



**PROGRAM PROGRESS PERFORMANCE REPORT FOR
UNIVERSITY TRANSPORTATION CENTERS**

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Research and Innovative Technology Administration

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Project Title: Safety Research Using Simulation (SAFER-SIM)

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Overview

SAFER-Sim has added a new and unique simulator platform for All Terrain Vehicles. Safety research in this area is new and innovative and has the potential to significantly improve the safety of drivers of these vehicles through a better understanding of driver/vehicle performance and the influence of state regulations concerning how and where these vehicles should be operated.

The SAFER-SIM Year 1 projects are coming to completion and reports and summaries will be available before the end of the next reporting period. A third call for proposals will be issued in November 2015 to fund projects supported by FY15 funds. An online reporting systems has been initiated to support and improve program efficacy.

A total of 24 students are supported by SAFER-Sim projects. A University of Puerto Rico-Mayaguez student, Engineer Juan Manuel Rivera, was awarded in the UTC annual dinner for his significant contributions to a SAFER-SIM research project. Three (3) students supported by SAFER-Sim projects have graduated and gone on to professional positions or a more advanced degree program.

The University of Puerto Rico-Mayaguez SAFER-SIM Team has had the opportunity to engage more than 2,000 students and engineering professionals in safety issues using the driving simulator during the outreach activities in 2015. The University of Iowa has reached approximately 400 through participation in STEM events and facility tours focused on technology careers.

Attendance at the SAFER-Symposium events hosted at consortium sites continues to prove to provide valuable leadership development and collaboration experience for faculty and particularly the approximately 40 student attendees. SAFER-Sim researchers have provided sixteen (16) invited and conference presentations, serve on twelve (12) advisory committees, edit and review for over seventeen (17) journals and conferences, and hold leadership positions in thirteen (13) organizations.

A copy of this report can be found on the SAFER-SIM website under the “Reports” tab (<http://safersim.nads-sc.uiowa.edu/reports.php>).

Accomplishments

a. Goals and objectives of the program

The goal of the SAFER-SIM UTC is to use simulation techniques to address the safety issues prioritized by the US DOT. Specifically, our center has identified seven (7) areas of activity:

- 1. Conduct safety research using simulation techniques.** SAFER-Sim is excited to add another transportation domain to our simulation expertise. Researchers at the University of Iowa Emergency Medicine Department have developed an all-terrain vehicle (ATV) simulator. Research into ATV driver safety is a new and emerging field in transportation safety that has the potential to significantly impact the health and safety of ATV riders.

Progress continues on all previously funded projects. Of the projects funded in Year 1, four (4) are complete, final reports have been received for two (2) and are in progress for two

(2). The remaining seven (7) Year 1 projects are expected to conclude before the next PPPR. Final reports on the results of these projects are being prepared for publication and will be made available to the public on the SaferSim website under the research tab for each project (<http://safersim.nads-sc.uiowa.edu/research.php>). Additionally, two-page summaries of each project will be added to the resources tab, a new tab under development. These summaries focus on recommended practices for transportation professionals providing easier access to key information than the full project report.

Table 1 Year 1 funded project completion summary

Project Title	Scheduled End Date
Dynamic Simulation Models for Road Safety and its Sustainability Implications	Final Report Received
Utilizing Micro Simulation to Evaluate the Safety and Efficiency of the Expressway System	Final Report Received
Operational and Safety-Based Analyses of Varied Toll Lane Configurations	Final Report in Preparation
The Effect of Roadside Vegetation and Clear Zone Design on Driver Behavior	Final Report in Preparation
Using Connected Vehicle Technology to Deliver Timely Warnings to Pedestrians	11/30/2015
Development and Evaluation of Infrastructure Strategies for Safer Cycling	11/30/2015
Impact of Deflection Angle on Roundabout Driver Behavior	11/30/2015
Cross-Platform Driving Simulator Scenarios to Use in the Roadway Design and Planning Process	12/31/2015
Effectiveness of In-Vehicle Virtual Traffic Control Devices	2/29/2016
Driving Simulators for Virtual Road Safety Audits	2/29/2016
Examination of Driver Behavior in Response to Pedestrian and Bicyclist Behaviors	3/31/2016

A call for proposals for projects using FY15 money will be issued in November 2015. The call will focus on collaborative projects building on previously SAFER-Sim or related work in order to most efficiently utilize the lower funding level for FY15. As in previous calls,

proposals will be reviewed by SAFER-Sim Associate Directors with priority given to collaborative projects. The start date for new projects will be January 2016.

