**26th IEEE International Conference on Intelligent Transportation Systems**
September 24th – 28th, 2023
Palacio Euskalduna, Bilbao, Bizkaia, Spain

2023.ieee-itsc.org

# Call for Workshop Proposals

### 26th IEEE International Conference on Intelligent Transportation Systems

The 26th edition of the IEEE International Conference on Intelligent Transportation Systems (ITSC 2023) is the annual flagship conference sponsored by the IEEE Intelligent Transportation Systems Society (ITSS). This event hosts an attractive agenda of technical contributions, keynote presentations, tutorials, special sessions, and workshops on topics related to the field of Intelligent Transportation Systems (ITS). The conference aims to gather researchers and practitioners working in this field towards sharing, discussing, and opening new paths in the theory, analysis, simulation, data-based modeling, experimentation, deployment, and case studies embracing transportation and mobility at their core. In particular, ITSC 2023 builds upon its motto to invite and encourage prospective authors to present results, findings, perspectives, and developments related to the implementation and deployment of ITS applications that consider human interaction at the core of their design.

ITSC 2023 solicits proposals for half-day and full-day workshops covering topics relevant to the field of intelligent transportation systems and its applications. Interested organizers are invited to submit their tutorial proposals in the topic areas listed in the Call for Papers of the conference (https://2023.ieee-itsc.org/call-for-paper/call-for-papers/).

The proposal for a workshop should include title; contents of the workshop; a list of topics of interest; website; details of the organizers; a list of potential contributors with their affiliations, contact e-mails, and abstracts; information about the target audience and expected attendance; invited speakers; and materials needed to implement the workshop. Proposals must be submitted electronically by following the instructions available in the conference website (https://2023.ieee-itsc.org/). The deadline is March 1st, 2023.

Disclaimer 1: any workshop proposal that is incomplete and/or is not submitted by following this form will not be evaluated for its inclusion in the program of the conference.

Disclaimer 2: The proposal should describe how the workshop will be organized to encourage an active interaction between presenters and attendance.

Disclaimer 3: Attendance at workshops will be subject to an additional fee, in addition to the Conference registration fee. Thus, all workshop session participants (including organizers and presenters) will be required to pay a workshop attendance fee due to the venue hire cost and catering costs.

Disclaimer 4: unless otherwise imposed by organizational constraints, workshops will be held on September 24th, 2023.

Further enquiries can be forwarded to: contact@2023.ieee-itsc.org

# Workshop Proposal

- Title:

  Cooperative Decision-making in Intelligent Transportation Systems.

- Contents:
  - Motivation and objectives.
  - ➤ Motivation

      Intelligent transportation system (ITS) plays an important role in both economic and social development, and connected and automated vehicles (CAVs) are an essential part of ITS. Before fully autonomous driving is achieved, CAVs will operate for a certain period in mixed autonomy traffic, which includes both CAVs and human-driven vehicles (HVs). Therefore, the collaboration between CAVs and HVs and the communication between CAVs need to be carefully considered to ensure that CAVs can perform cooperative driving behaviors in mixed autonomy traffic.

      The proper driving instructions of CAVs are generated in decision-making systems. With the development of computer science and artificial intelligence, many novel methods and algorithms have been developed for decision-making of autonomous vehicles. However, the dynamic and interactive conditions in the mixed traffic scenarios bring a higher demand on precisely modelling and understanding of interaction between heterogeneous traffic participants, and require a more intelligent cooperative decision-making system for CAVs. Thus, new methods and deployment for modeling the mixed autonomy traffic, solving decision-making problem of CAVs, establishing evaluation metrics are urgently required for a safer and more efficient ITS.

      The explorations of cooperative decision-making for CAVs cover a broad range of techniques and efforts from different aspects, such as graph representation (e.g., graph neural network) to interaction modeling, to deep reinforcement learning, and to validation and metrics of decision-making methods. Meanwhile, the progress also includes the development in benchmark dataset, standard scenario, and simulated environments (e.g., highway-envs and SUMO). This workshop focuses on the discussion of above aspects, including contributions of methodology (scenario modeling, state representation, reinforcement learning, testing and validation methods, etc.), and development of infrastructures (simulated environment and benchmark, real vehicle experiment).

  - ➤ Objectives

      Through this workshop, we hope to collect efficient methods for solving decision-making problems for CAVs in intelligent transportation systems, broaden the ways of algorithm validation, build more complete standard traffic scenarios and algorithm library, and explore experimental solutions for decision-making algorithms; thus promoting the comprehensive development of decision-making technology for CAVs.

  - Relevance to the ITS community.

      As mentioned before, CAVs are an important component of ITS and the proper operation of CAVs is essential for improving the efficiency and safety of ITS. The ability of CAVs to generate reasonable driving strategy depends heavily on their decision-making system. Therefore, the design of high intelligent cooperative decision-making algorithms for CAVs is essential for optimizing the performance of ITS, thus promoting the development of the ITS community.

  - Topics of interest.

Researchers in related areas from both, academia or industry are invited to submit extended abstracts (at least 4-pages long) or full papers to be presented in the format of spotlight presentation and poster presentation.

