NJIT RESEARCH PROMISES HELP FOR COMMUTER HASSLES

For many people, getting to and from work can be a job in itself. Commuters trying to find the fastest, most convenient methods of travel are often frustrated because adequate information is not always available. However, at the Institute for Transportation, through a study funded by the Federal Highway Administration, researchers have developed a traveler information system that has the potential to change the daily routines of today's commuters.

Termed the Multi-Modal Advanced Traveler Information System (MATUS), this system provides travelers with the ability to choose various modes of transportation from a user friendly Geographic Information System (GIS) software platform. Users of this system can have access to information concerning route planning by private automobile, mass transit, and ridesharing.

"In today's market, you want to give commuters all the options," said Tom Batz, manager of technology for the Transportation Operations Coordinating Committee (TRANSOM), a New Jersey-based clearinghouse for transportation. "You don't want to preclude them from using transit, the highways, or even ridesharing."

Systems such as MATUS are becoming an important component of the services provided by public transportation agencies and the private sector. That's welcome news for employers of 100 or more people who, under the 1990 Clean Air Act, are requested to increase the passenger occupancy levels in their employees' vehicles by 25 percent above the regional mark. Currently, the average vehicle occupancy for the region is about 1.08. For many employers, the figure translates into 88 percent of their employees driving to work alone.

"In order to reduce congestion, you have to provide those companies or individuals with reasonable alternatives," said Joshua Greenfeld, associate professor of civil and environmental engineering and co-investigator in the project. "This system gives them alternatives." It could be accessed by telephone, fax, computer or pager, and would be maintained at a traffic information center. Once a user accesses the system, he or she has the option of selecting any or all particular modes of travel and then deciding on the best option according to his or her personal preference. A traveler can also store a default set of routinely used preferences in order to get a quick response as needed.

"You can't build new roadways now, so you have to make the most efficient use of the facilities you have," said Batz. "The way to do that is to make sure we know what's going on on those roadways so that we can react when there are problems. And we have to let the public know what's going on so that they can avoid problems."

A subscriber to MATUS would have a built-in user profile database containing personal and travel characteristics such as name, addresses and phone numbers for both home and work, preferred departure time for work, and preferred arrival time at work. In addition to the profile database, MATUS provides a user interface and three subsystems: route planning, transit information and ridesharing.

The route planning subsystem allows a traveler to select a preferred class of road facilities, e.g., no freeways or tolls. The traveller also can select the shortest or fastest route and specify intermediate stops along the way. Along with the route based on the traveller criteria, MATUS will also provide the fastest route.

"The significance of a system like this is to give the user more information," said Kyriacos Mouskos, assistant professor of civil and environmental engineering and co-investigator in the study.

In the transit information subsystem, unique algorithms were developed that allow travelers to specify their preferred maximum number of transfers and the time they are willing to wait at transfer locations, as well as the furthest distance they would be willing to walk in order to make a transfer. "Some people may not mind sitting on a bus and catching up with some reading," said Greenfeld. "Others may want to get there

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In this inaugural issue of ONRoute we are eager to indicate the status of the development of NJIT’s Transportation Program.

Authorized in 1990 by the New Jersey Board of Higher Education to award designated M.S. and Ph.D. degrees in transportation, the Institute for Transportation (IT) currently awards more than 20 M.S. degrees each year to students at its Newark and Trenton campuses. The first Ph.D. degree was awarded at the October, 1994 graduation, and the second at the October, 1995 graduation (see Boile, this page).

As shown on the organizational chart, IT also administers other activities. Research programs have been enhanced under two major initiatives:

- The National Center for Transportation and Industrial Productivity (NCTIP), one of three national university transportation centers designated by the Research and Special Projects Administration of the USDOT. This is a significant source of funding for student support, programmatic development, research activities and technology transfer. The research activities include studies of freight and passenger movement, and facilities, institutions and regulations.

- The Intelligent Transportation Systems (ITS) program which supports research in areas such as electronic toll collection, evaluation of ITS systems, innovative ridesharing systems, advanced traveler information studies, and incident management.

Under Other Sponsored Programs, the Institute has been conducting a Pipeline Safety Study for the Research and Special Programs Administration (RSPA) of the USDOT. One of the objectives is to evaluate and develop criteria for the siting of gas and hazardous liquid transmission pipelines in proximity to the public in urban areas and in sensitive environments. This study should optimize safety to the public in siting of these pipelines.

In the area of Technology Transfer, IT promotes immediate and ongoing exchange of ideas via technical briefings, seminars, newsletters, working papers, report dissemination and continual regional contact with the public and private sectors. Notice of these activities may also be found on NJIT’S World Wide Web Home Page (WWW. NJIT. EDU/IT).

The Institute for Transportation is comfortably housed in Tiernan Hall in a complex which accommodates the faculty, staff and students. We would be delighted, if you are in the “neighborhood”, to have you stop by for a visit.

