

This is how we drive the future





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Institute for Sustainable Transportation & Logistics (ISTL) Annual Progress Report June 1, 2015 – May 31, 2016

Adel W. Sadek, Ph.D.

**Director, Institute for Sustainable Transportation & Logistics
Professor, Civil, Structural and Environmental Engineering; University at Buffalo**

Institute for Sustainable Transportation & Logistics (ISTL) Overview

The Institute for Sustainable Transportation and Logistics (ISTL) was envisioned to serve as an umbrella which brings together faculty and students from all across UB interested in transportation and logistics research. ISTL is jointly led by the School of Engineering and Applied Sciences (SEAS) and the School of Management (SOM), and houses research programs focused on transportation, logistics and Supply-Chain Management (SCM), will offer a new interdisciplinary master's degree (along with a certificate) in Sustainable Transportation and Logistics starting in fall 2017, and engages in outreach for community engagement and fostering partnerships with governmental agencies, industry, and other academic institutions (both domestic as well as international). The Institute was designed to leverage existing faculty from SEAS (specifically, Civil, Structural & Environmental Engineering (CSEE), Industrial & Systems Engineering (ISE), and Computer Science & Engineering (CSE)) and SoM (specifically from Operations Management and Strategy (OMS)). Additional faculty members from other disciplines (e.g. economics, geography, urban and regional planning, mechanical & aerospace engineering, and electrical engineering) are affiliated with the institute. Besides leveraging existing faculty, the initiative has successfully hired a total of six new faculty members (3 in SEAS and 3 in SOM).

This report highlights the recent progress and accomplishments of ISTL during the reporting period of June 1, 2015 – May 31, 2016 with a focus on the work completed in line with the core mission objectives of research, education and outreach, as well as the vision for ISTL in the coming year.



1. PEOPLE

1.1 Leadership


Adel Sadek, Ph.D., Director
Nallan Suresh, Ph.D., Associate Director
Panos Anastasopoulos, Ph.D., Associate Director
Ria Iliadou, Outreach and Operations Coordinator

1.2 External Advisory Board

Jack Ampuja, President and CEO, Supply Chain Optimizers and co-Chair of the Transportation and Logistics Council of Buffalo Niagara Partnership
Clark Cheng, Ph.D., Director of Operations Research, Norfolk Southern Railway
Dave Duchscherer, Chairman, Wendel Duchscherer
Thomas George, Surface Transportation Director, Niagara Frontier Transportation Authority (NFTA)
Athena Hutchins, Executive Director, Niagara International Transportation Technology Council (NITTEC)
Daniel Leonard, Director of Economic Development, Buffalo Niagara Partnership
Tim Mathien, Director, ROAR Logistics
Joah Sapphire, President, Global Dynamic Group, LLC
Stephen Still, Ph.D., Managing Director, Seabury APG – Aviation Planning & Technology
Jessica Windham, Director, Helmsman Freight Solutions

1.3 Core Researchers

Panos Anastasopoulos, Ph.D., Assistant Professor: Civil, Structural and Environmental Engineering
Rajan Batta, Ph.D., Associate Dean for Research and Graduate Education: School of Engineering and Applied Sciences
Jurriaan De Jong, Ph.D., Assistant Professor: Operations Management & Strategy, School of Management
Wen Dong, Ph.D., Assistant Professor: Department of Computer Science and Engineering
Qing He, Ph.D., Stephen Still Assistant Professor: Joint appointment – Civil, Structural & Environmental Engineering and Industrial and Systems Engineering
Jing Gao, Ph.D., Assistant Professor: Computer Science and Engineering
Jee Eun (Jamie) Kang, Ph.D., Assistant Professor: Industrial and Systems Engineering
Mark H. Karwan, Ph.D., Professor: Industrial and Systems Engineering
Tevfik Kosar, Ph.D., Associate Professor: Computer Science and Engineering
Changhyun Kwon, Ph.D., Assistant Professor: Industrial and Systems Engineering
Winston T. Lin, Ph.D., Professor: Operations Management and Strategy, SOM



