

Technical Committee on Automotive Controls

The IEEE Control Systems Society (CSS) Technical Committee on Automotive Controls (TC-AC) works with academic researchers and industry practitioners who address control challenges for automotive applications. The TC serves its members by coordinating invited sessions at conferences, special issues in journals, and disseminating information between industry and academics, such as job postings and calls for funding proposals. The TC meets twice annually, at the American Control Conference (ACC) and the Conference on Decision and Control (CDC).

HISTORY AND MISSION

When informally started by Prof. Luigi Glielmo of the University of Napoli Federico II and Prof. Jessy Grizzle of the University of Michigan, the committee was named the Technical Activity Board on Automotive Control. After its formal approval by the CSS in 1999, the name was changed to TC-AC. The TC-AC has nearly 150 members, with approximately 70% from academia and 30% from industry. Benefiting from both academic and industrial participation, the committee coordinates activities focused on improving the understanding of the challenges, problems, and effective methods of controlling automotive systems. The TC provides the gathering point for running technical meetings and organizes invited sessions and workshops at major conferences. Through meetings and discussions during invited sessions, TC-AC brings together control engineers, researchers, and practitioners to

identify current trends and future directions of automotive control research and the development in many areas, including powertrain systems, energy storage systems, internal combustion engines, connected and autonomous vehicles, and exhaust after-treatment systems. Emphasis is placed on model-order reduction methods for control-oriented models' design, system dynamic modeling and identification, control-based optimization, and estimation.

ACTIVITIES

For the past five years, TC-AC has partnered with the American Society of Mechanical Engineers (ASME) Energy Systems (ES) TC and Automotive Transportation Systems (ATS) TC to organize invited sessions at the ACC. As the industry races to develop both fully autonomous and long-range battery electric vehicles, this partnership has broadened the scope of the automotive invited sessions and better represents the interdisciplinary challenges

associated with the development of electrified powertrains and advanced driver-assistance systems. To address the rapid evolution of vehicle electrification, Dr. Siegel co-organized a tutorial session with Prof. Scott Moura, "The State-of-the-Art and the Future of Battery Systems and Control" at the 2019 ACC in Philadelphia. This session proved to be very popular and quickly ran out of seating, as displayed in Figure 1. At the 2020 ACC, the TC jointly organized six invited sessions with the ASME ATS and four with the ESTC. Siegel also participated as a panelist in the 2020 ACC Student Career Advising Session. TC-AC organized one invited session at the 2020 CDC, "Estimation, Control, and Optimization of Automotive Systems." Several members of the TC also actively contributed to the IEEE European Public Policy Committee's development of a position statement "Intelligent, Connected and Autonomous Vehicles (ICAVs)," addressing issues such as privacy and data



FIGURE 1 A presentation to a packed room at the 2019 American Control Conference for the tutorial "The State-of-the-Art and the Future of Battery Systems and Control."

protection, cybersecurity, safety, licensing, and liability. Antonio Sciarretta and Ardalan Vahidi recently published the book *Energy-Efficient Driving of Road Vehicles: Toward Cooperative, Connected, and Automated Mobility* (Lecture Notes in Intelligent Transportation and Infrastructure, Springer, 2019).

MEMBER AWARDS

Professor and Past TC Chair Simona Onori is currently the editor in chief of *SAE Engineers International Journal of Electrified Vehicles* and the 2020–2022 Distinguished Lecturer for the IEEE Vehicular Technology Society. Onori also received a U.S. Department of Energy 2020 C3E Women in Clean Energy Award in the Research category. Dr. Son Tong received the Siemens DF

PL Invention of the Year Award, related to autonomous vehicle control development, and was a finalist for the 2019 AutoSens Award in the Most Influential Research category. Tyler Ard, Faraz Ashtiani, Ardalan Vahidi, and Hoseinali Borhan received an ATS Best Paper Award for “Optimizing Gap Tracking Subject to Dynamic Losses via Connected and Anticipative MPC in Truck Platooning” in *Proceedings of the American Control Conference*, Denver, Colorado, 2020

JOINING THE TECHNICAL COMMITTEE

Membership in TC-AC is open to anyone interested and willing to participate in the organizational activities of the committee. Nonmembers can still

benefit from participating in the activities organized by TC, such as invited sessions and workshops. To join TC-AC, individuals must be an IEEE CSS Member and send an email with affiliation information to Jason Siegel (siegeljb@umich.edu). Upon receipt of requests, individuals will be added to the TC-AC email list. The committee uses this email list as an efficient vehicle to distribute information about events, meetings, calls for papers, and job openings in industry and academia. Information about TC-AC can be found at <http://automotive-controls.ieeecss.org/>. We also have a LinkedIn group for sharing calls for papers and targeted job postings and announcements.

Jason B. Siegel

Technical Committee on Discrete Event Systems

A discrete-event system (DES) is a dynamic system that is discrete in time and usually in state space, asynchronous or event driven (that is, driven by events or instantaneous happenings in time, which may or may not include the tick of a clock), and nondeterministic (namely, embodies internal chance or other unmodeled mechanisms of choice that govern its state transitions). Application domains of DESs span from advanced manufacturing, intelligent transportation, and logistic (service) systems, to communication protocols, concurrent programming, and software engineering.

A central objective of DES research is to bridge control theory and computer science. In the IEEE Control Systems Society (CSS), DES research has been closely related to hybrid systems

(and, more recently, to event-triggered and cyberphysical systems). In computer science, DES research is related to formal methods, model checking, and reactive synthesis. Recent topics of research vitality in the DES community include networked distributed systems, cybersecurity, resilience, smart cities, and the Internet of Things.

The mission of the CSS Technical Committee on Discrete Event Systems (TC-DES) is to promote research and education on DESs. The TC is dedicated to providing the latest information to its members through monthly newsletters, organizing invited/tutorial sessions and workshops at major control conferences, and compiling online educational and application-related resources on the TC’s website (<http://discrete-event-systems.ieeecss.org/>). TC-DES was established more than 30 years ago (June 1, 1999) and currently has 168 members (from 24 countries and including 46

students). The current TC chair is Kai Cai from Osaka City University (Japan). The three cochairs are Anne-Kathrin Schmuck from Max Planck Institute (Germany), Eric Rutten from INRIA Grenoble Rhone-Alpes (France), and Xiang Yin from Shanghai Jiaotong University (China). This column summarizes the main activities of the TC from 2019 to 2020.

TECHNICAL COMMITTEE ACTIVITIES

The TC meetings have been regularly held during the American Control Conference and the IEEE Conference on Decision and Control (CDC). In the 2019–2020 meetings, TC members mainly discussed future invited/tutorial sessions to organize at conferences, new special issues to propose in relevant journals, topics to promote that demonstrate the impact of the field, and new collaborations to establish with other TCs.