Semiannual Program Progress Performance Report for
Southeastern Transportation Center (STC)
US DOT Regional University Transportation Center

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Office of the Secretary of Transportation

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1. **Accomplishments**

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

At this point in the life of our 2013 USDOT Regional UTC grant, STC work is yielding results from its research, education, and technology transfer activities in the context of our theme, *Comprehensive Transportation Safety*. Therefore, the summary of our efforts over the past six months reflects many outputs from the work on our four Major Research Initiatives and Opportunity & Exploratory Grants:

- valuable datasets and final reports from research efforts;
- clearly defined research areas for future grants;
- new collaborations with industry partners;
- raised public awareness of transportation safety concerns;
- scholarly output reaching a wider, international audience;
- improved impact factor and citation rate for the *Journal of Transportation Safety & Security*;
- a large number of scholarly publications and presentations;
- student involvement in wrapping up research work;
- graduation of transportation students with advanced degrees;
- well-trained graduates entering the field;
- workforce improvement programs;
- safety awareness outreach to communities; and
- programs for pre-college education.

To advance comprehensive transportation safety in the Southeastern region, STC strove 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 a variety of operations related to moving people and goods. We helped the transportation sector improve its existing workforce while we developed the next generations of educators, professionals, technical specialists, and practitioners to create and sustain our nation’s safe transportation systems. We devised a technology transfer program to implement the outcomes of our research program and disseminate research results, with their implications and significance, to practitioners, decision makers, students, educators, and other transportation researchers.

The work of achieving comprehensive transportation safety is never finished. We will continue to contribute to the goals of the University Transportation Centers Program by building upon the successes our consortium achieved under this grant.
1.b. What was accomplished under these goals? What opportunities for training and professional development has the program provided?

UT

- Research accomplishments: UT faculty worked on STC’s major research initiatives that resulted in publications and presentations at prestigious conferences and the development of new technology products that can have far reaching impacts on safety. Through our research, we continued to enhance our “Comprehensive Transportation Safety” approach, which is based on technological innovations, roadway safety measures, and behavioral issues related to safety. The full scope of our work will be reflected at the 2019 Transportation Research Board (TRB) annual meeting.

- Educational accomplishments: On the education side, many of the students are involved in conducting research and benefitting from experiential learning that comes with publishing and attending conferences. They were exposed to a curriculum that offers courses on safety and intelligent transportation systems. The UT transportation program graduate 11 Masters and three Ph.D. students during the reporting period.

- Outreach accomplishments:
  
  ○ **Crash Scene Investigation Camp**
    Sixteen rising 8th and 9th graders attended the inaugural CSI: Crash Scene Investigation Summer camp held in early July. Attendees learned an overview of vehicular dynamics that allow crashes to be reconstructed. Students were able to pick apart evidence through actual dashcam videos, determine speed of vehicle on impact by the vehicle’s crush, and utilize crash reconstruction equipment (i.e., total station, drones, conventional and heavy vehicle event data recorders). The Southeastern Transportation Center Seatbelt Convincer was used to emphasize the importance of wearing a seatbelt when a motor vehicle is in motion. In addition, accelerometers were placed on the convincer for students to learn about low speed (i.e., 5-7 mph) crash forces and compare to forces of higher speeds. One of the primary goals of the camp was to illustrate the statistics of motor vehicle crashes, especially distracted driving, for the soon-to-be young drivers. This camp is set to become an annual summer with exportable lesson plans, supply lists, and other helpful information for use in other locations.

  ○ **#GetConvinced Teen Outreach Program - Not buckled up? What’s holding you back?**
    With the end of the CDC Nighttime Seatbelt pilot study drawing near, CTR Associate Director Dr. Jerry Everett wanted to sustain the grant’s focus of increasing seatbelt use by young people. His solution was to request and obtain funding from Tennessee Highway Safety Office, whose primary mission is reducing fatalities on our roads. Dr. Everett and his team developed the #GetConvinced outreach program, aimed at teens aged 15-19. Studies show that car crashes are the leading cause of death for this age group. This grant allows CTR to bring the Arrive Alive with The Seatbelt Convincer program to area schools and events at no cost.

