

Street Smart



D016651-2637

SwRI Plays Significant Role in 15th World Congress on ITS

As a leader in intelligent transportation systems (ITS), Southwest Research Institute (SwRI) played multiple roles in the 15th World Congress on ITS, Nov 17-20 in New York. SwRI participated in fully integrated demonstrations showcasing “IntelliDrive” vehicle infrastructure integration, vehicle-to-roadside and vehicle-to-vehicle communications applications, and innovative mobility solutions operating on the streets and highways of New York City.

“The next generation of ITS technology is focusing on saving time, resources and, most importantly, lives,” said Dr. Steven W. Dellenback, director of SwRI’s ITS Department. “We’re solving today’s problems with tomorrow’s technology. In the near term, we are focusing on how to prevent vehicles from getting into accidents. In the long term, our vision of a vehicle that drives itself is well within our technology grasp.”

The SwRI staff coordinated and participated in an autonomous vehicle demonstration on 11th Avenue that brought together leaders in the field of vehicle autonomy to highlight what the future of

surface transportation might look like. SwRI demonstrated its fully autonomous, driverless ground vehicle negotiating a course in Manhattan, along with a DARPA Urban Challenge autonomous vehicle. A five-block section of 11th Avenue was closed to traffic to allow the teams to demonstrate applications such as vehicle-to-vehicle based collision avoidance, traffic signal violation warnings and autonomous vehicle operations.

Among the scenarios the autonomous vehicles sensed and navigated were a U-turn, closed lanes, avoiding a stalled vehicle and passing a slow-moving vehicle. The two driverless vehicles also interacted at a number of intersections with human-driven vehicles.

As a leader in ITS technologies, SwRI developed its autonomous vehicle and related technologies through a \$5 million internal research and development program called the Southwest Safe Transport Initiative. SSTI is charged with developing enabling technologies to provide cars, trucks and tractors with active safety and autonomous capabilities to improve safety and mobility in urban

An autonomous vehicle, which SwRI engineers modified from an SUV, participated in a live demonstration on the streets of New York City during the 15th World Congress on ITS in November 2008.

traffic environments. The other team in the demonstration was a successful participant in the 2007 DARPA challenges aimed at accelerating the development of autonomous vehicle technologies for military applications.

In collaboration with French national laboratory INRIA, the Institute also demonstrated how an autonomous vehicle can cooperate with a human-driven vehicle using dedicated short range communications (DSRC) to share sensor data in a pedestrian warning and avoidance system. The demonstration showed how cooperative vehicle systems can compensate for blind spots or occluded visibility at a pedestrian crosswalk.

The demonstration involved a pedestrian stepping into a crosswalk in front of a stopped vehicle, such as a



D016651-0005

Traffic signal timing can be controlled to provide priority to mass transit or emergency vehicles operating in traffic by using vehicle-to-infrastructure software applications.

D016666



bus or van. As the SwRI autonomous vehicle approached the intersection, the pedestrian could not be detected by the vehicle's onboard sensors or by the driver. Traveling in the opposite direction, another vehicle, equipped with sensors and DSRC radio, detected the pedestrian in the crosswalk and transmitted information about the crosswalk and pedestrian to the SwRI vehicle. This enhanced perception allowed the SwRI vehicle to automatically stop at the crosswalk to allow the pedestrian to safely cross.

"The cooperative sensor sharing system was first developed by SwRI and INRIA engineers on CyCabs and tested at INRIA facilities in Versailles, France," said Paul Avery, a senior research engineer in SwRI's ITS Department. "Next, the algorithms were ported onto the SwRI autonomous vehicle platform, and we developed additional interfaces for the system to utilize DSRC."

Additionally, SwRI worked with other ITS World Congress demonstrators to implement the Vehicle Infrastructure Integration test bed in Manhattan and

along the Long Island Expressway, demonstrating how the next-generation ITS technology can improve vehicle safety and efficiency. The IntelliDrive initiative is working to deploy advanced vehicle-to-vehicle and vehicle-to-infrastructure communications technologies to improve roadway safety and mobility. SwRI provided overall system integration and coordination for the tour buses and developed the probe data and mass transit/emergency vehicle signal preempt priority applications. SwRI also provided a probe data map viewer on the buses as well as a roadside probe data collection application. Congress participants were

able to ride six demonstration buses on Manhattan and Long Island test routes.

"Over the past several decades, improvements to surface infrastructure and vehicle safety systems have reduced the number of fatalities around the world. However, a significant number of vehicle accidents are still attributable to driver error," said Ryan Lamm, SwRI intelligent vehicle systems manager. "Removing the driver from the scenario could provide a safer, more environmentally friendly and more convenient way for people to commute."

Contact Dellenback at (210) 522-3914 or steven.dellenback@swri.org.