



IEEE Transactions on Control Systems Technology

Special Journal Issue on Intelligent decision making, motion planning and control of automated vehicles in interaction-driven traffic scenarios

Abstract

With an increasing level of automation, automated vehicles (AVs) require more advanced decision making and motion planning schemes (hereafter referred to as planning) and control methods to operate in challenging traffic scenarios. Especially in dense road traffic, interaction-aware behavior becomes more crucial for AVs such as to maintain a certain level of performance (prevent the AV from getting stuck) while guaranteeing safety (avoid collisions) at the same time. Experienced human drivers perform very well on anticipating other road users' (re)actions, based on their own actions, and acting accordingly. For automated systems it is still a challenge to perform in a human-like proactive manner. Consequently, planning and control schemes should be designed such as to mimic these capabilities while providing rigorous safety guarantees. There are various ways to achieve this goal, e.g., through optimization-based planning and control schemes that are robust or stochastic, accommodate interactions and potentially involve (active) learning from data to continuously improve performance while collecting data on the road. That said, this special issue addresses open research questions, novel methods, and recent advancements (relevant to the controls community) to solve AV planning and control problems in challenging multi-actor and interaction-driven traffic scenarios, such as lane changing / merging scenarios, intersections, roundabouts or unstructured environments.

Topics relevant to the special issue include (but are not limited to):

- Planning for and control of automated and autonomous vehicles
- Interaction-aware planning and control
- Utilization of context modeling and prediction models in planning and control to enable scalability, safer and more efficient driving
- Generalization of planning and control schemes to multiple scenarios (avoiding strong scenario-dependency)
- Communication-enabled planning and control (e.g., through V2X communication)
- Robustness of planning and control schemes to functional insufficiencies in perception, world modeling and localization
- Prediction- and optimization-based planning and control
- Safe (active) learning for planning and control
- Robust, stochastic and risk-averse planning and control

Paper Submission Guidelines

All submitted papers must be relevant to the controls community and convey **technological advances**, which are either validated in **realistic/high fidelity simulations** or in **experiments**. **Only regular papers** may be submitted to and will be considered for the special issue. Contributions should be original and not be under consideration elsewhere for publication. The authors should follow the journal guidelines, regarding the manuscript content and its format.

Manuscripts submitted for inclusion in this special issue will be handled by a panel of Guest Editors (see below) and will go through a peer review process to assess their suitability in terms of technical novelty, scientific rigor, scope, and relevance. Manuscripts that are deemed unsuitable for the special issue will be returned to the authors and may not be resubmitted or considered for publication outside the special issue without approval from the Editor-in-Chief. Authors are kindly invited to submit their manuscripts via the Transactions submission portal: <https://css.paperplaza.net/journals/tcst/scripts/login.pl>

Important Dates:

- Submission Site Opens: 1 June 2023
- First Submission Deadline: 15 January 2024
- Notification of First Round Decision: 15 March 2024
- Revised Paper Submission Deadline: 15 April 2024
- Notification of Final Decision: 15 May 2024
- Final Manuscript Submission: 15 June 2024
- Tentative Publication Date (Online): November 2024

Guest Editors:

Alexander Katriniok (principal guest editor)
Eindhoven University of Technology, The Netherlands
Ford Research & Innovation Center, Germany
E-Mail: a.katriniok@tue.nl

Emilia Silvas (principal guest editor)
Eindhoven University of Technology, The Netherlands
TNO, The Netherlands
E-Mail: e.silvas@tue.nl

Francesco Borrelli
University of California, Berkeley, USA
E-Mail: fborrelli@berkeley.edu

Anouck Girard
University of Michigan, USA
E-Mail: anouck@umich.edu

Mario Zanon
IMT School for Advanced Studies Lucca, Italy
E-Mail: mario.zanon@imtlucca.it

Jana Tumova
KTH Royal Institute of Technology, Sweden
E-Mail: tumova@kth.se

Saverio Bolognani
ETH Zurich, Switzerland
E-Mail: bsaverio@ethz.ch

Yuxiao Chen
NVIDIA, USA
E-Mail: yuxiaoc@nvidia.com