The topics of interest within the scope of this workshop include, but not limited to, the following:

- Novel methods in multi-agent decision-making in intelligent transportation systems;
- Novel algorithms for multi-agent reinforcement learning;
- The modeling of complex and dynamic traffic environment;
- The modeling of cooperation and interaction between different vehicles;
- State representation of connected and automated vehicles in mixed autonomy traffic;
- The development and implementation of graph reinforcement learning in decision-making;
- Interpretability and generalizability of decision-making algorithms;
- The development and evaluation of simulation environments and program library for decision-making of connected and automated vehicles;
- Novel testing and validation methods of decision-making in highly interactive scenarios;
- The application and deployment of decision-making algorithms on the intelligent vehicle platform;
- Dataset and establishment of standard traffic scenarios for decision-making;
- Systematic survey or review for decision-making of connected and automated vehicles.

o **Dedicated website.**
  https://sites.google.com/view/ieeeitsc-2023-workshop-cavs
o **Format: Half day**

- **Organizers (names, affiliations, emails, and short bio):**
  - **Qi Liu (Corresponding organizer)**
    Email: liuqibeishida@126.com

    Qi Liu received the B.S. degree from the Beijing Institute of Technology (BIT), Beijing, China, in 2019. He currently pursuing a Ph.D. degree in department of mechanical engineering with Prof. Shihua Yuan. His research interests include environmental perception, machine learning, decision-making, and motion controlling. His focus is reinforcement learning-based decision-making for autonomous vehicles. He also serves as a reviewer for ITSC2022, IV2022, and IV2023.

  - **Xueyuan Li**
    Email: lixueyuan@bit.edu.cn

    Xueyuan Li received the B.S., M.S., and Ph.D. degrees in vehicle engineering from Beijing Institute of Technology, Beijing, China, in 1999, 2002, and 2010, respectively. He was the Director of the National Key Laboratory of Vehicular Transmission from 2008 to 2014. He is currently the Vice Director of the Department of Vehicle Engineering, Beijing Institute of Technology. Since 2002, he has been an Associate Professor with the School of Mechanical Engineering, Beijing Institute of Technology. His research interests include vehicle transmission theory and technology, unmanned vehicle theory and technology, and machine learning.

  - **Zirui Li**
    Email: z.li@bit.edu.cn

    Zirui Li received the B.S. degree from the Beijing Institute of Technology (BIT), Beijing, China, in 2019, where he is currently pursuing the Ph.D. degree in mechanical engineering. From June, 2021 to July, 2022, he was a visiting researcher in Delft University of Technology (TU Delft). From Aug, 2022. He is the visiting researcher in the Chair of Traffic Process Automation at TU Dresden.

  - **Shihua Yuan**
    Email: yuanshihua@bit.edu.cn

    Shihua Yuan received the B.S., M.S., and Ph.D. degrees in vehicle engineering from Beijing Institute of Technology, Beijing, China, in 1982, 1985, and 2000, respectively. From 1992 to 1997, he was an Associate Professor with Beijing Institute of Technology, where he has been a Professor with the School of Mechanical Engineering since 1997. He is the author of more than 100 research articles.

His research interests include vehicle dynamics, vehicle braking energy recovery, vehicle continuous transmission and its control technology, and unmanned ground vehicles.

➢ **Guodong Du**

**Email:** guoddu@ethz.ch

Guodong Du received the B.S. degree in mechanical engineering from Beijing Institute of Technology, Beijing, China, in 2019. He is currently pursuing the Ph.D. degree in automobile engineering at Beijing Institute of Technology, Beijing, China. He also serves as an academic guest of ETH Zurich. His research interests include motion planning and control, reinforcement learning algorithm, vehicle dynamics control, energy management of hybrid electric vehicles.

- Potential contributors to the workshop (names, affiliations, contact information, abstracts (if available):

- Intended audience and expected attendance for the workshop (including a clear statement how interaction between presenters and attendance will be fostered):

The invited speakers, authors of contributed papers, and all researchers participated in ITSC-2023 who are interested in this workshop are welcomed to join in this workshop. The workshop is expected to have three sessions.

➢ **Session 1: Presentation from invited speakers**

At first, all the invited speakers will show their demo for 10~15minutes; after each presentation, 5 minutes for questions are provided for the audience to enable more opportunities to communicated with the invited speakers.

➢ **Session 2: Presentation from contributors**

Then, all the authors of contributed papers show their demo for 10~15 minutes; after each presentation, three opportunities for questions are provided for the audience.

➢ **Session 3: Demonstration of our library for CAVs**

Finally, we plan to share our program library for decision-making of CAVs based on graph reinforcement learning (https://github.com/Jacklinkk/Graph_CAVs); and everyone can ask questions for it to facilitate discussion and thought provoking. We hope that this demonstration can better promote the implementation and verification of relevant algorithms for decision-making of CAVs.

- Invited speakers (if any):
  ➢ **Xin Gao, Ph.D. Candidate, Beijing Institute of Technology**

  ➢ **Fan Yang, Ph.D. Candidate, Beijing Institute of Technology**

  ➢ **Dong Chen, Ph.D. Candidate, Michigan State University**

  ➢ **Lipu Zhou, Ph.D., Mei tuan**

  ➢ **Yujie Tang, Associate professor, Dalhousie University**

  ➢ **Chaoyang Jiang, Associate professor, Beijing Institute of Technology**

  Tentative speakers:
  ➢ **Andreas A. Malikopoulos, Professor, ASME Fellow, University of Delaware**

  ➢ **Jingda Wu, Ph.D. Candidate, Nanyang Technological University**

  ➢ **Jiachen Li, Postdoctoral Researcher, Stanford University**

  ➢ **Boris Ivanovic, Ph.D, Researcher in Nvidia**

- ➢ **Namo Asavisanu, Ph.D. Candidate, University of Southern California**

- ➢ **Minhae Kwon, Associate professor,  Soongsil University**

- **Materials and equipment needed for the workshop:**

  All speakers should present their demos in the workshop.

- **Contact details of the proposers (email, postal address, etc):**
  Proposer: Qi Liu
  Email: liuqibeishida@126.com
  Phone: +86 18518199661/18600337272