

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

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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:

Project No.	PI	Project Title	Status
MITR24-1	Ben-Akiva Abou-Zeid Zegras	Capturing the Relationship between Motility, Mobility and Well-Being Using Smart Phones	active
MITR24-2	Coughlin	Transportation Wellbeing, Age and Safety	active
MITR24-3	D'Ambrosio	Assessing Alternative Transportation Options for Older Users	active
MITR24-4	Glass Mehler	Spoken Dialog Planning to Reduce User Distraction in Mobile Environments	active
MITR24-5	Gonzalez	Transportation Model in the Boston Metropolitan Area from Origin Destination Matrices Generated with Big Data	active
MITR24-6	Murga Salvucci	Kendall Square: Lessons Drawn from Its Past Development to Guide Its Future	active
MITR24-7	Osorio	Simulation-Based Energy-Efficient Transit Signal Priority Strategies	active
MITR24-8	Reimer	Technology Adoption and Use Across the Lifespan	active
MITR24-9	Salvucci Murga	Development of a "Universal" Residential Public Transportation Pass, as Part of a Comprehensive Multi-Modal Approach to Urban Parking	active

MITR24-10	Sheffi Goentzel	Big Data During Crisis: Lessons from Hurricane Irene	active
MITR24-11	Sussman	Determining Performance Measures to Evaluate the Effect of High Speed Rail on Communities' Livability	active
MITR24-11A	Trancik	Time Dependent Environmental Impact of Transportation	active
HVDR24-12	Howitt Giles	Disaster Recovery for Transportation: China's Wenchuan Earthquake of 2008 and Japan's Tohoku Earthquake and Tsunami of 2011	active
HVDR24-13A	Mayne	The Politics of Transport Policy in the Greater Copenhagen Region	active
HVDR24-14	Shoag	Cell Phones and Vehicle Safety	active
HVDR24-14A	Shoag	Land-Use Regulation and Commuting Patterns	active
UMAR24-14B	Christofa	Signal Timing Optimization for Improved Person Mobility and Air	active
UMAR24-15	Christofa Collura	A Person-based Comparison of Transit Preferential Treatments on Signalized Arterial Corridors	active
UMAR24-16	Collura Burlison Gao	A Decision Support System to Assess Disruptive Impacts of Alternative Transportation Financing Approaches	completed
UMAR24-16A	Fisher	ADHD Teen Driver Evaluation and Training Tool Development	active
UMAR24-17	Fisher Romoser	Moving Map Displays: Using CTIL and Eye Tracking Technologies to Measure Distraction in Locomotive Cabs	active
UMAR24-18	Ganz Collura	Hybrid NFC and Vision Based Navigation System in Subways for the Blind and Visually Impaired	active
UMAR24-19	Gao	A Spatial Learning Model for the Micro-Simulation of Travel Dynamics	completed
UMAR24-19A	Gao	An Optimal Adaptive Routing Algorithm for Large-Scale Stochastic Time-Dependent Networks	active
UMAR24-20	Gao	Cognitive Maps for Route Choice Modeling	completed
UMAR24-21	Gartner Jones Statmatiadis	Robust Performance of Transportation Networks Using Quantile Metrics	completed

UMAR24-21A	Gonzalez	Data-based Model for Regional Freight Demand	active
UMAR24-21B	Knodler	An Observational Evaluation of Safety and Operations Resulting from Driver Distraction	active
UMAR24-22	Knodler Romoser Fisher	Evaluating the Effects of Integrated Training on Minimizing Driver Distraction	active
UMAR24-22A	Ni	Efficient Methodology for Traffic Flow Model Calibration	active
UMAR24-23	Ni Gao	Making More Value out of Transportation Data	active
UMAR24-24	Ni	Modeling Drivers' Lateral Motion Control	active
UMAR24-25	Romoser Knodler Fisher	Reducing Older Driver Crashes: Technology, Training and Livable Communities	active
UMAR24-26	Stamatiadis Gartner Xie	ITS Equipment Placement for Safety and Mobility	completed
UMAR24-27	Zarillo Collura Burlison	Security & Privacy Breaches in ETPS: Problem Survey & Case Study of I-90	active
UCNR24-28	Garrick Atkinson-Palombo	The Impact of Parking Policies on the Long-term Vitality of American Cities	active
UCNR24-28A	Garrick Atkinson-Palombo	Assessing the Full Cost of Parking Provision from the Perspective of the Municipality	active
UCNR24-29	Gokhale Lownes	Automated Congestion Prediction with Smart Phones	active
UCNR24-30	Ivan Ravishanker	Investigation of Road and Roadside Design Elements Associated with Elderly Pedestrian Safety	active
UCNR24-30A	Ivan Ravishanker	Effectiveness of Interventions at Midblock Crossings for Improving Senior and Other Pedestrian Safety	active
UCNR24-31	Konduri Lownes	Transportation System Modeling in the Information Era	active

