Semiannual Program Progress Performance Report for

Southeastern Transportation Center (STC)

US DOT Regional University Transportation Center

Submitted to: US Department of Transportation

Office of the Secretary of Transportation

Grant period: 1 October 2013—30 September 2017

Reporting period: 1 April 2014—30 September 2014

Submitted: 30 October 2014

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Grant: DTRT13-G-UTC34
DUNS: 00-338-7891
EIN: 62-6001636

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STC Program Progress Performance Report

1. **Accomplishments**
    a. **What are the major goals of the program?**

Under the theme of Comprehensive Transportation Safety, the Southeastern Transportation Center (STC) is expanding our research, education, work force development and technology transfer activities, focusing resources in this same thematic area, to address existing and emerging transportation challenges in the Southeast.

To achieve comprehensive transportation safety in our region, STC strives to understand its sociology and safety cultures; gather and curate relevant data; integrate human factors with infrastructure use; implement and enrich the Highway Safety Manual and similar tools; and apply these to all operations related to moving people and goods.

We help the transportation sector improve its existing workforce while we develop the next generations of educators, professionals, technical specialists, and practitioners who will create and sustain our nation's safe transportation systems.

We are developing and implementing a comprehensive T2 program that is designed to implement the outcomes of our research program, and disseminate research results as well as their implications and significance to a broad range of constituents (practitioners, decision makers, students, educators and other transportation researcher).

b. What was accomplished under these goals? What opportunities for training and professional development have the program provided?

Research Accomplished under Program Goals

The STC Research Program consists of two major components: (1) Major Research Initiatives (MRIs); and (2) Opportunity and Exploratory (O&E) Grants. During this second reporting period of the STC Grant, contracts have been signed and these activities are underway.

Details of the research components, as well as specific research activities by STC consortium member, are presented in the following research performance summary.

Reg Souleyrette (UKY) is the Research Director for the Major Research Initiatives (MRIs). Dr. Souleyrette is directing project development in collaboration with the STC Director, Stephen Richards (UTK). To date, project scopes and budgets are approved and activity is underway. They have assisted research coordinators in the development of MRI work tasks. The management structure for the MRI-1 project has been changed to report to the Research Director, who has facilitated project development tracking and contracting status.

Under this paradigm, these items have been accomplished this reporting period:

- Conducted bi-weekly status reviews to establish MRI projects
- Developed a quarterly collaborative progress review approach for MRI program/projects

- Developed (with others) the purpose and agenda for the STC Fall Research Meeting held September 29-30, 2014.
- Worked with MRI Coordinators to determine the projects to be awarded for each Major Research Initiative Program (detailed table follows)

Major Research Initiatives Teams

MRI	Name	Email	University
1	Jennifer Ogle MRI 1 co-coordinator	ogle@clemson.edu	Clemson
1	Jerry Pigman	jerry.pigman@uky.edu	UKY
1	Raghavan Srinivasan MRI 1 co-coordinator	srini@hsrc.unc.edu	UNC-CH
2	Nick Stamatiadis MRI 2 co-coordinator	nick.stamatiadis@uky.edu	UKY
3	Chris Cherry	cherry@utk.edu	UTK
3	Chunjiao Dong	cdong5@utk.edu	UTK
3	Steve Polzin MRI 3 co-coordinator	polzin@cutr.usf.edu	USF
4	Bryan Gibson	bryan.gibson@uky.edu	UKY
4	Mei Chen	mei.chen@uky.edu	UKY
1, 2, 4	Lee Han MRIs 1, 2, 3 research facilitator	lhan@utk.edu	UTK
1, 3	Steven Jones	sjones@eng.ua.edu	UA
1, 4	Asad Khattak MRI 4 coordinator	akhattak@utk.edu	UTK
2, 4	Mohamed Abdel-Aty	m.aty@ucf.edu	UCF
2, 4	Essam Radwan MRI 2 co-coordinator	ahmed.radwan@ucf.edu	UCF
3, 4	Shashi Nambisan MRI 3 co-coordinator	shashi@utk.edu	UTK
3, 4	Reg Souleyrette research director	souleyrette@uky.edu	UKY
3, 4	Steve Richards	stever@utk.edu	UTK

MRI 1: Crash Modification Factors and the Highway Safety Manual; MRI 2: Integrated Simulation and Safety; MRI 3: Socio-Demographic Characteristics and Culture as Factors in Differential Safety Performance across Geography; MRI 4: Big Data for Safety Monitoring, Assessment, and Improvement

Progress on the four Major Research Initiatives

MRI 1 Crash Modification Factors and the Highway Safety Manual

The MRI 1 team in Tennessee is focusing research on the traffic work zone procedure in the HSM, and acquiring detailed incident and accident data for Interstate work zones in Tennessee. The team has requested similar data from other Southeastern states.

In North Carolina, the HSRC team will estimate crash modification functions for two or three engineering treatments for which data on treatment and reference sites are readily available. The team will combine data from multiple jurisdictions that have data on the same treatment. This effort is being coordinated with ongoing NCHRP Project 17-63 (Guidance for the Development and Application of Crash Modification Factors) that is developing guidelines to develop crash modification functions. The initial focus has been to contact state agencies to identify data sets for this effort. So far, one data set has been identified: stop-to-signal conversions on rural two lane roads in urban and suburban areas in North Carolina. This data set can be used as a starting point to develop crash modification functions for the stop-to-signal conversion.

In Kentucky, Safety Performance Functions (SPFs) have been developed and analyzed for in-state applications. One example is refined crash query analysis related to SPFs for cable median barriers.

MRI 2 Integrated Simulation and Safety

The main goal of MRI 2 is to evaluate the use of simulation in assessing and possibly predicting safety levels for roadway environments for pedestrian and bicycle conflicts with vehicular traffic. The primary objective is to develop the pedestrian and bicycle to vehicle crash prediction models. Under the matching fund requirement, the Florida Department of Transportation awarded UCF a contract to develop a statewide pedestrian crash rate methodology and assess the available crash prediction functions.

A detailed literature review of commonly used simulation tools and their capability to model incidents, accidents, and traffic operation under such conditions was completed under this contract, and a similar effort for bicycle safety assessment just started. The team has developed simulations of large-scale incidents during evacuations. Initial results were tabulated and presented at the recent STC Fall Research Meeting in Knoxville.

MRI 3 Exploring Socio-Demographic Characteristics and Culture Factors in Differential Safety Performance across Geography

The MRI 3 team has initiated a search of new datasets that could improve exposure metrics for different types of vehicles, different owner demographics, and different geographies. Most vehicles now have an electronic vehicle history, and resellers' basic information is generally available online. These data can be mined to identify factors that may contribute to increased crash and fatality risks of different modes. During this time period, research has been initiated and matching funds have been sought from various sources, which is an ongoing activity. Exploratory work with data sets was initiated to help refine focus hypotheses and develop a working knowledge of the data sets. Staffing assignments have been made and administrative activities carried out to establish research accounts and finalize year one work programs.

