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Dynamic Travel Information Personalized and Delivered to Your Cell Phone

Florida 511 (FL511) is Florida’s main system for public travel information. Despite extensive, live coverage of travel conditions on interstates, the FL511 Web site provides users with links only to transit system Web sites. Alerts, delivered only via text message, email, or phone call, are sent for a few interstates and major roads in Florida; they can be so numerous that useful information is lost, and accessing these messages while driving is hazardous.

Researchers at NCTR investigated improving FL511, focusing on information delivery that is pertinent, timely, and customized to individual travel behavior.

The researchers had previously developed TRAC-IT, a software system that collects data about a user’s travel behavior and delivers real-time, location-based services using GPS-enabled mobile phones. This project enhanced TRAC-IT’s abilities by adding Path Prediction technology, by which TRAC-IT creates a profile of a traveler’s typical daily movements and provides travel information or alerts based on this profile. For example, TRAC-IT can anticipate that a traveler is likely to drive home after work and can provide a travel advisory for the

317 trips were recorded by 14 volunteers over 3 months

Personalized travel information provides users with direct participation incentives

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It seems that virtually every industry today is concerned with workforce development. As the baby boomers retire and take their skills with them, how will they be replaced, and in a world of rapidly-changing technology and skill requirements, how will good employees be retained? Public transportation is particularly focused on identifying ways to attract and retain quality employees. Many of today’s public transit systems hired in large numbers in the 1970s as private transit systems went out of business and were replaced by public authorities. The employees who joined in the 1970s are retiring, while the technology of buses and trains makes remarkable strides and requires people with electronics and computer skills. More significantly, many in the public transportation sector will tell you that they knew nothing about transit career opportunities when they were growing up. By most accounts, public transit is “the accidental profession.”

A significant symposium on Workforce Development was sponsored by the Council of University Transportation Centers in Washington, D.C. in April 2012 that brought together representatives from transportation, higher education, government, consultants, and many more to develop strategies for moving forward that will continue to be refined and implemented. NCTR is contributing in many ways to a massive initiative to attract and retain public transit employees.

USF and our NCTR partners at North Dakota State University, the University of Illinois at Chicago, and Florida International University all engage students on our research projects to introduce them to the real issues facing operating transit agencies, and some are placed in internships at these agencies. Several UTC consortium faculty are developing a new curriculum for universities throughout the country to introduce students to transit. NCTR produced “Careers in Transit,” a video designed for teenagers that emphasizes the green nature of transit and the technology being used (viewed on YouTube almost 13,000 times).

We also produced a “Guidebook for Startup Transit Agencies” that enables people new to the industry to understand transit regulations and requirements so they can fully understand their new positions. Fellow NCTR researcher Jill Hough and I serve on a national Advisory Board for a project underway at the Heldrich Center for Workforce Development at Rutgers entitled “Public Transit Occupational Guidebook” that identifies the 170+ different job classifications in the transit industry and the skills necessary for such work. This is the first comprehensive presentation of transit career opportunities and will be shared with secondary schools, colleges/universities, guidance counselors, and employment agencies, among others. We hope that public transportation—an industry providing so many good professional opportunities and a service so helpful to our economy, environment, and quality of life—will no longer be referred to as “the accidental profession.”

Joel Volinski
Director, National Center for Transit Research
typical route. TRAC-IT supports other modes, such as public transportation, walking, or biking.

The researchers designed a Fast GPS Clustering algorithm that uses location data from GPS-enabled mobile phones to determine points-of-interest the traveler often visits. This algorithm’s efficiency, compared to traditional hierarchical clustering, is critical for processing large volumes of GPS data. A Trip Segmentation (TS) algorithm divides GPS data into trips between points-of-interest to produce origin/destination models. A Naïve Bayes classifier predicted probable traveler destinations and departure times.

Researchers extended TRAC-IT’s abilities by accessing data from Hillsborough Area Regional Transit’s automatic vehicle location (AVL) system and showed how to combine FL511 with transit data to create a multimodal traveler information system. Having one application that informs users about both traffic congestion and public transit options may encourage travelers to use transportation alternatives.

Using the text-to-speech converter of the Android (Google, Inc.) smartphone operating system, researchers produced a mobile application, Traffic Text-to-Speech (TTS) that speaks alerts without driver action, creating a safer interaction between the driver and the alert system. Traffic TTS tracks user speed and waits for a complete stop before notifying the user of pending alerts.

This project showed that Florida’s traveler information system can be extended to other data sources, including public transportation, and provide timely, personalized, and appropriate information. Future work will focus on extending FL511 to more roads, integrating more real-time transit information, and deploying project technologies to the public.


