	Royal Institute of Technology

14:50-15:10 FrB03.5

Optimal Traffic Control for Roads with Mixed Autonomous and Human-Driven Vehicles, pp. 4114-4119.

Mohajerpoor, Reza	CSIRO
cai, Chen	Data61, CSIRO

15:10-15:30 FrB03.6

Resilient Physics-Based Traffic Congestion Control, pp. 4120-4125.

Rastgoftar, Hossein	University of Michigan Ann Arbor
Girard, Anouck	University of Michigan, Ann Arbor

FrB04 Governor's SQ 14

Energy Management in Vehicle Systems (Invited Session)

Chair: Pangborn, Herschel	University of Illinois at Urbana-Champaign
Co-Chair: Jain, Neera	Purdue University
Organizer: Pangborn, Herschel	Pennsylvania State University
Organizer: Koeln, Justin	University of Texas at Dallas
Organizer: Jain, Neera	Purdue University
Organizer: Lin, Xinfan	University of California, Davis

13:30-13:50 FrB04.1

Hierarchical MPC with Coordinating Terminal Costs (I), pp. 4126-4133.

Raghuraman, Vignesh	The University of Texas at Dallas
Renganathan, Venkatraman	University of Texas at Dallas
Summers, Tyler H.	University of Texas at Dallas
Koeln, Justin	University of Texas at Dallas

13:50-14:10 FrB04.2

Optimal Exploration and Charging for an Autonomous UnderwaterVehicle with Energy-Harvesting Kite (I), pp. 4134-4139.

Reed, James	North Carolina State University
Daniels, Joshua	North Carolina State University
Siddiqui, Ayaz	North Carolina State University
Cobb, Mitchell	North Carolina State University
Vermillion, Christopher	North Carolina State University

14:10-14:30 FrB04.3

Model Predictive Control for Dynamic Load Scheduling in Small Power Systems (I), pp. 4140-4146.

Sinsley, Gregory L.	United States Naval Academy
Opila, Daniel F.	United States Naval Academy

14:30-14:50 FrB04.4

Hierarchical Hybrid MPC for Management of Distributed Phase Change Thermal Energy Storage (I), pp. 4147-4153.

Pangborn, Herschel	Pennsylvania State University
Laird, Cary	University of Illinois at Urbana-Champaign
Alleyne, Andrew G.	Univ of Illinois, Urbana-Champaign

14:50-15:10 FrB04.5

Experimental Model and Controller Validation for a Series Hybrid Unmanned Aerial Vehicle (I), pp. 4154-4160.

Aksland, Christopher	University of Illinois at Urbana-Champaign
Alleyne, Andrew G.	Univ of Illinois, Urbana-Champaign

15:10-15:30 FrB04.6

Optimal Control of Energy Flow between Electrified Auxiliaries and Powertrain in Hybrid-Electric Heavy-Duty Vehicles, pp. 4161-4168.

Dellermann, Matthias	Daimler Truck AG
Gehring, Ottmar	Daimler AG
Zirn, Oliver	Esslingen University of Applied Sciences

FrB05 Plaza Court 6

Aerospace Systems I (Regular Session)

Chair: Taheri, Ehsan	Auburn University
Co-Chair: Ergöçmen, Burak	Middle East Technical University

13:30-13:50 FrB05.1

Active Hybrid Fault Tolerant Flight Control of an UAV under Control Surface Damage, pp. 4169-4174.

Ergöçmen, Burak	Middle East Technical University
Yavrucuk, İlkay	Middle East Technical University

13:50-14:10 FrB05.2

State-Dependent LQR Control for a Tilt-Rotor UAV, pp. 4175-4181.

Willis, Jacob — Brigham Young University
Johnson, Jacob Collin — Brigham Young University
Beard, Randal W. — Brigham Young Univ

14:10-14:30 FrB05.3

Entry Trajectory Optimization for Mars Science Laboratory Class Missions Using Indirect Uniform Trigonometrization Method, pp. 4182-4187.

Mall, Kshitij — Auburn University
Taheri, Ehsan — Auburn University

14:30-14:50 FrB05.4

Longitudinal Short-Period Aircraft Motion Control under Loadcase Variation, pp. 4188-4194.

Gossmann, Felix — University of the German Federal Armed Forces Munich
Gabrys, Agnes — Frau
Svaricek, Ferdinand — Univ. of German Armed Forces Munich

14:50-15:10 FrB05.5

Orbital Uncertainty Propagation with PC-Kriging, pp. 4195-4200.

Jia, Bin — Intelligent Fusion Technology
Xin, Ming — University of Missouri

15:10-15:30 FrB05.6

Numerical Solver for LQR Problems for Large-Scale Inter-Connected Systems Using Ritz Method and Laguerre Functions, pp. 4201-4206.

Radmanesh, Reza — University of Michigan
Kumar, Manish — University of Cincinnati
Nemati, Alireza — University of Toledo
French, Donald — University of Cincinnati

FrB06 Ballroom DE

Energy Systems I (Regular Session)

Chair: Scruggs, Jeff — University of Michigan
Co-Chair: CAI, JIE — University of Oklahoma

13:30-13:50 FrB06.1

Distributed Adaptive Control of Air Handling Units for Interconnected Building Zones, pp. 4207-4212.

Lymperopoulos, Georgios — University of Southern California
Papadopoullos, Panayiotis — University of Cyprus
Ioannou, Petros A. — Univ. of Southern California
Polycarpou, Marios M. — University of Cyprus

13:50-14:10 FrB06.2

An Autonomous MPC Scheme for Energy-Efficient Control of Building HVAC Systems, pp. 4213-4218.

Zeng, Tingting — University of Florida
Barooah, Prabir — Univ. of Florida

14:10-14:30 FrB06.3

Predictive Control of Building Thermal Loads for Participation in Energy and Regulation Markets, pp. 4219-4224.

CAI, JIE — University of Oklahoma
Zhang, Hao — University of Oklahoma

14:30-14:50 FrB06.4

Optimized Control of PCM-Based Storage Integrated in Building Air-Distribution Systems, pp. 4225-4230.

Jiang, Zhimin — The University of Oklahoma
CAI, JIE — University of Oklahoma
Zhang, Hao — University of Oklahoma

14:50-15:10 FrB06.5

A Dynamic Strategy for Cyber-Attack Detection in Large-Scale Power Systems Via Output Clustering, pp. 4231-4236.

Jevtic, Ana — Massachusetts Institute of Technology
Ilic, Marija — Massachusetts Inst. of Tech

15:10-15:30 FrB06.6

Robust Control of Wave Energy Converters Using Unstructured Uncertainty, pp. 4237-4244.

Lao, Yejun — University of Michigan
Scruggs, Jeff — University of Michigan

FrB07 Plaza Court 7

Biosystems I (Regular Session)

Chair: Gyorgy, Andras — New York University Abu Dhabi
Co-Chair: Yeung, Enoch — University of California Santa Barbara

13:30-13:50 FrB07.1

Steady State Programming of Controlled Nonlinear Systems Via Deep Dynamic Mode Decomposition, pp. 4245-4251.

Hasnain, Aqib — University of California, Santa Barbara
Boddupalli, Nibodh — University of California Santa Barbara
Balakrishnan, Shara — University of California Santa Barbara
Yeung, Enoch — University of California Santa Barbara

13:50-14:10 FrB07.2

Robust Optimal Scheduling of Combined Chemo and Immunotherapy: Considerations on Chemotherapy Detrimental Effects, pp. 4252-4257.

Moussa, Kaouther — Univ. Grenoble Alpes, CNRS, Grenoble INP, GIPSA-Lab
Fiacchini, Mirko — CNRS, Univ. Grenoble Alpes
Alamir, Mazen — CNRS / University of Grenoble

14:10-14:30 FrB07.3

Oxygen Ratio Control in Critical Care Ventilation Using Compressed Oxygen and Blower Gas Sources, pp. 4258-4263.

Borrello, Michael A. — Philips Healthcare

14:30-14:50 FrB07.4

Scarcity of Cellular Resources Decreases the Robustness of Toggle Switches to Noise, pp. 4264-4269.

Gyorgy, Andras — New York University Abu Dhabi

14:50-15:10 FrB07.5

Noise Suppression by Stochastic Delays in Negatively Autoregulated Gene Expression, pp. 4270-4275.

Smith, Madeline — University of Delaware
Singh, Abhyudai — University of Delaware

15:10-15:30 FrB07.6

Trade-Offs in Robustness to Perturbations of Bacterial Population Controllers, pp. 4276-4282.

McBride, Cameron	Massachusetts Institute of Technology
Del Vecchio, Domitilla	Massachusetts Institute of Technology

FrB08 Governor's SQ 10

Mechatronic Systems (Regular Session)

Chair: Ren, Juan	Iowa State University
Co-Chair: Heertjes, Marcel	Eindhoven University of Technology

13:30-13:50 FrB08.1

Low-Cost DC Motor System for Teaching Automatic Controls, pp. 4283-4288.

Cook, Michael	Milwaukee School of Engineering
Bonniwell, Jennifer	Milwaukee School of Engineering
Rodriguez, Luis	Milwaukee School of Engineering
Williams, Daniel	Milwaukee School of Engineering
Pribbernow, Jacob	Kohler Company

13:50-14:10 FrB08.2

A Voltage Control Paradigm for Economic Brushless DC Motor Control, pp. 4289-4294.

White, Warren N.	Kansas State Univ
Patterson, Eric	University
Uzzaman, Nahid	Kansas State University

14:10-14:30 FrB08.3

Homotopy Continuation for Feedback Linearization of Noncontact Magnetic Manipulators, pp. 4295-4300.