Chunming Qiao, Ph.D., Professor and IEEE Fellow: Computer Science and Engineering
Jun Ru, Ph.D., Assistant Professor: Operations Management and Strategy, SOM
Natalie C. Simpson, Ph.D., Associate Professor: Operations Management and Strategy, SOM
Adel Sadek, Ph.D., Professor: Civil, Structural and Environmental Engineering
Lu Su, Ph.D., Assistant Professor: Computer Science and Engineering
Nallan C. Suresh, Ph.D., Distinguished Professor & Chair: Operations Management and Strategy, SOM
Aditya Vedantam, Ph.D., Assistant Professor: Operations Management and Strategy, SOM
Charles (Xiaoqiang) Wang, Ph.D., Associate Professor: Operations Management and Strategy, SOM
Qian Wang, Ph.D., Assistant Professor: Civil, Structural and Environmental Engineering
Mike (Mingcheng) Wei, Ph.D., Assistant Professor: Operations Management & Strategy, SOM
Sean (Changxu) Wu, Ph.D., Associate Professor: Industrial and Systems Engineering

1.4 Affiliated Researchers

Alex Anas, Ph.D., Professor: Economics
Daniel B. Hess, Ph.D., Associate Professor: Urban and Regional Planning
Kevin Hulme, Ph.D., Senior Research Associate: The Center for Engineering Design and Applied Simulation
Sara Metcalf, Ph.D., Associate Professor: Geography
HyungSeon Oh, Ph.D., Assistant Professor: Electrical Engineering
JiYoung Park, Ph.D., Assistant Professor: Urban and Regional Planning
Christian S. Renschler, Ph.D., Associate Professor: Geography
Jennifer Zirnheld, Ph.D., Assistant Professor: Electrical Engineering



1.5. Faculty Expansion

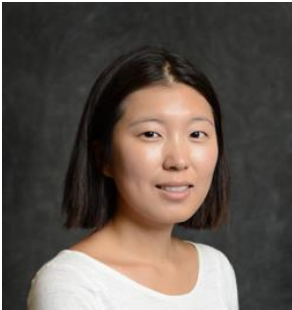
To build on ISTL's goal of strategic faculty expansion to support ISTL, six faculty members have been successfully hired since the establishment of ISTL. These hires are listed in Table 1 below, along with the institution where they received their Ph.D. degree, their primary departments at UB and their areas of expertise.

Table 1. ISTL Faculty Successfully Hired

Start Date	Name	Ph.D. Institution	Hiring Department	Area
Fall 2013	Dr. Panos Anastasopoulos	Purdue University	Civil Engineering (SEAS)	Infrastructure management, traffic safety, econometrics, advanced statistical modeling
	Dr. Jee Eun (Jamie) Kang	UC Irvine	Industrial & Systems Engineering (SEAS)	Network design for alternative-fueled vehicles, activity-based travel modeling, Operations Research
	Dr. Jurrian De Jong	Ohio State University	Operations & Management Strategy - SoM	Health-care supply chain management, buyer-supplier relationship, operations management, statistics
Fall 2014	Dr. Wen Dong	MIT	Computer Science (SEAS)	Big Data Analytics, Cyber Physical Systems, Agent-based modeling
	Dr. Mike Wei	Washington University	Operations & Management Strategy (SoM)	Supply chain management; game theoretic operations models; revenue management and dynamic pricing; strategic consumer behavior; social networks
Fall 2015	Dr. Aditya Vedantam	Purdue University	Operations & Management Strategy (SoM)	Sustainability in supply chain management with emphasis on sustainable product design, sustainable procurement, and clean energy technologies and recycling operations.

1.6. Featured Faculty

Jamie Kang, Ph.D.



Dr. Jamie Kang is an Assistant Professor in the Department of Industrial and Systems Engineering at University at Buffalo, the State University of New York (SUNY Buffalo). She earned her Ph.D. in Transportation Engineering from University of California Irvine in 2013. Her research interests include applied operations research, transportation planning and modeling, autonomous vehicles, travel behavior, disaster operations management, and sustainable transportation. Her research activities are supported by the NSF, Region 2 University Transportation Center, Transportation Informatics University Transportation Center, and the Korea

Transport Institute.