UCNR24-31A	Konduri Lownes	Crowdsourcing Real-Time Traveler Information Services: Issues, Challenges and Recommendations	active
UCNR24-32	Lownes	t-HUB: Connecticut Public Transport Data Hub	active
UCNR24-32A	Lownes	Spring 2014 Pilot Project Competition	active
UMER24-33	Garder	Elderly Pedestrian Safety and Driver Distractions	active
UMER24-34	Rubin	Regional Credit Trading: Economic and GHG Impacts of a National Low Carbon Fuel Standard	completed

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

The December 2014 edition of the AARP Bulletin included an AARP Special Safety Report on New Car Technologies. Bryan Reimer, New England Center associate director, was included in the story, "3 New Car Technologies That Decrease Danger." Dr. Reimer discussed how future collision mitigation systems may prevent crashes and reduce risk of accidents due to driver error.

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 Traccar (<http://www.traccar.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 in Blacksburg, Virginia held 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:

Project No.	PI	Project Title	Current Status
MITE24-35	Coughlin	Massachusetts Avenue Area Living Laboratory (MALL)	active
MITE24-36	Jarzombek Hendricks	Engaging emerging minority youth in real-time, community-based transportation research and modeling	active
HVDE24-36A	Gomez-Ibanez	Transportation Cases throughout the Curriculum	active
UMAE24-37	Knodler	Creating an Education ASSET	active
UCNE24-38	Lownes	Senior Design	active
UCNE24-39	Lownes	Graduate Course	active

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:

Project No.	PI	Project Title	Current Status
MITT24-45	Coughlin	MIT Technology Transfer Initiative	active
UCNT24-46	Shea	LTAP/TTAP Core Competency Development and Pilot	active

2. Products

Journal publications

Blanc, BP, M Gangi, C Atkinson-Palombo, C McCahill, N Garrick. The Effects of Urban Fabric Changes on Real Estate Property Tax Revenue: Evidence from Six American Cities. *Transportation Research Record: Journal of the Transportation Research Board*, 2014.

Brown, Maxwell, Jonathan Rubin and Paul Leiby, "Evaluating Carbon Tax Incidence, Market Effects, and Efficiency within the Transportation Fuel Sector," 587 - Current Issues in Alternative Transportation Fuels and Technologies, *Transportation Research Board*, 13 January 2015. (UMER24-34 Rubin Regional Credit Trading: Economic and GHG Impacts of a National Low Carbon Fuel Standard) [submitted].

Farid, Y.Z., Christofa, E., and Collura, J. 2015. [Person-Based Evaluation of Dedicated Bus Lanes and Queue Jumper Lanes at Signalized Intersections with Nearside Bus Stops](#). *Transportation Research Record* [Under review].

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*].

Fiondella, L. and Gokhale, S.S., Automated Congestion Prediction with Smart Phones: Architectural Design and Integration Lessons Learned, In preparation for the *International Conference on Software Engineering and Knowledge Engineering*, Pittsburgh, PA, July 6-8, 2015 [in preparation].

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

from the Major Road at Unsignalized Intersections,” Transport by Taylor and Francis. July 10, 2014.

Jia, C.; Wang, J.; and Ni, D. An Efficient Methodology for Calibrating Traffic Flow Models Based on Bisection Analysis. *Journal of Applied Mathematics*. Volume 2014, Article ID 949723. Hindawi Publishing Corporation. 2014.

Khalighi, F., and Christofa, E. 2015. Emission-based Signal Timing Optimization for Isolated Intersections. *Transportation Research Record* [under review].

McCahill, C., J Haerter-Ratchford, N Garrick, C Atkinson-Palombo. Parking in Urban Centers: Policies, Supplies and Implications in Six Cities. *Transportation Research Record: Journal of the Transportation Research Board*, 2014.

McCahill, C., N Garrick. Automobile use and land consumption: Empirical evidence from 12 cities *Urban Design International* 17 (3), 221-227, 2012.