Riahi, Nayereh	Southern Illinois University
Tituaña, Luis R	Southern Illinois University
Komaee, Arash	Southern Illinois University

14:30-14:50 FrB08.4

Towards Improving the Performance of the RNN-Based Inversion Model in Output Tracking Control, pp. 4301-4306.

Xie, Shengwen	Iowa State University
Ren, Juan	Iowa State University

14:50-15:10 FrB08.5

Experimental Demonstration of a Nonlinear PID-Based Control Design Using Multiple Hybrid Integrator-Gain Elements, pp. 4307-4312.

van den Eijnden, Sebastiaan	Eindhoven University of Technology
Heertjes, Marcel	Eindhoven University of Technology
Nijmeijer, Hendrik	Eindhoven University of Technology

15:10-15:30 FrB08.6

Observer Based Sliding Mode Control: Equivalence with Classical Frequency Domain Control, pp. 4313-4318.

Sira-Ramirez, Hebertt	CINVESTAV
Zurita-Bustamante, Eric William	Cinvestav
Aguilar-Orduña, Mario Andres	CINVESTAV

FrB09 Governor's SQ 16

Control Applications II (Regular Session)

Chair: Chen, Xudong	University of Colorado, Boulder
Co-Chair: Kwon, Joseph	Texas A&M University

13:30-13:50 FrB09.1

Fuel-Balanced Formation Flight Control of Underactuated Satellites, pp. 4319-4324.

Dearing, Thomas	University of Colorado Boulder
Petersen, Christopher	Air Force Research Laboratory
Nicotra, Marco M	University of Colorado Boulder
Chen, Xudong	University of Colorado, Boulder

13:50-14:10 FrB09.2

A Frequency Domain Analysis of Compressible Linearized Navier-Stokes Equations in a Hypersonic Compression Ramp Flow, pp. 4325-4330.

Dwivedi, Anubhav	University of Minnesota, Twin Cities
Candler, Graham V.	University of Minnesota, Twin Cities
Jovanovic, Mihailo R.	University of Southern California

14:10-14:30 FrB09.3

Modeling of CsPbBr3 Perovskite Quantum Dots for Equilibrium-Based Crystal Size Control, pp. 4331-4336.

Sitapure, Niranjan	Texas A&M University
Qiao, Tian	Texas A&M University
Son, Dong Hee	Texas A&M University
Kwon, Joseph	Texas A&M University

14:30-14:50 FrB09.4

Open Loop Safe Trajectory Design for Cislunar NRHO Rendezvous, pp. 4337-4342.

Innocenti, Mario	University of Pisa
Bucchioni, Giordana	University of Pisa

14:50-15:10 FrB09.5

Multiscale Modeling and Control of Fiber Length in Pulp Digester, pp. 4343-4348.

Choi, Hyun-Kyu	Texas A&M University
Kwon, Joseph	Texas A&M University

FrB10 Governor's SQ 11

Modeling and Control for Human-Robot Interaction (Invited Session)

Chair: Ersal, Tulga	University of Michigan
Co-Chair: Wang, Yue	Clemson University
Organizer: Jain, Neera	Purdue University
Organizer: Wang, Yue	Clemson University

13:30-13:50 FrB10.1

Experimental Evaluation of Human Motion Prediction Toward Safe and Efficient Human Robot Collaboration (I), pp. 4349-4354.

ZHAO, WEIYE	Carnegie Mellon University
Sun, Liting	University of California, Berkeley
Liu, Changliu	Carnegie Mellon University
Tomizuka, Masayoshi	Univ of California, Berkeley

13:50-14:10 FrB10.2

Autonomous Driving Using Safe Reinforcement Learning by Incorporating a Regret-Based Human Lane-Changing Decision Model (I), pp. 4355-4361.

Chen, Dong	Michigan State University

Jiang, Longsheng	Clemson University
Wang, Yue	Clemson University
Li, Zhaojian	Michigan State University

14:10-14:30 FrB10.3

Efficient Behavior-Aware Control of Automated Vehicles at Crosswalks Using Minimal Information Pedestrian Prediction Model (I), pp. 4362-4368.

Jayaraman, Suresh Kumaar	University of Michigan
Robert Jr., Lionel	University of Michigan
Yang, Xi Jessie	University of Michigan
Pradhan, Anuj	University of Massachusetts
Tilbury, Dawn M.	University of Michigan

14:30-14:50 FrB10.4

Design and Human-In-The-Loop Evaluation of a Workload-Adaptive Haptic Shared Control Framework for Semi-Autonomous Driving (I), pp. 4369-4374.

Weng, Yifan	University of Michigan
Luo, Ruikun	University of MIchigan
Jayakumar, Paramsothy	U.S. Army RDECOM-TARDEC
Brudnak, Mark	TARDEC
Paul, Victor	U.S. Army Ground Vehicle Systems Center
Desaraju, Vishnu	Carnegie Mellon University
Stein, Jeffrey L.	Univ. of Michigan
Yang, Xi Jessie	University of Michigan
Ersal, Tulga	University of Michigan

14:50-15:10 FrB10.5

Subgoal Learning Via Operator Command Quantification for Human-Machine Shared Control Task Modeling, pp. 4375-4380.

Jin, Zongyao	Texas A&M University
Pagilla, Prabhakar R.	Texas A&M University

15:10-15:30 FrB10.6

Online Threshold Tracking in Cyber-Physical-Human Systems Based on Binary Observations, pp. 4381-4386.

Sun, Jieming	Florida State University
Li, Lichun	FAMU-FSU College of Engineering

FrB11 Director's Row I

Networked Systems III (Regular Session)

Chair: Shim, Hyungbo	Seoul National University
Co-Chair: Touri, Behrouz	University of California San Diego

13:30-13:50 FrB11.1

Resilient Vector Consensus in Multi-Agent Networks Using Centerpoints, pp. 4387-4392.

Shabbir, Mudassir	Information Technology University
Li, Jiani	Vanderbilt University
Abbas, Waseem	Vanderbilt University
Koutsoukos, Xenofon	Vanderbilt University

13:50-14:10 FrB11.2

State Estimation of Networked Control Systems Corrupted by Unknown Input and Output Sparse Errors, pp. 4393-4398.

Zhang, Mukai	Purdue University
Alenezi, Badriah	Purdue University
Hui, Stefen	San Diego State University
Zak, Stanislaw H.	Purdue Univ

14:10-14:30 FrB11.3

Byzantine-Resilient Distributed Optimization of Multi-Dimensional Functions (I), pp. 4399-4404.

Kuwaranancharoen, Kananart	Purdue University
Xin, Lei	Purdue University
Sundaram, Shreyas	Purdue University

14:30-14:50 FrB11.4

Weighted Averaged Behavior of Synchronization among Heterogeneous Agents in a Sampled-Data Setting, pp. 4405-4410.

NAM, JIYEON	ASRI, Seoul National University
Kim, Taekyoo	ASRI, Seoul National University
Park, Gyunghoon	Korea Institute of Science and Technology
Shim, Hyungbo	Seoul National University

14:50-15:10 FrB11.5

A New Event-Triggering Approach for Scheduling Guidance Data Transmissions in Networked Control Systemsy, pp. 4411-4416.

Ristevski, Stefan	University of South Florida
Dogan, Kadriye Merve	University of South Florida
Yucelen, Tansel	University of South Florida
Muse, Jonathan	Wright Patterson Air Force Base

15:10-15:30 FrB11.6

On Ergodicity of Time-Varying Distributed Averaging Dynamics, pp. 4417-4422.

Aghajan, Adel	University of California San Diego
Touri, Behrouz	University of California San Diego

FrB12 Director's Row E

Filtering (Regular Session)

Chair: Lee, Taeyoung	George Washington University
Co-Chair: Kassarian, Ervan	ISAE-Supaero

13:30-13:50 FrB12.1

Error Bounds and Guidelines for Privacy Calibration in Differentially Private Kalman Filtering, pp. 4423-4428.

Yazdani, Kasra	University of Florida
Hale, Matthew	University of Florida

13:50-14:10 FrB12.2

Matrix Fisher-Gaussian Distribution on SO(3) X R^n for Attitude Estimation with a Gyro Bias, pp. 4429-4434.

Wang, Weixin	George Washington University
Lee, Taeyoung	George Washington University

14:10-14:30 FrB12.3

Optimal Measurement Projections with Adaptive Mixture Kalman Filtering for GNSS Positioning, pp. 4435-4441.

Greiff, Marcus Carl	Lund University
Berntorp, Karl	Mitsubishi Electric Research Labs

14:30-14:50 FrB12.4

Adaptive Learning Kalman Filter with Gaussian Process, pp. 4442-4447.

Lee, Taeyoung	George Washington University

14:50-15:10 FrB12.5

Lunar Terrain Relative Navigation Using a Convolutional Neural Network for Visual Crater Detection, pp. 4448-4453.

Downes, Lena	Massachusetts Institute of Technology
Steiner, Ted	Draper
How, Jonathan, P.	MIT

15:10-15:30 FrB12.6

Convergent EKF-Based Control Allocation: General Formulation and Application to a Control Moment Gyro Cluster, pp. 4454-4459.

