Human-centered, Holistic Systems for Active Safety

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Abstract

"Smart" (or Intelligent) spaces are supposed to assist humans to accomplish their goals, with enhanced safety, efficiency, effectiveness, and convenience. Such spaces need to capture and maintain an awareness of the static and dynamic states of the space and its inhabitants. Computer vision is recognized as a core discipline to realize such capabilities for observing humans in smart spaces so that appropriate actions can be taken in a reliable, efficient, and robust manner. Automobiles provide an interesting and challenging domain for research as well as applications of Intelligent Environment and associated technologies. Some of the ideas and concepts developed around "Smart Spaces" (rooms and buildings) can be extended to the automobile domain. However, the special constraints imposed by size, time, speed, criticality, and environmental variations, make this domain significantly different. In this presentation, we will provide a framework and roadmap for developing "active" safety systems for automobiles. We will consider three main components of the system, *driver, vehicle, and vehicle surround.* We will discuss various issues and ideas for developing of models for these main components as well as models associated with the complex task of safe driving. The presentation will include discussion of novel sensory systems and algorithms for *"holistically"* capturing not only the dynamic surround information of the vehicle but also the state, intent and behavior patterns of drivers.

Related References *(for videos and full listings visit LISA website):*

- Mohan M. Trivedi, Shinko Y. Cheng, Holistic Sensing and Active Displays for Intelligent Driver Support Systems, *Computer*, May 2007. (pdf)
- Mohan M. Trivedi, Tarak Gandhi, Joel McCall, Looking-In and Looking-Out of a Vehicle: Computer-Vision-Based Enhanced Vehicle Safety, *IEEE Transactions on Intelligent Transportation Systems*, March 2007, (pdf)
- Joel C. McCall, Mohan M. Trivedi, Driver Behavior and Situation Aware Brake Assistance for Intelligent Vehicles, *Proceeding of the IEEE, 95(2), pp. 374-387*, Feb. 2007. (pdf)
- Anup Doshi, Shinko Y. Cheng, and Mohan M. Trivedi, A Novel, Active Heads-Up Display for Driver Assistance, *IEEE Transactions on Systems, Man, and Cybernetics - Part B, Special Issue on Human Computing,* 2008.