For more information, contact NCTR Senior Research Associate Sean Barbeau, barbeau@cutr.usf.edu.
Enabling Cost-Effective Multimodal Trip Planners through Open Transit Data

Electronic navigation systems are now common and widely used, via Internet services, handheld devices, and devices in vehicles, to guide drivers using instructions and maps. Next-generation systems will plan trips by other modes, such as public transportation, bicycling, and walking, and will be able to link different modes in one trip (e.g., bike to bus). Multimodal navigation systems will serve a broad range of users and promote alternative transportation.

Current trip planners, such as Google Maps or Bing Maps, use proprietary systems and data collections that are updated slowly and include few alternative modes for limited areas. These services are not positioned to take advantage of user communities that can contribute and update large amounts of data or to respond to the needs of individual communities. Implementing a new proprietary multimodal trip planner in a city can be cost-prohibitive for many communities, as demonstrated by GoRoo.com in Chicago, which cost more than $1.2 million to implement.

In this project, NCTR researchers examined the feasibility of building less expensive multimodal navigation systems using publicly available data and open-source trip planning software. The researchers identified basic requirements for a multimodal
trip planner, considering the unique needs of walkers, cyclists, and people with disabilities. For example, most navigation systems are concerned with finding the shortest or quickest route, but a walker or cyclist may be most concerned with a route’s safety. Travelers with disabilities may want to know about impediments or support, such as stairs or curb cuts.

The researchers identified the open multimodal data at OpenStreetMap.org and the open-source trip planner at OpenTripPlanner as useful to software developers implementing a multimodal navigation system. They describe in detail how to acquire data from public sources, including transit agency General Transit Feed Specification (GTFS) datasets, to expand the multimodal information that drives the system. Because OpenStreetMap (OSM) is user-extensible, as the researchers reviewed data from OpenStreetMap, they also proposed several changes to OpenStreetMap coding conventions to improve its ability to meet the needs of a multimodal trip planner.

To add transit data to OpenStreetMap more easily, an open-source software tool, GTFS-OSM Sync (GO-Sync), was developed that synchronizes bus stop data between transit agencies and OpenStreetMap. GO-Sync allows transit agencies to benefit from crowdsourced improvements to their bus stop inventory. Researchers also deployed a working OpenTripPlanner website prototype that uses data conforming to the conventions outlined in the project. Users of the website were able to compute routes between points, with links between walking, bicycling, and transit as needed to accomplish desired trips.

The results of this project allow local transit services to develop practical, cost-effective multimodal trip planners drawing on local data interests.


For more information on the project, contact NCTR Research Associate Edward Hillsman, hillsman@cutr.usf.edu.

Example intersection to illustrate tagging of crosswalks, sidewalks, curb cuts, and signals.
Elected officials, government executives, and transportation agencies are continually challenged to assess and explore methods for more efficient operation. One method long credited with increasing efficiency while reducing costs is contracting with the private sector to provide transit services. The trend for transportation agencies to purchase some or all of their services has shown a steady increase.

The Florida Department of Transportation (FDOT) contracted with CUTR and NCTR to investigate, document, analyze, and synthesize previous privatization experiences of providing fixed route bus public transportation services in Florida and the U.S. The extensive body of experience with purchasing transportation services reveals the pros and cons of this approach to more efficient use of public resources, as well as the strengths and weaknesses of the decision-making processes that led to transportation contracts. The researchers conducted a comprehensive review of past studies and reports on the topic of contracting fixed route bus service in the U.S. A 2001 report from the Transportation Research Board's Special Report 258, Contracting for Bus and Demand-Responsive Transit Services, provided an important historical view of the topic, with extensive survey results from 2000. Perspectives from this work were combined with those from other researchers to provide a timeline of the development of public transportation contracting and lessons learned. Reviewing studies going back to the '80s, the researchers found that the decision to purchase services and the degree of success in doing so depended on completeness in assessing the costs and benefits, especially understanding the costs of administering, contracting, and oversight.

Using the National Transportation Database, researchers examined trends in purchasing services by region, by type of service purchased, and by size of agency. The report includes detailed comparisons based on operating cost per revenue mile, per revenue hour, and by passenger mile. Researchers found that set

**Increase in percent of public transportation vehicles operated through purchased services for the U.S., the Southeast, and Florida from 1998 to 2008 (NTD data).**
routes profited least from purchasing services, while demand response services profited most. Smaller agencies tended to purchase a wider range of services.

From their investigation, the researchers derived a series of critical questions that can assist policy makers in evaluating decisions to purchase services. They also supply a set of best practices to help guide the decision-making process.

For more information on this project, contact CUTR Transportation Program and Economic Analysis Program Director Steve Reich, reich@cutr.usf.edu.