Kassarian, Ervan	ISAE-Supaero
Rognant, Mathieu	ONERA
Evain, Hélène	CNES
Alazard, Daniel	ISAE-SUPAERO
Chauffaut, Corentin	ISAE Research Center

FrB13 Plaza Court 1

Uncertain Systems II (Regular Session)

Chair: Halder, Abhishek	University of California, Santa Cruz
Co-Chair: Martinez, Sonia	University of California at San Diego

13:30-13:50 FrB13.1

Nonlinear Model Reduction Based on Stochastic Obsevability, pp. 4460-4465.

Kawamura, Taijiro	Tokyo Institute of Technology
Yamakita, Masaki	Tokyo Inst. of Tech

13:50-14:10 FrB13.2

The Convex Geometry of Integrator Reach Sets, pp. 4466-4471.

Haddad, Shadi	University of California, Santa Cruz
Halder, Abhishek	University of California, Santa Cruz

14:10-14:30 FrB13.3

Robust LQR for Uncertain Discrete-Time Systems Using Polynomial Chaos, pp. 4472-4477.

Tadiparthi, Vaishnav	Texas A&M University
Bhattacharya, Raktim	Texas A&M

14:30-14:50 FrB13.4

A Convex Optimization Approach to Improving Suboptimal Hyperparameters of Sliced Normal Distributions, pp. 4478-4483.

Colbert, Brendon	Arizona State University
Crespo, Luis G	NASA
Peet, Matthew M.	Arizona State University

14:50-15:10 FrB13.5

Non-Bayesian Social Learning with Gaussian Uncertain Models, pp. 4484-4490.

Hare, James	Army Research Laboratory
Uribe, Cesar	Massachusetts Institute of Technology
Kaplan, Lance	Army Research Laboratory
Jadbabaie, Ali	MIT

15:10-15:30 FrB13.6

Data-Driven Ambiguity Sets for Linear Systems under Disturbances and Noisy Observations, pp. 4491-4496.

Boskos, Dimitris	UCSD
Cortes, Jorge	University of California, San Diego
Martinez, Sonia	University of California at San Diego

FrB14 Plaza Court 8

Control and Estimation in Flow Systems (Invited Session)

Chair: Tang, Shuxia	Texas Tech University
Co-Chair: Zhang, Liguo	Beijing University of Technology
Organizer: Tang, Shuxia	Texas Tech University
Organizer: Diagne, Mamadou	Rensselaer Polytechnic Institute

13:30-13:50 FrB14.1

Distributed Consensus-Based Boundary Observers for Freeway Traffic Estimation with Sensor Networks (I), pp. 4497-4502.

Zhang, Liguo	Beijing University of Technology
Lu, Yusheng	Beijing University of Technology

13:50-14:10 FrB14.2

Robust State Estimation for a Class of Hyperbolic Systems with Boundary Sensor Uncertain Parameter (I), pp. 4503-4508.

Xu, Xiaodong	University of Texas at Austin
Yin, Xunyuan	University of Alberta
Yuan, Yuan	University of Alberta
Dubljevic, Stevan	University of Alberta

14:10-14:30 FrB14.3

Adaptive Control of Reaction-Advection-Diffusion PDEs with Distributed Actuation and Unknown Input Delay (I), pp. 4509-4514.

Wang, Shanshan	Donghua University
Diagne, Mamadou	Rensselaer Polytechnic Institute
Qi, Jie	Donghua University

14:30-14:50 FrB14.4

Regulator Design for a Congested Continuum Traffic Model with App-Routing Instability (I), pp. 4515-4520.

Chen, Stephen	University of California, San Diego
Yu, Huan	University of California San Diego
Krstic, Miroslav	University of California, San Diego

14:50-15:10 FrB14.5

Linear Model Predictive Control for a Cascade ODE-PDE System, pp. 4521-4526.

Khatibi, Seyedhamidreza	University of Alberta
Ozorio Cassol, Guilherme	University of Alberta
Dubljevic, Stevan	University of Alberta

15:10-15:30 FrB14.6

Investigating the Underlying Dynamical Structure of Supersonic Flows Using Effective Model Reduction (I), pp. 4527-4532.

Wilson, Dan	University of Tennessee
Sahyoun, Samir	University of Tennessee
Kreth, Phil	University of Tennessee Space Institute
Djouadi, Seddik, M.	University of Tennessee

FrB15 Plaza Court 5

Nonlinear Systems Identification (Regular Session)

Chair: Taha, Ahmad	The University of Texas at San Antonio
Co-Chair: Kwon, Joseph	Texas A&M University

13:30-13:50 FrB15.1

Application of Koopman Operator for Model-Based Control of Fracture Propagation, pp. 4533-4538.

Narasingam, Abhinav — Texas A&M University
Kwon, Joseph — Texas A&M University

13:50-14:10 FrB15.2

Persistence of Excitation in Uniformly Embedded Reproducing Kernel Hilbert (RKH) Spaces, pp. 4539-4544.

Guo, Jia — Virginia Tech
Paruchuri, Sai Tej — Virginia Tech
Kurdila, Andrew J. — Virginia Tech

14:10-14:30 FrB15.3

Fast Identification of Koopman-Invariant Subspaces: Parallel Symmetric Subspace Decomposition, pp. 4545-4550.

Haseli, Masih — University of California, San Diego
Cortes, Jorge — University of California, San Diego

14:30-14:50 FrB15.4

Data-Driven Operator Theoretic Methods for Global Phase Space Learning, pp. 4551-4557.

Nandanoori, Sai Pushpak — Pacific Northwest National Laboratory
Sinha, Subhrajit — Pacific Northwest National Laboratory
Yeung, Enoch — University of California Santa Barbara

14:50-15:10 FrB15.5

New Insights on One-Sided Lipschitz and Quadratically Inner-Bounded Nonlinear Dynamic Systems, pp. 4558-4563.

Nugroho, Sebastian Adi — The University of Texas at San Antonio
Hoang, Vu — The University of Texas at San Antonio
Radosz, Maria — The University of Texas at San Antonio
Wang, Shen — The University of Texas at San Antonio
Taha, Ahmad — The University of Texas at San Antonio

FrB16 — Governor's SQ 17

Distributed Control II (Regular Session)

Chair: Liu, Fengjiao — Yale University
Co-Chair: Casavola, Alessandro — Universita' Della Calabria

13:30-13:50 FrB16.1

Turn-Based Command Governor Strategies for Interconnected Dynamical Systems with Time-Varying Couplings, pp. 4564-4569.

Tedesco, Francesco — Università Della Calabria
Casavola, Alessandro — Universita' Della Calabria

13:50-14:10 FrB16.2

Distributed H∞ Mean-Square Finite-Time Control for Large-Scale Systems under Gossip Communication Protocol, pp. 4570-4575.

Yu, Tao — University of Science and Technology of China
Xiong, Junlin — University of Science and Technology of China

14:10-14:30 FrB16.3

Distributed Control of Linear Multi-Channel Systems: Summary of Results, pp. 4576-4581.

Wang, Lili — Yale University
Fullmer, Daniel — Yale University
Liu, Fengjiao — Yale University
Morse, A. Stephen — Yale Univ

14:30-14:50 FrB16.4

Instant Distributed Model Predictive Control for Constrained Linear Systems, pp. 4582-4587.

Figura, Martin — University of Notre Dame
Su, Lanlan — University of Leicester
Gupta, Vijay — University of Notre Dame
Inoue, Masaki — Keio University

14:50-15:10 FrB16.5

First Order Methods for Globally Optimal Distributed Controllers Beyond Quadratic Invariance, pp. 4588-4593.

Furieri, Luca — ETH Zurich
Kamgarpour, Maryam — Swiss Federal Institute of Technology

15:10-15:30 FrB16.6

On the Gap between System Level Synthesis and Structured Controller Design: The Case of Relative Feedback, pp. 4594-4599.

Jensen, Emily — University of California, Santa Barbara
Bamieh, Bassam — Univ. of California at Santa Barbara

FrB17 — Director's Row J

Linear Systems I (Regular Session)

Chair: Lawrence, Douglas A. — Ohio Univ
Co-Chair: Choi, Chiu H. — Univ. of North Florida

13:30-13:50 FrB17.1

A Geometric Approach to Ensemble Control Analysis and Design, pp. 4600-4605.

Miao, Wei — Washington University in St. Louis
Li, Jr-Shin — Washington University in St. Louis

13:50-14:10 FrB17.2

Evaluation of Backward Differentiation Methods for Computing Controllability Gramians, pp. 4606-4611.

Choi, Chiu H. — Univ. of North Florida

14:10-14:30 FrB17.3

Continuous-Time Signal Temporal Logic Planning with Control Barrier Functions, pp. 4612-4618.

Yang, Guang — Boston University
Belta, Calin — Boston University
Tron, Roberto — Boston University

14:30-14:50 FrB17.4

Frequency Response Analysis of Parametric Resonance and Vibrational Stabilization, pp. 4619-4624.

Chikmagalur, Karthik — University of California Santa Barbara
Bamieh, Bassam — Univ. of California at Santa Barbara

14:50-15:10 FrB17.5

Stability Analysis of Linear Impulsive Systems Using Lie-Algebraic Methods, pp. 4625-4631.

Lawrence, Douglas A. — Ohio Univ

FrB18 — Plaza Court 4

Game Theory I (Regular Session)

Chair: Vamvoudakis, Kyriakos G. — Georgia Inst. of Tech

Co-Chair: Brown, Philip N. — University of Colorado, Colorado Springs

13:30-13:50 — FrB18.1

When Showing Your Hand Pays Off: Announcing Strategic Intentions in Colonel Blotto Games, pp. 4632-4637.

