

IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGY

Special Issue on **Connected and Autonomous Vehicles: Technologies, Methodologies, and Applications**

During the last decade, there have been considerable developments in automated driving technology. This phenomenon is exemplified by the watershed event of the DARPA Challenges in the mid-2000s, followed by increased efforts from a number of industrial players and the testing of Google self-driving cars on public roads, which induced even greater investments by a number of technology providers as well as automotive manufacturers. Not only technological advancements have been demonstrated in many venues, several states and federal government in US have also moved forward to set up regulations and guidelines to prepare for the introduction of self-driving cars. Activities have intensified even more around the globe in recent years. In the next few years, many manufacturers may begin to offer ADS that are equipped with various automation features. With their anticipated impacts, ADS definitely have the potential to lead to real and far-reaching ramifications in our society.

In the meantime, since the late 1990s, ITS America petitioned the allocation of seventy-five megahertz of spectrum in the 5.9 GHz band “for the operation of intelligent transportation systems, including spectrum for the dedicated short-range vehicle-to-wayside wireless standard,” DSRC. Later, several standard bodies, including American ASTM/IEEE, European CEN/TC278, and Japan’s ISO/TC204, carried out the work on the formulation of the DSRC (Dedicated Short Range Communications) standards. Chinese domestic enterprises also formulated the LTE-V protocol for intelligent connected vehicles. In the last few years, however, a new alliance has emerged to promote Cellular V2X in conjunction with the upcoming introduction of 5G cellular network. Independent of the technologies, the adoption of connectivity in vehicles is an unmistakable trend that has enabled a suite of safety, comfort, convenience, and efficiency functions and will continue to do so for the future.

Although there have been remarkable achievements, connected and autonomous vehicle still face many challenges, e.g., accurate perception of the surrounding environment, ensuring safe driving in adverse weather, unification of dedicated communication and networking technologies.

This special issue, inspired by the recent advances in connected and autonomous vehicles, will encourage innovative and diverse contributions ranging from the domains of driver assistance systems to highly automated systems, from networking/communication protocols to connected vehicle applications, from sensing and perception to mapping and localization, from energy efficiency to electrification, from cybersecurity to edge processing, from verification to scalability problems. Specific topics include, but are not limited to:

- Advanced driver assistance systems
- Connected and autonomous driving systems
- Driverless Vehicles and Robotaxi
- Vehicular localization and mapping
- Sensing, sensor fusion, and autonomous perception

- Detection, Tracking, and Prediction
- Trajectory planning
- Decision making and driving policy
- Machine learning applications in autonomous driving
- Wireless communication technologies and communication protocols
- Vehicular communication system architectures and design
- New trends in networking and communications for connected and autonomous vehicles
- Security and privacy issues for connected and autonomous vehicles
- Energy consumption, efficiency, and environmental issues
- Vehicle social networks
- Methodologies of vehicular and driver behavior modeling
- Human-machine interaction in automated driving systems
- Mobility services by connected and autonomous vehicles
- Traffic modeling and optimization of connected and autonomous vehicles
- Deployment scalability issues for connected and autonomous vehicles
- Real world road driving tests and simulation testing
- Database for testing automated driving
- Functional safety and verification

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