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**NCTR Student Receives APTA Foundation Scholarship**

Kyle Taniguchi, a candidate for a master’s degree in Civil Engineering at USF and a research assistant at NCTR, was the recipient of an American Public Transportation Foundation scholarship presented to him at the APTA Annual Meeting in New Orleans in October 2011. In addition, he was honored to be asked to help Linda Bohlinger, Chair of the American Public Transportation Foundation and VP and National Director of Management Consulting for HNTB Corporation, to present a $50,000 check during the retirement tribute to APTA President Bill Millar, which will be used to establish a new APTA scholarship award bearing Mr. Millar’s name. Millar has been a longtime supporter of NCTR and serves on the Editorial Board of NCTR’s *Journal of Public Transportation*.

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**NCTR-Hosted Public Transportation Listservs**

- All CUTR/NCTR listservs – access via [http://lists.cutr.usf.edu/read/all_forums](http://lists.cutr.usf.edu/read/all_forums)
- BFM—General (transit maintenance) – discussion forum; 337 subscribers
- Bus Rapid Transit (BRT) – discussion forum; 487 subscribers
- Journal of Public Transportation (JPT) – announcements sent by NCTR including calls for papers and availability of the online copies of NCTR’s academic journal on public transportation; 487 subscribers
- National Center for Transit Research (NCTR) – announcements of publications, conferences, etc.; 1,265 subscribers
- Parking Management (Parking) – discussion forum; 294 subscribers
- Rural Transit Assistance Program (RTAP) – discussion forum; 120 subscribers
- Sustainable Transport Indicators – 276 subscribers
- Telework – discussion forum; 364 subscribers
- Transportation Demand Management (Transp-tdm) – discussion forum; 1,974 subscribers
### FY 2012 Newly Designated NCTR Projects

- Evaluation of Camera-Based Systems to Reduce Transit Bus Side Collisions *(Pei-Sung Lin, CUTR, 77940)*
- A Tool for Assessing Economic Impacts of Public Transit Spending *(Xuehao Chu, CUTR, 77941)*
- Flexible Public Transportation Services in Florida *(Jay Goodwill, CUTR, 77942)*
- Tracking Costs of Alternatively-Fueled Buses *(Steve Reich, CUTR, 77943)*
- Effectively Managing Consumer Fuel Price-Driven Transit Demand *(Justin Begley, CUTR, 77944)*
- TBEST Calibration for Guideway and BRT Modes *(Steve Polzin, CUTR, 77945)*
- Ridership Impacts of South Florida’s EASY Smart Card *(Ann Joslin, CUTR, 77946)*
- Improving Cost Effectiveness of Financial Incentives in Managing TDM *(Chanyoung Lee, CUTR, 77947)*

### FY 2012 Ongoing NCTR Projects

- An Assessment of Public Transportation Markets Using NHTS Data *(Xuehao Chu, CUTR, 77920)*
- Improving Value of Travel Time Savings Estimation for More Cost-Effective Transportation Project Evaluation *(Victoria Perk, CUTR, 77921)*
- Project UCARE: Uniform Cost Accounting and Reporting Elements for TDM *(Phil Winters, CUTR, 77922)*
- Tracking Costs of Alternative Fueled Buses in Florida *(Steve Reich, CUTR, 77927)*
- Best Practices in Bus Dispatch *(Chris Deannuntis, CUTR, 77930)*
- Assessing the Impact of Proposed Transit Investments and Public Policy Choices on Land Use Patterns (A Simulation Approach with UrbanSim) *(Chanyoung Lee, CUTR, 77931)*
- Dynamic Delivery of the National Transit Database Sampling Manual *(Xuehao Chu, CUTR, 77933)*
- Analysis of the Implementation Status of Impact of Transit Research *(Michael Audino, CUTR, 77934)*
- Development of a Regional Public Transportation GIS Architecture and Data Model *(Sean Barbeau, CUTR, 77935)*
- Quantifying the Benefits of the TRIP Program *(Jan Davis, CUTR, 77936)*
- Field Evaluation of Yield-to-Bus Roadside Treatments and Bus Pullout Bays Design Characteristics *(Pei-Sung Lin, CUTR, 77938)*
- Forecasting Paratransit Services Demand—Review and Recommendations *(Jay Goodwill, CUTR, 77939)*

### NCTR Projects Completed in FY2012

- Expanding the Google Transit Feed Specification to Support Operations and Planning *(Martin Catalá, CUTR, 77902)*
- Analysis of Contracting for Fixed-Route Bus Service *(Steve Reich, CUTR, 77923)*

Information on NCTR research projects and contact information for principal investigators can be accessed at [http://www.nctr.usf.edu/research/research-fy-2006-2012](http://www.nctr.usf.edu/research/research-fy-2006-2012).