The Milestones of IEEE TIV: The Best Associate Editors and George N. Saridis Best Papers Awards

Dear All,

I am delighted to share with you the two milestones for IEEE TIV: i) On September 5, 2022, the IEEE TIV has received its 1000th submission this year; and ii) The number of submissions received has reached 1200, our annual submission target, on October 11. It is expected that over 1500 submissions should be received this year. Thanks to all of you for your tremendous effort and enthusiastic dedication for serving our TIV.

Next, I would like to take this opportunity to announce the Winners of the IEEE TIV Outstanding Service Awards this year:

The Best Senior Editor:
Danil Prokhorov (Toyota, USA).

The Best Associate Editors:
Xiao Wang (Anhui University, China. Qingdao Academy of Intelligent Industries, China).
Bai Li (Hunan University, China).
Dongpu Cao (University of Waterloo, Canada, Tsinghua University, China).

Thanks to the great effort by the IEEE TIV George N. Saridis Best Paper Award Committee, which was chaired by Dr. Danil Prokhorov, we are happy to announce the winners of the George N. Saridis Best Transactions Paper Award of IEEE TIV for 2016-2020. The full list of winners is included in the end of this editorial.

Congratulations to all recipients!

Scanning the Issue

A Survey on Attack Detection and Resilience for Connected and Automated Vehicles
Z. Ju, H. Zhang, X. Li, X. Chen, J. Han, M. Yang

Recent advances in attack detection and resilience strategies for connected and automated vehicles (CAVs) are reviewed from vehicle dynamics and control perspective. The existing results are summarized and discussed according to the positions at which the attacks occur, where the positions in CAV systems are divided into three categories, namely, intra-vehicle communication network, perception sensors, and inter-vehicle communication network. Based on the discussion, potential research directions and challenges are provided.

Resilient Branching MPC for Multi-Vehicle Traffic Scenarios Using Adversarial Disturbance Sequences
V. Fors, B. Olofsson, E. Frisk

A motion planning and control method to handle uncertainty introduced by traffic is proposed. By not relying on prior data of the traffic behavior, the proposed method can handle unexpected traffic behavior not previously encountered. The method automatically computes alternative predictions of the surrounding traffic that are intentionally adversarial to the ego vehicle and includes these in a model predictive control framework. Simulation results show that the method performs favorably to reinforcement-learning approaches without requiring prior training.

Prediction-Uncertainty-Aware Decision-Making for Autonomous Vehicles
X. Tang, K. Yang, H. Wang, J. Wu, Y. Qin, W. Yu, D. Cao

Current motion prediction solutions are designed with a strong reliance on black box predictions based on neural networks, which is unacceptable for safety-critical applications. Therefore, an uncertainty estimation approach based on the deep ensemble technique is proposed for motion prediction. Subsequently, the estimated uncertainty is considered in the decision-making module to improve driving safety.

Human-Oriented Online Driving Authority Optimization for Driver-Automation Shared Steering Control
J. Liu, Q. Dai, H. Guo, J. Guo, H. Chen

A model predictive control(MPC) based shared steering framework is proposed to optimize driving authority between automation and human driver. Human driver workload can be alleviated when the driver and the automation have similar driving intentions. And the human driver has absolute control authority over an intelligent vehicle when their intentions are inconsistent. The simulation results show that the proposed framework can not only restrict vehicles to safe areas but also lessen the driver's workload.

Online Relative Positioning of Autonomous Vehicles using Signals of Opportunity
N. Souli, P. Kolios, G. Ellinas

This paper proposes an online relative positioning system (ONL-RPS) of autonomous unmanned aerial vehicles (UAVs). The system capitalizes on signals-of-opportunity (SOPs) in conjunction with inertial measurements for localization and navigation in GNSS-denied environments. The proposed method uses the signals' characteristics over a large frequency

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spectrum, along with an optimal learning technique, to adaptively choose a sequence of frequencies that provide location estimates in real-time. Through extensive field experiments, the prototype ONL-RPS is proved to be an efficient alternative to GPS.