Alex Anas, Ph.D.



Dr. Alex Anas has been a professor of economics at the State University of New York at Buffalo since 1991. He obtained his BA and BS from Carnegie Mellon University in 1972, and his MA, MCP in 1974 and Ph.D. in 1975 from the University of Pennsylvania. Prior to joining the faculty at Buffalo, Dr. Anas was on the faculty at Northwestern University from 1975 to 1991 and had visiting appointments at Stanford University in 1981-82 and the University of Illinois at Urbana-Champaign in 1986-88. In 2006, he was elected Fellow of the Regional Science Association International. Prof. Anas currently serves on the editorial boards of The Economics of Transportation, Journal of Housing Economics, Journal of Urban Economics, and the Journal of Regional Science.

Dr. Anas' research interests have spanned theoretical, empirical and applied urban economics. His publications have contributed to understanding dynamic land use adjustment with durable housing and the abandonment of housing in central cities, the effects of transportation including public transportation on property values and urban land use, the effects of traffic congestion and congestion pricing on land use, dynamic housing market models, the effects of regulations on the housing market, models with dispersed jobs and residences, theories of systems of cities with intercity trade, urban agglomeration, ethnic segregation and ghettos, and the beneficial effects of urban sprawl. On November 12, 2016, Dr. Alex Anas was presented with the 2016 Walter Isard Award "in recognition of distinguished scholarly achievements in the field of Regional Science."



2. RESEARCH

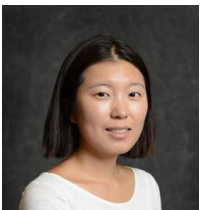
2.1. TransInfo Research

One of the major research achievements of ISTL has been the awarding of UB's first ever U.S. Department of Transportation's University Transportation Center. The Tier I Transportation Informatics (TransInfo) Center, headquartered at UB, is one of only 35 nationally funded centers. TransInfo, whose research focus is on Transportation Informatics and harnessing the power of Big Data to improve transportation system performance, has a total research budget of around **\$6.25 Million**. This past year, TransInfo made awards for a total of six new research projects, of which four projects are currently being undertaken by UB faculty, graduate students and researchers. These projects are listed below (the ones in italics are those performed by UB faculty members).

1. *Towards Quality-Aware Big Data Integration for Crowd-sourced Road Sensing System (UB – L Su, J Gao and Q He)*
2. Development of a Prediction Model for Crash Occurrence by Analyzing Traffic Crash and Citations Data Developing (UPR-M)
3. A Smartphone App Platform to Decipher Travel Behavior (RPI & GMU)
4. *Variational Inference for Agent-Based Models with Applications to Achieve Fuel Economy (UB – W Dong and C Qiao)*
5. *Effectiveness of Various Public Private Partnership Pavement Rehabilitation Treatments: A Big Data Informatics Survival Analysis of Pavement Service Life (UB – P Anastasopoulos)*
6. *Inferring Origin-Destination Demand and Utility-Based Travel Preferences in Multi-Modal Travel Environment Using Automatic Fare Collection Data (UB – J Kang and A Nikolaev)*

2.2 Additional Research Funding and Awards

In addition to currently funded projects under the ISTL and TransInfo umbrella, the following awards were made over the past year



Prof. Jamie Kang and Prof. Mark Karwan received funding from the National Science Foundation for a project entitled Household-Level Use of Autonomous Vehicles: Modeling Framework, Traveler Adaptation, and Infrastructure to Mitigate Negative Effects (\$200,000) 2015-2018.