    The #GetConvinced program has brought the **STC Seatbelt Convincer** to more than 5,000 young people. The convincer simulates a 5-7 mph crash, demonstrating just how jolting even a low-speed impact is and how effective seatbelts can be. During this reporting period, CTR staff brought the convincer to area events attended by 16-32 year olds in Blount, Knox, Loudon, Roane, and Sevier counties. The Convincer made appearances at the Luke Bryan Farm Tour Concert at Maple Lane Farms in Greenback; UT Police Department’s Blue Light Special awareness campaign; local high school driving classes; law enforcement community events such as Blount and Alcoa’s law enforcement **National Nights Out**; and the press conference for Tennessee Highway Safety Office’s **Seatbelts Are for Everyone** launch.

- Dr. Khattak was plenary session speaker at the 18th COTA International Conference of Transportation Professionals (CICTP) conference in Beijing, China, July 2018. He presented work sponsored by US DOT on using connected and automated vehicle data to develop innovative solutions for safety problems.

NCAT

- The STC Education Program supported two freshman Incentive Award students for the 2017-2018 academic year. The Incentive Award was given to freshman who declared Transportation/Supply Chain Management as
their undergraduate major. They have received research mentorship, internship opportunities, and they will attend the Annual UTC Conference for the Southeastern Region in October 2018 at Clemson University.

- The selection process for the 2018 Summer High School Transportation Institute (STI) began in May 2018. Sixteen high school juniors and seniors were selected to participate in the 2018 STI which started on June 27 and ended on August 3. Stipends for eight of these students were funded through the STC grant. A team of university faculty, private and public sector professionals from diverse disciplines and areas of transportation utilized a variety of educational activities, including lectures and presentations, group projects and field trips to meet program objectives. Participants were enrolled in and successfully completed a freshman college-level English course. Successful completion earned the students an English credit at the college of their choice. Other components of the enhancement program were SAT Preparation, Library/Research Instruction and a Financial Planning Workshop.

  Evaluations were administered after each scheduled session, guest presenter, and site visit. Pre/posttests were also administered. Student projects were presented at the Closing Ceremony on August 3. Projects were well researched and delivered. Topics included Air Safety, Rail Safety, Bridge Safety, and NC Ports. The students’ newly acquired knowledge of the field of transportation was made visually evident with creatively designed PowerPoint presentations. Each participant received a weekly stipend through the STC grant and a Certificate of Completion at the end of the program.

- Data collection for the STC O/E Pedestrian Safety project was completed during the reporting period.

**UK**

- Final reports for MRI 1 and MRI 2 have been submitted.
- Completed summary of connected vehicle applications, implementation (benefits/costs), and barriers to implementation.

**Research Accomplished under Program Goals**

**Major Research Initiatives (MRI)**

**MRI 1. Crash Modification Factors and the Highway Safety Manual**

*Reginald Souleyrette, University of Kentucky, Coordinator* Participating schools: UTK, UK, HSRC, UA

**UT**

Relevant papers published, presented, or under review during the reporting period:

MRI 2. Integrated Simulation and Safety Essam Radwan, University of Central Florida Nikiforos Stamatiadis, University of Kentucky; Co-ordinators Participating schools: UTK, UK, UCF

UT

Relevant papers published, presented, or under review during the reporting period:


UCF

The main goal of this research effort is to evaluate the use of simulation in assessing and possibly predicting safety levels for pedestrian environments. The study objectives that contribute to this main goal include: 1) development of crash prediction models based on simulation for vehicle to pedestrian crashes; 2) evaluation of human centered simulation for pedestrian conflicts for roadway projects; and 3) development of incident and emergency simulation models for better understanding and management of such situations with safety considerations.

This period included Year 3 of the project. Tasks 3 and 4 are accomplished which included field data, driving simulator and microsimulation framework as well as the final report.