MRI 4 Big Data for Safety Monitoring, Assessment, and Improvement

While considerations of simulation, data reliability, human behaviors, and abnormal traffic operations have been incorporated into all the MRIs, the MRI 4 team has worked on error propagation models of real-time GPS data collected from circumstances similar to naturalistic driving efforts. While GPS location data are relatively usable for certain applications, the

inherent error increases quickly when deriving acceleration or vehicular "jerk" magnitudes in real-time. The team collected real-time travel time data on multiple sections in Nashville, from license plate readers, Bluetooth readers, probe vehicles, INRIX database, NAVTEQ, Remote Traffic Microwave Sensors (RTMS), and several other sources, all in real time.

The objective of MRI 4 is to develop innovative programs to monitor, assess, and improve safety using Big Data. The MRI will provide a framework and a roadmap that can be used to plan, design, operate, and maintain data intensive safety systems, i.e., systems that can enhance safety by using historical and real-time data from several sources. By developing knowledge, tools, and products based on Big Data, the MRI will contribute to potential improvements in safety. The MRI focuses on safety data from a diverse set of sources that include radars, video, loop detectors, Bluetooth devices, GPS devices, social media, and weather (RWIS), merged with conventional data sources such as roadway parameters, roadside elements, land use, and planning data. Work accomplished under this MRI for the reporting period included:

- Data collection (macroscopic analysis)
- Analysis of DUI crashes using Big Data
- Data Collection (microscopic analysis)

Opportunity & Exploratory Grants

In addition to the four MRIs, work is underway on the Opportunity & Exploratory grants awarded to STC faculty. Following are highlights of several projects:

In Utilizing Assistive Technology to Remove Communication Barriers in the Public Transportation System for Passengers with Disabilities, Dr. Sawhney (UTK), the principal investigator, has collected data about communication barriers of disabled passengers and bus drivers from 598 individuals. Data were collected through interviews of people belonging to a specific disability groups, and online passenger and driver surveys.

Several tasks of *Evaluating the Wrong-Way Driving (WWD) Incidents Problem on the Florida's Turnpike Enterprise (FTE) Roadway System* have been accomplished to date and results have been sent for presentation and publication in the Transportation Research Board (TRB) conference in Washington D.C., January 2015. The UCF Research Team has completed these tasks: literature and research review, WWD hot spot macroscopic route and county ranking, and mapping WWD incident hot spots, and countermeasures identification.

For Coordinated Emergency Vehicle Pre-emption, Adam Kirk (UKY) has identified and reviewed published and ongoing research work, collected corridor data sufficient for micro simulation, and developed a micro simulation model to emulate real world conditions. These activities have allowed Kirk to develop and calibrate a base simulation model. The project's objective is to quantify the operational benefits of preempting an entire corridor for emergency vehicle operations.

For Promoting Safe Transportation Among Older Drivers: Risk Assessment via Driving Simulator Technology, Jerri Edwards (USF) has met her goals at three months to obtain IRB approval, train staff in administration of driving simulator assessment and data extraction, train staff in recruitment procedures, and finalize objective on-road performance evaluation. The next

goal is to complete data management system and train GRAs in data entry. Edwards has identified additional supply needs and is working to fill them. The study protocol has been pilot tested with two practice participants. The next milestone is to recruit and enroll 50 older adult drivers by March 15th, 2015.

Progress on Chris Cherry's (UTK) New Technologies and Bicycle Safety includes completion of the review of relevant literature, and collecting information for user behavior and route choice that ultimately impacts the safety of the bicyclists. In the meantime, development of an application, which will capture large data about the user behavior and route selection in Knoxville, is on the verge of deployment. After fixing some of the minor issues, the app will be ready for public use.

The O&E projects and PIs are:

Project Title	University	PI
Automated Traffic Surveillance from an Aerial Camera Array	Clemson	Wayne Sarasua
Intervention Strategies for Unsafe Cell Phone Usage Among Teen Drivers	NCA&T	Maranda McBride
Evaluating the Wrong-Way Driving Incidents Problem on the Florida's Turnpike Enterprise Roadway System	UCF	Haitham Al-Deek
Development and Evaluation of Coordinated Traffic Signal Emergency Preemption System	UK	Adam Kirk
Promoting Safe Transportation Among Older Drivers: Risk Assessment via Driving Simulator Technology	USF	Jerri D. Edwards
New technologies and bicycle safety	UT	Chris Cherry
Utilizing Assistive Technology to Remove Communication Barriers in the Public Transportation System for Passengers with Disabilities	UT	Rupy Sawhney

Education Accomplished under Program Goals

The STC Education Program is distributed and coordinated among all the consortium members. During this second period of the STC Grant, education sub-grants that were put in place with each of our member universities, and a number of education-related activities have been launched, as summarized below, by consortium member.

University of Tennessee, Knoxville (UTK)

Six STC scholarships were awarded to competitively recruit student applicants to UTK.

Shashi Nambisan was named the STC Education Director.

A transportation safety course, which was revised and updated for delivery, is being taught this Fall with 15 graduate students. Six courses were offered in Fall 2014 as part of the transportation curriculum in the Department of Civil & Environmental Engineering (CEE).

STC and CEE are jointly sponsoring speaker series webinars during the reporting period of 2014. Information about previous and upcoming seminars is available at stc.utk.edu/STCtechtransfer/webinars.html.

Fall 2014 STC Speaker Series & Webinars include:

- September 4: Bob Murphy, President, RPM Transportation Consultants, LLC. *The Transportation Revolution Revisited.*
- September 11: Wei Lu & Cheng Liu, Oak Ridge National Lab. Computational Transportation Science: Challenges and Opportunities in Traffic Modeling and Simulation.
- September 18: John Bell & William Rose, UT College of Business. Real World Practical Influences on Vehicle Routing and Urban Delivery.
- September 25: Nick Weander, Tennessee Department of Transportation. *TDOT's 25 Year Long Range Transportation Plan.*

Drs. Nambisan and Jerry Everett, both of the Center for Transportation Research, were awarded a $1.2 million, three year research project by Centers for Disease Control and Prevention to improve night-time seat belt use through education and enforcement strategies.

Dr. Nambisan, in partnership with education and curriculum development specialist Dr. Jennifer Richards and CTR's Dr. Everett, led a summer transportation academy for teachers (July 14-16, 2014) in which 20 teachers from area high schools participated along with two peer-mentor teachers. The academy employed an experiential learning process to alert, engage, attract, and excite teachers in pre-collegiate (K-12) systems to adopt transportation systems contexts to facilitate learning. It also provided teachers first-hand experiences about educational and career opportunities in transportation. Eight participants were selected for Phase 2 of this Academy in which they will develop, implement, and assess transportation based lesson plans in their classes. Ms. Wenshu Li, a PhD student in Educational Psychology and Research, has supported these efforts as a research assistant.

Drs. Nambisan and Cherry mentored two high-school students over the summer break. Their research project was to evaluate the spatial and temporal aspects of the operations of GEM-electric vehicles in UT's maintenance fleet. This was in partnership with CURENT, a NSF-funded engineering research center at UTK.

