Progress Performance Report
for the
New England University Transportation Center
Massachusetts Institute of Technology

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Reporting Period: July-December 2014

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University Transportation Centers Program - Region 1

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04-210-3594

Recipient Account No
6925355

Joseph F. Coughlin, Director
coughlin@mit.edu
617.253.4978

Massachusetts Institute of Technology
77 Massachusetts Avenue, E40-279
Cambridge, MA 02139
REPORTING CATEGORIES

1. Accomplishments

Major goals as stated in New England UTC Prospectus

Research Goal

- To conduct research in technology applications and systems integration with related work in policy, planning and human factors that improve transportation safety as well as further our understanding and realization of livable communities to support mobility across the lifespan.

- To support peer-reviewed investigations that address safety and livability by exploring and furthering research, policy, and practice in the application of ubiquitous intelligence, use of big data, and improved human performance.

Following is the list of the 45 research projects under this grant, and their current status:

<table>
<thead>
<tr>
<th>Project No.</th>
<th>PI</th>
<th>Project Title</th>
<th>Status</th>
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<tbody>
<tr>
<td>MITR24-1</td>
<td>Ben-Akiva Abou-Zeid Zegras</td>
<td>Capturing the Relationship between Motility, Mobility and Well-Being Using Smart Phones</td>
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<td>MITR24-2</td>
<td>Coughlin</td>
<td>Transportation Wellbeing, Age and Safety</td>
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<td>MITR24-3</td>
<td>D'Ambrosio</td>
<td>Assessing Alternative Transportation Options for Older Users</td>
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<td>MITR24-4</td>
<td>Glass Mehler</td>
<td>Spoken Dialog Planning to Reduce User Distraction in Mobile Environments</td>
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<td>MITR24-5</td>
<td>Gonzalez</td>
<td>Transportation Model in the Boston Metropolitan Area from Origin Destination Matrices Generated with Big Data</td>
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<td>MITR24-6</td>
<td>Murga Salvucci</td>
<td>Kendall Square: Lessons Drawn from Its Past Development to Guide Its Future</td>
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<td>MITR24-7</td>
<td>Osorio</td>
<td>Simulation-Based Energy-Efficient Transit Signal Priority Strategies</td>
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<td>MITR24-8</td>
<td>Reimer</td>
<td>Technology Adoption and Use Across the Lifespan</td>
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<td>MITR24-9</td>
<td>Salvucci Murga</td>
<td>Development of a &quot;Universal&quot; Residential Public Transportation Pass, as Part of a Comprehensive Multi-Modal Approach to Urban Parking</td>
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<td>Goentzel</td>
<td>Big Data During Crisis: Lessons from Hurricane Irene</td>
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<td>Determining Performance Measures to Evaluate the Effect of High Speed Rail on Communities’ Livability</td>
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<td>Giles</td>
<td>Disaster Recovery for Transportation: China’s Wenchuan Earthquake of 2008 and Japan’s Tohoku Earthquake and Tsunami of 2011</td>
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<td>The Politics of Transport Policy in the Greater Copenhagen Region</td>
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<td>Cell Phones and Vehicle Safety</td>
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<td>UMAR24-14B</td>
<td>Christofa</td>
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<td>Signal Timing Optimization for Improved Person Mobility and Air</td>
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<td>A Person-based Comparison of Transit Preferential Treatments on Signalized Arterial Corridors</td>
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<td>ADHD Teen Driver Evaluation and Training Tool Development</td>
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<td>UMAR24-17</td>
<td>Fisher</td>
<td>Romoser</td>
<td>Moving Map Displays: Using CTIL and Eye Tracking Technologies to Measure Distraction in Locomotive Cabs</td>
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<td>UMAR24-18</td>
<td>Ganz</td>
<td>Collura</td>
<td>Hybrid NFC and Vision Based Navigation System in Subways for the Blind and Visually Impaired</td>
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<td>Gao</td>
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<td>A Spatial Learning Model for the Micro-Simulation of Travel Dynamics</td>
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<td>UMAR24-19A</td>
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<td>An Optimal Adaptive Routing Algorithm for Large-Scale Stochastic Time-Dependent Networks</td>
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<td>Cognitive Maps for Route Choice Modeling</td>
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<td>Jones</td>
<td>Statmatiadis Robust Performance of Transportation Networks Using Quantile Metrics</td>
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<td>UMAR24-23</td>
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<td>Making More Value out of Transportation Data</td>
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<td>Modeling Drivers’ Lateral Motion Control</td>
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<td>Reducing Older Driver Crashes: Technology, Training and Livable Communities</td>
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<td>ITS Equipment Placement for Safety and Mobility</td>
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<td>Security &amp; Privacy Breaches in ETPS: Problem Survey &amp; Case Study of I-90</td>
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<td>UCNR24-28</td>
<td>Garrick Atkinson-Palombo</td>
<td>The Impact of Parking Policies on the Long-term Vitality of American Cities</td>
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<td>UCNR24-28A</td>
<td>Garrick Atkinson-Palombo</td>
<td>Assessing the Full Cost of Parking Provision from the Perspective of the Municipality</td>
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<td>Ivan Ravishanker</td>
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<td>UCNR24-30A</td>
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<td>UCNR24-31</td>
<td>Konduri Lownes</td>
<td>Transportation System Modeling in the Information Era</td>
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</table>
Accomplishments under the New England UTC’s research goal