Dr. Maria P. Boile

Following her stated wish to pursue her career in academia, Dr. Maria P. Boile, 1995 recipient of the second transportation doctorate to be awarded by the Institute for Transportation, has joined the faculty of the Civil and Environmental Engineering Department at Lafayette College in Easton, Pennsylvania.

In the past two semesters, Dr. Boile has developed and taught junior and senior level courses in Transportation Engineering and Planning, and Mass Transit Systems, finding teaching both enjoyable and challenging as she works to find ways of presenting material most effectively. To this end she has joined the Teaching Enhancement Group, an informal assemblage of Lafayette faculty who meet to talk about teaching, with topics ranging from the concrete in how to design syllabi to the less concrete such as active learning.

Dr. Boile is recipient of a Knight grant, a research initiation grant given to a few new faculty each year, which provides funds for student support and equipment. Last semester she guided an independent study related to her doctoral dissertation research on intermodal highway-rail network equilibrium modeling. This work was innovative and had theoretical and practical applications in the fields of urban transportation planning and modeling, and optimization of transportation networks.

She is looking forward to continuing her work in the areas of mass transit and intermodal passenger and freight movement, involving students and exposing them to real world transportation problems.
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faster and may be willing to make two transfers.” Transit networks and schedule information are coded into the GIS. In addition, the menu-driven user interface in the subsystems provides travelers with the ability to make changes to their profiles in an efficient manner. "We also implemented something that is unique," said Greenfeld. "If you leave at a certain time, you can ask for the time you want to arrive at your destination. If you state your arrival time, the system can tell you what time you need to leave your house."

The ridesharing subsystem has, perhaps, the greatest potential for use, and is probably the cheapest and most immediate method for reducing traffic congestion. "From our standpoint, we need as much ridesharing as possible to reduce the number of cars on the road," said Noreen Cardinali, manager of the Employer Trip Reduction Program at the New Jersey Department of Transportation. "If you look at the numbers, there are more people car pooling and van pooling than there are using mass transportation. That's because you have car pools and van pools running in suburban areas of the state where there is no form of mass transportation." MATIS identifies potential ride sharers by matching area, time schedules, and user preferences. An algorithm was developed that takes into account the time of departure from home and work location, pickup and drop off radii, maximum tolerances of time allowed at both ends of the trip, off days, age, and even smoking habits. "Public transportation can't be all things to all people," said Cardinali. "There's a limit to how far out into some of the rural areas it can go. And some people prefer to have door-to-door service. With car pooling and van pooling, you can get door-to-door service."

Various advanced traveler information systems are currently being used at kiosks in supermarkets, roadside rest areas, shopping malls, and major businesses in the Los Angeles area. "The most important benefit of this system is that the user will have information with which to make an intelligent choice about the mode of transportation to choose," said Lou Pignataro, executive director of the Institute for Transportation at NJIT and a co-investigator in the project. "The degree of sophistication of our system is probably beyond what others have done."

The next step toward implementing MATIS is to develop a customized system for real-time operation. An efficient platform to handle multiple queries in a short time frame still needs to be designed.

Eventually, more functions and services will be added to the system. "It's just a matter of developing the database," said Greenfeld. "It's not a matter of developing the logic. The logic is there."

Real-time implementation will require traffic surveillance and communications and data processing systems that can handle the queries. "The provision of multiple alternatives to the users for reaching their destinations, taking into consideration the variability among travelers, understanding their specific needs and preferences, and a user friendly service environment, will make MATIS attractive to the public," said Pignataro.

Principal investigators for this study are Kyriacos Mouakos, Joshua Greenfeld and Louis J. Pignataro.

Arlene R-M Willis, ‘94, ‘95, B.S.I.E., M.S. (Transportation), was awarded the University Transportation Center Student-of-the-Year Award administered by the Research and Special Programs Administration (RSPA) of the USDOT. Presentation of this award took place January 8, 1996 in Washington, D.C. at the 75th Annual Meeting of the Transportation Research Board. Her Paper: “Evaluating Transportation Needs in a Developing Country: The Case of Montego Bay Free Zone Employees” was presented at this meeting.

Ms. Willis is a past recipient of the Dwight David Eisenhower Fellowship from the National Highway Institute, an agency of USDOT. She was assigned to FHWA headquarters in Washington, D.C. where she worked on the project “Developing Effective Congestion Management Systems”, coordinating four case studies. Her work in CMS appears in the September, 1995 Metropolitan Planning Technical Report.

Ms. Willis is a registered consultant with the Inter-American Development Bank (IADB) - a multi-lateral funding organization whose objective is the development of sustainable infrastructure for countries in Latin America and the Caribbean. She and also serves as Membership Committee Chairperson of the Women’s Transportation Seminar of South Florida.

Currently, she is employed as a transportation planner by David Plummer & Associates in Coral Gables, Florida.
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