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Hot Topic

Intelligent Transportation Systems, Cell Phone Enhancements Improve Mass Transit

IEEE members in a field known as Intelligent Transportation Systems (ITS) are paving the way to what could become the ideal commute: fast, safe, convenient, and eco-friendly. They're doing this by using ordinary cell phones loaded with custom software, a variant of Wi-Fi communications technology named DSRC (dedicated short-range communications), and complementary technologies built into cars, buses, and roadways.

Take, for example, the Networked Traveler project led by IEEE Member **Jim Misener**, executive director of Partners for Advanced Transit and Highways (PATH) at the University of California, Berkeley, USA, and **Raja Sengupta**, IEEE member and assistant professor of civil engineering systems, also at UC-Berkeley.

Working in conjunction with the U.S. Department of Transportation, the California Department of Transportation (Caltrans), and NAVTEQ (the navigation system maps and data supplier), Misener and his team at PATH are developing a cell phone application that is intended to "affect or be a catalyst of a mode shift" to mass transit from car travel. By linking to traffic and transit information, it will enable the user to find a nearby commuter train station or bus stop, determine a mass transit route, check schedules, and find available parking near the train station or bus stop. It also will provide real-time GPS-based transit status—such as where the bus is and when it will reach the bus stop—as well as traffic and road-safety conditions, and "eco" and "fastest" driving routes. All of this could be done pre-trip or en-route in the car, and information also could be pushed to the cell phone via text or text-to-speech with technologies like RSS messaging, Misener says. The goal, he says, is to let the user determine whether mass transit would be a better way to travel to the intended destination.

In November, PATH demonstrated these and other aspects of the Networked Traveler project at the 15th Annual World Congress on Intelligent Transportation Systems in New York, using a New York City transit bus specially outfitted with a display system, DSRC, Wi-Fi and 3G cell phone service.

The Networked Traveler cell phone application is expected to be ready for public testing by March or April, and PATH is hoping to garner 1,000 users in the San Francisco Bay, Calif., USA, area, Misener says.

Another research project at UC Berkeley, dubbed Mobile Millennium, comprises an alliance of Nokia, NAVTEQ, and Caltrans, and is compiling real-time traffic data by anonymously surveying GPS-enabled cell phones at pre-determined locations on roadways in northern California. The project relies on a dedicated application that works only with unlocked Java-enabled Nokia and Blackberry phones—although a version for non-Java phones is being developed—and users of the

software also can receive real-time information about traffic along their routes, gleaned from the collective data. Several thousand copies of the application have been downloaded to phones since it was released last November and now several hundred uses are recorded per day, says IEEE Member **Quinn Jacobson**, research leader at the Nokia Research Center in Palo Alto, Calif., USA.

Of course, such success will require mass deployment of ITS technologies and no single car company can offer this on a sufficient scale. Yet with an ITS Society operating within IEEE, fostering research and development in aspects ranging from antennas and signal processors to radar systems and vehicle dynamics, “the potential is enormous,” says IEEE Member **Erik Coelingh**, technical leader for active safety functions at Volvo Car Corp. in Gothenburg, Sweden.

Coelingh is pursuing an ITS technology-driven scenario known as “platooning.” With platooning, cars wirelessly connect to buses, and automatically follow them from place to place along a designated route to a destination, without any role played by the car’s driver. The driver can instead fill the time with other activities, such as reading a newspaper.

In this scenario, a busdriver takes full responsibility for getting the passengers safely from point A to point B. Platooning extends that bus driver’s responsibility to the people in cars following the bus. The business model could include an electronic payment passed wirelessly to the bus from the car, Coelingh says, adding that existing lane-departure-warning systems could evolve to lane-keeping technology that controls the steering wheel and keeps the car on the correct path behind the bus.

Platooning will also require car-to-car wireless communications, so that each vehicle in the convoy following the bus knows what the one directly ahead is doing or about to do. This will enable simultaneous starting and stopping along the route, and also the ability to follow one another closely at high speed.

Such autonomous driving by cars will almost certainly result in safer and faster traffic flow, Coelingh adds, noting that driver error plays a role in more than 90 percent of traffic accidents. And there may be a benefit in fuel economy as driving very close together reduces drag on the platooning cars.

“We have a vision that this kind of technology will help us practically get rid of traffic accidents and reduce the number of people getting killed in these accidents,” Coelingh says.

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