In summary, this period focused on developing a framework to consolidate the significant parameters from the three legged approach, which included field data, micro-simulation data, and driving simulator data, and determining the best way forward to maximize gains. The evaluation process concerning pedestrian safety using one or more type of data was investigated to predict conflicts, propose countermeasures, and test it before implementation. The final report was submitted on June 30.

Relevant publication during the reporting period:


MRI 3. Exploring Socio-Demographic Characteristics and Culture Factors in Differential Safety Performance across Geography; Shashi Nambisan, University of Tennessee; Steve Polzin, University of South Florida; Co-ordinators Participating schools: UTK, USF, UA

This project is complete and final reports have been submitted.
Relevant publication during the reporting period:


Connected and Automated vehicles: What are the implications of partial adoption?

Publications from this O&E project:


UCF

Disaster Analytics: Disaster Preparedness and Management through Online Social Media

Under this project three accomplishments have been made to date.

- Developed models to infer individual evacuation behaviors from Twitter data and compared relative performance of each model.
- Developed models to predict evacuation traffic based on Twitter data and
- Developed models to predict short-term traffic speed based on traffic sensor data.

Based on the results of this project, one article has been accepted for presentation at the TRB Annual Meeting in January 2019 and one article has been accepted for presentation at IEEE International Conference on Intelligent Transportation Systems in November 2018.

Publications from this O&E project:


Evaluating the Potential of Connected Vehicles in Combating Wrong-Way Driving

This project was completed in August 2018, and the project final report was submitted to STC on July 24, 2018. Several accomplishments have been made to date. Specifically, the UCF research team submitted a progress report to FHWA per the main sponsor matching contract. UCF continues to collect data from devices installed on the CFX system and evaluate the efficacy of the new technology installed to combat WWD. Three journal papers were submitted for presentation at the Transportation Research Board (TRB) annual meeting in Washington, D.C. in January 2019. All three papers were accepted for presentation and they are being evaluated for possible publication in the Transportation Research Record: Journal of the Transportation Research Board. Five previously accepted papers for publication have all been published online in TRR. We made two progress presentations to CFX, the matching fund sponsor of this research, in May 2018 and September 2018.

Publications from this O&E project:


1.c. Have the results been disseminated? If so, in what ways?

**UT**

- Preparations are underway for UTK’s Engineers Day. The 2018 Engineers Day will be on October 25 (http://www.engr.utk.edu/engineers-day/) with approximately 1,500 students attending from various high schools as well as a number of home-schoolers. Attendees will be able to ride the STC Seat Belt Convincer. This simulates a low-speed crash that shows the importance of wearing a seatbelt.
- We participated in the Fall 2018 Freshman Engineering Fair. Another outreach activity includes Transit Day at Knox County Schools. Students learn about the transit system in Knoxville while being able to board one of the trolleys.
- STEMpunk Reverse Science Fair is for high school students who want to pursue engineering as a major. This event allows students to get hands-on experience of research activities being conducted at the university. Some of the research includes: transportation efficiency through electric bicycles, and autonomous and connected vehicle technology through a driving simulator.

**USF**

Our most recent research report led to a story in the Tampa Bay Business Journal as well as a follow-up televised interview for our local NBC affiliate. *USF research arm determines what makes pedestrians more likely to die in auto crashes - Tampa Bay Business Journal*
1.d. What do you plan to do during the next reporting period to accomplish the goals and objectives?

All consortium members will be wrapping up the research projects, educational activities, outreach and professional development activities for the Southeastern Transportation Center.

2. Products: What has your STC work produced? (Publications, conference papers, and presentations)

2.a. Journal publications:

Publications relevant to STC’s various research initiatives are listed under the specific projects above.

UT


Clemson
• Zhao, X., D. Dawson, W. Sarasua, “Multiple Hypothesis Tracking with Kinematics and Appearance Models on Traffic Flow for Wide Area Traffic Surveillance,” Journal of Computing in Civil Engineering, American Society of Civil Engineers, New York, accepted for publication.