Chandan, Rahul — University of California, Santa Barbara

Paarporn, Keith — University of California, Santa Barbara

Marden, Jason R. — University of California, Santa Barbara

13:50-14:10 — FrB18.2

Exploiting an Adversary's Intentions in Graphical Coordination Games, pp. 4638-4643.

Collins, Brandon — University of Colorado Colorado Springs

Brown, Philip N. — University of Colorado, Colorado Springs

14:10-14:30 — FrB18.3

Passive Fault-Tolerant Estimation under Strategic Adversarial Bias, pp. 4644-4651.

Sarıtaş, Serkan — KTH Royal Institute of Technology

Dán, György — KTH - Royal Institute of Technology

Sandberg, Henrik — KTH Royal Institute of Technology

14:30-14:50 — FrB18.4

Beating Humans in a Penny-Matching Game by Leveraging Cognitive Hierarchy Theory and Bayesian Learning, pp. 4652-4657.

Tian, Ran — University of Michigan

Li, Nan — University of Michigan

Kolmanovsky, Ilya V. — The University of Michigan

Girard, Anouck — University of Michigan, Ann Arbor

14:50-15:10 — FrB18.5

Constrained Differential Games for Secure Decision-Making against Stealthy Attacks, pp. 4658-4663.

Fotiadis, Filippos — Georgia Institute of Technology

Kanellopoulos, Aris — Georgia Institute of Technology

Vamvoudakis, Kyriakos G. — Georgia Inst. of Tech

15:10-15:30 — FrB18.6

Games on Networks with Community Structure: Existence, Uniqueness and Stability of Equilibria, pp. 4664-4670.

Jin, Kun — University of Michigan, Ann Arbor

Khalili, Mohammad mahdi — University of Michigan, Ann Arbor

Liu, Mingyan — University of Michigan

FrB19 — Plaza Court 3

Optimization (Regular Session)

Chair: Dadras, Sara — Ford Motor Company

Co-Chair: Pequito, Sergio — Rensselaer Polytechnic Institute

13:30-13:50 — FrB19.1

Actuator Placement for Heterogeneous Complex Dynamical Networks with Long-Term Memory, pp. 4671-4676.

Kyriakis, Panagiotis — University of Southern California

Pequito, Sergio — Rensselaer Polytechnic Institute

Bogdan, Paul — University of Southern California

13:50-14:10 — FrB19.2

Implicit Trajectory Planning for Feedback Linearizable Systems: A Time-Varying Optimization Approach, pp. 4677-4682.

Zheng, Tianqi — Johns Hopkins University

Simpson-Porco, John W. — University of Waterloo

Mallada, Enrique — Johns Hopkins University

14:10-14:30 — FrB19.3

LQR Via First Order Flows, pp. 4683-4688.

Bu, Jingjing — University of Washington

Mesbahi, Afshin — University of Washington

Mesbahi, Mehran — University of Washington

14:30-14:50 — FrB19.4

Gradient-Consensus Method for Distributed Optimization in Directed Multi-Agent Networks, pp. 4689-4694.

Khatana, Vivek — University of Minnesota, Twin-Cities

Saraswat, Govind — Univseristy of Minnesota, Minneapolis

Patel, Sourav — University of Minnesota

Salapaka, Murti V. — University of Minnesota, Minneapolis

14:50-15:10 — FrB19.5

Light Energy Saving Method of Lighting System Based on MISO FO Newton-Based ES, pp. 4695-4700.

Yin, Chun — University of Electronic Science and Technology of China

Dadras, Sara — Ford Motor Company

Cheng, Yuhua — University of Electronic Science and Technology of China

Huang, Xuegang — Aerodynamics Institute, China Aerodynamics Research and Developm

Chen, Kai — School of Automation Engineering, University of Electronic Scien

Dadras, Soodeh — Utah State University

15:10-15:30 — FrB19.6

On the Optimal Interdiction of Transportation Networks, pp. 4701-4706.

Zhang, Tianyun — Syracuse University

Fardad, Makan — Syracuse University

FrB20 — Plaza Court 2

Formal Verification I (Regular Session)

Chair: Ozay, Necmiye — Univ. of Michigan

Co-Chair: Jeannin, Jean-Baptiste — University of Michigan

13:30-13:50 — FrB20.1

Efficient Automata-Based Planning and Control under Spatio-Temporal Logic Specifications, pp. 4707-4714.

Lindemann, Lars — Royal Institute of Technology, KTH
Dimarogonas, Dimos V. — KTH Royal Institute of Technology

13:50-14:10 FrB20.2

Scalable Zonotope-Ellipsoid Conversions Using the Euclidean Zonotope Norm, pp. 4715-4721.

Gaßmann, Victor — Technische Universität München
Althoff, Matthias — Technische Universität München

14:10-14:30 FrB20.3

Scalable Computation of Controlled Invariant Sets for Discrete-Time Linear Systems with Input Delays, pp. 4722-4728.

Liu, Zexiang — University of Michigan
Yang, Liren — University of Michigan
Ozay, Necmiye — Univ. of Michigan

14:30-14:50 FrB20.4

Formal Verification of Swerving Maneuvers for Car Collision Avoidance, pp. 4729-4736.

Abhishek, Aakash — University of Michigan, Ann Arbor
Sood, Harry — University of Michigan
Jeannin, Jean-Baptiste — University of Michigan

14:50-15:10 FrB20.5

Parameter Sensitivity Analysis of Controlled Invariant Sets Via Value Iteration, pp. 4737-4744.

Yang, Liren — University of Michigan
Rizzo, Denise — US Army CCDC Ground Vehicle System Center (GVSC)
Castanier, Matthew — US Army Tank Automotive Research, Development, and Engineering C
Ozay, Necmiye — Univ. of Michigan

15:10-15:30 FrB20.6

Differentially Private Controller Synthesis with Metric Temporal Logic Specifications, pp. 4745-4750.

Xu, Zhe — University of Texas, Austin
Yazdani, Kasra — University of Florida
Hale, Matthew — University of Florida
Topcu, Ufuk — The University of Texas at Austin

FrB21 Director's Row H

Learning and Control: Opportunities and Challenges (Tutorial Session)

Chair: Vidyasagar, Mathukumalli — Indian Institute of Technology Hyderabad
Co-Chair: Touri, Behrouz — University of California San Diego
Organizer: Vidyasagar, Mathukumalli — Indian Institute of Technology Hyderabad
Organizer: Touri, Behrouz — University of California San Diego

13:30-13:31 FrB21.1

*Introduction To: Learning and Control: Opportunities and Challenges (I)**.

Vidyasagar, Mathukumalli — Indian Institute of Technology Hyderabad
Touri, Behrouz — University of California San Diego

13:31-14:10 FrB21.2

Mathematical Foundations of Deep and Reinforcement Learning (I), pp. 4751-4756.

Vidyasagar, Mathukumalli — Indian Institute of Technology Hyderabad

14:10-14:50 FrB21.3

*Safety and Robustness in Deep Learning Using Semidefinite Programming (I)**.

Pappas, George J. — University of Pennsylvania
Morari, Manfred — University of Pennsylvania

14:50-15:30 FrB21.4

Cognitive Cyber-Physical Systems: Cognitive Neuroscience, Machine Learning, and Control (I), pp. 4757-4758.

Khargonekar, Pramod — Univ. of California, Irvine

FrBT3 Meetings

FrBT3 (Special Session)

13:30-15:30 FrBT3.1

NSF Program Manager Office Hours: Dr. Robert Landers (Friday), pp. 4759-4760.

Landers, Robert G. — Missouri University of Science and Technology

13:30-15:30 FrBT3.2

NSF Program Manager Office Hours: Dr. Eduardo Misawa (Friday), pp. 4761-4762.

Misawa, Eduardo — National Science Foundation

FrLBP-P01 Ballroom ABC

Poster-FrP (Late Breaking Poster Session)

15:30-16:00 FrLBP-P01.1

Generic Controller Development for Distributed Aerodynamic Control Devices on Large Wind Turbine Blades, pp. 4763-4763.

Abbas, Nikhar — University of Colorado Boulder
Feil, Roland — National Renewable Energy Laboratory
Pao, Lucy Y. — University of Colorado Boulder

15:30-16:00 FrLBP-P01.2

A Derivative-Free Optimization Method with Application to Functions with Exploding and Vanishing Gradients, pp. 4764-4764.

Al-Abri, Said — Georgia Institute of Technology
Lin, Tony — Georgia Institute of Technology
Tao, Molei — Georgia Institute of Technology
Zhang, Fumin — Georgia Institute of Technology

15:30-16:00 FrLBP-P01.3

Proportional Power Sharing Control of Distributed Generators in Microgirds, pp. 4765-4765.

Aalipour, Farzad — University of Central Florida
Das, Tuhin — University of Central Florida

15:30-16:00 FrLBP-P01.4

Spacecraft Trajectory Control Using Higher-Order State Transition Tensors, pp. 4766-4766.

Boone, Spencer — University of Colorado Boulder
McMahon, Jay — University of Colorado

15:30-16:00 FrLBP-P01.5

Sliding Mode Control of an Ionic Polymer-Metal Composite (IPMC) Actuator, pp. 4767-4767.

Lapins, Chantel K. — University of Utah

Nagel, William — University of Utah
Leang, Kam K. — University of Utah

15:30-16:00 — FrLBP-P01.6

Learning Passive Linear Models of Nonlinear Systems from Data, pp. 4768-4768.

Sivaranjani, S — University of Notre Dame
Agarwal, Etika — General Electric Research
Gupta, Vijay — University of Notre Dame

15:30-16:00 — FrLBP-P01.7

Macroscopic Network Circulation for Planar Graphs, pp. 4769-4769.