Dr. Coughlin featured in Washington Post article on older drivers and new car tech  
July 10, 2014

The Washington Post featured a story on older driver safety education and new car technology, highlighting AARP’s Driver Safety Program, the largest older driver education program in the nation. Last year, New England Center director Joe Coughlin led an expert committee advising AARP on changes and updates to the course in light of a changing older driver population, dynamic context of road safety and new technology. A key component of the course update addresses new vehicle systems that may improve safety but introduce new challenges such as learning to use and trust devices that add complexity to the decades of experience an older driver has had with automobiles. Coughlin notes in the Washington Post article that the car has historically been mechanical, but is increasingly software-heavy. Coughlin adds that new technology demands a new car buying experience—one that focuses on educating buyers on navigating these valuable systems easily and safely.

New England Center and Toyota test your texting-while-walking  
September 19, 2014

Toyota’s Distracted Walking Dojo is a demonstration developed for workplace education by Toyota’s Corporate Safety Team that utilizes a texting simulation exercise developed by MIT’s New England University Transportation Center. Watch a video of the demonstration which is intended to demonstrate how using a device while walking affects cognitive ability. It is a very revealing exercise, and shows how dangerous any kind of distraction involving a portable device can be—whether walking or while behind the wheel of a car.

Dr. Coughlin in Fast Company Magazine special HP issue on future of transportation  
September 25, 2014

Joe Coughlin, Director of the New England University Transportation Center, was featured by Fast Company Magazine in a special section sponsored by HP on the future of transportation. Coughlin discussed how the aging of society places new demands on the transportation system driving innovation in vehicle design, transit services and livable communities. The article featured his work with Toyota, USDOT and others, working on vehicles that are more connected and aware of driver state and well-being.

The Center Announces DOT’s 2015 Transportation Internship Program for Diverse Groups  
October 21, 2014

DOT’s Summer Transportation Internship Program for Diverse Groups (STIPDG) provides a unique opportunity to gain valuable professional experience and skills that will complement one’s academic pursuits. This hands-on program is designed to mentor and cultivate tomorrow’s leaders, strengthen
their understanding of the transportation industry and prepare them for future public service opportunities. This is a paid internship program open to all qualified candidates; the internship period is June 8-August, 15, 2015.

**Study performed in New England Center driving simulator featured in Wired magazine**
**November 17, 2014**
Wired spoke with New England Center research scientist Bruce Mehler regarding a study of university students who were using Google Glass while in a driving simulator. The piece concluded: “Turns out, hands-free driving doesn’t mean distraction-free driving. But whether Google Glass, which is largely hands-free and uses visuals projected into your line of sight, is the best of a bad lot hasn’t been answered just yet.” Read the article at Wired.com

**New England Center names outstanding student award recipient**
**December 1, 2014**
Ms. Jing Ding-Mastera has been named the winner of the UTC Outstanding Student of the Year Award 2014 for the New England (Region One) University Transportation Center. She will be honored at a special ceremony to be held during the CUTC Annual Banquet at the 94th Annual TRB meeting in Washington, DC on January 10, 2015. She also received $1000, a certificate from USDOT, two free registrations to the CUTC Banquet, and free travel expenses to Washington.