Thirteen (13) graduate and eleven (11) undergraduate students were supported by SAFER-Sim funded projects during this reporting period. Faculty and students from Civil Engineering, Computer Science, Education Psychology, Emergency Medicine, Industrial Engineering, Kinesiology, NADS, Psych. & Quant. Foundations, Psychology, Radiology, Science Education.

Table 2. Summary of students currently supported by projects.

Institution	Types of Projects	Graduate Students	Undergrad. Students
University of Iowa	6 Individual 3 Collaborative	7	3
University of Central Florida	3 Individual 2 Collaborative	3	2
University of Massachusetts – Amherst	7 Individual 2 Collaborative	0	2
University of Puerto Rico - Mayaguez	0 Individual 2 Collaborative	3	6
University of Wisconsin - Madison	5 Individual 2 Collaborative	11	0

- 2. Leadership Development.** SAFER-Sim continues to focus on developing transportation safety leaders and collaboration by providing opportunities for students to interact and present their work. Collaboration across the engineering and social science fields is key to future improvements in road user safety. SAFER-Simposiums hosted by the consortium sites support such collaborative interactions and the formation of professional relationships that will continue into the future. The third symposium was hosted by **University of Central Florida** October 5 & 6, 2015, with attendance of more than 70, in conjunction with the International Road Safety and Simulation 2015 in Orlando, Florida. The organizational planning and student preparation took place during the reporting period with the symposium and conference occurring less than a week after the end of the reporting period. Attendees included students involved in SAFER-Sim projects, faculty, and the five site directors. As part of the symposium there was a networking dinner attended by more than 40 students. Transportation professionals who were former students at University of Central Florida presented perspectives on careers in government, industry and academia to symposium attendees. SAFER-Sim students presented more than 20 posters highlighting their work on SAFER-Sim projects in a session the morning of the first day of the International Road Safety Conference. This poster session was attended by students, faculty, and conference attendees.

SAFER-Sim students and faculty have an excellent record of leadership as professionals in the safety and health community.

Invited presentations

SAFER-Sim faculty and students have given eleven (11) invited presentations at symposia, workshops, panel discussions, and meetings. These include U.S and international gatherings:

- Biennial Meeting of the Society for Research in Child Development, Philadelphia, PA
- Transportation Research Board (TRB) 94th Annual Meeting, Washington, D.C.
- V/AR & Transportation – Examples from Academia, Pre-Conference Workshop on Virtual Reality (VR) and Augmented Reality (AR) for Transportation Research, Orlando, FL
- Panel Discussion: Potential Transportation Research using Virtual/Augmented Reality, Pre-Conference Workshop on Virtual Reality (VR) and Augmented Reality (AR), Orlando, FL
- Korea Research Institute of Human Settlement (KRIHS), Ajou University in Korea and Tongji University, China.
- Civil Engineering Conference, Capadoccia, Turkey
- 15th COTA International Conference of Transportation Professionals, Beijing, China
- KRIHS and Korea Expressway Corporation (KEC).
- RTI User Group Meeting
- TRB 2016's Human Factors Workshop entitled "Cross-Modal Distributed Simulation"

Student conference papers accepted

SAFER-Sim students have had seventeen (17) journal articles, conference papers and posters accepted. Including these conferences:

- 9th biennial meeting of the Cognitive Development Society in Columbus, OH
- Department of Epidemiology Poster Session, University of Iowa, Iowa City, IA.
- 2016 Transportation Research Board (TRB) Meeting, Washington, DC
- 2015 International Road Safety and Simulation International Conference, Orlando, FL
- 21st ACM Symposium on Virtual Reality Software and Technology, Beijing China
- IEEE Virtual Reality Conference, 2016

Advisory committees

SAFER-Sim faculty serve on twelve (12) advisory committees for national and local organizations and have led workshops organized by these committees:

- Safety subcommittee of the University of Iowa Bicycle Advisory Committee
- Lifesavers Traffic Safety Conference, Bike/Pedestrian Safety Committee
- TRB Operator Education and Regulation
- TRB Joint subcommittee on the Human Factors of In-Vehicle Systems (Chair)
- TRB User Information Committee
- TRB Human Factors Workshop Planning Committee
- TRB Committee on Automated Vehicles
- SAE On-Road Automated Vehicles Committee
- Workshops on Automated Driving at the TRB annual meeting
- 2015 International Road Safety and Simulation International Conference
- 2015 Strategic Highway Safety Plan (SHSP)

- Safety Summit & State Transportation Innovation Council (STIC)

Journal editing and reviewing activity

Many SAFER-Sim faculty at each site have served as reviewers for at least twenty (20) journals, conferences, and committees covering a wide range of scientific areas.