Prof. Jamie Kang and Prof. Alexander Nikolaev have been awarded funding from NSF, for EAGER: Inferring Comprehensive Individual Traveler Information in Multi-Modal Travel Environment Using Automatic Fare Collection Data (\$150,000) 2016–2018



Dr. Qing He has been awarded funding from NSF CMMI 1637604. “EAGER: Collaborative Proposal: Towards Dynamic Social Ride-sharing: An Essential Component in Envisioned Smart Communities”. (\$150,000). August 2016 – July 2018

Dr. Qing He and Dr. J. Gao have been awarded funding from UTRC2 “Inferring High-Resolution Individual’s Activity and Trip Purposes with the Fusion of Social Media, Land Use and Connected Vehicle Trajectories” (\$100,000). September 2016 –December 2017



Dr. Panos Anastasopoulos, in collaboration with CUBRC, was awarded \$353,585 in funding from Federal Highway Administration, Strategic Highway Research Program (SHRP 2) for a project entitled “Phase 2 – Research Utilizing the SHRP2 Safety Data to Support Highway Safety: The Development of New Insights into Driver Behavior to Improve High Visibility Highway Safety Enforcement Programs (HVE). **Dr. Panos Anastasopoulos** was also awarded an additional \$503,585 in funding from New York State Department of Transportation (NYSDOT) to support that research

Other research related initiatives include the collaboration of ISTL researchers with NYSDOT and the Niagara International Transportation Technology Coalition (NITTEC) on a **\$7.8 million** proposal to the U.S. Department of Transportation entitled “Advanced Transportation and Congestion Management Technology Deployment (ATCMTD) Program – A Connected Region: Moving Technological Innovations Forward in the NITTEC Region”.

2.3. New Research Partnerships



Kaleida Health

Professors De Jong and Suresh (OMS) have partnered with Kaleida Health on a supply chain project focused on materials management, strategic sourcing and value analysis. Two groups of MS students in supply chain & operations are now working at Kaleida Health in WNY, while a Dutch Professor is executing the same project with a group of Master's students in the Netherlands in six hospitals.



Professors De Jong and Batta, who are also faculty members of the UB's Community for Global Health Equity (CGHE) submitted a proposal on pharmaceutical drug supply chain in Uganda. The objective is to improve the last-mile supply chain and to address the inequity in the supply chain. The Clinton Health Access Initiative (CHAI) has also been involved in this project.

2.4 ISTL Research in National News



Dr. Qing He, the Stephen Still Assistant Professor in Transportation Engineering and Logistics, Department of Civil, Structural and Environmental Engineering and Department of Industrial and Systems Engineering was featured in numerous media outlets for his research into social media applications for transportation events, which has gained regional and national media attention. His work has appeared in the Washington Post, in addition to the Weather Channel and WKBW Buffalo hosting him on their broadcasts. Buffalo Niagara 360 (BN360) also honored Dr. He as their December Spotlight Professional for his research.

One of his research studies which attracted specific attention is his work regarding quantifying and modeling the impact of inclement weather on transportation system performance, aided by data from Twitter. One problem that the majority of previous research studies on the topic have faced is that they largely depended on weather data merely from atmospheric weather stations; data which lacked information about road surface condition. The emergence of social media platforms, such as Twitter and Facebook, provides a new opportunity to extract more weather related data from such platforms.



The study had two primary objectives; first, to examine if real world weather events can be inferred from social media data, and secondly, to determine whether including weather variables, extracted from social media data, can improve the predictive accuracy of models developed to quantify the impact of inclement weather on freeway traffic speed. To achieve those objectives, weather data, Twitter data, and traffic information were compiled for the Buffalo-Niagara metropolitan area as a case study. A method called the Twitter Weather Events observation was then applied to the Twitter data, and the sensitivity and false



alarm rate for the method was evaluated against real world weather data. Following this, linear regression models for predicting the impact of inclement weather on freeway speed were developed with and without the Twitter-based weather variables incorporated. The results indicate that Twitter data has a relatively high sensitivity for predicting inclement weather (i.e., snow) especially during the daytime and for areas with significant snowfall. They also show that the incorporation of Twitter-based weather variables can help improve the predictive accuracy of the models.

Links to all of [Dr. He's appearances and articles are available here](#).