Parallel Driving OS: A Ubiquitous Cyber-Physical-SocialSystem-Based Operating System for Autonomous Driving
L. Chen, Y. Zhang, B. Tian, Y. Ai, D. Cao, F.-Y. Wang

This paper presents a unified autonomous driving operating system in CPSS, called PDOS, which can integrate autonomous driving algorithms and platforms. The proposed PDOS is a ubiquitous operating system based on parallel driving theory and can manage resources, optimize algorithms, and support application development. Furthermore, a design methodology of derived PDOS is proposed to make it applicable to various scenarios. Validation in real scenarios shows that it is an efficient operating system for autonomous driving.

Driver and Pedestrian Mutual Awareness for Path Prsediction and Collision Risk Estimation
M. Roth, J. Stapel, R. Happee, D. Gavrila

A novel method for vehicle-pedestrian path prediction is presented. It models individual paths within a single Dynamic Bayesian Network and incorporates awareness of the driver and pedestrian towards each other. The method was validated with real-world vehicle-pedestrian encounters and shows that at a prediction horizon of 1.5 s, context-aware models outperform context-agnostic models in path prediction for scenarios with a dynamics change. It further indicates that driver attention-aware models improve collision risk estimation compared to driver-agnostic models.

Driving Performance under Violations of Traffic Rules: Novice vs. Experienced Drivers
J. Xu, K. Guo, P. Sun

Human factors in driving and driving Ergonomics are crucial to the goal of autonomous driving. Our driving simulator is used to design driving scenarios and study the driving performance of drivers with different driving experiences when other road users violate traffic rules. The results reveal that novice drivers cannot perform as well as experienced drivers when they encounter other road users who do not obey traffic rules in visual attention, manipulation control, and driving situation prediction.

A Pathway Forward: the Evolution of the Research on Intelligent Vehicles on IEEE Transactions
H. Wang, X. Wang, X. Li, X. Wu, J. Hu, Y. Chen, Y. Li

This paper presents a bibliographic and collaboration pattern analysis of the IEEE Transactions on Intelligent Vehicles (T-IV). In this paper, a journal analysis framework is proposed. The most productive/influential authors, institutions, and countries/regions are identified. The research group structure is generated. Hot research topics and trends are discussed. Analysis results find that the Cooperative Automation (CA) is a research trend that includes vehicle group control, platoon control, intersection management, cooperation security, and cooperative perception.

The George N. Saridis Best Transactions Paper Award of The IEEE Transactions on Intelligent Vehicles

Danil Prokhorov, Senior Editor, Chair of the Award Selection Committee

We are pleased to announce the George N. Saridis Best Transactions Paper Award of the IEEE Transactions on Intelligent Vehicles. The annual George N. Saridis Best Transactions Paper Award is to recognize the best regular papers and survey papers published in the IEEE Transactions on Intelligent Vehicles.

The award committee followed a rigorous process to select these best papers. Firstly, Top 15 most-cited papers according to Google Scholar, plus any papers solicited or nominated through the open call, are considered as Candidate Papers. Next, the Award Committee is responsible for organizing the review process to select 2-3 papers as the Finalist Papers from the Candidate Papers. Finally, the Award Committee votes to discuss and decide the final Best Papers.

The following is the list of final results for the 2016–2020 George N. Saridis Best Transactions Paper Award.

