

A Quest for Human-Robot Cohabitation: Towards Human-Centered Autonomous Driving

Keynote Address

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Abstract

With recent advances in imaging sensors, embedded computing, machine perception, learning, planning and control, intelligent vehicle technology is moving tantalizingly closer to a future with large-scale deployment of self-driving automobiles on roadways. However, we are also realizing that many important issues need deeper examination so that the safety, reliability and robustness of these highly complex systems can be assured. Toward this end, we highlight research issues as they relate to the understanding of human agents interacting with the automated vehicle, who are either occupants of such vehicles, or who are in the near vicinity of the vehicles. The main idea is to develop an approach to properly design, implement and evaluate methods and computational frameworks for distributed systems where intelligent robots and humans cohabit, with proper understanding of mutual goals, plans, intentions, risks and safety parameters. We emphasize the need and the implications of utilizing a holistic approach, where driving in a naturalistic context is observed over long periods to learn behaviors of human agents in order to predict intentions and interactivity patterns of all intelligent agents. Development of highly automated vehicles opens new research avenues in machine learning, modeling, active control, perception of dynamic events, and novel architectures for distributed cognitive systems. This presentation will give examples of some of the accomplishments in the design of such systems and also highlight important research challenges yet to be overcome.

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Bibliography

Mohan Manubhai Trivedi is a Distinguished Professor of Electrical and Computer Engineering and founding director of the Computer Vision and Robotics Research Laboratory, as well as the Laboratory for Intelligent and Safe Automobiles (LISA) at the University of California San Diego. LISA team is recognized as the most prolific and most cited in the intelligent vehicles and intelligent transportation systems field. Trivedi with his colleagues has won over 20 “Best/Finalist” Paper awards, has received the IEEE ITS Societys Outstanding Research Award and LEAD Institution Award as well as the Meritorious Service and Pioneer Award (Technical Activities) of the IEEE Computer Society. He has given over 110 keynote/plenary talks and he regularly serves on panels dealing with technological, strategic, privacy, and ethical issues surrounding research areas he is involved in. He is a Fellow of IEEE, SPIE, and IAPR. Trivedi has served as the Robotics Technical Committee Chair for the IEEE Computer Society, on the Governing

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