Journals

- American Journal of Public health, Safety Science
- International Journal of Injury Control and Safety Promotion
- Accident Analysis and Prevention
- Traffic Injury Prevention
- ACM Transactions of Perception
- IEEE Transactions on Visualization and Computer Graphics
- Human Factors Journal
- Society of Automotive Engineers
- IEEE Transactions on Visualization and Computer Graphics

Conferences

- TRB Annual Meeting
 - Bicycle, Pedestrian
 - Operator Education and Regulation Committees
 - User Information Committee
 - Automated Vehicles
 - Joint subcommittee on the Human Factors of In-Vehicle Systems
- 3D User Interaction (3DUI) Conference
- IEEE Virtual Reality Conference
- Driver Assessment Conference
- Journal of Intelligent Transportation Systems3D User Interaction (3DUI) Conference
- 2015 Road Safety and Simulation (RSS) International Conference
- 2016 Pan-American Congress of Traffic Transportation and Logistics
- Human Factors and Ergonomics Society Annual Meeting

Individuals also serve on Editorials Boards or as Editor-in-Chief:

- Journal of Experimental Psychology: Applied, Editorial Board
- Journal of Experimental Child Psychology, Editorial Board
- National Science Foundation, Developmental & Learning Sciences, College of Reviewers
- Editor-in-Chief of Accident Analysis and Prevention

Leadership positions of students and faculty in professional organizations

SAFER-Sim students and faculty are hold leadership roles in several professional organizations in a wide range of safety and health fields.

Faculty

- Vice President for the New England Chapter of HFES
- Fellow at the Liberty Mutual Research Institute for Safety
- Fellow at the Volpe National Center

- American Institute of Aeronautics and Astronautics
- American Society of Civil Engineers
- Society of Automotive Engineers
- American Academy of Pediatrics
- All-Terrain Vehicle Policy Revision Committee
- Statewide Iowa ATV Injury Prevention Task Force
- International Society for Agricultural Safety and Health (ISASH) Transportation Committee
- Iowa Injury Prevention Research Center Executive Board
- Safe States Public Policy Committee
- ISASH Transportation Committee

Students

- Director of Activities of ITE University of Puerto Rico-Mayaguez Student Chapter
- President of Institute of Civil Engineers Student Chapter
- Secretary of ITE University of Puerto Rico-Mayaguez Student Chapter

Additionally, Dr. Jennissen from the University of Iowa ATV simulator lab testified on behalf of American Academy of Pediatrics at the Consumer Product Safety Commission hearing on Proposed Rulemaking for Recreational Off-Highway Vehicles. Dr. Hamann from the University of Iowa Department Of Public Health received the University of Iowa Postdoctoral Scholar Research Excellence Award in April and served as the president of the University of Iowa Postdoctoral Association during this reporting period.

Placement of students

Juan Rivera, of University of Puerto Rico-Mayaguez, was hired as a Traffic Engineer of the Florida DOT. Jon Freeman, of University of Massachusetts-Amherst, is now a transportation engineer at Green International Affiliates, Inc.

- 3. Education and Workforce Development.** The SAFER-SIM consortium members organized and participated in several education events and made plans for future collaborative efforts in education and workforce development. Overall, more than 400 students have been reached by these activities.

K-12 Student Events

The **University of Puerto Rico-Mayaguez** has been particularly active in engagement with K-12 students. During and educational presentation to elementary, intermediate, high school and college students about the driving simulator, students learned how the driving simulator operates and the benefits of performing research with this equipment to improve highway safety. The outreach activities gave the students a driving simulation experience, a presentation of the output and how it is analyzed, and then an opportunity to for the exchange of ideas with them. The event impacted more than 100 elementary, middle, high school and college students from all over Puerto Rico.

The **University of Puerto Rico** SAFER-SIM research team also assisted the 2015 Summer Transportation Institute (STI) for high school students. Seventeen (17) tenth grade students,

representing ten (10) public and private schools from Puerto Rico, participated in the 2015 STI. Nine (9) university students from engineering, mathematics and social science served as mentors and twelve (12) professors served as instructors in the Safety and/or Transportation related activities that provided the balance of classroom lectures, a four-week long research activity, adjusting to university life activities, and sport and recreational activities. A closing ceremony was held which consisted of group presentations associated with transportation safety research projects and the diploma for completing all the STI requirements.