In July 2014, Dr. Han gave an invited talk at the top ranked transportation program in China at Southwest Jiaotong University, in the City of Chengdu. As China sees a much higher traffic fatality rate than the US and European counties, this is the beginning of a very worthwhile collaboration. Dr. Han spoke about how government's investment in Intelligent Transportation Systems in the past three decades could provide much better and timely traffic data for safety improvement and crash countermeasure purposes.

Dr. Han was awarded the UTK's College of Engineering Research Achievement Award, based on the externally sponsored projects he conducted and the scholarly journal papers he published on topics related to transportation safety and operations.

Dr. Han was awarded the University of Tennessee Chancellor's Citation for Research and Creative Accomplishments in April 2014. This is one of the highest honors for research accomplishments at the University of Tennessee.

Dr. Han gave an invited talked to a large group of Industrial and Systems Engineering Department graduate students on the State of Tennessee's effort to collect and disseminate real-time traffic condition information to aid the motoring public and address the technological challenges.

Drs. Nambisan and Han mentored Ms. Ebony Lemons, a Civil Engineering undergraduate student at UTK. Her research addressed the impact factors of the Transportation Research Records of the Transportation Research Board.

STC sponsored travel of students to attend conferences. Mr. Jun Liu presented *Providing real-time driving volatility information*, Paper #12468, at the Intelligent Transportation Systems World Congress meeting, Detroit, 2014.

Awards received by CEE students during this reporting period:

Time	Award	Entity	Recipient
Summer 2014	William L. Moore Jr. TSITE Scholarship	Tennessee ITE	J. Liu
Spring 2014	Chancellor's Extraordinary Professional Promise Award	University of Tennessee	T. Yoon
Spring 2014	Annual Scholarship Award	Intelligent Transportation Society of Tennessee	Hyeonsup Lim
Spring 2014	Student Paper Competition First Place	Tennessee Institute of Transportation Engineers	J.J. Yang

Highway Safety Research Center, UNC-CH (HSRC)

HSRC is developing plans to modify a distance learning course called *Road Safety 101*. HSRC personnel are reviewing the course materials to identify the necessary modifications and additions. This course will be offered in Spring 2015.

North Carolina A&T State University (NCAT)

The STC Education Award has funded 31 transportation and supply chain, and civil engineering students for the 2014-2015 academic year. These students will receive research mentorship and internship experiences, as well as experiential learning activities.

Twenty high school students were selected in the 2014 Summer High School Transportation Institute (STI). This program's goal is to exposed high school students to the transportation industry, creating an awareness and knowledge base of the broad spectrum of transportation careers available to them. On opening day, 19 high school juniors and seniors participated and

spent five and one-half weeks studying a rigorous curriculum on the five modes of transportation, careers in the industry, and transportation and related academic opportunities available at North Carolina A&T State University. All modes discussed addressed safety expectations and issues facing the specific mode.

All 19 students left the Summer Transportation Institute program with an increased understanding and awareness of the transportation industry, and an improved body of knowledge defining what the transportation discipline is all about. The students were afforded the opportunity to demonstrate their experiences at the closing ceremony on the final day of the STI. Participants gave a brief synopsis of their summer activities and classroom lectures demonstrating their newly acquired knowledge of the transportation industry. Several expressed a desire to enroll in the discipline when they enter college. Each student received a stipend of $125 per week ($625), college credit for a 3-credit hour Freshman English course, valuable SAT preparation sessions, student development and transportation career exploration seminars, and awareness of and exposure to the transportation industry. Three students were acknowledged with special distinction, receiving the Director's Award, Excellence Award and Outstanding Achievement plaques. Additionally, all participants received a Certificate of Completion.

University of Alabama (UA)

During the week of July 14-16, 2014, the University of Alabama in association with the Alabama Department of Transportation 5th Division conducted its Advanced Transportation Institute for 10 high school students from underrepresented groups. The institute has two main purposes:

- To introduce high school students to careers in transportation by partnering with a transportation agency.
- To introduce those students to the college application process, scholarships, and college life.

An abbreviated list of institute activities follows:

- ALDOT materials laboratory tour
- Quarry tour
- ITS lab experiment
- Computer bridge design
- Presentations by ALDOT and UA personnel on job opportunities and university life
- Road safety computer exercise
- 3-D printing lab tour
- Culminating banquet for participants with their families

University of Central Florida (UCF)

UCF established a joint internship with MetroPlan Orlando and the intern, Barbara Kelley, was selected to begin the program in June 2014. She is investigating pedestrian and bicyclist crashes that occurred in Orange, Osceola, and Seminole counties in 2012 and 2013. Currently Barbara is categorizing crashes and will characterize a crash based on environmental and behavioral factors of both the drivers and non-motorists.

University of Kentucky (UKY)

The objective of UKY's education program is to select, engage, and support graduate students in safety research, and reach out to undergraduates and high school teachers and students. Three graduate students have been selected and assigned to research projects as part of STC's MRI 1, 2, and 4 programs. Several graduate students participated in the STC Fall Research Meeting.

Technology Transfer Accomplished under Program Goals

c. How have the results been disseminated? If so, in what way(s)?

UTK

Working with STC Technology Transfer Director Steven Jones (UA), the faculty and staff at UTK organized and hosted the 2014 STC Fall Research Meeting. The agenda included working sessions for each of the four Major Research Initiatives teams on Day 1 (September 29). The evening event featured 3-Minute Thesis presentations by students from UTK, UKY, UA, and Clemson. This was the STC's first experience with the lively and informative format, and will be part of student research events throughout the grant period. Day 2 was devoted to presentations by the MRI teams as well as the PIs for the Opportunity & Exploratory grants. The meeting concluded with a presentation by Dr. Dan Turner (UA), *How Connected/Automated Vehicles are Reshaping Transportation Safety and Operations Research.*

UT's CEE faculty communicated STC related results through several sources, including the Internet and presentations at conferences such as the ITS World Congress in Detroit.

CEE faculty, CTR staff, and students prepared research papers for technical presentations at the 2015 TRB Annual Meeting. These include Drs. Lee Han, Asad Khattak, Chris Cherry, Shashi Nambisan, Baoshan Huang, Stephen Richards, David Clarke, as well as several graduate students.

Dr. Cherry presented his work and ideas on safety efforts underway to the local Transportation Planning Organization's Technical Advisory Committee, as well as to the city and state transportation staff (City of Knoxville, Knoxville Area Transit, and Tennessee DOT).

Dr. Cherry has submitted a patent application on a product that could improve cyclist safety at railroad crossings. Working with CEE faculty, he has developed a bicycle data application, *I Bike KNX* that gathers probe data from smartphones. This app was derived from and in collaboration with the *Cycle Atlanta* app developed by faculty at Georgia Tech under the Stride UTC. This app is being deployed to gather probe bike safety data.

Dr. Han gave an invited talked to Industrial and Systems Engineering graduate students on the technological challenges of Tennessee's effort to collect and disseminate real-time traffic condition information to aid the motoring public.