Askarzadeh, Zahra — University of California, Irvine
Ariaei, Fariba — University of Southern California
Georgiou, Tryphon T. — University of California, Irvine
Chen, Yongxin — Georgia Institute of Technology

FrLBP-P02 — ACC Sponsors
Meeting Space-FrP

15:30-16:00 — FrLBP-P02.1

Gold Sponsor: General Motors, pp. 4770-4770.

Eckman, Wendy — General Motors

15:30-16:00 — FrLBP-P02.2

Gold Sponsor: Mathworks, pp. 4771-4771.

Rose, Jennifer — MathWorks
Ulusoy, Melda — Mathworks

15:30-16:00 — FrLBP-P02.3

Gold Sponsor: Mitsubishi Electric Research Lab (MERL), pp. 4772-4772.

Thornton, Jay — Mitsubishi Electric Research Lab
Di Cairano, Stefano — Mitsubishi Electric Research Lab

15:30-16:00 — FrLBP-P02.4

Silver Sponsor: Quanser, pp. 4773-4773.

Rahaman, Josie — Quanser Consulting
Wang, Gemma — Quanser

15:30-16:00 — FrLBP-P02.5

Silver Sponsor: SIAM, pp. 4774-4774.

O'Neill, Kristin — SIAM

15:30-16:00 — FrLBP-P02.6

Silver Sponsor: Cancelled, pp. 4775-4775.

Kelly, Claire — Wiley

15:30-16:00 — FrLBP-P02.7

Silver Sponsor: DSPACE, pp. 4776-4776.

Johnson, Janice — DSpace

15:30-16:00 — FrLBP-P02.8

Silver Sponsor: Springer Nature, pp. 4777-4777.

Tominich, Christopher — Springer
Jackson, Oliver — Springer

15:30-16:00 — FrLBP-P02.9

Bronze Sponsor: Processes, pp. 4778-4778.

Xiang, Wency — Processes MDPI

15:30-16:00 — FrLBP-P02.10

Bronze Sponsor: Halliburton, pp. 4779-4779.

Darbe, Robert — Halliburton

FrC01 — Governor's SQ 12
Iterative Learning Control (Regular Session)

Chair: Alleyne, Andrew G. — Univ of Illinois, Urbana-Champaign
Co-Chair: Vamvoudakis, Kyriakos G. — Georgia Inst. of Tech

16:00-16:20 — FrC01.1

Constrained Crane Load Transferring and Lowering under Uncalm Sea Conditions Using Adaptive Iterative Learning Control, pp. 4780-4785.

Jin, Xu — University of Kentucky

16:20-16:40 — FrC01.2

Continuous-Time Safe Learning with Temporal Logic Constraints in Adversarial Environments, pp. 4786-4791.

Sun, Chuangchuang — Massachusetts Institute of Technology
Vamvoudakis, Kyriakos G. — Georgia Inst. of Tech

16:40-17:00 — FrC01.3

A Flexible-Time Iterative Learning Control Framework for Linear, Time-Based Performance Objectives, pp. 4792-4797.

Wu, Maxwell — University of Michigan
Cobb, Mitchell — North Carolina State University
Vermillion, Christopher — North Carolina State University
Barton, Kira — University of Michigan, Ann Arbor

17:00-17:20 — FrC01.4

Random Search for Learning the Linear Quadratic Regulator, pp. 4798-4803.

Mohammadi, Hesameddin — University of Southern California
Soltanolkotabi, Mahdi — USC
Jovanovic, Mihailo R. — University of Southern California

17:20-17:40 — FrC01.5

Iterative Learning Control for Robot Manipulators with Non-Repetitive Reference Trajectory, Iteration Varying Trial Lengths, and Asymmetric Output Constraints, pp. 4804-4809.

Jin, Xu — University of Kentucky

17:40-18:00 — FrC01.6

An Improved Iterative Learning Control for Uncertain Multi-Axis Systems, pp. 4810-4816.

Armstrong, Ashley — University of Illinois at Urbana-Champaign
Alleyne, Andrew G. — Univ of Illinois, Urbana-Champaign

FrC02 — Ballroom F
Advanced Control of Wind Turbines and Farms II (Invited Session)

Chair: Bottasso, Carlo Luigi — Technical University of Munich
Co-Chair: Doekemeijer, Bart Matthijs — Delft University of Technology
Organizer: Doekemeijer, Bart Matthijs — Delft University of Technology
Organizer: Scholbrock, Andrew — National Renewable Energy Laboratory
Organizer: Bay, Christopher — National Renewable Energy Laboratory
Organizer: Fleming, Paul — National Renewable Energy Laboratory

Organizer: van Wingerden, Jan-Willem	Delft University of Technology

16:00-16:20 FrC02.1

Wake Deflection Control with Wind Direction Changes: Wind Tunnel Comparison of Different Wind Farm Flow Models (I), pp. 4817-4823.

Campagnolo, Filippo	Technische Universitaet Muenchen
Bottasso, Carlo Luigi	Technical University of Munich
Schreiber, Johannes	Wind Energy Institute, Technical University of München

16:20-16:40 FrC02.2

Stochastic Dynamic Programming for Wind Farm Power Maximization (I), pp. 4824-4829.

Guo, Yi	University of Texas at Dallas
Rotea, Mario	University of Texas at Dallas
Summers, Tyler H.	University of Texas at Dallas

16:40-17:00 FrC02.3

Real-Time Energy Market Arbitrage Via Aerodynamic Energy Storage in Wind Farms (I), pp. 4830-4835.

Shapiro, Carl	Johns Hopkins University
Ji, Chengda	Johns Hopkins University
Gayme, Dennice	The Johns Hopkins University

17:00-17:20 FrC02.4

Resilient Autonomous Wind Farms (I), pp. 4836-4842.

Barker, Aaron	National Renewable Energy Laboratory
Annoni, Jennifer	National Renewable Energy Laboratory
Anderson, Benjamin	National Renewable Energy Laboratory

17:20-17:40 FrC02.5

Distributed Control of Wind Farm Power Set Points to Minimise Fatigue Loads (I), pp. 4843-4848.

Stock, Adam	University of Strathclyde
Cole, Matthew	University of Strathclyde
Leithead, William	University of Strathclyde
Amos, Lindsey	University of Strathclyde

FrC03 Governor's SQ 15

Safety and Security of Vehicle Systems (Invited Session)

Chair: Chen, Yan	Arizona State University
Co-Chair: Tomáš, Haniš	Czech Technical University in Prague, Faculty of Electrical Engineering
Organizer: Dadras, Soodeh	Utah State University
Organizer: Ahmed, Qadeer	The Ohio State University
Organizer: Hall, Carrie	Illinois Institute of Technology

16:00-16:20 FrC03.1

A Two-Layer Predictive Emergency Steering and Escape Assistant (I), pp. 4849-4855.

Adelberger, Daniel	Johannes Kepler University Linz
Del Re, Luigi	Johannes Kepler University Linz

16:20-16:40 FrC03.2

Adaptive Nonlinear Model Predictive Control for Collision Imminent Steering with Uncertain Coefficient of Friction (I), pp. 4856-4861.

Wurts, John	University of Michigan
Dallas, James	University of Michigan
Stein, Jeffrey L.	Univ. of Michigan
Ersal, Tulga	University of Michigan

16:40-17:00 FrC03.3

Shared Steering Control of Tire Blowout for Ground Vehicles (I), pp. 4862-4867.

Li, Ao	Arizona State University
Chen, Yan	Arizona State University
Lin, Wen-Chiao	General Motors Company
Du, Xinyu	General Motors Global R&D

17:00-17:20 FrC03.4

Effect of Roll Motion Control on Vehicle Lateral Stability and Rollover Avoidance, pp. 4868-4874.

Chokor, Abbas	Université De Technologie De Compiègne
Talj, Reine	Heudiasyc, UTC
Doumiati, Moustapha	Université De Technologie De Compiègne
Charara, Ali	Umr Cnrs 6599

17:20-17:40 FrC03.5

Driving Envelope Definition and Envelope Protection Using Model Predictive Control, pp. 4875-4880.

Efremov, Denis	Czech Technical University in Prague, Faculty of Electrical Engi
Klauco, Martin	Slovak University of Technology in Bratislava
Tomáš, Haniš	Czech Technical University in Prague, Faculty of Electrical Engi
Hromcik, Martin	Czech Technical University, FEE

17:40-18:00 FrC03.6

A Robust Energy and Emissions Conscious Cruise Controller for Connected Vehicles with Privacy Considerations (I), pp. 4881-4886.

Huang, Chunan	University of Michigan, Ann Arbor
Zhang, Xueru	University of Michigan - Ann Arbor
Salehi, Rasoul	University of Michigan
Ersal, Tulga	University of Michigan
Stefanopoulou, Anna G.	University of Michigan

FrC04 Governor's SQ 14

Engine and Powertrain Control (Invited Session)

Chair: Ossareh, Hamid	University of Vermont
Co-Chair: Salehi, Rasoul	University of Michigan
Organizer: Chen, Pingen	Tennessee Technological University
Organizer: Hall, Carrie	Illinois Institute of Technology
Organizer: Ossareh, Hamid	University of Vermont
Organizer: Salehi, Rasoul	University of Michigan

16:00-16:20 FrC04.1

Improvement of Variable Cam Timing Multirate Control Via Optimal Output Filtering (I), pp. 4887-4892.