One research project involved an urban driving scenario that was specifically developed for the students enrolled in the STI using the Internet Scene Assembly (ISA). The simulation started on a highway and the final destination was a residence located downtown in the middle of the city. The students drove the simulation twice; first following a set of instructions to get from the beginning to the final destination, second they completed the same route wearing “Drunk Busters” goggles that simulate the changes in vision corresponding to a 0.16% alcohol in their blood. Following the simulator drives, the University of Puerto Rico-Mayaguez research team illustrated to the students the typical outputs of the simulator and the process used to analyze the data using the Microsoft Excel®, which included a comparison between the driving performance with and without the “Drunk Busters” goggles. Only 20% of the participating students arrived to their final destination using the “Drunk Busters” goggles.

The STI tenth-graded students presented their final transportation group project in front of approximately one-hundred (100) relatives, professors, mentors and students. Their family members witnessed their learning and accomplishments. Exposure to this interdisciplinary transportation project will ultimately make a positive contribution in their decision of which career path to choose among transportation engineering options offered at University of Puerto Rico-Mayaguez, therefore contributing to the development of the next generation transportation workforce in this millennium.

SAFER-Sim researchers at the **University of Iowa** are collaborating with STEM Innovator at the Kirkwood Community College Regional Center in Coralville, Iowa. This program presents teams of 4-6 high school students with real world projects proposed by professionals in technology fields from industry and academia. Students with diverse backgrounds and interests are encouraged to take part in this program to demonstrate to students that work in STEM fields requires diverse talents. Through an on-going partnership between SAFER-Sim researchers and the STEM Innovator program, project proposals will be submitted by researchers each semester. Three project proposals were submitted to date of which two were chosen by students; development of a website to present the ATV lab’s work on driver safety and an phone app ATV drivers with information about the location and safety rules at off-road vehicle recreational parks in Iowa. These two projects support technical transfer of research results and help improve ATV driver safety by encouraging riding in parks designed for use by those vehicles. SAFER-Sim researchers meet with student teams weekly to provide feedback and supporting materials for the projects throughout the semester. Students are also encouraged to visit partner locations to gain understanding and foster interest in positions in STEM fields.

Curriculum modules and courses developed

The Global Road Safety course developed by Drs. Cara Hamman and Corinne Peek-Asa at the **University of Iowa** was a success and the first group of University of Iowa students finished in May 2015. The course trains undergraduate and graduate students on the field of simulation research and how to develop scenarios, including lecture, hands-on activities, and a field trips to see simulators in operation. The full curriculum has been created for an in-person class and plans are to offer the course again in Spring 2016. Drs. Hamann and Peek-Asa also plan to further develop this course into an online version that could be taken by a wider array of students both within and beyond Iowa. Interest has been expressed by SAFER-Sim members at the University of Massachusetts in utilizing the course material.

Schools and career fair visits

The portable simulator at the **University of Iowa** is available for travel to eastern Iowa middle schools and high schools. The simulator can be used for a Texting-and-Driving demonstration on the effects of distraction while driving. The University of Iowa (UI) collaborated with the Midwest Transportation Center regional UTC at Iowa State University (ISU) in developing a mobile driving simulator demonstration of distracted driving for teenagers. The texting and driving demo has been presented at events geared toward teen drivers in Des Moines, Iowa, and West Burlington, Iowa as well as to the general public at the Iowa State Fair. Eastern Iowa schools are being contacted to schedule future events. We have found most schools prefer these demonstrations near prom and graduation events in the spring. The same portable simulator will be available for the “Exploring the Science of Driving” curriculum for middle and high schools and can be used by teachers in their classroom. The curriculum module will be ready for use in schools January 2016. Students will use a portable driving simulator in their school to collect driving performance data then analysis that data to explore STEM concepts. Data sets will also be available. A highly portable desktop MiniSim driving simulator will be available for loan to teachers wishing to utilize this curriculum.

University of Iowa members have also attended several outreach events at local schools and hosted numerous tours of the NADS simulation facility through involvement with the Workplace Learning Connection at the Kirkwood Community College and engagement with Boy Scout troops. These efforts include mock interviews, teaching a Traffic Safety Merit Badge, presentations on the range of educational backgrounds of individuals employed at simulation facilities. These efforts have reached approximately 400 students. Additionally, a tour for the University of Iowa’s Office of Admissions was hosted involving 12 high school guidance counselors.

Videos and animations

SAFER-Sim researchers at the **University of Wisconsin** developed video lessons called “Driving Simulator Scenario Creation Process”. This resource provides valuable insight for anyone, student or professional, into the process of scenario creation for a driving simulator. These videos were posted on YouTube and are available to the public (<https://www.youtube.com/playlist?list=PLQcoZ3uITZkjBfa0bA41fsKfVJJj338In>).