Dr. Han was interviewed and quoted by The Oregonian for an investigative story on how the City of Portland stopped its red light camera program from bleeding money, a common problem of municipalities that bought into such programs to promote traffic safety at signalized intersections. Dr. Han's paper in Transport Policy assessed the risks traffic signal timing plan changes that could lead to poorer safety outcomes.

Dr. Han also gave a live interview on National Public Radio-NPR affiliate WOSU in June 2014. Dr. Han was the main guest on the program "Will Traffic Camera Get the Red Light?" because of his paper, coauthored with his student Dr. Qiang Yang and Dr. Cherry, on the safety concerns of traffic signal timing schemes being modified to generate revenues to sustain red light camera programs.

Editorial work highlights

- As special advisor to the *Journal of Transportation Safety & Security,* Dr. Khattak worked to increase the journal's citation rate. Dr. Nambisan was appointed to the editorial board.
- Dr. Khattak continues as Editor-in-Chief of Journal of Intelligent Transportation Systems.
- Dr. Han was appointed to the editorial board of International Journal of Transportation Science and Technology in 2014.
- Dr. Cherry worked on the editorial board of *International Journal of Sustainable Transportation*. He also served on the Editorial board of a new journal titled *Traffic and Transport Theory & Practice*.
- Dr. Han was appointed to the editorial board of *Journal of Traffic and Transportation Engineering* in 2014.
- Dr. Han continues to serve on the editorial board of the *Scientific World Journal.*

Committee service

- Shashi Nambisan was elected president of the Council of University Transportation Centers. He was also selected as Quest Scholar of the Week at University of Tennessee. Dr. Nambisan continues as co-chair the TRB National Data Requirements and Programs committee, and as a member of the TRB Education and Training Committee.
- Asad Khattak worked as co-chair of Advanced Traveler Information Systems sub-committee, organizing a workshop on this topic for the 2015 TRB annual meeting.
- Chris Cherry is a member of ANF20 Bicycle Transportation. He also chairs the joint (bike, ped, motorcycle, law enforcement committees) subcommittee on emerging technologies for low speed vehicles. Locally, he serves on the Knoxville Greenway Commission.
- Lee Han was appointed to the TRB Managed Lane committee, a standing committee that addresses operational and safety aspects of lane management policies and technologies. Dr. Han is a member of TRB Emergency Evacuation Task Force, which is about to be elevated to full committee status. Dr. Han is UT's representative to TRB.
- Mark Burton
    - AT030 Agriculture Transportation
    - AW020 Inland Water Transportation
- Larry Bray
    - AW020 Inland Water Transportation (past chair)

- Dave Clarke
    - AT010 Freight Transportation Regulation and Economics
    - AT050 Intermodal Freight Terminal Design and Operations
    - AR040 Rail Freight Transport Committee (past chair)
    - AR030 Railroad Operating Technologies
    - AR040(1) Subcommittee on Rail Capacity (chair)
- Jerry Everett
    - ADA30 Transportation Planning for Small and Medium Sized Communities (chair)
    - ABG20 Transportation Training and Education
- Lissa Gay
    - ABG30 Technology Transfer (research coordinator)
- Steve Richards
    - AHB60 Highway/Rail Grade Crossings (emeritus)
    - AHD50 Roadside Maintenance Operations

HSRC

Committee Service

- Daniel Carter
    - ANB25 Highway Safety Performance Committee
- Forest Council
    - Strategic Highway Research Program (SHRP2) Safety Technical Coordinating Committee (chair)
    - Strategic Highway Research Program (SHRP2) Committee on Long-Term Stewardship of Safety Data
    - Oversight Committee for Use and Oversight of SHRP 2 Safety Data, Phase 1
    - ANB20 Committee on Safety, Data, Analysis, and Evaluation (emeritus member)
- Caroline Dickson
    - ANB23 Task Force on Road Safety Workforce Development
- Robert Foss
    - ANB30 Committee on Operator Education and Regulation (chair, subcommittee on young drivers)
- Dan Gelinne
    - ANB23 Task Force on Road Safety Workforce Development
- Bill Hall
    - ANB45 Occupant Protection Committee (communications coordinator)
- David Harkey

- ANO00 Safety and Systems Users Group
- ANB00 Safety Section (chair)

- Bevan Kirley
  - ANB45 Occupant Protection Committee
  - AN000(2) Safety and Systems Users Group Young Members Council Subcommittee
  - TRB Young Members Council
- Bo Lan
  - ABJ80 Statistics Methods Committee
- Kristen Langford
  - ANF10 Pedestrians Committee (co-chair, subcommittee on ped/bike university education)
- Natalie O'Brien
  - ANB30 Committee on Operator Education and Regulation
- Laura Sandt
  - ANF10 Pedestrians Committee (secretary; co-chair, papers subcommittee)
- Raghavan Srinivasan
  - ANB20 Committee on Safety, Data, Analysis, and Evaluation
- Carl Sundstrom
  - ANF20 Bicycle Transportation Committee
- Libby Thomas
  - AHB65 Traffic Speed and Safety, Cross Cutting Issues Joint Subcommittee (co-chair)
- Charlie Zegeer
  - ANF10 Pedestrians Committee (emeritus member)

UA

The University of Alabama and Alabama Department of Transportation jointly sponsored and hosted the *Advanced Transportation Institute*. UA's College of Engineering covered the story (news.eng.ua.edu/2014/08/transportation-center-alabama-hosted-summer-institute/) under the title *Transportation Center for Alabama Hosted Summer Institute*. Dr. Dan Turner, professor emeritus, gave a presentation at the 2014 STC Fall Research Meeting about the institute with a detailed discussion on the logistics of organizing and executing a program for high school student.

Committee Service

- Jay Lindly
  - AFB70 Utilities Committee (past chair and current member)
- Steven Jones

- ABG30 Technology Transfer (communications coordinator)

UCF

UCF researcher Haitham Al-Deek presented a conference paper for the ASCE TDI Congress June 10, 2014 held in Orlando, Florida. The paper is Wrong-Way Driving Incidents on Central Florida Toll Road Network, Phase-1 Study: An Investigation into the Extent of this Problem? Authors are John H. Rogers, Adrian Sandt, and Al-Deek.

The UCF Research Team submitted two papers for presentation at TRB 2015: Wrong Way Driving Multifactor Risk-Based Analysis for Florida Limited Access and Toll Facilities and Wrong Way Driving Prevention: Incident Survey & Current Practiced Solutions. Both papers were accepted for presentation, and publication is pending revisions.

The research team has also revised and resubmitted another manuscript to Inderscience Journal for Wrong-Way *Driving on Florida Toll Roads: An Investigation into Multiple Incident Parameters and Targeted Countermeasures for Reductions*. This third paper has been accepted for publication pending these revisions, which were completed in August 2014.

Professor Al-Deek's work in wrong-way driving has been covered extensively in the media. See the Orlando Sentinel's video interview of Al-Deek (www.orlandosentinel.com/orlnews-wrong-way-driver-study-and-p-20140227-embeddedvideo.html). Al-Deek presented project progress to date at the 2014 STC Fall Research Meeting.