NCAT
• McBride, M., Carter, L., and Phillips, B.; Integrating the Theory of Planned Behavior and Behavioral Attitudes to Explore Texting among Young Drivers in the US; Transportation Research Part F: Psychology and Behaviour; submitted but not accepted; acknowledgement of federal support (yes).

UA
• Adanu, K., Penmetsa, P., Jones, S., Smith, R. 2018. Gendered Analysis of Fatal Crashes Among Young Drivers in Alabama, USA. Accepted by Safety, 4(3), 29. YES

UK
• Amiridis, K., Stamatiadis, N., and Kirk, A. 2 “Safety-Based Decisions for Left-Turn Phasing,” accepted Advances in Transportation Sciences. (accepted, awaiting publication)

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

NCAT
• Horton, J.; Pedestrian Safety with Personal Listening Devices; Thesis; awaiting publication; acknowledgement of federal support (yes).

UK

2.c. Other publications, conference papers, and presentations:

UT


Chris Cherry made the following presentations:

● Do e-bikes belong in a city? Evidence-Base for answers to FAQs. Presented at Interbike Electric Theater on September 19, 2018

● New Probe Data Sources to Measure Cycling Behavior and Safety. Queensland University of Science and Technology Monash University, Institute of Transport Studies. April 18 and May 15, 2018.


NCAT

● Horton, J.; Pedestrian Safety with Personal Listening Devices; Presentation at the Institute of Industrial and Systems Engineering (IISE) Conference; May 22, 2018.

UCF

• Wu, J., Radwan, E., and Abou-Senna, H. Analysis of driver’s avoidance behavior at mid-block crossings based on driving simulation experiment. Presented at the International Conference on Road Safety and Simulation (RSS), Netherlands, 17-19 October 2017.

• Abou-Senna, H, Radwan, E., & Mohamed, A. Developing a Safety Prioritization Tool for Pedestrian Sidewalk and Bicyclist Bike-Lane Gaps in Central Florida. Presented at the International Conference on Road Safety and Simulation (RSS), Netherlands, 17-19 October 2017.


UK


• “Left-Turn Phasing Decisions for Improved Intersection Safety,” Transport Research Arena Conference, Vienna, Austria, April 16-19, 2018 (Stamatiadis)


2.d. Website(s) or other Internet site(s):

UT

• Weekly Transportation Safety Seminar Series (Led by UTK): http://mediasite.utk.edu/UTK/Catalog/catalogs/transportation-seminar-series

The UTK ITE Student Chapter

• created a new, more user-friendly website (https://utkite.weebly.com/)

• updated the Facebook page (https://www.facebook.com/BigOrangeITE/)

• created a Twitter (https://twitter.com/UTKITE), and

• obtained a University of Tennessee email address (ite@utk.edu )

NCAT

• https://www.ncat.edu/cobe/transportation-institute/eduprog.html: Webpage where the STI program is described and the application is accessible.

• https://www.ncat.edu/cobe/transportation-institute/images/The%20STI%20Experience.pdf: Webpage highlighting where pictures of some of the STI activities are posted.

• https://www.ncat.edu/cobe/transportation-institute/Files2013/catmpages/sti.html: Webpage with additional information about the STI program.


• https://www.facebook.com/groups/62775664232070/: STI program Facebook page
2.e. **Technologies or techniques:**

**UT**

During the reporting period, we were awarded a competitive project by the Tennessee Department of Transportation:


It is based on previous STC tests and work on various connected and automated vehicle technologies in the field, on the UT Knoxville campus, and the East Tennessee State University campus in Johnson City, TN. Dedicated Short Range Communications (DSRC) technology is being used along with new algorithms and applications for signal phasing at intersections, freeway merging systems at on-ramps, and for testing the reliability of DSRC on rural two-way two-lane roads. The work is reflected in the following papers (under submission to IEEE journals) and a presentation at the 2019 Transportation Research Board annual meeting:

- A Cooperative Freeway Merge Assistance System using Connected Vehicles, Poster Session 392, Md Salman Ahmed, Mohammad Hoque, Jackeline Rios-Torres, Asad Khattak
- Intersection Approach Advisory Through V2X Technology Using Signal Phase and Timing (SPaT) Information at Fixed-Time Signalized Intersection , Poster Session 572, Md Salman Ahmed, Mohammad Hoque, Asad Khattak
- Impact of Vehicle-to-Vehicle Communication Reliability of Safety Applications: An Experimental Study, Lectern Session 755, Mohammad Hoque, Md Salman Ahmed, Jackeline Rios-Torres, Asad Khattak, Ramin Arvin

2.f. **Inventions, patent applications and/or licenses:**

None

2.g. **Other products:**

The UTK-based *Journal of Transportation Safety & Security* achieved an Impact Factor of 0.736 during Volume Year 10.

3. **Participants and Other Collaborating Organizations**

3.a. **Table of Collaborating Organizations**

<table>
<thead>
<tr>
<th>Organization Name</th>
<th>Location of the Organization</th>
<th>Partner’s Contribution to the Project</th>
<th>Name (First and Last)</th>
<th>University</th>
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<tbody>
<tr>
<td>University</td>
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<tr>
<td>Institution</td>
<td>City, State</td>
<td>Support Type</td>
<td>Contact Person</td>
<td>Institution Code</td>
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<tr>
<td>NC Department of Transportation</td>
<td>Raleigh, NC</td>
<td>In-kind support-presentations, financial support NCA&amp;T Scholarship</td>
<td>JoAna McCoy, Director of Education Initiatives</td>
<td>NCAT</td>
</tr>
<tr>
<td>NC FHWA</td>
<td>Raleigh, NC</td>
<td>In-kind support-presentations, collaborative support</td>
<td>Lynise DeVance, Program Manager, Civil Rights Office</td>
<td>NCAT</td>
</tr>
<tr>
<td>Department of Psychology</td>
<td>University of Alabama - Birmingham</td>
<td>Collaborative support</td>
<td>David Schwebel, Despina Stavrinos</td>
<td>NCAT</td>
</tr>
<tr>
<td>Department of Accounting</td>
<td>Greensboro, NC</td>
<td>Collaborative support</td>
<td>Brandis Phillips</td>
<td>NCAT</td>
</tr>
<tr>
<td>Department of Information Systems</td>
<td>Virginia Commonwealth University Fredericksburg, VA</td>
<td>Collaborative support</td>
<td>Lemuria Carter</td>
<td>NCAT</td>
</tr>
<tr>
<td>UNC Highway Safety Research Center</td>
<td>Chapel Hill, NC</td>
<td>Collaborative support</td>
<td>Caroline Mozingo</td>
<td>NCAT</td>
</tr>
<tr>
<td>Humans and Autonomy Lab</td>
<td>Duke University Durham, NC</td>
<td>Collaborative support</td>
<td>Missy Cummings</td>
<td>NCAT</td>
</tr>
<tr>
<td>Center for Advanced Public Safety (at Univ. of Alabama)</td>
<td>Tuscaloosa, AL</td>
<td>Collaborative Support</td>
<td>Dr. Randy Smith</td>
<td>UA</td>
</tr>
<tr>
<td>Alabama Center for Insurance Information and Research</td>
<td>Tuscaloosa, AL</td>
<td>Collaborative Support</td>
<td>Dr. Lars Powell</td>
<td>UA</td>
</tr>
<tr>
<td>Central Florida Expressway Authority (CFX)</td>
<td>4974 ORL Tower Road Orlando, FL 32807</td>
<td>Provided direct match for this project</td>
<td>Corey Quinn, P.E.</td>
<td>UCF</td>
</tr>
<tr>
<td>Enforcement Engineering, Inc.</td>
<td>Jacksonville, Florida</td>
<td>Has provided privileged wrong way data for analysis</td>
<td>Grady Carrick, Ph.D.</td>
<td>UCF</td>
</tr>
<tr>
<td>Department of Civil and Environmental Engineering</td>
<td>Rose-Hulman Institute of Technology Terre Haute, IN</td>
<td>Collaborative research</td>
<td>Arif M. Sadri</td>
<td>UCF</td>
</tr>
<tr>
<td>MIT Media Lab</td>
<td>MIT Cambridge, MA</td>
<td>Collaborative research</td>
<td>Manuel Cebrian</td>
<td>UCF</td>
</tr>
</tbody>
</table>

3.b. Additional collaborators:

UT
CTR is partnering with Vessul Creative (https://vessul.co) to develop a three-part virtual reality film for students who are 14-18 years old. See project details under 4.f.