**New England Center researcher quoted in AARP Bulletin**
**December 5, 2014**

**Project UMAR24-27**
**Security & Privacy Breaches in ETPS: Problem Survey & Case Study of I-90**
The research concerns gathering news reports of security and privacy breach violations in electronic transportation payment systems (ETPS) over a sixteen-year period from the year 1997 until 2012. One new development is that news articles reporting the same breach event have been identified, so that website users may now browse all reports on the same event as a group. In addition, the research has produced and validated a completed computer simulation using VISSIM traffic software of the entire I-90 Massachusetts Turnpike. This was accomplished using real data provided by the Mass Pike agency. The long stretch of the Mass Pike ticketing tolling system in Massachusetts, both eastbound and westbound, and all of its exit/entrance plazas, have been constructed in VISSIM. Analyses of the impacts of adopting protective measures on transponders have been completed.

**Project UCNR24-29**
**Automated Congestion Prediction with Smart Phones**
The former postdoctoral fellow supported by this project is now an assistant professor in the Electrical and Computer Engineering Department at the University of Massachusetts, Dartmouth. He has recruited a PhD student who has explored implementations with several alternative technologies. These include mobile application development, GIS systems, and database management systems. The PI and former postdoctoral fellow are preparing a conference paper to share the results of the first application developed.

**Project UCNR24-31A**
**Crowdsourcing Real-Time Traveler Information Services: Issues, Challenges and Recommendations**
The research goal is to evaluate the feasibility and applicability of crowdsourcing as a solution for real-time traveler information services for the shuttle bus service serving the University of Connecticut. To this end, a number of off-the-shelf smartphone tracking applications were explored. After a thorough review, two android solutions, namely Tracccar (http://www.tracccar.org/) and GPSLogger (http://code.mendhak.com/gpslogger/), were selected. Real-time shuttle data was collected using the two applications to mimic data that would potentially be provided by participants in a crowdsourced solution for real-time traveler information. An analysis of the smartphone trajectories...
and comparison with ground truths indicated that while not ideal (owing to issues of accuracy) the
data collected from smartphone is reasonable and can be utilized to provide real-time traveler
information.

**Project UCNR24-32A**
**Spring 2014 Pilot Project Competition**
A pilot project competition at the University of Connecticut was executed during August-September
2014, resulting in five seed research projects selected:

**Training the Next Generation of Transportation Professionals: Multi-media Communication**
**Training for Transportation Sustainability**
PI: Carol Atkinson-Palombo (Geography)  
Funding award: $10,270 (Federal), $21,382 (Match)

**Interdisciplinary Seminar Series in Livable Transportation Systems and Urban Planning**
PI: John Ivan (Civil Engineering)  
Funding award: $2,000 (Federal), $2,000 (Match)

**The Double Dividend: Capturing Environmental and Economic Benefits from Connecticut's**
**Deep Water Ports**
PI: Fred Carstensen (Economics)  
Funding award: $15,800 (Federal), $19,733 (Match)

**The Suburbanization of American Cities Post World War II: Documenting, Visualizing and**
**Analyzing the Impacts using Hartford, Connecticut as a Case Study**
PI: Norman Garrick (Civil Engineering)  
Funding award: $8,382 (Federal), $9,052 (Match)

**Climate Adaptation in New London Harbor: Whoever Moves First Wins?**
PI: Bruce Hyde (Land Use Academy)  
Funding award: $15,644 (Federal), $15,705 (Match)

**How the New England UTC's research results have been disseminated**

**Dr. Reimer speaks at HMi 2014 Concepts & Systems**
**July 15, 2014**
"Global Premier: The Second International Conference on Human Machine Interaction 2014" is an
annual research conference aimed at presenting current research being carried out. The idea of the
conference is for the scientists, scholars, engineers and students from the universities all around the
world and the industry to present ongoing research activities, and, hence, to foster research relations
between the universities and the industry. New England UTC research scientist Bryan Reimer spoke
at this conference on July 10 in Berlin, Germany. He presented on HMI concepts for autonomous
driving, augmented reality, voice control and speech recognition, and multimodal interface
management.