2.5 Faculty Achievements

Over 60 publications and presentations summarized some of the work being done under the ISTL umbrella, during the reporting year covered by this report. These are summarized in appendix B.



Prof. Chunming Qiao received the 2015 Distinguished Technical Achievement Award from IEEE's Communications Society (ComSoc) - Communications Switching and Routing (CSR) Technical Committee.



Dr. Natalie Simpson wins two Best Paper Award – the first is for her paper entitled "Exploring Operational Resilience in the Context of Military Aviation: Finding the Right Mode at the Right Time, presented at the 23rd Annual Conference of the American Society of Business and Social Sciences, and the second for her paper entitled Simulating the Salient Properties of Decision Making in Emergency Response presented at the 2016 NEDSI Annual Conference'



Dr. Alex Anas was presented with the 2016 Walter Isard Award, named in honor of Professor Walter Isard, father of Regional Science, founder of the Regional Science Association, and a leading scholar in the worldwide Regional Science community.

3. EDUCATION

The ISTL education mission aims to train globally competitive graduates who are well rounded technically and managerially, and who intend to assume leadership positions in transportation and logistics, which have emerged as major sectors of the economy. Over this reporting period, there has been significant progress toward this vision as outlined herein.

3.1 Sustainable Transportation and Logistics MS Degree



New York State
EDUCATION DEPARTMENT
Knowledge > Skill > Opportunity

A key component of ISTL's educational vision is a signature trans-disciplinary M.S. degree in Sustainable Transportation and Logistics (STL). The proposed program is a 30-credit, full-time, 3-semester program. It can also be pursued on a

part-time basis to enable those working in industry to benefit from the program. The curriculum consists of five courses that are designed to provide a common platform of relevant engineering principles & practices, coupled with managerial concepts & practices. Upon entering the program, the candidates will complete these five core courses as a cohort, followed by five courses in one of the following two tracks: (1) Sustainable Transportation; and (2) Logistics. The five core courses are:

ISTL501/MGO 638 – Logistics and Distribution Management;
ISTL 502 – Optimization & Resource Planning
ISTL 503/MGO 636 – Supply Chains: Design, Modeling and Optimization
ISTL 504 – Transportation Analytics; and
ISTL 505 – Transportation Systems Modeling Fundamentals

In August 2015, SUNY approved the new degree's application package, and in April 2016, the degree was approved by NYS Board of Education. We anticipate welcoming the first cohort of STL students in fall 2017.



3.2. 2015 UB National Summer Transportation Institute (UB NSTI)



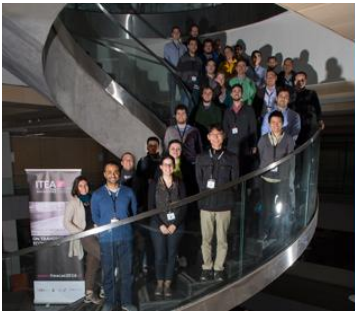
For the third consecutive year, ISTL core faculty members Dr. Qing He, Dr. Adel Sadek and Dr. Qian Wang were awarded a grant by the Federal Highway Administration to host the 2015 UB National Summer Transportation Institute (UB NSTI) in July. UB NSTI successfully attracted nearly 30 local high school students to participate in an innovative one-week summer educational program in transportation. The overall goal of the Institute is "to support the inclusion of high school students, from diverse backgrounds, within National Summer Transportation Institutes that result in an increase in the number of students pursuing transportation related careers". During this reporting period, funding was awarded to continue UB NSTI in summer, 2016.

3.3 Student Awards and Achievements



Dr. Ta-Wei (Daniel) Kao's paper: "Analyzing Productive Efficiencies in Supply Networks: A Two-Stage Empirical Investigation" selected as an ISM Best Paper Award finalist by the Academy of Management's OM Division. His paper was presented, along with the three other finalists, in a special session at the Academy of Management conference in August in Vancouver (Daniel received a \$1,000 award).