Sumer, Dogan	Ford Motor Company
Wang, Yan	Ford Research and Advanced Engineerintg, Ford Motor Company
Filev, Dimitre P.	Ford Motor Company

16:20-16:40 FrC04.2

Multi-Objective Stochastic Bayesian Optimization for Iterative Engine Calibration (I), pp. 4893-4898.

Pal, Anuj	Michigan State University
Zhu, Ling	Ford Motor Company
Wang, Yan	Ford Research and Advanced Engineerintg, Ford Motor Company
Zhu, Guoming	Michigan State University

16:40-17:00 FrC04.3

Term-By-Term Observer Design Method to Estimate NH3 Storage in SCR Catalyst (I), pp. 4899-4904.

Jain, Kaushal Kamal	Purdue University
Hiremath, Jagdish	Cummins Inc
Meckl, Peter H.	Purdue Univ

17:00-17:20 FrC04.4

Design and Evaluation of EV Drivetrain Clunk and Shuffle Management Control System (I), pp. 4905-4912.

Ravichandran, Maruthi	Ford Motor Company
Doering, Jeff	Ford Motor Company
Johri, Rajit	Ford Motor Company
Ruybal, Kevin	Ford Motor Company

17:20-17:40 FrC04.5

*Adaptive Control Method of Clutch Torque During Clutch Slip Engagement**.

Park, Jinrak	Korea Advanced Institute of Science and Technology
Choi, Seibum Ben	KAIST

17:40-18:00 FrC04.6

Hierarchical Optimization of Speed and Gearshift Control for Battery Electric Vehicles Using Preview Information, pp. 4913-4919.

Han, Kyoungseok	University of Michigan
Li, Nan	University of Michigan
Kolmanovsky, Ilya V.	The University of Michigan
Girard, Anouck	University of Michigan, Ann Arbor
Wang, Yan	Ford Research and Advanced Engineerintg, Ford Motor Company
Filev, Dimitre P.	Ford Motor Company
Dai, Edward	Ford Motor Company

FrC05 Plaza Court 6

Aerospace Systems II (Regular Session)

Chair: Di Cairano, Stefano	Mitsubishi Electric Research Labs
Co-Chair: Hoagg, Jesse B.	University of Kentucky

16:00-16:20 FrC05.1

Fail-Safe Rendezvous Control on Elliptic Orbits Using Reachable Sets, pp. 4920-4925.

Aguilar Marsillach, Daniel	University of Colorado
Di Cairano, Stefano	Mitsubishi Electric Research Labs
Weiss, Avishai	Mitsubishi Electric Research Labs

16:20-16:40 FrC05.2

Unmanned Aerial Vehicle Angular Velocity Control Via Reinforcement Learning in Dimension Reduced Search Spaces, pp. 4926-4931.

Li, Qiang	University of Central Florida
Xu, Yunjun	University of Central Florida

16:40-17:00 FrC05.3

Small-Satellite Attitude Control Using Continuous but Only Piecewise-Continuously Differentiable Sinusoidal Controls, pp. 4932-4937.

Chavan, Roshan A.	University of Kentucky
Seigler, Thomas M.	University of Kentucky
Hoagg, Jesse B.	University of Kentucky

17:00-17:20 FrC05.4

Spacecraft Relative Motion Planning Using Chained Chance-Constrained Admissible Sets, pp. 4938-4944.

Berning, Andrew	The University of Michigan
Li, Nan	University of Michigan
Girard, Anouck	University of Michigan, Ann Arbor
Leve, Frederick	AFOSR
Petersen, Christopher	Air Force Research Laboratory
Kolmanovsky, Ilya V.	The University of Michigan

17:20-17:40 FrC05.5

Control Allocation Consensus among Onboard Actuators with a Directed/Undirected Graph Topology, pp. 4945-4950.

Mark, August	University of Central Florida
Xu, Yunjun	University of Central Florida
Dickinson, Benjamin	US Air Force Research Laboratory

17:40-18:00 FrC05.6

Relative-Position Formation Control of Satellites Using Electromagnetic Actuation with Piecewise-Sinusoidal Controls, pp. 4951-4956.

Abbasi, Zahra	University of Kentucky
Sunny, Ajin	University of Kentucky
Hoagg, Jesse B.	University of Kentucky
Seigler, Thomas M.	University of Kentucky

FrC06 Ballroom DE

Energy Systems II (Regular Session)

Chair: Lin, Xianke	University of Ontario Institute of Technology
Co-Chair: Schoenwald, David A.	Sandia National Lab

16:00-16:20 FrC06.1

A Data-Driven Power Consumption Model for Electric UAVs, pp. 4957-4962.

She, Xu Ting Pamela	University of Ontario Institute of Technology
Lin, Xianke	University of Ontario Institute of Technology
Lang, Haoxiang	University of Ontario Institute of Technology

16:20-16:40 FrC06.2

An Optimal Control Approach to Nudging Via Default Setting in the Context of Indoor Thermal Comfort, pp. 4963-4968.

Cheng, Yijie	University of Illinois at Urbana-Champaign
Langbort, Cedric	Univ of Illinois, Urbana-Champaign

16:40-17:00 FrC06.3

A Hybrid Control Framework for Large-Scale Battery Integration to the Power System for Stability Analysis, pp.

4969-4974.

A.Biroon, Roghieh	Clemson University
Pisu, Pierluigi	Clemson University
Schoenwald, David A.	Sandia National Lab

17:00-17:20 FrC06.4

On-Board Supercapacitors Cooperative Charging Algorithm: Stability Analysis and Weight Optimization, pp. 4975-4980.

Luo, Xiaoyu	Shanghai Jiao Tong University
He, Jianping	Shanghai Jiao Tong University
Zhu, Shanying	Shanghai Jiao Tong University

17:20-17:40 FrC06.5

An Influence Model Approach to Failure Cascade Prediction in Large Scale Power Systems, pp. 4981-4988.

Wu, Xinyu	Massachusetts Institute of Technology
Wu, Dan	MIT
Modiano, Eytan	MIT

17:40-18:00 FrC06.6

Real-Time Nonlinear Model Predictive Control for Microgrid Operation, pp. 4989-4995.

Nurkanović, Armin	Siemens AG
Mesanovic, Amer	Siemens AG, Munich; Otto-Von-Guericke University Magdeburg,
Zanelli, Andrea	University of Freiburg
Frison, Gianluca	University of Freiburg
Frey, Jonathan	University of Freiburg
Albrecht, Sebastian	Siemens AG
Diehl, Moritz	University of Freiburg

FrC07 Plaza Court 7

Biosystems II (Regular Session)

Chair: Abramovitch, Daniel Y.	Agilent Technologies
Co-Chair: Hui, Qing	University of Nebraska-Lincoln

16:00-16:20 FrC07.1

Fractional-Order Model Predictive Control for Neurophysiological Cyber-Physical Systems: A Case Study Using Transcranial Magnetic Stimulation (I), pp. 4996-5001.

Romero, Orlando	Rensselaer Polytechnic Institute
Chatterjee, Sarthak	Rensselaer Polytechnic Institute
Pequito, Sergio	Rensselaer Polytechnic Institute

16:20-16:40 FrC07.2

Genomic Decoy Sites Enhance the Oscillatory Regime of a Biomolecular Clock, pp. 5002-5007.

Dey, Supravat	Department of Electrical and Computer Engineering, University O
Singh, Abhyudai	University of Delaware

16:40-17:00 FrC07.3

Improved Peak Detection for Mass Spectrometry Via Augmented Dominant Peak Removal, pp. 5008-5015.

Abramovitch, Daniel Y.	Agilent Technologies

17:00-17:20 FrC07.4

A Coupled Spring Forced Bat Searching Algorithm: Design, Analysis and Evaluation, pp. 5016-5021.

Zhang, Haopeng	University of Louisville
Hui, Qing	University of Nebraska-Lincoln

17:20-17:40 FrC07.5

Optimal Trajectory Tracking for Population Dynamics with Input Constraints in Chemostat Reactor Applications, pp. 5022-5027.

Kurth, Anna-Carina	Institute for System Dynamics, University of Stuttgart
Schmidt, Kevin	University of Stuttgart
Sawodny, Oliver	University of Stuttgart

17:40-18:00 FrC07.6

Derivation of a Dynamic Model for Palmitate-Induced NFκB Signaling Pathway through Systems Biology Approach, pp. 5028-5033.

Lee, Dongheon	Texas A&M University
Ding, Yufang	Texas A&M University
Jayaraman, Arul	Texas A&M University
Kwon, Joseph	Texas A&M University

FrC08 Governor's SQ 10

Mechanical Systems (Regular Session)

Chair: Al Janaideh, Mohammad	Memorial University
Co-Chair: Caverly, Ryan James	University of Minnesota

16:00-16:20 FrC08.1

Fault Detection in Flexible Beams Based on Output Only Measurements, pp. 5034-5039.

Khalil, Abdelrahman	Memorial University of Newfoundland
Aljanaideh, Khaled	Jordan University of Science and Technolgoy
Rideout, Donald Geoffrey	Memorial University of Newfoundland
Al Janaideh, Mohammad	Memorial University

16:20-16:40 FrC08.2

Stabilizing Mass Matrix Determination for Underactuated Mechanical Systems through Algebraic Means, pp. 5040-5045.

White, Warren N.	Kansas State Univ
Lare, Constance, A	Kansas State University

16:40-17:00 FrC08.3

Noncolocated Passivity-Based Control of a 2 DOF Tower Crane with a Flexible Hoist Cable, pp. 5046-5051.