The **University of Puerto Rico** produced a 20-minute comprehensive video documenting the different Summer Transportation related activities. It highlights field trips to major transportation facilities in the San Juan Metropolitan Area including the ITS Operation Control

Center of the Dynamic Toll Reversible Lane (DTL) which is one of the expressway facilities simulated as part of the research project.

The **University of Massachusetts** is producing videos on simulation as a research tool. These videos will be aimed at high school students and college freshmen to generate interest and excitement. SAFER-Sim consortium sites have provided materials for the video to present a wide range of simulation applications. The videos are expected to be complete during the fall semester.

4. **Technology Transfer.** During this reporting period, SAFER-SIM projects have resulted in several journal articles and conference presentations in addition to the presentations at the SAFER-Symposium in Orlando, FL and invited presentations listed above. Dr. Hamann from the University of Iowa received the Best Oral Presentation award for her presentation at the Midwest Postdoctoral Symposium, Ames, IA.

University of Central Florida	2 conference papers and posters
University of Iowa	6 conference papers
University of Massachusetts	2 conference papers and posters
University of Puerto Rico	2 conference papers
University of Wisconsin	1 conference paper 1 journal article authored by a student

Additionally, SAFER-Sim members have attended an impressive number of conferences as noted in the lists provided in the Leadership Development section above. Attendance at these conferences has provided extensive networking opportunities as well as avenues for discussion of SAFER-Sim and related projects with professional colleagues in industry, government and academia.

A significant technology transfer event was organized by SAFER-Sim Director Mohamed Abdel-Aty at the **University of Central Florida** with David Yang of Federal Highway Administration. The half-day workshop: V/AR & Transportation – Examples from Academia, and a panel discussion: Potential Transportation Research using Virtual/Augmented Reality was attended by practitioners, students and faculty from the SAFER-Symposium and the International Road Safety and Simulation conference attendees. Virtual and augmented reality are related, but distinct fields and each support safety research and improvements in road safety. The presentations from the workshop will be available on the SAFER-Sim website.

Additionally, Dr. Hamann attended a faculty workshop on pedestrian and bicycle topics at Portland State University in June 2015. Here she was able to network with many leaders in this field and learn about research methods and ways to incorporate ped/bike topics into university courses. Dawn Marshall attended Road Safety Presentation by Dr. Ioni Lewis at the University of Iowa Public Policy Center. The presentation focused on traffic safety campaigns, how to target them to specific populations and measure the impacts within those groups.

The SaferSim lecture series continues to connect researchers and provide a venue for sharing work supporting a collaborative atmosphere. Attendance at SAFER-Sim sponsored webinars and lectures has been good and is increasing. The SAFER-Sim lecture series and the **University of**

Iowa hosted five (5) recorded presentations covering topics on pedestrian safety, using driving simulators to detect driver impairment, creating drivable environments from SHRP2 and other data sources, issues with ATV driver safety. Each lecture was attended by 10 to 15 people. The lectures have been so well received, plans are being made to change the venue to live webinars that are recorded to allow wider participation with individuals across the SAFER-Sim sites and allow those not able to attend to view the presentations at a later time. Kelvin Santiago, Doctoral Student of **University of Wisconsin-Madison** also presented a webinar, AutoCAD Civil 3D to ISA using Blender Interphase to support University of Puerto Rico-Mayaguez Driving Simulation, which was attended by graduate and undergraduate students from other SAFER-Sim sites. As mentioned above, **The University of Massachusetts** is producing instructional videos on the use of simulation for transportation safety for students and transportation professionals and also will be available on the SAFER-Sim website.

The re-organization and re-design of the SAFER-Sim website, hosted by the **University of Iowa**, to support all users and potential users of simulators; students, faculty, transportation professionals continues. This effort is critical to supporting the technical transfer and other activities, including accurate reporting of SAFER-Sim and is extensive. This project is supported by a research assistant who took on the effort while working as an undergraduate student and was subsequently hired to continue following graduation. Significant planning and redesign of supporting databases has been completed. A major addition is online reporting forms for SAFER-Sim researchers and site directors at both the individual project and site levels. The underlying website structure will also allow automatic updates to the SAFER-Sim website for news events submitted by researchers across the consortium sites as well. A new Resources tab that will host two-page project summaries focused on best practices and key results for transportation professionals as well as additional resources for transportation professionals on the uses of simulation and how to use simulators will be added soon.