Committee Service

- Mohamed Abdel-Aty
  - ANB25 Highway Safety Performance Committee
  - AND20 User Information Systems

UKY

Committee Service

- Joe Crabtree
  - AW020 Inland Water Transportation
- Eric Green
  - ABJ60 GIS Committee
  - ANB40 Law Enforcement Committee
- Reginald Souleyrette
  - AN000 Safety and Systems Users Group
  - ABJ60 Data and Information Systems Section (immediate past chair, liaison to safety section)
- Nick Stamatiadis
  - AFB50T Context Sensitive Solutions Task Force (chair)
  - AHB65 Operational Effects of Geometrics
  - AHB65-4 Subcommittee Low Speed Roads (past chair)

University of South Florida (USF)

Committee Service

- Steven E. Polzin
    - ABJ10 National Data Requirements and Programs, co-chair
    - ABJ45T Task Force on Understanding New Directions For the National Household Travel Survey
    - TRB Committee for Study of Innovative Urban Mobility Services

d. What do you plan to do during the next reporting period to accomplish the goals and objectives?

UTK

Research

UTK will continue to work on the four MRIs and Dr. Cherry's O&E Grant for new technologies and bicycle safety.

Education

CEE faculty will work with STC to recruit capable students with interest in transportation safety, and continue the transportation seminar webcast series. The safety course on accident reconstruction will be updated and offered in Spring 2015.

Dr. Nambisan, in partnership with Dr. Jennifer Richards (education and curriculum development specialist in UT's Department of Food Science & Technology), continues to work on Phase 2 of the summer transportation academy for K-12 teachers. From the 20 teachers who participated in Phase 1, eight were selected to for Phase 2. They will develop, implement, and assess transportation based lesson plans that will be used in their classes. Ms. Wenshu Li, a PhD student in Educational Psychology and Research, is a research assistant in these efforts.

Outreach

In line with USDOT priorities, UTK will establish a pedestrian and bicycle transportation website, focusing on technical aspect of safety issues. It will be populated with information and studies related to pedestrian and bicycle safety. We will coordinate our efforts with consortium partners, especially University of North Carolina Pedestrian and Bicycle Information Center.

International links will be strengthened with various universities in Asia, Europe, and Australia. Specifically, collaborations with Beijing Jiatong and Southeast Jiaotong universities will be explored. A recent graduate, Dr. Hongtai Yang, is an assistant professor at Southwest Jiaotong University; Dr. Cherry has ongoing collaborations with Kunming University of Science and Technology and Tsinghua University in China, along with Utrecht University in Netherlands, and Monash University in Australia. Dr. Han and Dr. Huang are working closely with Changsha University. Drs. Cherry, Han, and Nambisan have been invited to make presentations at the *Transportation Planning and Modeling for Developing Countries* conference in Mumbai, India in December 2014.

The faculty at UTK will work to further strengthen the *Journal of Transportation Safety & Security*. It has already seen very good growth in paper submissions and a special issue on railroad grade crossing safety is in the works. The goal is to have the journal listed in the Science Citation Index within the next two years.

NCAT

Research

Drs. McBride and Carter will move forward on the research activities involved with their O/E research project. Their project focuses on determining the attitudes and behaviors that distinguish those who text and drive versus those who do not. The target audience is teen and young adult drivers. Understanding these factors could provide the information needed to develop and implements training and messaging that would lead to fewer incidents of texting while driving.

Education

STC Education Award recipients will receive mentorship and assist on various research projects with faculty, interview with companies for upcoming summer internships, and participate in scheduled experiential learning activities.

Collaboration

In the coming months we expect to make contact with the appropriate person at one of our consortium universities to participate in the 2015 STI to provide lecture, presentation and/or tour of labs or other suitable transportation facilities available.

UA

Research

The University of Alabama will participate in MRIs 1 and 3, performing research in those areas and, in upcoming reporting periods, disseminating results of the research.

Education

In addition, we will begin planning the Summer 2015 *Advanced Transportation Institute* for high school students whose populations are underrepresented in transportation engineering.

UCF

Research

UCF will commence work on the two MRIs and the O&E grant projects, and secure the needed match for these research initiatives.

Education

UCF will attempt to establish two more internships with other transportation agencies such as Florida Turnpike Enterprise, and the Orlando Orange County Expressway Authority.

UCF will take an active role in *Camp Connect I* and *Camp Connect II* planned for Summer 2015. The College of Engineering and Computer Science's Office of Diversity facilitate this engineering

exploration program for students from underrepresented communities. One Camp Connect attendee who is local high school student continues to help with the camp. This student has been involved in transportation engineering research at UCF that includes learning how to use traffic simulation software, data collection and extraction, and learning the engineering analysis process. Two UCF undergraduate students involved in transportation research also assist with Camp Connect.

UKY

Technology Transfer

Adam Kirk will present *Coordinated Emergency Vehicle Pre-emption* to North American PTV Users Group conference on October 30, 2014.

USF

Research

With contracts in place, USF anticipates significant work progress on MRI3 in the next time period.

2. Products: What has the program produced?

a. Publications, conference papers, and presentations

UTK

UTK hosted the STC Fall Research Meeting on September 29 & 30, 2014. This working meeting allowed the Major Research Initiative teams to meet and refine their projects, then make presentations to the larger group. Principal investigators for the Opportunity & Exploratory Grants also presented their progress to date, and STC students gave 3-Minute Thesis presentations at the dinner on the first day.

Papers presented at conferences during reporting period

Bartnick B., J. Liu, S. Richards, & A. Khattak, Driver behavior at railway-highway grade crossings with passive traffic controls: A driving simulator study, Presented at 2014 Global Level Crossing Safety & Trespass Prevention Symposium, Urbana, IL, August 2014.

Shashi Nambisan, International Engineering Education Research, 121st Annual Conference of the American Society for Engineering Education, Indianapolis, IN. June 15-18, 2014. Session W246. (Session Moderator Invited).

Shashi Nambisan, Global Perspective and Experiential Learning in Civil Engineering, 121st Annual Conference of the American Society for Engineering Education, Indianapolis, IN. June 15-18, 2014. Session T213. (Session Moderator Invited).

UA

Presentations

Turner, D. and J. Lindly, *Advanced Transportation Institute*. STC Fall Research Meeting, Knoxville, TN, September 30, 2014.

Turner, D., How Connected/Automated Vehicles are Reshaping Transportation Safety and Operations Research. STC Fall Research Meeting, Knoxville, TN, September 30, 2014.

UCF

Publications

Paper submitted to TRB in July 2014: *Multi-level Hot Zone Identification for Pedestrian Safety*, based partly on research for STC MRI4 – Big Data.

Presentations

Haitham Al-Deek presented a conference paper for ASCE TDI Congress June 10, 2014: Wrong-Way Driving Incidents on Central Florida Toll Road Network, Phase-1 Study: An Investigation into the Extent of this Problem?