UK
TRIMARC (http://www.trimarc.org/site/pages/Index.html) provided incident data;
KYTC (https://transportation.ky.gov/Pages/Home.aspx) provided highway inventory data

4. Impact

4.a. What impact has your STC work had on the principal disciplines of the program?

UT
Stakeholder involvement is reflected in TDOT’s buy-in of the safety approach and their investment of matching funds in adoption and calibration of the Highway Safety Manual. During the reporting period, the UT research team has worked on research papers and presentations described under MRI 1. Also, as mentioned above, UT obtained a new TDOT project testing Connected and Automated Vehicles (CAVs). This new project will enable different units in UT (Knoxville, Chattanooga, and Tullahoma) and East Tennessee State University to work collaboratively on establishing technology testbeds.

NCAT
The results of the pedestrian safety study provided additional knowledge on the potential impacts of using personal listening devices while crossing intersections. The results confirmed the belief that the use of personal listening devices while crossing streets can indeed impact various types of street crossing behavior metrics such as wait time, hit rate, missed opportunities, etc. They did not, however, suggest any differences in these metrics based on the two types of headset that were tested (air conduction earbuds versus bone conduction transducers).

UCF
MRI #2
This research provides an added dimension for using a driving simulator to analyze pedestrian safety from the driver’s point of view. The lack of pedestrian safety data has been a major hurdle for researchers to better quantify pedestrian crash rates. In addition, this research provided a three-legged stool summarizing three different kinds of data to evaluate pedestrian safety, including field data, simulation data, and driving simulator data.

Disaster Analysis O&E
The work will have an impact on disaster management by an effective use of social media and machine learning models and algorithms. This project provides new algorithms to analyze social media data for disaster management applications. It will also provide critical insights on social media communication during disasters.

MRI#4
This research proves the potential of using Big Data for the integration of transportation planning and traffic safety analysis. The application of Big Data from multiple sources enables us to provide valuable insights and research direction in the field.
4.b. What impact has your STC work had on other disciplines?

NCAT
The pedestrian safety study uncovered some unexpected results associated with the differences in the street crossing behavior metrics between males and females as well as differences in associated with the genre of the music to which participants were listening. It also indicated associations between performance using the virtual reality software and the participants familiarity with video gaming. Further studies will be conducted to investigate these results more thoroughly.

UCF
The research for MRI #2, conducted on pedestrian safety and how to utilize different safety measures using field data together with microsimulation and driving simulators, has shed light on the challenges and opportunities researchers and practitioners face when dealing with pedestrian safety. The outcome of this research will help us rethink how to design research experiments and what to take into consideration to secure credible data.

4.c. What impact has your STC work had on the development of transportation workforce development?

UT
Nine graduate students, many of whom are doctoral students, recently completed their degree requirements from the UT Civil & Environmental Engineering program. The recent graduates and their dissertation titles are:


This dissertation will be defended in October, 2018:


Fifteen UTK students prepared papers submitted and submitted them to TRB for review. The students include:

Alexandra Boggs, Mojdeh Azad Disfany, Mohsen Kamrani, Ramin Arvin, Rashid Mussah Abdul, Behram Wali, Numan Ahmad, Xiaobing Li, Hoseinzadeh Nima, Yuandong Liu, Meng Zhang, Zhihua Zhang, Amin Mohamadi-Hezaveh, Russell Graves, David Harris.