Md. Saidul Islam, Volodymyr Serhiyenko, John N. Ivan, Nalini Ravishanker, Per Erik Garder, “Explaining Pedestrian Safety Experience at Urban and Suburban Street Crossings Considering Observed Conflicts and Pedestrian Counts,” the *Journal of Transportation Safety & Security* Volume 6, Issue 4 [Taylor & Francis Publication], October 2014 [Third most downloaded *Journal of Transportation Safety & Security* article in 2014.]

Books, dissertations, or one-time publications

Berthoume, A.L. Microscopic Modeling of Driver Behavior Based on Modifying Field Theory for Work Zone. PhD Dissertation, Department of Civil and Environmental Engineering, University of Massachusetts Amherst. 2014.

McCahill, C., N Garrick. Parking Supply and Urban Impacts. *Parking Issues and Policies* (Transport and Sustainability, Volume 5) Emerald, 2014.

Other publications, conference papers and presentations

Bertolaccini, K.; Lownes, N.E. and S.T. Waller (2015) Equity Modeling for Public Transportation Networks, *Proc. 94th Annual Meeting of the Transportation Research Board*, Paper #15-1173.

Blanc, Bryan, Gangi, Michael, Atkinson-palombo, Carol, Garrick, Norman W, McCahill, Chris, "The Effects of Urban Fabric Changes on Real Estate Property Tax Revenue: Evidence from Six American Cities", 93rd Annual Meeting of the Transportation Research Board.

Farid, Y.Z., Christofa, E., and Collura, J. 2015. Person-Based Evaluation of Dedicated Bus Lanes and Queue Jumper Lanes at Signalized Intersections with Nearside Bus Stops. In *Proceedings of the 94th Annual Transportation Research Board Meeting* [Accepted].

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.

Jia, C.; Wang, J.; and Ni, D. An Efficient Methodology for Calibrating Traffic Flow Models Based on Bisection Analysis. The Mid-year meeting of TRB Committee on Traffic Flow Theory and Characteristics, Fort Lauderdale, FL. 2012.

Khalighi, F., and Christofa, E. 2015. Emission-based Signal Timing Optimization for Isolated Intersections. In *Proceedings of the 94th Annual Transportation Research Board Meeting* [Accepted].

Konduri, K.C., Ning, Y., Angueira, J., and Pendyala, R.M. Transportation System Modeling in the Information Era: An Application of a Continuous-Time Integrated Transport Modeling Framework for Capturing Activity-Travel Behaviors in Response to Real-Time Traveler Information. Presented at the Conference on Agent-Based Modeling in Transportation Planning and Operations, Blacksburg, Virginia, September 30 – October 2, 2013.

Konduri, K.C., Ning, Y., Pendyala, R.M., and Zhou, X. Modeling Behavioral Response to Real Time Traveler Information: An Application of a Continuous-Time Integrated Modeling Framework. Presented at the 2014 Conference on Innovations in Travel Demand Forecasting, Baltimore, MD, April 27-30, 2014.

McCahill, Chris, Garrick, Norman W, Atkinson-palombo, Carol, "Visualizing Urban Parking Supply Ratios", Congress for New Urbanism (CNU) 22: The Resilient Community, Buffalo, New York.

McCahill, Chris, Haerter, Jessica, Garrick, Norman W, Atkinson-Palombo, Carol, "Parking in Urban Centers: Policies, Supplies, and Implications in Six Cities", 93rd Annual Meeting of the Transportation Research Board.

Tian Zhou, Lixin Gao, and Daiheng Ni, Road Traffic Prediction by Incorporating Online Information. Workshop on Connecting Online & Offline Life (COOL). Seoul, Korea. 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

"3 Enormous Benefits to Charging the Right Price for Parking". The Atlantic Cities. April 2, 2014.

"American Cities Are Haunted by Too Many Parking Spaces". BloombergBusinessweek. April 1, 2014.

"Is urban parking the symptom or the disease?" Op-ed Connecticut Mirror. May 14, 2014.

"How Hartford's Bet on Cars Set the Stage for Population Loss and Segregation". StreetBlog USA. April 17, 2014.

"Hartford overinvested in parking". Hartford Business. April 14, 2014.

"How Parking Cost Hartford". Connecticut Public Radio. April 10, 2014.

"Parking Craters Aren't Just Ugly; They're a Cancer on Your City's Downtown on Loss and Segregation". StreetBlog. April 10, 2014.

"Study: Hartford, New Haven Hurt By Abundance of Parking". Connecticut Public Radio. March 31, 2014.

"Urban Parking at Any Price?" UConn Today. March 26, 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.

Northeastern Connecticut Transit District – 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.

5. CHANGES/PROBLEMS

No change.

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.

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.