

Proposal for a Special Session at the 2018 IEEE Symposium on Computational Intelligence in Vehicles and Transportation Systems (CIVTS'2018)

Special Session Title: “Advances in Intelligent Systems and Algorithms for Autonomous Driving and its Applications”

Theme and Scope of this Session:

Achieving autonomous operation of a vehicle whether fully or as a driver assisting technology in the real-world, requires advanced real-time systems and algorithms including environmental perception, localization, planning and control in addition to a vehicle platform supporting sensors and state of the art computational hardware and software.

Autonomous operations may demand that about one GB of data be processed each second in the vehicle's real-time operating system. This data will need to be analyzed quickly enough in order for the vehicle to react to changes in its surroundings in less than a second. This will demand new levels of vehicle intelligence and computational powers to help the vehicle determine when, how hard and how fast to brake, accelerate and/or steer based on analysis of range of variables from vehicles speed, road conditions, surrounding traffic, unpredictable behavior of pedestrians, bicyclists, and other cars while in the city to name just a few.

This special session will be a forum for the latest research in intelligent systems, algorithms, applications and challenges of autonomous driving. Topics for this special session include but are not limited to:

List of main topics:

- Navigation, Guidance and Control of Autonomous Vehicles
- Autonomous Driving in Unstructured Environments
- Path planning for Autonomous Vehicles
- Localization for Autonomous Vehicles
- Lane Departure Warning/Lane Keeping Assistance
- Collision & Blind Spot Warning
- Pedestrian Detection
- Obstacle Detection
- Active Pedestrian Protection
- Collision Imminent Braking
- Collision Avoidance
- Vehicle Environment Perception
- Deep Learning for Machine Vision
- Synthetic Data for Deep Learning
- Driver State and Intent Recognition
- Vision, Radar, Lidar Systems and Processing in Vehicles
- Sensor Fusion for Autonomous Vehicles
- GPU Computing for Autonomous Vehicles
- Fault Tolerant Autonomous System Architectures
- Cooperative Driverless Vehicles
- Crowd Sourcing of Traffic Information
- Learning Autonomous Vehicles
- Cloud Computing in Autonomous Driving
- Automated Package Delivery Systems
- Ride Sharing Systems
- Ride Hailing systems

Organizers / Chairs:

Dr. Mahmoud Abou-Nasr (main contact, email: abounasr@ieee.org)

Dr. Abou-Nasr is a Senior Member of the IEEE and Vice Chair, Computational Intelligence & Systems Man and Cybernetics SEM Chapter (2011-2014). He has received his Ph.D. and the M.S. degrees in 1994 and 1984 respectively from the University of Windsor, Ontario, Canada, both in Electrical Engineering. Currently he is a Technical Expert with Ford Motor Company, Research and Advanced Engineering, Machine Learning for Autonomous Vehicles & Robotics department, where he leads research & development of deep learning, recurrent neural networks and advanced computational intelligence techniques for autonomous vehicles and automotive applications. His research interests are in the areas of deep learning, machine vision with deep convolutional networks, recurrent neural networks, reinforcement learning, pattern recognition, forecasting, data mining, optimization and control. He has been an adjunct faculty member of the computer science department, Wayne State University, Detroit, Michigan and the operations research department, University of Michigan Dearborn. Prior to joining Ford, he held positions with the aerospace and robotics industries in the areas of real-time control and embedded communications protocols. He is an editor of the book "Real World Data Mining Applications," Annals of Information Systems, Springer, an associate editor of the DMIN'09-DMIN'16 proceedings, a co-chair of the IEEE Symposium on Computational Intelligence in Vehicles and Transportations Systems (2016, 2017) and an author of two book chapters on recurrent neural networks in automotive applications and reinforcement learning. He is a member of the program and technical committees of several international conferences including IEEE international joint conference on neural networks (IJCNN), IEEE World Congress on Computational Intelligence (WCCI), the International Symposium on Visual Computing (ISVC) and the journals of Neural Networks and IEEE Transactions on Neural Networks & Learning Systems. Dr. Abou-Nasr has organized and chaired numerous special sessions in SSCI14, WCCI 2015, DMIN and IJCNN conferences as well as international classification competitions in WCCI Hong Kong (2008), IJCNN San Jose, CA (2011). He was also invited to present on topics of computational intelligence in the University of Nevada Reno (2014) and the IEEE Computational intelligence Industry Forum San Jose CA (2015).