These papers were prepared for TRB presentation and publication:


• Wali B. & A. Khattak, A Heterogeneity Based Case-Control Analysis of Motorcyclist’s Injury Crashes: Evidence from Motorcycle Crash Causation Study, 19-05159, Accepted for Presentation at the TRB Annual Meeting, National Academies, 2019.


Additionally, the UT faculty presented papers at conferences attended by students and practitioners at the plenary session of CICTP conference in Beijing, China, July 2018.
• Supported four students from UTK ITE Student Chapter to attend the Tennessee Institute of Transportation Engineers (TSITE) Summer Meeting. Students were able to present research reported in their papers of the annual student paper competition.

• Supported 2 UTK ITE Student Chapter meetings in the Spring and Fall semesters thus far. The meetings were held to promote further learning and career development into the transportation engineering realm for undergraduates and graduates students.

• Students planned and assisted in the inaugural weeklong camp, Crash Scene Investigation (CSI) Camp, for rising eighth and ninth graders. Sixteen students attended the camp to examine motor vehicle crashes by picking apart evidence and using mathematics. Some activities that students learned include measuring vehicle crush to determine speed of vehicle on impact, examining dashcam footage of vehicles involved in crashes, and determining the cause of the crashes in different scenarios.

Clemson
Dr. Jennifer Ogle had one PhD student, Mahdi Rajabi, and two MS Thesis students, Hind Ali and Nancy Chhetri, graduate on UTC funds.

NCAT
The STI program introduced several high schoolers to the various disciplines of transportation. Several of the students expressed increased interest in pursuing a career in transportation. One student went on to complete a summer internship with Fiat Chrysler Automotive company and hopes to be offered a full-time job with them or another automotive company in the near future.

UCF
MRI #2 produced one PhD student with STC support. He is currently working as a post-doctoral research associate. The Disaster Analytics project supported one MSc thesis student. The WWD project supported two MS thesis graduates, Omar Al-Sahili and Omar Faruk, who joined the industry after working on this project.

UK
The study offers opportunity for graduate students and postdocs to work on advanced modeling and data analytics, preparing them for future career in transportation system design, operation, planning, and advanced research.

USF
Two CUTR students supported with STC education funds were part of the CUTR collegiate traffic bowl team that won the National Traffic Bowl Grand Championship at the ITE annual meeting in Minneapolis in August.

4.d. What impact has your STC work had on physical, institutional, and information resources at your university or partner institutions?

NCAT
The funding received for the pedestrian study enabled us to purchase a virtual reality device and street crossing simulation software.

UCF
The Disaster Analytics project allowed us to purchase a large-scale dataset on Hurricane Matthew from Twitter.
Results were shared with KYTC, and methods developed in this study are also used in a separate study to assess the performance measures for traffic incident management for KYTC.

**4.e. What impact has your STC work had on technology transfer?**

**NCAT**
The results of the pedestrian safety study may lead to the development of training protocols that will help people understand the impact of distracted walking on street crossing safety.

**UCF**
The MRI #2 research will help us share the methodology for collecting traffic related data from multiple sources for safety analysis and building safety models with colleagues at other universities. A model that can combine field data, microsimulation data, and simulator data and predict conflicts will be shared as well as a framework to accomplish this task complementing prior experience from respective efforts.

**4.f. What impact has your STC work had on society beyond science and technology?**

**UT**
UTK’s Center for Transportation Research is partnering with Vessul Creative to develop a three-part virtual reality film for students who are 14-18 years old. This project will deliver a fully produced VR film and installation of the VR equipment. The film can be paired with the Seatbelt Convincer and will place the viewer in distracted driving scenarios that result in a simulated crash. The video will be timed so that individuals riding the convincer will feel the impact at the same time the crash on the VR video occurs. The video will be able to stand alone as a single, viewable piece and also be separated into three modules. By separating the video into separate modules, those standing in line to ride the Convincer can watch the pre-crash sequence and then watch the post-crash scene after they have ridden the Convincer. The goal of the VR experience is to make the Convincer’s crash impact more real for the riders.