Practitioner attendance at events

The **University of Puerto Rico** participated in major technology transfer and outreach activities that included practitioners and students: the 2015 Mega Civil Friday Conference sponsored by the Institute of Civil Engineers and the Summer Educational and Outreach Activity with K-12 students through the Summer Transportation Institute (described above). For the first time, the University of Puerto Rico-Mayaguez mobile driving simulator was exhibited on center stage of the Puerto Rico Convention Center as part of the 2015 Mega Civil Friday annual conference. This is the most important technical event of professional civil engineers in Puerto Rico and is geared toward practitioners from the public and private sector construction industry. Portability is a key feature of the University of Puerto Rico-Mayaguez simulator. Our research team was able to transport it to the Puerto Rico convention center in San Juan. The University of Puerto Rico-Mayaguez also participated in outreach events geared toward K-12 students coming from public and private schools: 2015 Pre-Engineering Summer Camp, 2015 Community Support and Engagement Program Summer Camp, 2015 Civil Engineering and Surveying Department Freshman and Transfer Students Orientation. The outreach activities consisted of a three-step process. In the first step, participants received an initial overview of the main components of the driving simulator, then the general characteristics of the SAFER-SIM research project were presented and third, the configurations are evaluated with a hands-on driving simulation experience with representative participants. For the second step, the participants were

presented with the outputs of the driving simulator and the process used to analyze the data. Finally, an exchange of ideas with the participants took place. The University of Puerto Rico-Mayaguez SAFER-SIM Team has had the opportunity to engage more than 2,000 students and engineering professionals in safety issues using the driving simulator during the outreach activities in 2015.

Facility Tours

The **University of Iowa** members of SAFER-Sim have been particularly busy providing lab tours over the last several months. The UI Hank Lab gave 24 tours during the funding period. This includes demonstrations for UI classes, visitors from the automotive industry, representatives from Iowa and U.S. DOT, and groups of K-12 students visiting campus. The National Advanced Driving Simulator has hosted more than 2 dozen tours for various groups including students and community groups. NADS also hosted a visit from David Yang from the Federal Highway Administration that included tours of NADS and the Hank lab. Topics covered during this meeting included simultaneous simulation across geographic locations, development building of bicycle and pedestrian simulators, and converting real-world data sources into drivable environments in simulators. This meeting was one of the sparks that fueled the organization of the augmented and virtual reality workshop and panel discussion in Orlando, FL. The **University of Massachusetts** and **University of Wisconsin** have also hosted facility tours.

Media requests

Labs at the **University of Iowa** have also fielded several requests from media resulting in news stories in 2015.

May

KCRG television featured the Hank Virtual Environments Lab

<http://www.kcrg.com/subject/news/university-of-iowa-studying-safety-of-pedestrians-texting-and-crossing-20150508#JHilHQrrlCtjdI5o.01>

January

The Cedar Rapids Gazette newspaper published an article on the Hank Virtual Environments Lab

<http://www.thegazette.com/subject/news/public-safety-stop-texting-and-walk-already-20150124>

June

The Hank Virtual Environments Lab was featured on the National Science Foundation web site

http://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=135532&WT.mc_id=USNSF_51&WT.mc_ev=click

An ABC News story discussed the marijuana driving study that was conducted at the UI NADS.

<http://abc7.com/news/nida-study-analyzes-how-marijuana-impairs-drivers/802296/>

NADS miniSim vision testing simulator is featured on KCRG TV-9

<http://www.kcrg.com/subject/news/ui-to-begin-testing-cataract-treatment-with-driving-simulator-20150605>

July

Vice Media came to NADS and shot footage for a future story on drinking and driving.

http://company.vice.com/en_us

September

Inverse journalist visited NADS

<https://www.inverse.com/article/6050-the-national-advanced-driving-simulator-is-big-boy-grand-theft-auto>

- 5. Collaboration .** A main focus of the SAFER-Sim is collaboration within the consortium sites, across disciplines and with other centers. To date, 6 multiple site collaborative projects and another 5 projects across disciplines have been funded, 42% of our funded projects. Many of the journal articles and conference papers based on collaborative SAFER-Sim projects and included authors from two or more consortium sites. In addition to the SAFER-Sim funded collaborative research projects, the **University of Central Florida**, **University of Massachusetts** and **University of Puerto Rico** are particularly active collaborators. University of Central Florida and University of Puerto Rico-Mayaguez started an exchange of ideas about analysis of different variables associated with the driving simulator during this period. Both research teams have been developing ideas to improve the analysis process techniques.

Joint technology transfer activities have been coordinated with the SAFER-Sim participating universities as well as with other technology transfer programs such as: The Puerto Rico Local Technical Assistance Program at University of Puerto Rico-Mayaguez. These activities include the identification and coordination of local transportation agencies and professional associations (ITE, CIAPR, IIC) to participate in the practitioners training section of the Puerto Rico SAFER-Sim Symposium. Furthermore, a seminar on simulation tools and applications to transportation was offered in collaboration with the Florida Chapter of the College of Engineers and Surveyors of Puerto Rico.

