

Cristina Olaverri-Monreal



Connected and Automated Driving Systems

Cooperative, automated driving systems represent an opportunity to enhance mobility and increase safety. The highest levels of automation will make human intervention superfluous as automation will be in charge of driving subtasks. This will not only lead to a decrease in the rate of accidents caused by human errors but also to a reduction of air congestion and pollution. In addition, exemption from driving duties will give passengers the freedom to perform other tasks during their trip.

Concurrently, communication and network technologies that support vehicular communications like the ones implemented in autonomous car applications, will revolutionize the world of automotive industry and transport as we know it with radical advances in mobility. They will make it possible to identify exceptional situations based on data available from other vehicles in surroundings, thus enhancing situational awareness to act accordingly.

The latest scientific advances in these exciting areas of automated and connected driving will be presented and discussed at the 2022 IEEE Intelligent Vehicles Symposium.

Society's (ITSS's) first flagship conference of 2022 is approaching (5–9 June 2022), and we are looking forward to reconnecting and meeting with colleagues and friends, whose research is currently paving the way toward more inclusive and sustainable mobility. We are eager to learn about new developments in the field of intelligent vehicles during the presentations and participate in the lively discussions that will take place during the workshops.

In the same area of research, advantages of vehicle-roadside communication with automated vehicle systems were outlined as a part of the ITSS's latest Industry Meets Academia Webinar Series episode in March. For example, Prof. Raj Rajkumar of Carnegie Mellon University provided a historical perspective of the development of autonomy in vehicles starting from the 1990s until now. Dr. Andreas Schaller from Bosch added his perspective based on the 5G Automotive Association roadmap regarding automated vehicles in Germany. Finally, Dr. Raja Ponnaluri from the Florida Department of Transportation provided additional information to underscore the value of vehicle-roadside

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or serial communication with sensor nodes is also designed, which is convenient for real-time display of the magnetic field intensity waveforms and traffic volume of the detection area, the number of different vehicle types, average speed of traffic volume, and other traffic parameters.

In terms of vehicle-detection algorithms, a variance-sequence-state machine based on magnetic field-strength values is designed to monitor vehicle flow, which overcomes the drawbacks of using only magnetic field-strength sequences or variance sequences for vehicle detection and achieves high-accuracy vehicle-flow-monitoring effects and data based on the segmentation algorithm; it realizes estimation of the vehicle's speed, determination of the vehicle's direction, tracking of the reference value of the magnetic field environment, and provides a high-quality data set for the vehicle's type-recognition algorithm.

In the vehicle-recognition algorithm, feature extraction of the vehicle's magnetic field waveform is completed, and the feature dimension reduction is performed based on the principal component analysis algorithm. The centroid separation algorithm based on the K-means clustering algorithm and the support vector machine (SVM)-classification algorithm based on the radial basis function are designed to achieve high-accuracy classification of small and medium cars, trucks, and buses. The centroid-separation algorithm separates buses from other types of vehicles, improves the speed of the classification algorithm, and reduces the burden of the subsequent SVM algorithm model.

This thesis conducts road-field experiments on the designed sensor nodes, corresponding embedded software vehicle-detection algorithms, and vehicle-identification algorithms. The experimental results

verify that the system is stable and can meet the needs of obtaining road-traffic parameters.

- 1) Name of the student: Haitao Wang
- 2) Name of supervisor: Prof. Haifeng Zhang
- 3) Host university: Harbin Institute of Technology
- 4) Date of the conferral of a Ph.D. degree: June 2021
- 5) Ph.D. thesis' web access: https://kns.cnki.net/kcms/detail/detail.aspx?dbcode=CMFD&dbname=CMFDTEMP&filename=1021902759.nh&uniplatform=NZKPT&v=EPW2my00lpg5f41_OUgwsRxdXiYi1hhzU5bOpXn0TSi3I_ft-YiCAnaP6qwtDATB.

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ITS

PRESIDENT'S MESSAGE *(continued from page 5)*

communication for connected and automated vehicles.

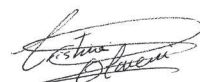
It is also important to mention that we have just concluded our IEEE Executive Committee Meeting, during which the latest developments regarding management, strategic planning, and international representation of the ITSS were discussed. Consolidation of the major strategy items for the Society is advancing toward an excellent level of quality in all Society products. In addition, the impact of IEEE ITSS periodicals, as they become some of the top publications in the field of ITS, continues to increase. This is positively affecting visibility of the most relevant infor-

mation related to ITS as demonstrated by the excellent networking opportunities that its conferences and meetings provide, particularly promoting Young Professional members and underrepresented groups.

These accomplishments would not have been possible without the continued perseverance and dedication of all of our members to promote our Society and ensure its success. I particularly want to express my gratitude for the contributions of the new established Outreach Committee and also to the colleagues from the Board of Governors that serve as ITSS liaisons for the IEEE Council on RFID, IEEE Future Networks, IEEE Trans-

portation Electrification Community, IEEE-USA's Public Policy Committee, Intellectual Property Committee, Research & Development Policy Committee, Diversity and Inclusion, IEEE Transportation Technologies Award, and IEEE ITSS-Smart Cities Steering. Your commitment is recognized and highly appreciated.

Sincerely,



Cristina Olaverri-Monreal
President, ITS

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