**New England Center sponsors Auto-UI**
**September 18, 2014**
The New England University Transportation Center sponsored AutomotiveUI 2014 in Seattle,
Washington in collaboration with The Pacific NW Transportation Consortium. AutomotiveUI—the
International Conference on Automotive User Interfaces and Interactive Vehicular Applications—is the
premier forum for UI research in the automotive domain. It brings together researchers and
practitioners interested in both the technical and the human aspects of in-vehicle user interfaces and
applications. The conference addressed novel in-vehicle services, models of and concepts for
enhancing the driver experience, driver performance and behavior, and the development of semi-
autonomous driving.
New England Center releases new research on voice interfaces in cars
September 20, 2014
Automotive voice-command interfaces may require more visual engagement from drivers than previously thought, a recent series of New England University Transportation Center studies have found. New England Center associate director Bryan Reimer and research scientist Bruce Mehler, and colleagues set out to assess whether and to what extent voice-command interfaces impact driver behavior. As the results came in, however, a more complex picture emerged. Their findings clearly illustrate that modern vehicle interfaces can be highly multi-modal in nature, drawing upon various degrees of auditory-vocal-visual-manual and cognitive resources. Consequently, all such potential resource demands should be considered in evaluating drivers’ interactions with in-vehicle and portable interfaces.

Dr. Reimer speaks at the Vermont Highway Safety Alliance annual meeting
October 15, 2014
Dr. Bryan Reimer, Associate Director of the New England University Transportation Center, presented at the Vermont Highway Safety Alliance Annual Meeting in Killington Vermont October 14, 2014. In his talk titled, “Human Centered Considerations: Future Vehicles & the Aging Operator,” he described a vision for the future of older adult mobility in a radically changing operational environment that includes advanced driver assistance systems and increased automation. With the recent implementation of a hand-held device ban in Vermont, voice interfaces may provide for an acceptable and potentially safer alternative.

NE Center researchers present award-winning Google Glass driving simulation study
November 24, 2014
An extended presentation on the study “Comparing the Demands of Destination Entry using Google Glass and the Samsung Galaxy S4” was made at the 2014 Human Factors and Ergonomics Society Annual Meeting. This study was aimed at understanding how driving performance and attentional resources could be affected when using modern navigation entry devices while operating a vehicle. The extent to which older drivers or individuals with less technology experience might respond to the new Google Glass interface is an open question for further research. Building on this and related work, the researchers will continue to explore both basic and applied research aimed at supporting a better understanding of factors relevant to finding safe and effective methods of integrating technology into everyday life.

Project UMAR24-14B
Deterministic and Simulation Tests of the Emission-Based Signal Control System
The research team performed an evaluation of the previously developed emission-based signal control system through both deterministic and stochastic arrival tests. These research results, along with the ones from the last reporting period, will be reflected in a paper that will be presented at the 94th Annual Transportation Research Board Meeting in Washington DC on January 11-15 and is under review for publication in the Transportation Research Record.

Project UMAR24-15
Analytical Model Improvements to Incorporate the Impact of Bus Stops on Car and Bus Operations.
The analytical model that was previously developed for estimating the impact of transit preferential treatments on person delay and person discharge flow was improved to account for the impact of bus stop on car and bus operations. Lane-changing behavior due to the presence of bus stops was also taken into account. We also performed additional tests to evaluate the performance of different preferential treatments on a four-intersection signalized arterial using the improved models mentioned above. These research results will be reflected in a paper that will be presented at the 94th Annual Transportation Research Board Meeting in Washington DC on January 11-15 and is under review for publication in the Transportation Research Record.
Project UCNR24-28
The Impact of Parking Policies on the Long-term Vitality of American Cities
The results of this research study have been reported widely in the national media, including in Bloomsburg Business Week, Connecticut Public Radio, and StreetBlog.

Project UCNR24-29
Automated Congestion Prediction with Smart Phones
Results are being prepared for submission to the International Conference on Software Engineering and Knowledge Engineering. This paper will provide details of the experience gained implementing the mobile application and database server. It will also report steps that were taken to integrate these two so that location data could be transmitted from the app to the server through the internet for processing and storage. This experience report will expose computing professionals and software engineers, increasing interest in transportation research and careers.

Project UCNR24-30
Investigation of Road and Roadside Design Elements Associated with Elderly Pedestrian Safety
At the TRB Annual Meeting in January 2015, we will present research findings from this project to a meeting of the Subcommittee on Pedestrian and Bicycle Safety Analysis. This presentation is expected to be met with considerable discussion about explanations for the research findings as well as motivation by various advocacy groups for demanding exclusive pedestrian phasing at signals. A journal paper documenting the results is in progress and will be submitted soon for publication.

Project UCNR24-31
Transportation System Modeling in the Information Era
Preliminary findings from the research effort have been presented at two conferences including the Conference on Agent-Based Modeling in Transportation Planning and Operations held in Blacksburg, Virginia from September 30 – October 2, 2013, and the Innovations in Travel Demand Forecasting conference that was held in Baltimore, Maryland from April 27-30, 2014.