UKY

Publications

Jerry Pigman submitted a paper to TRB on SPF Development for Kentucky Crash Data.

Adam Kirk submitted a paper to TRB on Calibration of the Simulation Model

Presentations

Jerry Pigman conducted four crash analysis workshops focusing on HSM methodology.

b. Journal publications:

UTK

Publications

Yang J., L.D. Han*, P.B. Freeze, S. Chin, and H. Hwang (2014) "Short-Term Freeway Speed Profiling Based on Longitudinal Spatial-Temporal Dynamics," Transportation Research Record, National Research Council (in print).

Dong C., D. Clarke, X. Yan, A. Khattak, & B. Huang, Multivariate random-parameters zero-inflated negative binomial regression model: An application to estimate crash frequencies at intersections, Accident Analysis and Prevention, 70, 2014, pp. 320–329.

Dong, C., C. Shao, S.H. Richards, and L.D. Han (2014) "Flow Rate and Time Mean Speed Predictions for the Urban Freeway Network using State Space Models," Transportation Research Part C – Emerging Technologies, 43:20-32.

Zhang, H., M. Cetin, and A. Khattak, Queuing delays associated with secondary incidents, Forthcoming, Journal of Intelligent Transportation Systems, 2015 (federal support acknowledged).

Ji, S., C. Cherry, L. Han, D. Jordan, Electric Bike Sharing: Simulation of User Demand and System Availability. Forthcoming in Journal of Cleaner Production. 10.1016/j.jclepro.2013.09.024. 2014.

Oliveira-Neto F.M., L.D. Han*, and M.K. Jeong (2014). An Online Self-Learning Algorithm for License Plate Matching, IEEE Transactions on Intelligent Transportation Systems, 14(4):1806-1816.

Papers in review

Bartnick B., J. Liu, S. Richards, & A. Khattak, Driver behavior at railway-highway grade crossings with passive traffic controls: A driving simulator study, Journal of Transportation Safety & Security.

Wang X., A. Khattak, G. Amoli, S. Son, & J. Liu, What is the Level of Volatility in Instantaneous Driving Decisions? Submitted for review in Transportation Research Part C, 2014.

Pannell, Z., C. Cherry, H. Yang, O. Grembek, Road user vulnerability in China – Impacts of the new e-bike mode. Injury Prevention, 2014.

Cherry, C., H. Yang, L. Jones, M. He, Dynamics of E-bike Use in China. Transport Policy, 2014.

Campbell, A., C. Cherry, M. Ryerson, L. Jones, X. Yang (2014) Factors Influencing the Choice of Public Shared Bicycles and Electric Bicycles in Beijing. Transportation Research Part C.

UCF

A manuscript was revised and submitted to Inderscience journal for Engineering Management Transport titled "Wrong-Way Driving on Florida Toll Roads: An Investigation into Multiple Incident Parameters and Targeted Countermeasures for Reductions." This paper has been accepted for publication with addressing comments in revisions. Authors: John H. Rogers, P.E., Haitham Al-Deek, Ph.D., P.E., Ahmad Alomari, Frank A. Consoli, P.E., and Adrian Sandt

Two publications submitted and accepted by TRB for presentation (publication is pending revisions):

Wrong Way Driving Multifactor Risk-Based Analysis for Florida Limited Access and Toll Facilities. Authors: John H. Rogers P.E., Adrian Sandt , Haitham Al-Deek, Ph.D., P.E., Ahmad Alomari, Nizam Uddin, Ph.D., Eric Gordin, P.E., Cristina Dos Santos, and Grady Carrick, Ph.D.

Wrong Way Driving Prevention: Incident Survey and Current Practiced Solutions. Authors: Adrian Sandt, Haitham Al-Deek , John H. Rogers, and Ahmad Alomari.

c. Books or other non-periodical, one-time publications:

UTK

Dua Abdelqader, A New Framework to Estimate Pedestrians' Transit Demand from Discrete Mode Choice Modelling Applied toward the Prioritization of Pedestrian Infrastructure Investments in Knoxville, TN, MS Thesis (supervisor: Dr. Cherry)

Pannell, Zane, A Framework to predict high-risk roadways for pedestrians in Tennessee, MS Thesis (supervisor: Dr. Cherry).

Lu, Wei, Effects of Data Resolution and Human Behavior on Large Scale Evacuation Simulations, PhD Dissertation (supervisor: Dr. Han)

d. Other publications, conference papers and presentations:

UTK

Nambisan, Shashi, James Alleman, Sandra Larson, and Max Grogg. A Pilot Initiative in Iowa for an Intern Development and Management Program, Transportation Research Record # 2414, Journal of the Transportation Research Board, National Academy of Sciences, pp 35-44, 2014. DOI: 10.3141/2414-05.

Vinod Vasudevan and Shashi S. Nambisan, Impacts of Energy Regulations and Vehicular Technologies on Fuel Tax Revenues, American Society of Civil Engineers Journal of Infrastructure Systems, Volume 20, Issue 2, DOI: 10.1061/(ASCE)IS.1943-555X.0000184.

Dr. Khattak gave an invited talk in the Plenary Session of the 14th COTA International Conference of Transportation Professionals, CICTP, Changsha, China, July 2014, titled "Opportunities and Challenges for the Use of Big Data: Applications in the Public Sector."

Papers prepared for the Transportation Research Board

Liu J., A. Khattak, & L. Han, What is the Magnitude of Information Loss When Sampling Driving Performance Data? Transportation Research Board Annual Meeting, 2015, (accepted for presentation).

Liu J., A. Khattak, S. Richards, & S. Nambisan, What are the Differences in Driver Injury Outcomes at Highway-Rail Grade Crossings? The Role of Passive and Active Controls, Transportation Research Board Annual Meeting, 2015, (accepted for presentation).

Khattak A. & J. Liu, Generating Real-Time Volatility Information to Support Instantaneous Driving Decisions, Transportation Research Board Annual Meeting, 2015 (in review).

Langford, B., J. Chen, C. Cherry, Comparing safety-related riding behaviors on bicycles and electric bicycles. Transportation Research Board Annual Meeting, 2015 (in review).

Abdelqader, D.A., C. Cherry, S. Nambisan, A new transit-oriented framework for pedestrian infrastructure prioritization. Transportation Research Board Annual Meeting, 2015 (in review).

Ling, Z., C. Cherry, Y. Ni, Pedestrian Level of Service at Signalized Intersections in China: Comparison of the Intercept Survey Method, Contingent Field Survey Method and Crossing Video Simulation Method. Transportation Research Board Annual Meeting, 2015 (in review)

Han, L, S. Nambisan, E. Lemons, and C. Cherry, Fair Representation of Transportation Research Record's Impacts: A Case Study on Journal Citation Reports' Impact Factor. Transportation Research Board Annual Meeting, 2015 (under review).

Zhao, Q., L.D. Han, and N. Luo, Comprehensive Risk Assessment of Urban Hazard Installations Considering Rescue Accessibility and Evacuation Vulnerability, Transportation Research Record, National Research Council, 2015 (under review).

