MSU testing system to plot bus runs via computers, cell phones

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Left, Georgios Lazarou, Ron Lewis, and Will Jenkins

STARKVILLE, Miss.--Mississippi State scientists and campus transportation managers are planning to launch a wireless bus-tracking system that allows students to plot university routes and pinpoint passenger pick-up times via computers and cellular phones.

The Web-based Bully's Bus Tracker will combine the latest developments in automotive telematics--computers and telecommunications--with Global Positioning System technology to create a next-generation, intelligent transportation network.

"In the future, the system will feature an automated voice dial-up capability," predicted the project's principal investigator, Georgios Lazarou. "Students will be able to access the system by laptop or cell phone, check the location of a bus, ask the estimated arrival time at a particular stop, and get a voice response in real time."

The peer-to-peer communications technology, developed by Lazarou and fellow researchers at MSU's Center for Advanced Vehicular Systems, is being pilot-tested on a few campus buses. A demonstration is available at www.bullybus.msstate.edu.

"A prototype is being deployed to determine how feasible, beneficial, cost-effective, and desirable such a system would be," said Mike Rackley, head of MSU's Office of Information Technology Services, which is providing technical support.

Ray Hayes, vice president for finance and administration, said proposed bus service improvements are part of a broader, long-range university plan to remove vehicular traffic from the inner campus. Other improvements include designated zoned parking for commuting students, gated parking lots for faculty and staff, and expanded campus hiking and biking trails.

"After testing the bus-tracking system, if successful, we will have to determine the cost before proceeding

with full implementation," he added.

According to MSU transportation coordinator Mike Harris, the university operates seven shuttle buses that average a total of 650 miles a day over three routes covering the 4,200-acre main campus and stretching into the city of Starkville. Some 2,500 students and employees ride the 30-seat buses each day.

Developing the project within the Human and Systems Engineering thrust at CAVS are Lazarou; senior software engineer Joe Picone; HSE thrust leader Zach Rowland; Ron Lewis, a CAVS research associate who developed the Web application and software infrastructure; and electrical and computer engineering graduate student Will Jenkins, the principal hardware designer.

The project has been funded so far by an ongoing collaboration among the university, the state and CAVS. "It's a great example of what can happen when good people get together and roll up their sleeves," observed Picone, a professor of electrical and computer engineering.

The MSU scientists said key objectives of the research project include developing the hardware and software necessary to perform two-way communications with a vehicle, and collecting critical vehicle performance and sensing data.

Measurement information on board most current vehicles must be integrated into new cellular modem technology that allows seamless, high-speed wireless connections. A networked vehicle system will be based on a general packet radio service provided by Cingular Wireless LLC.

Web-based position monitoring and the Geographic Information System provide an interactive map that displays the location and the routes of each bus in real time. GIS allows the final design to be scalable to wider areas such as citywide or even nationwide.

The database can be extended to include cargo contents, driver identification and name-based location data such as cities, street names and businesses. Key engine parameters such as speed, rotations per minutes, temperature, and engine load are recorded at one-second intervals and stored in a database that can be accessed via the World Wide Web.

"Transportation managers can use the system to optimize traffic flow and bus routes," said Lazarou, an assistant professor of electrical and computer engineering. "Bus drivers can use the system to avoid getting the buses too close together."

A native of Cyprus, Lazarou said CAVS' Intelligent Electronic Systems research program bridges the gap between human reasoning and microelectronics to produce a new generation of autonomous systems capable of advanced decision-making and collaboration.

"Our core competencies include wireless communications systems, speech and signal processing," he said.

Over the next five to 10 years, CAVS researchers predict, transportation systems will transition from manually-operated systems, in which traffic flow is controlled by human operators residing in a central location, to autonomous intelligent systems that react to events in real-time before humans can intervene.

Networked vehicles that perform collaborative problem-solving are expected to be a cornerstone of the U.S. Department of Transportation's Intelligent Transportation Systems program. The technology also has military and emergency response applications.

"In the grand scheme of things, the MSU project is an example of implementing an intelligent transportation system," said Picone. "This means information can be transmitted to and from cars. For example, if a crash occurs down the roadway, cars can be notified in real-time and can be diverted to other roads.

"Eventually, we'll be able to use the data we collect to do further research on many issues in transportation, including optimizing fuel efficiency and minimizing pollution," he added. "We can do full-scale simulations of new power train designs."

CAVS, headed by Don Trotter, was established in 2001 by the State of Mississippi to enhance the interaction of the state with the automotive manufacturing community. A CAVS research facility located at MSU and an extension facility near Nissan in Canton opened in 2003.

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