Project UCNR24-32
t-HUB: Connecticut Public Transport Data Hub
A full-day t-HUB workshop (the third in the t-HUB series in the past 3 years) was held in Hartford, CT on September 24, 2014. Details and photos from the event can be found at the project website http://thub.uconn.edu. The project team demonstrated an alpha version of the t-HUB web application, receiving a great deal of feedback that will be incorporated into the final version due to be launched summer 2015. In addition, the project PI was invited to speak at the Region 2 UTC’s Transportation Technology Symposium on November 19, 2014 in New York, NY.

Plans during the next reporting period to accomplish the New England UTC’s research goal
No change on our major goals contained within our approved Application.
2A. Education Projects

Education & Workforce Goal

• To introduce transportation to all levels of education: K-12, undergraduate, graduate and continuing education.

• To place graduates into transportation fields.

• To provide current and developing methods, tools and insights to today’s transportation workforce to support their capacity to build, operate and manage a safe and efficient transportation system.

Following is the list of the 6 education projects under this grant, and their current status:

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<td>MITE24-36</td>
<td>Jarzombek</td>
<td>Engaging emerging minority youth in real-time, community-based transportation</td>
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<td>Hendricks</td>
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<td>HVDE24-36A</td>
<td>Gomez-Ibanez</td>
<td>Transportation Cases throughout the Curriculum</td>
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<td>UMAE24-37</td>
<td>Knodler</td>
<td>Creating an Education ASSET</td>
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<td>UCNE24-38</td>
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<td>Senior Design</td>
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<td>UCNE24-39</td>
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<td>Graduate Course</td>
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Accomplishments under the New England UTC’s education goal

Project HVDE24-36A
Transportation Cases Throughout the Curriculum
We committed to writing five cases but we have completed drafts of six. Four of the six were finished in the reporting period and test taught in courses at Harvard University (“SEPTA budget crisis”, “The American Airlines-US Airways Merger”, “Oregon VMT Tax”, “TSA Screening”) while the other two ("Hubway" and The Leasing of Rio’s Airport”) have been completed in draft and will be test taught in the spring semester of 2015. Based on the test teaching, the cases will be revised and teaching notes prepared.

Project UCNE24-38
Senior Design
This graduate course at the University of Connecticut has successfully resulted in new senior design partnerships with the Connecticut Department of Transportation (CTDOT).
3A. Technology Transfer Projects

Technology Transfer Goal

- To increase the awareness and level of information concerning transportation issues facing New England.
- To further our well-established technology transfer and outreach activities.
- To engage the public and private transportation sectors throughout the New England Region and the nation.

Following is the list of the 2 technology transfer projects under this grant, and their current status:

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<td>UCNT24-46</td>
<td>Shea</td>
<td>LTAP/TTAP Core Competency Development and Pilot</td>
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2. Products

Journal publications


Farid, Y.Z., Christofa, E., and Collura, J. An Analytical Model to Conduct a Person-based Evaluation of Transit Preferential Treatments on Signalized Arterials. [To be submitted for journal publication to the Journal of Intelligent Transportation Systems].


Hongmei Zhou, John N. Ivan, Per E. Gärder, and Nalini Ravishanker, “Gap Acceptance for Left Turns


**Books, dissertations, or one-time publications**


**Other publications, conference papers and presentations**


Garrick, Norman W, "Historic Perspective on Parking", 93rd Annual Meeting of the Transportation Research Board.

Howitt, Arn. “Japan’s Triple Disaster of 2011: Lessons for Organizing Emergency Response to Mega-Disasters,” at the Institute on Disaster Management and Reconstruction, Sichuan University, Chengdu, China, November 17, 2014. This lecture was also given at the Center for Crisis Management Research, School of Public Policy and Management, Tsinghua University, Beijing, China, August 25, 2014 and at the School of Transportation, Dalian University of Technology, Dalian, China, August 5, 2014.


Websites or other Internet sites

http://dx.doi.org/10.1155/2014/949723
http://mzgis.prod.umassd.edu/sop/index.php
http://thub.uconn.edu

Media

“Parking Craters Aren’t Just Ugly, They’re a Cancer on Your City’s Downtown on Loss and Segregation”. StreetBlog. April 10, 2014.
Technologies or techniques

Project UCNR24-29, Automated Congestion Prediction with Smart Phones
A software system to collect transportation data was developed under this research. A user installs an app on their smartphone. As they travel, a sequence of coordinates is transmitted to a server. Trip sequences are anonymous to protect user identity and location. The mobile app developer shares the app by downloading it to the user’s smartphone.

