

# Researcher Profile

## ***George List's system streamlines traffic flow by alerting commuters to tie-ups.***

By John Backman

Back in the 1950s, it seemed, all young boys played with cars. Few of them, however, grew up to direct traffic flow.

George List did. And someday, commuters everywhere may give thanks for that.

List, the director of Rensselaer's Center for Infrastructure and Transportation Studies, is ramping up a test of the wireless Advanced Traveler Information System (ATIS). Some 200 commuters in New York's Capital Region will use a wireless device that alerts them to impending traffic jams along the ATIS testbed — a frenetic section of U.S. Route 4 — and redirects them to a better route. All 200 devices are under evaluation now, as part of the experiment's first phase, to ensure they are ready for deployment.

"Users will turn on the device before they start their trip," explains List, who also serves as professor and chair of the Department of Civil and Environmental Engineering at Rensselaer. "Based on the feedback from the device, they'll decide when to start and what path to take. Then, as the trip progresses, they'll receive up-to-the-minute information about congestion in the network, blockages, and travel times. The software will also tell them what path will take them to their destination in the shortest time possible."

The key word is tell. The device, a combination of pocket PC, wireless GPS, PCS wireless Web access, and advanced software, actually "talks" to the commuter, providing a safer alternative than displaying the data on an in-vehicle monitor.

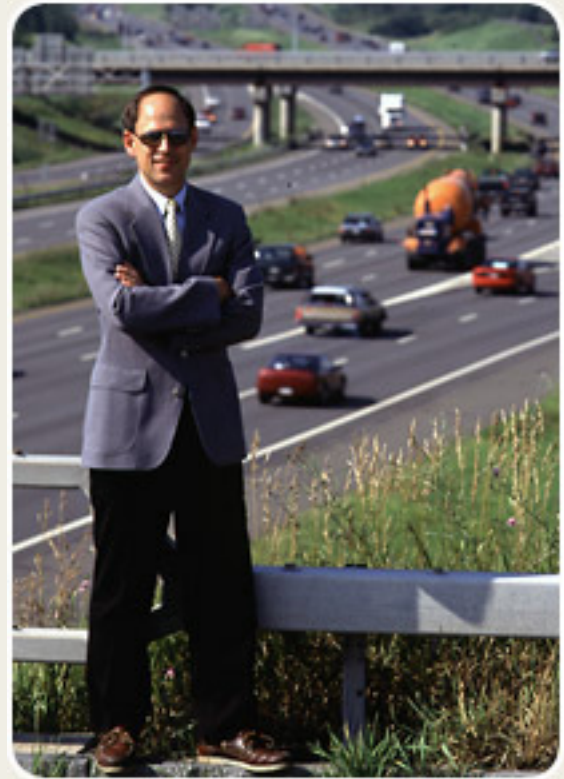
## **In the Blood**

For List, ATIS is the latest manifestation of what has literally been a lifelong interest. "I've always been fascinated by cars, planes, trains, trucks, and things that move," he recalls. "As a young kid, I always played with vehicular toys."

List, however, had something else to support his fascination: a role model. His father, a mechanical engineer, worked in advanced transportation technologies and was highly regarded for his patents on steerable trucks.

In keeping with the younger List's fascination was a corresponding interest in network analysis. Since earning his Ph.D. from the University of Pennsylvania 20 years ago, he has focused his life's work on transportation networks. "I enjoy thinking about how things move through these networks: how they are controlled, how well the network performs, how the network is designed, and how it is planned," he says. "Teaching courses like network planning and design, transportation systems operations, and traffic engineering is what I love to do."

His research interests reflect this. List has taken his primary focus — optimization and simulation-based tools for network planning, design, operation, and control — into a broad diversity of applications, from the logistics of transporting hazardous materials to advanced traffic management and traveler information systems.



George List, director of Rensselaer's Center for Infrastructure and Transportation Studies. Photo by Gary Gold.

## Toward a Smoother Commute

All of which brought him to ATIS. In the current experiment, the 200 wireless devices under preliminary testing will provide location, speed, and direction to Rensselaer's Traffic Management Center, which will track all the devices and plot their locations (along with those of all cell phones in the testbed) on a map of the road network. "The experiment is distinctive in that it involves probe densities sufficient to provide truly useful information back to the travelers," notes William (Al) Wallace, the co-principal investigator on the project.

One of the lessons already learned from the testing phase concerns battery life. "Since the devices are working hard while they are on, they draw a significant amount of power," List says. "In the long term, they will need to draw power from the car itself, from a high-capacity, longer-life battery, or from both."

Another lesson is that the GPS units must be able to see the sky consistently. In a car, that means putting the unit on the dashboard or the rear deck. Eventually, List says, these units will be built into all cars in a more permanent fashion.

Part of the genius behind ATIS is its scalability. "As long as the communications bandwidth is available, it will be relatively easy to expand ATIS throughout the whole Capital Region," List explains. "There are two reasons for this. First, the system 'bootstraps' itself: it depends on data that come from the very devices that are the end users of those data. Second, no investments in specialized communication systems are required: ATIS makes use of the cellular telephone network — specifically, the 3G Internet portion of the network, which is expanding rapidly."

## On to the Next Phase...and the Future

The second project phase will start in January, when all 200 units are put into service in the field. From there, List and his team — including researchers at Rensselaer, Cornell University, Polytechnic University, and CUBRC/Veridian Engineering — will evaluate traveler feedback and network data, then develop a plan for taking the ATIS regionwide.

The long-term benefits are substantial indeed. Not only will travelers reach their destination more quickly, but the system could deliver many benefits from streamlined traffic flow — including higher efficiency and lower automotive emissions.