Hargrove, S.R., H. Lim, and L.D. Han, "Key Considerations for the Evaluation of Real-Time Traffic Data," Transportation Research Record, National Research Council, 2015 (under review).

Yang, J., L.D. Han*, H. Yang, S. Chin, and H. Hwang , A Self-Learning Algorithm for Short-Term Speed Prediction Using Traffic Data from Dynamic Temporal/Spatial Sources," Transportation Research Record, National Research Council, 2015 (under review).

Zhu, D., L. Sun, L.D. Han*, X. Jia, and H. Lim A User-Oriented Index for Evaluating Efficiency of Urban Expressway – a Case Study in Shanghai, Transportation Research Record, National Research Council, 2015 (under review).

Lu W., L.D. Han*, C. Liu, and B.L. Bhaduri, "Effect of Zoning and Network Resolutions on Microscopic Traffic Simulation," Transportation Research Record, National Research Council, 2015 (under review).

Yang J., L.D. Han*, S. Chin, and H. Hwan, A Spatio-Temporal Approach for High Resolution Traffic Flow Imputation, Transportation Research Record, National Research Council 2015 (under review).

e. Website(s) or other Internet site(s):

stc.utk.edu

The main website for the STC has added innovations for online reporting by STC researchers, and search capabilities.

tesp.engr.utk.edu

The website for the Transportation Engineering & Science Program in Civil & Environmental Engineering, disseminates results of research and program activities.

www.cycleushare.com

cycleUshare, the nation's first fully automated electric bicycle sharing system located on the campus of the University of Tennessee-Knoxville

www.catss.ucf.edu

The Center for Advanced Transportation Systems Simulation website.

stc.utk.edu/STCevents/rss2015/index.html

The Road Safety and Simulation Conference RSS2015 website set up by staff at UCF and UTK.

www.ktc.uky.edu

UKY's site lists all transportation research reports issued by the UK-Kentucky Transportation Center, highlights high-value research activities, and links to Center's technology transfer website.

f. Technologies or techniques:

UTK

Chris Cherry has developed the "I Bike KNX" smartphone application for bicycle probe data tracking.

UKY

Adam Kirk has developed a technique for high resolution traffic signal detector data for micro-simulation calibration and development.

g. Inventions, patent applications and/or licenses:

UTK

Chris Cherry has a patent application under review: *Device for level bicycle at-grade crossing of rail tracks*. This product could improve safety of bicyclists at railroad crossings.

h. Other products:

The Road Safety and Simulation Conference RSS2015: the University of Central Florida and the University of Tennessee jointly bid to host RSS2015 in Orlando, Florida and won the bid. The conference will be a two and one-half day conference and will include a session for student research presentations. RSS2015 is scheduled for October 6-8, 2015 and will be held at the Marriott Orlando Airport. A website has been set up and call for abstracts has been sent out.

3. Participants and Other Collaborating Organizations

a. Table of Collaborators:

Organization Name	Location of the Organization	*Partner's Contribution to the Project	Name (First and Last)	University
National Cooperative Highway Research Program	Washington, D.C.	Collaborative support - match using funds from NCHRP Project 17-63: Guidance for the Development and Application of Crash Modification Factors	Raghavan Srinivasan	University of North Carolina Highway Safety Research Center
Conference of Minority Transportation Officials (COMTO)	Washington, DC	Collaborative Support – Garrett Morgan Youth Symposium attendance		North Carolina A&T State University
NC Department of Transportation	Raleigh, NC	In-kind support - presentation		North Carolina A&T State University
NC FHWA Division Office	Raleigh, NC	In-kind support - presentation	Lynise DeVance	North Carolina A&T State University
Caterpillar		Financial support		North Carolina A&T State University

Alabama DOT (5th Division)	Tuscaloosa, AL	Collaborative support and facilities		University of Alabama
Florida's Turnpike Enterprise (FTE)	Mile Post 263, Suite 5315, Ocoee, FL 34761	Financial support - $80,000 direct match. Collaborative support in dissemination of results by co-authoring one of the two papers submitted to	Eric Gordin, P.E.	University of Central Florida
Florida Department of Transportation	Tallahassee, Central Office	Financial support - $330,000 direct match for MRI 2.	Mr. John Moore	University of Central Florida
Enforcement Engineering	Jacksonville, FL	Collaborative support - provided citation and 911 call data for analysis	Grady Carrick, Ph.D.	University of Central Florida
KY Transportation Cabinet-DOH	Frankfort, KY	In-Kind support Collaborative support	Jason Siwula	NA
AAA Foundation for Traffic Safety	Washington, DC	Collaborative support	Peter Kissinger	NA
UNC-Highway Safety Research Center	Chapel Hill, NC	Collaborative support	David Harkey Raghavan Srinivasan	University of North Carolina
Center for Transportation Research	Knoxville, TN	Collaborative support	Airton Kohls	University of Kentucky
UK College of Engineering, Office of the Dean	Lexington, KY	Collaborative support	Kamyar Mahboub	University of Kentucky
Florida Department of Transportation	Tallahassee, FL	FDOT project being used as match		University of South Florida
Tennessee DOT	Nashville, TN	Matching request & data	N/A	University of Tennessee
ORNL	Oak Ridge, TN	Collaborative support		University of Tennessee

INRIX	Kirkland, WA	Collaborative support	N/A	University of Tennessee
US Dept. of Energy	Washington, D.C.		N/A	University of Tennessee
Knoxville Regional Trans Planning Org	Knoxville, TN	Collaborative support & personnel time	N/A	University of Tennessee
Social Bicycles (SoBi)	New York	Collaborative Support & data match	N/A	University of Tennessee
Georgia Tech	Atlanta	Collaborative support	N/A	University of Tennessee
Various Jiaotong Universities in China	Beijing, Nanjing, Guangzhou, Shenzhen, Changsha, China	Collaborative support & personnel exchanges	Dr. Xuedong Yang	University of Tennessee
Social Bicycles	New York	Data match, personnel time, and collaboration	Ryan Rzepeki	University of Tennessee
Community Action Committee	2247 Western Avenue Knoxville, TN 37921	In-Kind Support, collaborative support	Karen Estes	University of Tennessee
East Tennessee Human Resource Agency	9111 Cross Park Drive, Suite D-100 Knoxville, TN 37923	Personnel exchanges	Aaron Bradley	University of Tennessee
Knoxville Area Transit	301 Church Avenue Knoxville, TN 37915	Personnel exchanges	Melissa Roberson	University of Tennessee

b. Additional collaborators:

UTK

Significant collaborations in safety continue within UTK, nationally, and internationally.

Collaborations are underway between CEE, Industrial and Systems Engineering, the Department of Geography.

Collaborations are underway between CEE faculty and the STC consortium schools on the four MRIs. Additional collaborations are underway with staff from the Center for Transportation Analysis at Oak Ridge National Lab.