Shen, Ping-Yen	University of Minnesota - Twin Cities
Caverly, Ryan James	University of Minnesota

17:00-17:20 FrC08.4

Free Energy Principle Based State and Input Observer Design for Linear Systems with Colored Noise, pp. 5052-5058.

Anil Meera, Ajith	TU Delft
Wisse, Martijn	Tu Delft

17:20-17:40 FrC08.5

Fast Non-Singular Terminal Sliding Controller for Magnetic Levitation Systems: A Disturbance-Observer Scheme, pp. 5059-5064.

Goel, Ankur	Al Musanna College of Technology
Fekih, Afef	University of Louisiana at Lafayette
Mobayen, Saleh	University of Zanjan

17:40-18:00 FrC08.6

On-Line Path Planning and Visual Tracking of Fast-Moving Objects by Robot Manipulators with High-Speed Camera Arrays, pp. 5065-5070.

Hsiao, Tesheng — National Chiao Tung University
Cheng, Ching-Hungc — National Chiao Tung University

FrC09 Govenor's SQ 16

Control Applications III (Regular Session)

Chair: Liu, Ji — Stony Brook University
Co-Chair: Shastri, Subramanian — University of San Diego

16:00-16:20 FrC09.1

Extremum Seeking for Minimization of Beam Loss in the LANSCE Linear Accelerator by Tuning RF Cavities, pp. 5071-5075.

Scheinker, Alexander — Los Alamos National Lab
Naffziger, Peter — Los Alamos National Laboratory
Garcia, Antonio — Los Alamos National Laboratory

16:20-16:40 FrC09.2

Fractional Order Derivatives in Systems Theory, pp. 5076-5081.

Shastri, Subramanian — University of San Diego
Narendra, Kumpati S. — Yale Univ

16:40-17:00 FrC09.3

Accelerated ADMM Based Trajectory Optimization for Legged Locomotion with Coupled Rigid Body Dynamics, pp. 5082-5089.

Zhou, Ziyi — Georgia Institute of Technology
Zhao, Ye — Georgia Tech

17:00-17:20 FrC09.4

Security Risk Analysis of the Shorter-Queue Routing Policy for Two Symmetric Servers, pp. 5090-5095.

Tang, Yu — New York University
Wen, Yining — New York University
Jin, Li — New York University

17:20-17:40 FrC09.5

An Interactive Control Approach to 3D Shape Reconstruction, pp. 5096-5101.

Islam, Bipul — Stony Brook University
Liu, Ji — Stony Brook University
Yezzi, Anthony — Georgia Institute of Technology
Sandhu, Romeil — Stony Brook University

FrC10 Governor's SQ 11

Energy-Aware Robotics (Invited Session)

Chair: Vermillion, Christopher — North Carolina State University
Co-Chair: Gregg, Robert D. — University of Michigan
Organizer: Vermillion, Christopher — North Carolina State University
Organizer: Gregg, Robert D. — University of Michigan
Organizer: Rouse, Elliott — University of Michigan
Organizer: Mazumdar, Anirban — Georgia Institute of Technology

16:00-16:20 FrC10.1

Waypoint Optimization Using Bayesian Optimization: A Case Study in Airborne Wind Energy Systems (I), pp. 5102-5107.

Baheri, Ali — West Virginia University
Vermillion, Christopher — North Carolina State University

16:20-16:40 FrC10.2

Control for Optimal Energy Regeneration from Autorotation in UAVs (I), pp. 5108-5113.

Richter, Hanz — Cleveland State University

16:40-17:00 FrC10.3

Real-Time Power Optimization of a Bi-Modal Rolling-Flying Vehicle Via Extremum Seeking Control (I), pp. 5114-5118.

Atay, Stefan — North Carolina State University
Bryant, Matthew — North Carolina State University
Buckner, Gregory — North Carolina State University

17:00-17:20 FrC10.4

Robust Energy-Optimal Path Following Control for Autonomous Underwater Vehicles in Ocean Currents (I), pp. 5119-5124.

Yang, Niankai — University of Michigan
Chang, Dongsik — University of Michigan
Johnson-Roberson, Matthew — University of Michigan
Sun, Jing — University of Michigan

17:20-17:40 FrC10.5

Serious Sailing: Time-Optimal Control of Sailing Drones in Stochastic, Spatiotemporally Varying Wind Fields (I), pp. 5125-5130.

Shepherd, Blake — North Carolina State University
Haydon, Benjamin — North Carolina State University
Vermillion, Christopher — North Carolina State University

17:40-18:00 FrC10.6

Adaptive Compliance Shaping with Human Impedance Estimation (I), pp. 5131-5138.

Huang, Huang — Univeristy of Texas at Austin
Cappel, Henry — University of Texas at Austin
Thomas, Gray — University of Michigan
He, Binghan — The University of Texas at Austin
Sentis, Luis — The University of Texas at Austin

FrC12 Director's Row E

Identification (Regular Session)

Chair: Andersson, Sean B. — Boston University
Co-Chair: Tanaka, Takashi — University of Texas at Austin

16:00-16:20 FrC12.1

Hankel-Based Unsupervised Anomaly Detection, pp. 5139-5144.

Bekiroglu, Korkut — State University of New York - Polytechnic Institute
Tekeoglu, Ali — University of New Brunswick & Canadian Institute for Cybersecuri
Andriamanalimanana, Bruno — State University of New York Polytechnic Institute
Sengupta, Sam — SUNY Polytechnic Institute
Chiang, Chen-Fu — State University of New York Polytechnic Institute
Novillo, Jorge — SUNY Polytechnic Institute

16:20-16:40 FrC12.2

Closed-Loop Parameter Identification of Linear Dynamical Systems through the Lens of Feedback Channel Coding Theory, pp. 5145-5150.

Pedram, Ali Reza — University of Texas at Austin
Tanaka, Takashi — University of Texas at Austin

16:40-17:00 FrC12.3

A Time-Varying Approach to Single Particle Tracking with a Nonlinear Observation Model, pp. 5151-5156.

Godoy, Boris I. — Boston University
Lin, Ye — Boston University
Andersson, Sean B. — Boston University

17:00-17:20 FrC12.4

Linear System Identification under Multiplicative Noise from Multiple Trajectory Data, pp. 5157-5162.

Xing, Yu — Academy of Mathematics and Systems Science, Chinese Academy of S
Gravell, Benjamin — The University of Texas at Dallas
He, Xingkang — KTH Royal Institute of Technology
Johansson, Karl H. — Royal Institute of Technology
Summers, Tyler H. — University of Texas at Dallas

17:20-17:40 FrC12.5

Identifiability of a Series of Discrete Process Cycles Based on Multirate Data, pp. 5163-5168.

Lee, Cheol — University of Michigan-Dearborn

17:40-18:00 FrC12.6

A Loewner Matrix Based Convex Optimization Approach to Finding Low Rank Mixed Time/Frequency Domain Interpolants, pp. 5169-5174.

Singh, Rajiv — The MathWorks
Sznaier, Mario — Northeastern University

FrC13 — Plaza Court 1

Lyapunov Methods (Regular Session)

Chair: De Castro, Ricardo — German Aerospace Center (DLR)
Co-Chair: Duenas, Victor H — Syracuse University

16:00-16:20 FrC13.1

Lyapunov-Like Conditions for Tight Exit Probability Bounds through Comparison Theorems for SDEs, pp. 5175-5181.

Nilsson, Petter — California Institute of Technology
Ames, Aaron D. — California Institute of Technology

16:20-16:40 FrC13.2

Model Free Nonlinear Control with Finite-Time Estimation Applied to Closed-Loop Electrical Stimulation Induced Cycling, pp. 5182-5187.

Chang, Chen-Hao — Syracuse University
Duenas, Victor H — Syracuse University
Sanyal, Amit — Syracuse University

16:40-17:00 FrC13.3

Finite-Time Stability of Discrete Autonomous Systems, pp. 5188-5193.

Haddad, Wassim M. — Georgia Inst. of Tech
Lee, Junsoo — Georgia Institute of Technology

17:00-17:20 FrC13.4

Optimization Based Planner–Tracker Design for Safety Guarantees, pp. 5194-5200.

Yin, He — University of California, Berkeley
Bujarbaruah, Monimoy — UC Berkeley
Arcak, Murat — University of California, Berkeley
Packard, Andrew K. — Univ. of California at Berkeley

17:20-17:40 FrC13.5

Pyrheliometer Control Design for the Solar Energy Research Facility at Valparaiso University, pp. 5201-5206.

Nudehi, Shahin — Valparaiso University
krenzke, Peter — Valparaiso University
Venstrom, Luke — Valparaiso University

FrC14 — Plaza Court 8

Sensor Fusion (Regular Session)

Chair: Spall, James C. — Johns Hopkins Univ
Co-Chair: Batista, Pedro — Instituto Superior Técnico / University of Lisbon

16:00-16:20 FrC14.1

Optimal Periodic Multi-Agent Persistent Monitoring of a Finite Set of Targets with Uncertain States, pp. 5207-5212.

Pinto, Samuel C. — Boston University
Andersson, Sean B. — Boston University
Hendrickx, Julien M. — UCLouvain
Cassandras, Christos G. — Boston University

16:20-16:40 FrC14.2

Multilevel Data Integration with Application in Sensor Networks, pp. 5213-5218.

Wang, Long — Johns Hopkins University
Spall, James C. — Johns Hopkins Univ

16:40-17:00 FrC14.3

Sensor Fusion for Quadrotor Autonomous Navigation, pp. 5219-5224.