Following receiving his Ph.D. degree from the School of Management at UB, Dr. Kao accepted a position as an Assistant Professor in the College of Business at the University of Michigan – Dearborn.



Yoon Sang Moon, Ph.D. candidate in the Department of Economics at UB, presented his paper titled "Internal structure of consumer cities: core and sub-centers" at the 2016 Annual Conference of the International Transportation Economics Association (ITEA). Mr. Moon received the best paper written by a junior scholar award at the conference.

Dr. Yunfei Hou recently completed his Ph.D. work under the supervision of Prof. Chunming Qiao, and accepted a position as an Assistant Professor in the School of Computer Science and Engineering at California State University at San Bernardino.



2016 ITS-NY Best Student Essay Award was given to Mr. Zhenhua Zhang of SUNY Buffalo

This year's winner was **Mr. Zhenhua Zhang**, a Ph.D. candidate under the supervision of Dr. Qing He at the University at Buffalo, SUNY. The winner was announced at the ITS-NY 23rd Annual Meeting and Technology Exhibition in Saratoga June 9-10, 2016. His winning essay entitled, "On-site Traffic Accident Detection with Both Social Media and Traffic Data" was selected as the winner of the ITS-NY 2016 Best Student ITS Paper Competition. In this

paper, researchers investigated traffic accident detection models based on traffic and tweet data separately, and generated three important features: single token, paired token and 36 traffic-related data to achieve a more accurate and effective on-site traffic accident detection.

4. OUTREACH AND TECHNOLOGY TRANSFER

4.1 Transportation Informatics Tier I University Transportation Center First Annual Symposium: *Big Data Analytics Transforming Transportation Operations, Management and Safety*



Dean of the School of Engineering and Applied Sciences at the University at Buffalo, Dr. Liesl Folks

More than 100 transportation and big data professionals from academia, industry and government gathered for the First Annual Symposium on Transportation Informatics, an inaugural event hosted by Transportation Informatics Tier I University Transportation Center (TransInfo) at its lead institution, the University at Buffalo on August 13th and 14th, 2015. The University at Buffalo's continued support and commitment to its Transportation programs was evident as TransInfo hosted the University's President, Dr. Satish Tripathi, Vice President for Research and Economic Development, Venu Govindaraju and the Dean of the School of Engineering and Applied Sciences, Dr. Liesl Folks for welcoming remarks.

The Symposium underscored the importance of continued innovative research and implementation of big data analytics to address critical transportation needs to transform transportation operations, management and safety. Nearly 30 distinguished speakers were featured including keynote addresses from Michael Pack, Director of the University of Maryland CATT Lab; Ram Pendyala, PhD, Frederick R. Dickerson Chair and Professor of Transportation Systems at Georgia Tech; and Barry Einsig, Global Transportation Executive at Cisco.

Presentations, workshops and guided discussions covered a broad range of topics including, but not limited to: Developing computer models to predict border crossing delays, Using unmanned aircraft systems to inspect bridges, How connected vehicles can improve transportation systems, and Mining social media data to predict traffic. TransInfo graduate students presented 17 posters at a reception following the first day of events. TransInfo Director and University at Buffalo professor, Adel Sadek, PhD summarized the initiative succinctly; "Transportation systems in the U.S. and abroad are stressed, creating environments that can be unsafe, unhealthy and expensive. Transportation informatics addresses these problems through research-driven results", he said. The Symposium was generously sponsored by Cisco and Seabury Airline Planning Group. The full program for the event can be found [here](#).