Project UCNR24-32 t-HUB: Connecticut Public Transport Data Hub
This research has resulted in several tools for the processing of General Transit Feed Specification (GTFS) and the integration with public transportation analysis techniques. This technology will be integrated with the web application product.

Inventions, patent applications, and licenses
Nothing to report.

Other products

Project HVDR24-12 Disaster Recovery in Transportation
Research contributed to the writing of teaching case study, “The Triple Catastrophe: Japan’s 03/11/11 Earthquake, Tsunami, and Nuclear Crisis,” by David Giles. This will be distributed to other institutions through the Harvard Kennedy School Case program.

Project HVDE24-36A Transportation Cases Throughout the Curriculum
The teaching cases described in Education Goals: Accomplishment [above] are still in draft but ultimately will be distributed to other educational institutions through the Harvard Kennedy School Case Program.

Project UMAR24-27 Security & Privacy Breaches in ETPS: Problem Survey & Case Study of I-90
As noted above, the research has produced and validated a completed computer simulation using VISSIM traffic software of the entire I-90 Massachusetts Turnpike. This was accomplished using real data provided by the Mass Pike agency. Validation is completed using real data of the VISSIM simulation of the entire Mass Pike in Massachusetts including 17 exit/entrance plazas.

Project UCNE24-39 Graduate Course
In addition to offering a distance learning alternative to the traditional delivery mechanism [namely in-person lecturing] of the Transportation Planning course at UConn, the course helps develop instructional resources, data, and software related to transportation modeling that benefits the transportation community at large. The proposed web portal will borrow/build on philosophies and practices from successful web education initiatives (e.g. code.org in the computer science arena) to build a publicly accessible transportation planning educational resource. All of the software will be distributed under open-source licensing agreements.
3. Participants & Other Collaborating Organizations

Organizations that have been involved as partners

Capitol Region COG – workshop participant.

Capital Region Council of Governments (CRCOG). CRCOG provided in-kind support by sharing data to support the case study proposed in the research study.

Connecticut Department of Transportation (CTDOT). Senior Design graduate course participant and co-sponsor of two senior design projects.

Department of Electrical and Computer Engineering (ECE), UMass Amherst, Dr. Lixin Gao and her student Tian Zhou, collaborative research

FHWA – workshop sponsor/participant.

State Smart Transportation Initiative, University of Wisconsin, Madison, WI - Research Collaboration.

The Transportation, Logistics, and Parking Services division at the University of Connecticut.

Tsinghua University, China, Dr. Jianqiang Wang collaborative research

University of Massachusetts, Dartmouth. Department of Electrical and Computer Engineering.

Other collaborators or contacts that have been involved

CCNY – workshop participant - workshop participant.

Christopher McCahill, State Smart Transportation Initiative, University of Wisconsin.

Central Connecticut RPA - workshop participant.

Dr. Ram Pendyala from Georgia Institute of Technology.

Dr. Xuesong Zhou from Arizona State University.

Greater Bridgeport Transit – workshop participant.

Greater Hartford Transit District – workshop participant.

Greater New Haven Transit District – workshop participant.

Lower CT River Valley COG – workshop participant.


South Western Regional Planning Agency – workshop participant.

Southeast Area Transit District – workshop participant.

Windham Regional COG – workshop participant.

Windham Regional Transit District – workshop participant.
4. Impact

The impact on the development of the principal disciplines of the program

Project HVDR24-13A
The Politics of Transport Policy in the Greater Copenhagen Region
The researchers gathered detailed information on both large-scale, “big-bang” policy shifts as well as smaller-scale, incremental policy enactments that, taken together, turned Copenhagen into one of the world’s leaders in sustainable transportation. These policies resulted from national as well as municipal political action, and a key goal of this project has been to identify factors and conditions that influences politicians at the local and national level to pursue policies that facilitated the development and consolidation of a sustainable transportation regime in the Greater Copenhagen Region. To this end, we have collected a large store of local and national electoral data as well as information on the party affiliation of members and chairs of local council and national legislative transportation committees and heads of transportation departments.