Alejandro, Gómez-Casasola — Cinvestav
Rodríguez-Cortés, Hugo — CINVESTAV-IPN

17:00-17:20 FrC14.4

Decentralized Navigation Systems for Bearing-Based Position and Velocity Estimation in Tiered Formations, pp. 5225-5230.

Santos, David — Instituto Superior Técnico / University of Lisbon
Batista, Pedro — Instituto Superior Técnico / University of Lisbon

17:20-17:40 FrC14.5

Development of a Swimming Robot for Pipeline Leak Detection, pp. 5231-5236.

Ge, Ziyun — Zhejiang University
zhang, shuo — University of Alberta
Xie, Junyao — University of Alberta
Tang, Zhiyuan — Zhejiang University
Dubljevic, Stevan — University of Alberta

17:40-18:00 FrC14.6

Navigation and Source Localization Based on Single Pseudo-Ranges, pp. 5237-5242.

Batista, Pedro — Instituto Superior Técnico / University of Lisbon

FrC15 — Plaza Court 5

Nonholonomic Systems (Regular Session)

Chair: Nersesov, Sergey — Villanova University
Co-Chair: Wang, Yebin — Mitsubishi Electric Research Labs

16:00-16:20 FrC15.1

Improving Path Accuracy for Autonomous Parking Systems: An Optimal Control Approach, pp. 5243-5249.

Hansen, Emma Victoria — University of Washington
Wang, Yebin — Mitsubishi Electric Research Labs

16:20-16:40 FrC15.2

Piecewise-Linear Path Following for a Unicycle Using Transverse Feedback Linearization, pp. 5250-5255.

D'Souza, Rollen S. — University of Waterloo
Nielsen, Christopher — University of Waterloo

16:40-17:00 FrC15.3

Path Tracking for the Dissipative Chaplygin Sleigh, pp. 5256-5261.

Fedonyuk, Vitaliy — Clemson University
Tallapragada, Phanindra — Clemson University

17:00-17:20 FrC15.4

A Novel Strategy for Stabilization Control of a Planar Three-Link Underactuated Manipulator with a Passive First Joint, pp. 5262-5268.

CHU, Xiangyu — The Chinese University of Hong Kong
Lo, Chun Ho, David — The Chinese University of Hong Kong
Au, Kwok Wai Samuel — CUHK

17:20-17:40 FrC15.5

A Unified Approach to Stabilization, Trajectory Tracking, and Distributed Control of Planar Underactuated Vehicles, pp. 5269-5274.

Wang, Bo — Villanova University
Nersesov, Sergey — Villanova University
Ashrafiuon, Hashem — Villanova University

17:40-18:00 FrC15.6

A Switched Systems Approach to Unknown Environment Exploration with Intermittent State Feedback for Nonholonomic Systems, pp. 5275-5280.

Sun, Runhan — University of Florida
Bell, Zachary I. — University of Florida
Zegers, Federico — University of Florida
Dixon, Warren E. — University of Florida

FrC16 — Governor's SQ 17

Distributed Control III (Regular Session)

Chair: Shoukry, Yasser — University of California, Irvine
Co-Chair: Anderson, James — California Institute of Technology

16:00-16:20 FrC16.1

Controller Synthesis Subject to Logical and Structural Constraints: A Satisfiability Modulo Theories (SMT) Approach, pp. 5281-5286.

Bahavarnia, MirSaleh — University of Maryland, College Park
Shoukry, Yasser — University of California, Irvine
Martins, Nuno C. — University of Maryland

16:20-16:40 FrC16.2

Deployment Architectures for Cyber-Physical Control Systems, pp. 5287-5294.

Tseng, Shih-Hao — California Institute of Technology
Anderson, James — Columbia University

16:40-17:00 FrC16.3

A Backstepping Approach to System Level Synthesis for Spatially-Invariant Systems, pp. 5295-5300.

Jensen, Emily — University of California, Santa Barbara
Bamieh, Bassam — Univ. of California at Santa Barbara

17:00-17:20 FrC16.4

Complex Pattern Generation of Swarm Robotics Using Spatial-Temporal Logic and Density Feedback Control, pp. 5301-5306.

Zheng, Tongjia — University of Notre Dame
Liu, Zhiyu — University of Notre Dame
Lin, Hai — University of Notre Dame

17:20-17:40 FrC16.5

Distributed and Collision-Free Coverage Control of a Team of Mobile Sensors Using the Convex Uncertainty Voronoi Diagram, pp. 5307-5313.

Chen, Jun — Temple University
Dames, Philip — Temple University

17:40-18:00 FrC16.6

Distributed Feedback Controllers for Stable Cooperative Locomotion of Quadrupedal Robots: A Virtual Constraint Approach, pp. 5314-5321.

Akbari Hamed, Kaveh — Virginia Tech
kamidi, vinay — Virginia Tech
Pandala, Abhishek — Virginia Polytechnic Institute and State University
Ma, Wenlong — California Institute of Technogy
Ames, Aaron D. — California Institute of Technology

FrC17 — Director's Row J

Linear Systems II (Regular Session)

Chair: Goel, Ankit — University of Michigan
Co-Chair: Coogan, Samuel — Georgia Institute of Technology

16:00-16:20 FrC17.1

Lyapunov Differential Equation Hierarchy and Polynomial Lyapunov Functions for Switched Linear Systems, pp. 5322-5327.

Abate, Matthew — Georgia Institute of Technology
Klett, Corbin — Georgia Institute of Technology
Coogan, Samuel — Georgia Institute of Technology
Feron, Eric — King Abdullah University of Science and Technology

16:20-16:40 FrC17.2

A Unified Approach to State Space Realization, pp. 5328-5333.

Verriest, Erik I. — Georgia Inst. of Tech

16:40-17:00 FrC17.3

Optimal State Estimation under the Denial-Of-Service Attack: An Operator Approach, pp. 5334-5339.

Naghnaeian, Mohammad — Clemson University
Xuan, Yu — Clemson University

17:00-17:20 FrC17.4

Adaptive Control of MIMO Systems Using Sparsely Parameterized Controllers, pp. 5340-5345.

Goel, Ankit	University of Michigan
Islam, Syed Aseem Ul	University of Michigan
Bernstein, Dennis S.	Univ. of Michigan

17:20-17:40 FrC17.5

Selective Tracking Using Linear Trackability Analysis and Inversion-Based Tracking Control, pp. 5346-5351.

Kadam, Sujay	IIT Gandhinagar
Rao, Aishwarya	IIT Gandhinagar
Prusty, Biswajit Kumar	National Institute of Technology Rourkela, Odisha
Palanthandalam-Madapusi, Harish J.	Indian Institute of Technology Gandhinagar

17:40-18:00 FrC17.6

Robust Approximate Simulation for Hierarchical Control of Linear Systems under Disturbances, pp. 5352-5357.

Kurtz, Vincent	University of Notre Dame
Wensing, Patrick	University of Notre Dame
Lin, Hai	University of Notre Dame

FrC18 Plaza Court 4

Game Theory II (Regular Session)

Chair: Xu, Hao	University of Nevada, Reno
Co-Chair: Brown, Philip N.	University of Colorado, Colorado Springs

16:00-16:20 FrC18.1

Local First-Order Algorithms for Constrained Nonlinear Dynamic Games, pp. 5358-5363.

Di, Bolei	University of Minnesota
Lamperski, Andrew	University of Minnesota

16:20-16:40 FrC18.2

Stackelberg Equilibria for Two-Player Network Routing Games on Parallel Networks, pp. 5364-5369.

Grimsman, David	UC Santa Barbara
Hespanha, Joao P.	Univ. of California, Santa Barbara
Marden, Jason R.	University of California, Santa Barbara

16:40-17:00 FrC18.3

Carrots or Sticks? the Effectiveness of Subsidies and Tolls in Congestion Games, pp. 5370-5375.

Ferguson, Bryce L.	University of California, Santa Barbara
Brown, Philip N.	University of Colorado, Colorado Springs
Marden, Jason R.	University of California, Santa Barbara

17:00-17:20 FrC18.4

A Game-Theoretic Model for Aggregate Lane Choice Behavior of Highway Mainline Vehicles at the Vicinity of On–ramps, pp. 5376-5381.

Li, Ruolin	University of California, Berkeley
Liu, Jiaxi	University of California, Berkeley
Horowitz, Roberto	Univ. of California at Berkeley

17:20-17:40 FrC18.5

Mean Field Game and Decentralized Intelligent Adaptive Pursuit Evasion Strategy for Massive Multi-Agent System under Uncertain Environment, pp. 5382-5387.

Zhou, Zejian	University of Nevada, Reno
Xu, Hao	University of Nevada, Reno

17:40-18:00 FrC18.6

Sequential Decomposition of Mean-Field Games, pp. 5388-5393.

Vasal, Deepanshu	University of Michigan, Ann Arbor

FrC20 Plaza Court 2

Formal Verification II (Regular Session)

Chair: Zamani, Majid	University of Colorado Boulder
Co-Chair: Al Khatib, Mohammad	Technical University of Munich

16:00-16:20 FrC20.1

On Robustness Metrics for Learning STL Tasks, pp. 5394-5399.

Varnai, Peter	KTH Royal Institute of Technology
Dimarogonas, Dimos V.	KTH Royal Institute of Technology

16:20-16:40 FrC20.2

Metric Interval Temporal Logic Based Reinforcement Learning with Runtime Monitoring and Self-Correction, pp. 5400-5406.

Lin, Zhenyu	University of Maryland, College Park
Baras, John S.	University of Maryland

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Zamani, Majid	University of Colorado Boulder

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