International collaborators include:

- Beijing Jiaotong University
- Southeast University
- Tongji University
- Southwest Jiaotong University
- Kunming University of Science and Technology
- Tsinghua University
- Shenzheng University
- Changsha University of Science and Technology
- COTA-Chinese Overseas Transportation Association
- Utrecht University
- Monash University
- TU Delft
- University of Novi Sad.

UCF

CATSS at UCF has established an internship with MetroPlan Orlando to support Barbara Kelly, an undergraduate student in Civil Engineering Major, who worked full time in summer 2014 and currently part time in fall 2014. The joint project with MetroPlan Orlando is related to bicycle safety. The cost of the partnership is split 50-50.

4. Impact

a. What is the impact on the development of the principal discipline(s) of the program?

UTK

The work undertaken at UTK enhances safety through research on the Highway Safety Manual, safety simulations, big data applications, and the role of socio-demographics in safety. The multi-disciplinary research activity underway with diverse consortium partners will help create the knowledge-base and foundation needed for innovations in safety countermeasures and make methodological advances in safety modeling, simulation, and visualization. The impact will be felt in multiple modes of transportation and by multiple stakeholders.

As an example, findings from MRI 4 - STC Big Data are creating new metrics of driving volatility. These can be used in real-time to support instantaneous driving decisions. This is providing new analytics (driving volatility) using big data coming in from sensors to enhance safety.

HSRC

Most of the crash modification factors in the Highway Safety Manual, the CMF Clearinghouse, and other sources are just single factors implying that the safety effect of a treatment does not depend on the characteristics of a site. The MRI1 effort from HSRC will develop crash modification functions that will provide insight into how the safety effect of a treatment may vary, depending on the characteristics of a site.

NCAT

The program's education component has provided the impetus for an examination of the curriculum for the supply chain major and the marketing and sales major. The number of majors has more than doubled to a current total of 100+. Enterprise resource planning (SAP) has been introduced into the upper level coursework. Plans are in place to propose a minor in Supply Chain Management.

UCF

New technology is being tested as part of the pilot study to combat wrong-way driving in Florida and beyond. One of the technology concepts, known as Rectangular Rapid Flashing Beacon (RRFB) and LED, has never been applied before to combat WWD and until this time, was recognized only as a help in pedestrian crosswalks.

UKY

UKY's education initiatives and research projects continue to enable academic and professional research capabilities to be further developed in strategic highway safety areas.

b. What is the impact on other disciplines?

UTK

UTK's comprehensive view of safety affects other disciplines. As an example, the safety work underway is relevant to social sciences, e.g., the findings from the study of socio-demographics could affect social science research. Analysis of spatial and geographical aspects of safety may have an impact on the field of geography.

The application of modeling, simulation, and visualization techniques applied to safety may improve transportation operations such as incident and accident management, transportation planning, and sustainability by taking into account the costs of injuries and death and potential improvements in facility design.

NCAT

The Introduction to Supply Chain course has been designated as a requirement for the marketing and sales major. Future efforts are to have supply chain management designated as a core course for all business majors.

UCF

The use of new technology developed by electrical and ITS engineers to make driving safe on public roads is a great benefit to all disciplines, not just civil engineering.

c. What is the impact on the development of transportation workforce development?

UTK

UTK offers transportation courses both in the classroom and online. Six Tennessee Department of Transportation employees, who are practitioners pursuing their MS degree, are enrolled in the online distance learning Transportation Safety course.

The Accident Reconstruction course is being revised for delivery in Spring 2015. We are also purchasing accident reconstruction software (ARAS) to help students understand new tools available for accident reconstruction.

Undergraduate and graduate students worked on safety and related topics for their class projects, theses, and dissertations. This will help motivate them toward careers in transportation safety.

NCAT

Extensive efforts have been undertaken to broaden the articulation agreements with two-year institutions to ensure the highest number of accepted credits from two-year institutions, thus shortening the time to a four-year degree. Additionally, the minor will give students from other disciplines the opportunity to enter the transportation profession.

UCF

Students who complete UCF's internship program with MetroPlan Orlando will be ready for full time employment with MetroPlan Orlando.

d. What is the impact on physical, institutional and information resources at the university or other partner institutions?

UTK

UTK's Civil & Environmental Engineering Department is in the newly constructed John D. Tickle building, which has ample space for transportation labs, and houses the UT driving simulator used for safety studies.

e. What is the impact on technology transfer?

UTK

As STC projects progress, we will disseminate the results to various stakeholders in the transportation safety arena. We worked on presenting papers in various forums that impact

various stakeholders that include transportation practitioners, researchers, policy makers, and the private sector. Also, STC affiliated faculty at UT have an important impact internationally through collaborations with Asian and European countries.

UCF

Any reports developed from the Wrong Way Driving initiative can be shared with UCF for the possibility of delivering a seminar on the topic. This research will allow other state DOTs to see how to address and investigate wrong way driving, and introduce new countermeasures such as RRFB and enhance other implemented measures such as LEDs.

f. What is the impact on society beyond science and technology?

UTK

The Southeastern Transportation Center and UTK CEE faculty are well-positioned to directly affect safety in many ways.

- Socio-demographic, attitudinal, and behavioral research on safety will improve public knowledge and provide a fundamental understanding of how to improve safety from broad social, economic, spatial, and behavioral perspective.
- Highway Safety Manual improvements (one of the major research initiatives) can lead to reductions in hazards and application of new countermeasures that save lives.
- The Big Data applications in safety provides a means to innovate and consider new ways of approaching safety comprehensively by combining information from diverse databases and in a dynamic context.
- Safety simulations can lead to a better understanding of vehicles' interactions and why collisions occur. They advance the knowledge and skills of people who work in the safety field, and facilitate the study of human factors. Modeling, simulation, and visualization can ultimately help formulate regulatory policies that lead to safety improvements.

These efforts will contribute to the development of methods and applied knowledge in safety, train a skilled workforce, form social networks that stimulate safety research, and create new problem solving approaches that enhance safety.

NCAT

The research undertaken by Drs. McBride and Carter will improve public knowledge and attitudes towards texting while driving. Teens and young adults will have a better understanding of the law. These results will lead the effort to develop messaging that will lead to positive behavioral changes in this regard.

UCF

This research has significant impact on society by saving lives and combating a deadline and dangerous behavior that has been on the rise in many states, one of them is Florida. The research is addressing a very serious problem of wrong way driving which is very dangerous to public safety and allows the driving public to understand that new proactive techniques are

being applied and new investigations are ongoing to combat this deadly and dangerous behavior.

UKY

UKY's education program continues to develop a workforce of academicians and professionals who contribute to improving highway safety. The research projects will improve highway safety by providing data and information for better allocation of scarce resources to the highway infrastructure, which will improve mobility and reduce crashes and fatalities.

5. Changes/Problems

a. Changes in approach and reasons for change

Nothing to report.

b. Actual or anticipated problems or delays and actions or plans to resolve them

Nothing to report.

c. Changes that have a significant impact on expenditures

Nothing to report.

d. Significant changes in use or care of human subjects, vertebrate animals and/or biohazards

Nothing to report.

e. Change of primary performance site location from that originally proposed

Nothing to report.