4.2 Transportation Systems Engineering Seminar Series

ISTL, in collaboration with the Transportation Informatics Tier I University Transportation Center continued to sponsor a seminar series, hosting speakers from academia, industry and government – from around the world – through the academic year. ISTL was pleased to welcome a number of distinguished speakers over this reporting period and include:

- Li Zhang, Ph.D., P.E., F.ASCE, F.ITE, Associate Professor of Civil and Environmental Engineering Mississippi State, who presented a seminar entitled “Insights on Traffic Operations Research” on September 18, 2015
- Chris Hendrickson, Hamerschlag University Professor Emeritus, Carnegie Mellon University, Director, Traffic 21 Institute, Member, National Academy of Engineering, Editor-in-Chief, ASCE Journal of Transportation Engineering, who presented a Distinguished Lecture on October 12, 2015.
- Desheng Zhang, Ph.D. Candidate in the Department of Computer Science at the University of Minnesota, who presented a seminar entitled, “Transportation Applications for the Internet of Things” on October 23, 2015.
- Dr. Hanghang Tong: Assistant Professor, Computer Science Department, City College, City University of New York. *Optimal Dissemination on Graphs: Theories and Algorithms.*

4.3. UB to host the 2017 CUTC Summer Meeting in Buffalo, NY



UB’s TransInfo Center was selected to host the week-long 2017 Annual Summer Meeting of the Council of the University Transportation Centers (CUTC). CUTC was established in 1979 to promote university research, education, workforce development, and technology transfer. CUTC is currently made of more than 90 National Universities with established Transportation Research Centers. Representatives from all those centers will be convening in Buffalo during the period from June 19 to June 21 to discuss and formulate critical issues facing the transportation industry and research enterprises.

4.4 The 95th Annual Meeting of the Transportation Research Board



The 95th Annual Meeting of the Transportation Research Board took place in mid-January, 2016 with a strong presence from ISTL. Highlights included a co-sponsored reception welcoming over 100 attendees; over 15 presentations, papers and posters showcased by ISTL faculty and students.

TRB
2016

4.5 Other Outreach Activities



session which included several interesting presentations made by junior faculty and graduate students from all around New York State.

UB's ISTL and TransInfo played a leading role in organizing the 4th Connected & Autonomous vehicle symposium held at SUNY Poly on December 2, 2015. For that Symposium, UB's TransInfo sponsored the poster



The Buffalo Niagara region got a glimpse into the future on Friday, June 24, 2016 with a live demonstration of a driveless SUV at the University at Buffalo's North Campus. Nine year-old Marti is a self-driving retrofitted 2006 Ford Explorer, developed by Southwest Research Institute (SwRI), a Texas-based, nonprofit applied research and development organization. It is designed to improve safety at roadside construction projects. Engineers, politicians and journalists had the opportunity to experience automated technology in person and see potential transportation applications that could save lives.

For the event, UB's ISTL and TransInfo partnered with SwRI and Erie County Department of Public Works to demonstrate the technology on UB's North Campus.

5.0 Future Plans

Our broad vision for the coming year involves continuing to build tighter connections with industry and to explore collaborative partnerships and internship opportunities for our students. More specifically, ISTL's aspirations include



- Building the Partial Reality Experimental System for testing *Connected and Automated Vehicles* (MRI NSF Funding secured in November 2016)
- Getting the interdisciplinary degree approved (*approved on April 2016*)
- Recruiting the best *graduate students* to UB transportation and logistics programs (*award-winning students*)
- Going after other *Center-type opportunities* and large grants (e.g., NSF ERC, NSF MRI and others) (*TransInfo and NSF MRI*)
- Being viewed as a resource for WNY, NYS and the nation (working closely with NYSDOT, NITTEC, GBNRTC, NFTA)
- Continuing to build international collaborations