2016:

The George N. Saridis Best Transactions Paper Award for Outstanding Research

L. Li, W. -L. Huang, Y. Liu, N. -N. Zheng and F. -Y. Wang, "Intelligence Testing for Autonomous Vehicles: A New Approach," IEEE Transactions on Intelligent Vehicles, vol. 1, no. 2, pp. 158-166, June 2016, doi: 10.1109/TIV.2016.2608003. (Google Scholar Citations: 175)

The George N. Saridis Best Transactions Paper Award for Outstanding Survey

B. Paden, M. Čáp, S. Z. Yong, D. Yershov and E. Frazzoli, "A Survey of Motion Planning and Control Techniques for Self-Driving Urban Vehicles," IEEE Transactions on Intelligent Vehicles, vol. 1, no. 1, pp. 33-55, March 2016, doi: 10.1109/TIV.2016.2578706. (Google Scholar Citations: 1702)

2017:

The George N. Saridis Best Transactions Paper Award for Outstanding Research

W. Wang, C. Liu and D. Zhao, "How Much Data Are Enough? A Statistical Approach With Case Study on Longitudinal Driving Behavior," IEEE Transactions on Intelligent Vehicles, vol. 2, no. 2, pp. 85-98, June 2017, doi: 10.1109/TIV.2017.2720459. (Google Scholar Citations: 76)

The George N. Saridis Best Transactions Paper Award for Outstanding Survey

G. Bresson, Z. Alsayed, L. Yu and S. Glaser, "Simultaneous Localization and Mapping: A Survey of Current

Trends in Autonomous Driving," IEEE Transactions on Intelligent Vehicles, vol. 2, no. 3, pp. 194-220, Sept. 2017, doi: 10.1109/TIV.2017.2749181. (Google Scholar Citations: 510)

2018 (NO SURVEY PAPER):

The George N. Saridis Best Transactions Paper Award for Outstanding Research

N. Deo, A. Rangesh and M. M. Trivedi, "How Would Surround Vehicles Move? A Unified Framework for Maneuver Classification and Motion Prediction," IEEE Transactions on Intelligent Vehicles, vol. 3, no. 2, pp. 129-140, June 2018, doi: 10.1109/TIV.2018.2804159. (Google Scholar Citations: 221)

C. Hubmann, J. Schulz, M. Becker, D. Althoff and C. Stiller, "Automated Driving in Uncertain Environments: Planning With Interaction and Uncertain Maneuver Prediction," IEEE Transactions on Intelligent Vehicles, vol. 3, no. 1, pp. 5-17, March 2018, doi: 10.1109/TIV.2017.2788208. (Google Scholar Citations: 180)

2019:

The George N. Saridis Best Transactions Paper Award for Outstanding Research

A. Rangesh and M. M. Trivedi, "No Blind Spots: Full-Surround Multi-Object Tracking for Autonomous Vehicles Using Cameras and LiDARs," IEEE Transactions on Intelligent Vehicles, vol. 4, no. 4, pp. 588-599, Dec. 2019, doi: 10.1109/TIV.2019.2938110. (Google Scholar Citations: 113)

The George N. Saridis Best Transactions Paper Award for Outstanding Survey

Y. Kang, H. Yin and C. Berger, "Test Your Self-Driving Algorithm: An Overview of Publicly Available Driving Datasets and Virtual Testing Environments," IEEE Transactions on Intelligent Vehicles, vol. 4, no. 2, pp. 171-185, June 2019, doi: 10.1109/TIV.2018.2886678. (Google Scholar Citations:95)

2020:

The George N. Saridis Best Transactions Paper Award for Outstanding Research

C.-J. Hoel, K. Driggs-Campbell, K. Wolff, L. Laine and M. J. Kochenderfer, "Combining Planning and Deep Reinforcement Learning in Tactical Decision Making for Autonomous Driving," IEEE Transactions on Intelligent Vehicles, vol. 5, no. 2, pp. 294-305, June 2020, doi: 10.1109/TIV.2019.2955905. (Google Scholar Citations: 102)

The George N. Saridis Best Transactions Paper Award for Outstanding Survey

M. Hasenjäger, M. Heckmann and H. Wersing, "A Survey of Personalization for Advanced Driver Assistance Systems," IEEE Transactions on Intelligent Vehicles, vol. 5, no. 2, pp. 335-344, June 2020, doi: 10.1109/TIV.2019.2955910. (Google Scholar Citations: 46)

Congratulations to all authors!

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