**NCAT**
The pedestrian safety study improved public knowledge (particularly those who participated in the study and those who attended the study presentations) about the hazards associated with distracted walking. It also brought attention to the various behaviors that are affected when listening to music while walking.

**UCF**
MRI #2 - Because pedestrian safety is a major issue in central Florida, the FDOT match project for this STC initiative resulted in developing a safety prioritization tool (SPT) for pedestrians and bicyclists that prioritizes locations with missing sidewalks and bike lanes that have significant safety impacts.
5. **Changes/Problems**

No changes or problems during this reporting period.

6. **Additional information regarding products and impacts**

6.a. **Outputs:**

**UT**


**Weekly Transportation Safety Seminar Series**

**Spring 2018 Seminars at UTK:**

- February 1 - 2018 Transportation Research Board Conference Experiences, UTK Graduate Students
- February 8 - Challenges of Roadway Construction in Area with Sulfur-Bearing Formations: Investigation and Mitigation Techniques, Jim Ozment
- February 15 - Social Media and Crowd-Sourced Data in Transportation, Dr. Christa Brelsford, Oak Ridge National Laboratory
- February 22 - Transportation Infrastructure: Data to Pave the Way Forward, Pat Hu, US DOT Bureau of Transportation Statistics
- March 8 - Some Creative Thinking in Mobility Data Analytics, Dr. Ho-Ling Hwang, Oak Ridge National Laboratory
- April 5 - High-performance agent-based modeling and simulation of travel behavior: applications to transportation planning, operations, and control, Dr. Husain Aziz, Oak Ridge National Laboratory
- April 16 - Role of Geospatial and Big Data in Emergency Management, Dr. Bandana Kar, Oak Ridge National Laboratory

**Fall 2018 Seminars at UTK:**

- September 13, 2018, Enhancing Spatial Interaction Research with Social Flows and Creative Datasets, Dr. Clio Andris, Penn State University.
- September 20, 2018, Mobile Sensing to Mobile Control of Vehicular Traffic. Dr. Dan Work, Vanderbilt University.
- September 27, 2018, Optimization of Intracity Freight Movement with New Delivery Methods, Dr. Amy Moore, Oak Ridge National Laboratory.
- November 8, 2018, TBA, Dr. Joseph Schofer, Northwestern University.
- November 15, 2018, TBA, Dr. Hyun Kim, Geography Department, The University of Tennessee.
- November 29, 2018, TBA, Dr. Anahita Khojandi, Industrial and Systems Engineering, The University of Tennessee.

**UCF**

**MRI # 2**

- Two journal papers have been accepted and two conference papers have been presented.

**Disaster Analytics O&E**
● Two submissions have been accepted at TRB 2019 and IEEE ITSC 2018.
● One journal paper has been published and two journal papers have been submitted.

UK

6.b. Outcomes:

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MRI # 2
● Driver’s avoidance behavior pattern was investigated during the pedestrian-vehicle conflict.
● Driver’s characteristics variables (age and gender) and potential risk factors (time of day, marking, roadway type, and dressing color) were studied.
● Pedestrian-vehicle conflict prediction model is developed based on the midblock crossing experiment data. The model has a reliable prediction performance and can be tested in connected vehicles as a vehicle alert system.
● A framework for the process of the pedestrian safety evaluation based on the field data, micro-simulation data, and driving simulator data will be developed.
● A Safety Prioritization Tool (SPT) for sidewalk/bike lane gaps was developed through the FDOT match project.

Disaster Analytics O&E
● Improved understanding of social media use during hurricanes.

Wrong Way Driving O&E
● Safer travel on high speed roads.
● Combating a dangerous behavior of wrong way driving.

6.c. Impacts:

UCF
MRI # 2
● More accurately predict potential conflicts leading to pedestrian crashes through microscopic data.
● Effective countermeasures resulting from the driving simulator experiment could be implemented in the field.

Wrong Way Driving O&E
● Safer travel on high speed roads.
● Combating a dangerous behavior of wrong way driving.

UK
● Increased travel time reliability
● Improved incident management
● Increased public knowledge and awareness