Project UMAR24-22A
Efficient Methodology for Traffic Flow Model Calibration
This research contributes an efficient methodology for traffic flow model calibration. After successful implementation and application, one would expect well-calibrated traffic flow models that are capable of making better prediction for more efficient traffic flow control and management. Overall, this research leads to better tools for active and proactive control that are necessary to mitigate traffic congestion. The impact of this research has resulted in other researchers referencing this research and building upon the methodology developed.

Project UCNR24-28
The Impact of Parking Policies on the Long-term Vitality of American Cities
This research tracked changes in parking supplies and the built environment in six urban central business districts between 1960 and 2000. The results demonstrate that this parking supply comes at a high cost: it can only be met through a combination of costly parking infrastructure and/or considerable commitment of land to parking. These factors result in increased construction costs, loss of land for future development, fragmentation of the urban environment and undermining of efforts to manage travel demand. This research, therefore, offers guidance and justification for establishing parking standards that conform to long-term sustainable transportation and development goals.

The impact on other disciplines

Project UMAR24-14B
Signal Timing Optimization for Improved Person Mobility and Air
Environmental engineers and scientists are interested in using the developed models and mathematical program to better understand how traffic signal control and traffic levels affects the levels of emission in busy urban centers.

Project UMAR24-22A
Efficient Methodology for Traffic Flow Model Calibration
Although this research uses traffic flow model calibration as domain knowledge, the principle of transferring an optimization problem to a solution-finding problem is domain-independent. In this sense, the methodology developed in this research is useful for other disciplines which necessitate an alternative, efficient way of optimization.

Project UCNR24-28
The Impact of Parking Policies on the Long-term Vitality of American Cities
This research involves interdisciplinary collaboration with the University of Connecticut’s department of geography.
The impact on the development of transportation workforce development

Project UMAR24-14B
Signal Timing Optimization for Improved Person Mobility and Air
The graduate student working on this project is female: Ms. Farnoush Khalighi. This assists in the effort of increasing the diversity of the transportation workforce and is an example of providing an opportunity for underrepresented groups.

Project UMAR24-27
Security & Privacy Breaches in ETPS: Problem Survey & Case Study of I-90
By creating a database of news articles reporting breaches, university transportation programs can begin to include awareness and "lessons-learned" in their curriculum. Also, transportation agencies are demanding a workforce that is trained in information technology that includes skills that protect electronic payment systems from both security and privacy breaches.

Project UCNR24-29
Automated Congestion Prediction with Smart Phones
The impact includes opportunities for research in transportation related disciplines. A University of Massachusetts Dartmouth computer engineering PhD student participated in the research. He has gained significant exposure to the transportation research by researching existing development technologies. This kind of research experience will increase the likelihood of students from computing backgrounds to pursue a transportation related career. Also, workforce development includes placement of a computer researcher who will continue to conduct transportation research in a tenure track position. Moreover, the transportation engineering student is now a visiting assistant professor at Bucknell University. Two female University of Connecticut undergraduate computer science students were also trained in technologies to conduct transportation research.

The impact on physical, institutional, and information resources

Nothing to report.

The impact on technology transfer

Project UMAR24-27
Security & Privacy Breaches in ETPS: Problem Survey & Case Study of I-90
This new field will result in transportation consulting agencies that provide protection services to transportation agencies using ETPS. Cryptology and other protective measures on newly developed smart cards and toll transponders will, most certainly, be developed.

The impact on society beyond science and technology

Project UMAR24-14B
Signal Timing Optimization for Improved Person Mobility and Air
Improved traffic management systems, such as advanced traffic signal control strategies that improve transit operations and air quality, are essential for achieving livable urban areas. The research provides ways of utilizing existing infrastructure more efficiently, improving person mobility and the reliability of transit service with lower levels of pollutant emissions; therefore, assisting cities to reach their sustainability goals.
**Project UMAR24-27**
*Security & Privacy Breaches in ETPS: Problem Survey & Case Study of I-90*
By developing the website containing news reports of ETPS breach events, concerned transportation, transit and tolling agencies have improved their awareness of ETPS security vulnerabilities. Further use of ETPS will create more efficient operations at toll plazas, parking areas and other electronic transportation facilities and the capacity of these facilities will increase.