Appendix A. Mapping of Accomplishments against ISTL's 3-year Objectives

3- Year Objectives	Accomplishments
Increase the number of ladder faculty and improve student/faculty ratio through the hiring of an additional seven new faculty members (4 in SEAS and 3 in SoM)	Successfully hired 6 new hires for ISTL – 3 in Engineering and 3 in the School of Management (see Table 1).
Submit center-type grants including an IGERT proposal to NSF, and a University Transportation Center (UTC) to the U.S. Department of Transportation	A University Transportation Center (UTC) grant has already been secured (see section 2.1).
Submit 20 research proposals to NSF, USDOT, FHWA, TRB, DoE, DoD, and other federal and state agencies as well as to private industry (e.g., railroad and trucking industry).	ISTL faculty has submitted more than 20 research proposals so far to NSF, USDOT, FHWA, NCHRP, FRA, Xerox, and others
Submit 30 peer-reviewed publications in scientific journals or conference proceedings.	The number of transportation-related publications submitted by ISTL core and affiliated faculty far exceed 30 – a total of 60 publications during the year this report covers (See Appendix B).
Secure approval for the new interdisciplinary M.S. degree in Transportation and Logistics	The application has been approved by SUNY in August 2015, and by NYS Department of Education in April 2016.
Fund 15 – 20 different graduate students on externally funded projects	The number funded (partial and full) of graduate students working on transportation and logistics exceeds 15.
Graduate at least 4 Ph.D. students	Eight Ph.D. students have already graduated. They are: (1) Yunjie Zhao (CSEE); (2) Lei Lin (CSEE); (3) Louis (Shuai) Tang (CSEE); (4) Md Tawfik Sarwar (CSEE); (5) Zhenhua Zhang (CSEE); (6) Aditya Wagh (CSE); (7) Yunfei Hou (CSE); and (8) Ta-Wei (Daniel) Kao (OMS).
Establish an Advisory Board for ISTL, with members drawn from several local and global corporations, transportation governmental organizations and the trucking and rail industries.	Advisory Board established with currently 10 distinguished members (see section 1.2)



Offer students the opportunity for international experience through UB's branch campus at the Singapore Institute of Management during summer-time residencies. Collaborate with international academic institutions on joint research initiatives.	Partnership established with UHasselt in Belgium. Currently seeking additional partnership opportunity with the University of Windsor in Canada.
Hold two workshops or conferences on a theme related to Transportation & Logistics	ISTL sponsored or co-sponsored the followings: (1) Transportation Summit sponsored on May 2, 2014; (2) Third Connected Vehicle Symposium held in Albany in November 2014; (3) Fourth Connected Vehicle Symposium held in Albany on Dec 2, 2015; (4) TransInfo First Annual Symposium held on August 12 and 13, 2015; and (5) TransInfo Second Annual Symposium held in Arlington, VA in August 2016.

Appendix B. ISTL Publications and Presentations

ISTL Publications in Refereed Journals

1. Hou, Y., Zhong, W. , Su, L., Hulme, K.F., Sadek, A.W., and Qiao, C. (2016), TAsE: Improving the Efficiency of Electric Taxis with Transfer-Allowed Rideshare, IEEE Transactions on Vehicular Technology (Accepted).
2. Y. Zhao, A. Wagh, K. Hulme, C. Qiao, and A.W. Sadek. (2016). Integrated Traffic–Driving–Networking Simulator for the Design of Connected Vehicle Applications: Eco-signal Case Study. Journal of Intelligent Transportation Systems: Technology, Planning and Operations, Vol. 20, Issue 1, pp. 75 – 87.
3. L. Lin, Q. Wang, and A.W. Sadek. (2016). A Combined M5P Tree and Hazard-based Duration Model for Predicting Urban Freeway Traffic Accident Durations. *Accident Analysis and Prevention*, Volume 91, Pages 114–126
4. Ni, M.*, Q. He, and J. Gao, "Non-Recurrent Subway Passenger Flow Prediction from Social Media under Event Occurrences", IEEE Transactions on Intelligent Transportation Systems (*in press*).



5. Y. Zhang, C. Wu, C. Qiao, A. Sadek, and K. Hulme. (2015). Addressing the Safety of Transportation Cyber-Physical Systems: Development and Validation of a Verbal Warning Utility Scale for Intelligent Transportation Systems. *Mathematical Problems in Engineering*, Vol. 2015, Article ID 126947.
6. Y. Hou, Y. Zhao, A. Wagh, L. Zhang, C. Qiao, K.F. Hulme, C. Wu, A.W. Sadek, and X. Liu. (2015). Simulation Based Testing and Evaluation Tools for Transportation Cyber-Physical System. *IEEE Transactions on Vehicular Technology*, Vol. 65, Issue 3, pp. 1098 –1108.
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