SAFER-Sim projects are also generating and supporting collaboration within each site across departments and colleges. At the **University of Wisconsin-Madison**, there is collaboration between Civil Engineering and the Department of Radiology and Department of Kinesiology. At the **University of Iowa** projects involve collaboration between the College of Public Health and NADS, Emergency Medicine Department and Civil Engineering, Computer Science Department and Psychology Department, to name a few. SAFER-Sim projects are also working with other centers, such as the Great Plains Center for Agricultural Health (GPCAH), and Iowa Center for Agricultural Safety and Health (ICASH). SAFER-Sim work at the **University of Massachusetts-Amherst** is synergistic with some of the work done by the Crash Imminent Safety UTC (led by Ohio State University) of which UMass Amherst is also a member.

The call for proposals to be supported by FY15 funds will focus on collaborative projects and follow-on projects that enable more in depth collaboration both across institutions, but also across simulation platforms and creating driving environments in simulators from real world data. The software tools developed and improved by these projects will greatly enhance the ability of researchers using different simulators and civil transportation engineers to collaborate to improve roadway safety.

Attendance at the three SAFER-Symposium events hosted at consortium sites has been a huge success in promoting collaboration not only between faculty and, perhaps more importantly, between students involved in SAFER-Sim projects. Some 40 of the more than 70 symposium attendees were students. The student attendees are building professional relationships by interacting with other students through presentations and posters of projects at all phases. These interactions build networking skills and allow students to become deeply familiar with

each other's work. As students complete their degrees and move to professional positions, this provides a launching pad for new project ideas for addressing current and future transportation safety issues crossing the divide between human factors and civil engineering disciplines. These cross-discipline collaborations will be vitally important when connected and automated vehicle technologies blur the line traditionally separating these two disciplines.

A **University of Iowa** student who worked with Dr. Hamann on a SAFER-Sim project graduated with her Master's degree in May 2015. She has moved on to a doctoral program at the **University of Wisconsin-Madison** in Industrial Engineering, which is one of the SaferSim consortium member schools. She is now working as a graduate research assistant on simulation projects there as well. This transition was facilitated by student and faculty attendance of the SAFER-Simposium events.

Dr. Dan McGehee at the **University of Iowa's** Public Policy Center hosted an automated vehicles meeting that included approximately 30 attendees of the Iowa DOT, SAFER-Sim researchers and community special interest groups. The meeting focused on automated vehicle research in the state of Iowa, state policies on automated vehicles, and methods for facilitating that research. At the meeting, the Public Policy Center's a semi-automated Volvo XC90 was also available to allow attendees to experience vehicle automation. This vehicle will be used for research and technology demonstrations in the future. Two possible venues for on-road automated vehicle research in eastern Iowa are runways at the Iowa City Municipal Airport and an extensive network of bicycle and hiking trails in Johnson County, Iowa. SAFER-Sim looks forward to continuing to collaborate with the Iowa DOT and the UI Public Policy Center on automated vehicle research as needs and methods are determined for the state of Iowa.

NADS and the ATV simulation lab at the **University of Iowa** continue to work collaboratively with the Kirkwood Regional Center at the University of Iowa to explore ways that the curriculum being developed can be implemented as part of their ongoing science work and the STEM Innovator Course.

- 6. Program Efficacy.** Information to support SAFER-Sim efficacy is becoming more available. The Research and Innovative Technology Administration (RITA) approved the continued funding for the third of a three year contract as a minority institution on the SAFER-Sim Consortium. The lead institution has provided RITA with PPPRs on time. The consortium sites have provided financial reports on and with a single exception were complete, including documentation of matching funds. Reviews for the first two calls for proposals were efficient and timely and it is expected that the planned call in November 2015 will go just as smoothly. Some researchers have already prepared proposals in anticipation of the RFP. In the past, response to calls for proposals has been healthy, a total of 41 across two calls. It is expected that the number of proposals received in response to the planned call in November will be slightly lower due to the focus on collaborative and follow-on projects.

The activities of the SAFER-SIM UTC are advancing traffic safety through the use of simulation and developments in simulation. As projects complete, final reports are becoming available for dissemination, see Table 1 Year 1 funded project completion summary above. Journal articles and conference presentations are further disseminating results. These projects promise

significant advancements in safety for all roadway users as well as developments in simulator technology that will allow easier collaboration among users of different driving simulator platforms as well as using engineering CAD drawings and naturalistic driving data to create simulation environments. These results will also impact several areas of road safety, including road design, applications for road users, and understanding of driver, bicycle rider, and pedestrian performance in potentially dangerous situations. In addition, all SAFER-Sim projects provide students with hands-on experience supporting the development of future transportation safety professionals.