Justin Dauwels, Associate Professor, Nanyang Technological University, Singapore, jdauwels@ntu.edu.sg

Dr. Justin Dauwels is an Associate Professor with School of Electrical and Electronic Engineering at the Nanyang Technological University (NTU) in Singapore. He serves as Deputy Director of the ST Engineering – NTU corporate lab, which comprises 100+ PhD students, research staff and engineers, developing novel autonomous systems for airport operations and transportation. He is also involved as project PI in the Centre of Excellence for Testing and Research of Autonomous Vehicles - NTU (CENTRAN), which will lead the development of testing requirements for such vehicles, and was launched by the Land Transport Authority (LTA) and JTC, in partnership with NTU. Moreover, he serves as project PI in the BMW-NTU lab on Future Mobility and the NXP-NTU lab on vehicle-to-vehicle communication.

His research interests are in data analytics with applications to intelligent transportation systems, autonomous systems, and analysis of human behavior & physiology. He obtained the PhD degree in electrical engineering at the Swiss Polytechnical Institute of Technology

(ETH) in Zurich in December 2005. He was a postdoctoral fellow at the RIKEN Brain Science Institute (2006-2007) and a research scientist at the Massachusetts Institute of Technology (2008-2010). He has been a JSPS postdoctoral fellow (2007), a BAEF fellow (2008), a Henri-Benedictus Fellow of the King Baudouin Foundation (2008), and a JSPS invited fellow (2010, 2011). His research on intelligent transportation systems has been featured by the BBC, Straits Times, [Lianhe Zaobao](#), Channel 5, and numerous technology websites. His research team has won several best paper awards at international conferences. Besides his academic efforts, the team of Dr. Justin Dauwels also collaborates intensely with local start-ups, SMEs, and agencies, in addition to MNCs, in the field of data-driven transportation and logistics.

Jungme Park, Ph.D. Assistant Professor, Kettering University, USA,
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Jungme Park is an assistant professor in the Department of Electrical and Computer Engineering at Kettering University, USA. She received her B.S. degree in statistics from Korea University, Seoul, Korea and the M.S. and Ph.D. degrees in computer science from the University of Alabama, Tuscaloosa, AL. Her research interests lie in the area of environmental perception, driver awareness, and HD map generation and localization for autonomous driving. She had worked as a research scientist at the University of Michigan-Dearborn and accomplished a variety of research projects in the areas of computer vision and machine learning. Before she joined Kettering University, she was a senior research engineer worked for Hyundai Mobis and Changan US R&D center for autonomous driving. She worked on generating HD maps for Autonomous Driving using Camera and GPS sensors, evaluating different GNSS systems. She also developed NA traffic sign recognition system.

Weiwei Zhang, Ph.D, Assistant Professor, Shanghai University of Engineering Science, weiweiz@sues.edu.cn

Weiwei Zhang is a member of National Automobile Accident In-Depth Investigation System(NAIS) and SAE-China. He has received his Ph.D. degrees in 2015 from Hunan University, China, in Vehicle Engineering. Currently he is an Assistant Professor in College of Automotive Engineering Automobile at Shanghai University of Engineering Science, where he lead leads research & development of embedded vision and real-time deep learning for autonomous vehicles, intelligent transport system and some relevant Advanced Driver Assistance Systems(ADAS). He also works as a part-time R&D leader in Shanghai Zhijin Technology Company, researching on the intelligent algorithm for the Industry Robot, Automated Guided Vehicle and VR device. He had developed some real-time vehicle-type recognition system and illegal High-Beam capture system. From studying for his M.S degree in 2009, he has been working on the Navigation, Guidance and Control of Autonomous Vehicles using Mono-vision and radar. As the main team member, He attends the 2nd Intelligent Vehicle Future Challenge, hosted by National Nature Science Foundation of China in 2010. Now he is working on FCW system, AEB system and Hardware in Loop system for the Autonomous vehicles, to verify and evaluate the performance and reliability of Autonomous Driving system using radar/Lidar model(Oktal-SE), camera model(PreScan), Vehicle model(CarSim) and the dSpace Real-time IO Auto-box. Dr. Zhang has also published some paper on lane detection, frontal vehicle tracking and driver yawning detection on the Journal of Vehicle Engineering and IJCNN conference(2015)