**Project UCNR24-29**
*Automated Congestion Prediction with Smart Phones*
The impact of this research includes improving social, economic, and environmental conditions. The app [noted above] can be enhanced to conduct demographic surveys inexpensively. Studies on this data can pinpoint economic bias present in public transportation to specific underserved locations that disproportionately rely on such services. Reducing congestion through transportation models will improve the quality of life in large cities that suffer from severe congestion by reducing travel times and pollution.

**Project UMER24-33**
*Elderly Pedestrian Safety and Driver Distractions*
Prof. Per Garder is participating in a Public Advisory Council for reconstruction of an arterial (Broadway) in Bangor, Maine. The findings from this UTC supported research is being considered in the redesign of the reconstruction project.

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**5. CHANGES/PROBLEMS**

No change.

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**Additional information regarding Products and Impacts**

**Project UCNR24-32**
*t-HUB: Connecticut Public Transport Data Hub*
Education: t-HUB tools will be utilized in the classroom, enabling students to explore public transit data sets easily and meaningfully. Human Resources: an increased number of undergraduate researchers are now involved with public transportation research at our institution. Diversity: t-HUB has a diverse project team, a majority of students involved in the project are women. Research Performance: t-HUB is creating opportunities for new methodological research in public transportation network analysis by making data more readily available. Technology Transfer: t-HUB will result in the launch of a public web application, sharing the results of this project with anyone interested enough to request a username and password.

**Project UMER24-33**
*Elderly Pedestrian Safety and Driver Distractions*
Prof. Per Garder is integrating results from this research into his University of Maine transportation planning course: CIE 424.

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**Outputs**

**Project UCNR24-31**
*Transportation System Modeling in the Information Era*
The project team has finished the development of the integrated model prototype that combines a activity-based travel demand model system with a dynamic traffic assignment for modeling the full range of impacts of real-time traveler information systems. The prototype combines OpenAMOS
(Open-source Activity Mobility Simulator) as the activity-based model system and DTALite (Open-source Dynamic Traffic Assignment model) as the dynamic traffic assignment system using a novel dynamic integrated modeling framework. The effort required the addition of a number of new features to the individual software enterprises to enable the interfacing as envisioned in the dynamic integrated modeling framework. The new features have also been tested with demo data and the research team is in the process of applying this to Hartford metropolitan study area.

Outcomes

Project UMAR24-22A
Efficient Methodology for Traffic Flow Model Calibration
This research engages one PhD student and several graduate students in problem solving and scientific exploration. Students today are future leaders of research and development. Exposing students to research not only helps them acquire the necessary knowledge for successful careers but also motivates them to search for solutions and discover new knowledge that overall advances the state of the art of a discipline.

Project UMAR24-23
Making More Value out of Transportation Data
Findings will help traffic analysts to predict potential time and locations of congestion and deploy resources to anticipate such events proactively. By engaging graduate students in this research, they are exposed to the latest development of traffic engineering and future leaders of the profession are nurtured with an interdisciplinary perspective.

Project UMAR24-24
Modeling Drivers’ Lateral Motion Control
The research provides an opportunity for graduate and undergraduate students to develop hands-on experience in developing innovative transportation models and applications. The resultant traffic flow model can be implemented in a simulation tool that allows traffic analysts to predict traffic evolution in computers and better understand how traffic operates and how congestion builds up and dissipates.

Project UMAR24-27
Security & Privacy Breaches in ETPS: Problem Survey & Case Study of I-90
Both undergraduate and graduate students have gained knowledge in ETPS as well as in IT and website development. Four contributing students are co-authors on the TRB paper and one of these students accompanied the principal investigator to Washington DC to present their TRB paper. This paper was published in the TRB proceedings January 2014.

Project UCNR24-29
Automated Congestion Prediction with Smart Phones
Outcomes include improved processes, techniques, and skills to address transportation issues. The mobile app transportation data collection system enables richer data collection than physical systems deployed at static locations on roads. This richer data enables more detailed dynamic congestion models which can be used by transportation planners. The smartphone app does not require specialized skill and, therefore, reduces the effort needed to collect data.

Project UCNR24-31A
Crowdsourcing Real-Time Traveler Information Services: Issues, Challenges and Recommendations
The team envisions two significant contributions. First, the project will result in the development of a software prototype for utilizing smartphone traces to provide real-time traveler information. Second, the survey effort will lead to interesting insights into the behaviors of participants in crowdsourcing projects aimed at providing traveler information – a topic that is less understood.
**Impacts**

Nothing to report.

**Special Reporting Requirements**

Nothing to report.