SAFER-Sim has initiated an online reporting system that will allow researchers from all five consortium sites to submit quarterly reports for their research projects and center wide activities, including activities across all seven categories and related evaluation metrics. This will support program efficacy through frequent routine reporting. The a new automated news posting feature on the SAFER-Sim website will allow members to immediately publicize and record a wide range of activities and increase awareness of SAFER-Sim activities among website visitors. Final report and two-page summary templates for SAFER-Sim projects will provide a uniform look and format across SAFER-Sim documents published on the website.

At least three proposals have been submitted to other funding agencies that are related to SAFER-Sim projects:

J. K. Kearney (P.I.), J.M. Plumert (C.I.), Molly Nikolas, (C.I.), Geb Thomas (C.I.), & J. Cremer (C.I.), REU Supplement: Shared Virtual Environments for Studying Social Influences on Risky Cycling and Pedestrian Behavior, National Science Foundation, (\$16,000)

J. M. Plumert (PI), M. Nikolas (PI), & J. K. Kearney (PI), The Emergence of Risky Behavior in Dyads with Typically- and Atypically-Developing Youth, National Institutes of Health (\$1,078,498)

J. K. Kearney (PI) & J. M. Plumert (CoPI), The Influence of Avatar Motion and Appearance Fidelity on Joint Actions in Shared Virtual Environments, National Science Foundation (\$497,844)

Dawn Marshall and Kathy Holeton attended the Council of University Transportation Centers summer meeting hosted by Rutgers in New Jersey in June of 2015. Through these meetings connections were made with other UTC directors and administrators. These connections were evident during attendance at other events when conversations about potential collaborations occurred with directors of other UTCs. Dawn Marshall and Kathy Holeton will attend the Council of University Transportation Centers Winter meeting in conjunction with TRB in January 2016.

The center continues to hold regular teleconferences among the consortium members to share information, track progress on collaborative research projects, share outreach ideas, and plan future activities. These regular phone calls have proven to help preserve the collaborative nature of our center. The bi-weekly list of news items related to safety and simulation is distributed via email to over 200 people. The news listing has provided subscribers with links to 11 abstracts, 39 conferences and events, 3 multimedia links (a new category) and 77 reports, and a total of 477 links of all kinds. Feedback from subscribers has been positive indicating that they both find the news listing useful and look forward to receiving it.

Engineer Juan Manuel Rivera, graduate research assistant of the University of Puerto Rico-Mayaguez, was awarded in the UTC annual dinner for his significant contributions to the University of Puerto Rico-Mayaguez SAFER-SIM research project: Phase One Toll Plaza Simulation Project.

Since the last report, the University of Puerto Rico team has published the proceedings of the SAFER-Symposium hosted there in February 2015. This document incorporates all the technical presentations of the undergraduate and graduate researchers and PI's, approximately thirty (30) technical presentations, as well as the relevant information about the five (5) SAFER-Sim consortium universities.

The Civil Infrastructure Research Center (CIRC) and the University of Puerto Rico-Mayaguez Research and Development (R&D) Center have a fully automated accounting reporting system. All costs and reimbursements transactions associated with the student and faculty salary, equipment and material purchased are administered through these administrative offices. The University of Puerto Rico-Mayaguez has an independent auditing firm as well of Office Comptroller that audits all the research projects with external federal funds.

Improvement could be made in engagement with our advisory board. To that end, an advisory board meeting is planned in conjunction with the TRB annual meeting in January 2016. The opportunity to interact face to face with our advisory board members to receive feedback and suggestions is valuable. The agenda for the meeting will include:

- Review of SAFER-Sim activities
- Discussion of goals toward evaluation criteria
- Ways to improve communication
- What information would they like to see
- What format should the information take
- How frequently
- Suggestions for future collaborative and innovative work

Written feedback will also be requested from all advisory board members to ensure all members' input is taken into account.

An external University of Puerto Rico-Mayaguez SAFER-Sim advisory Panel has been established. It consists of four (4) professionals that represent the academia, public and private sector. The panel members have over 25 years of experience in transportation safety, human factors, vehicle manufacturing and performance, and transportation curriculum development and assessment. The University of Iowa will hold a meeting of SAFER-Sim principal investigators to discuss program efficacy, potential future collaborative projects, and provide instruction and feedback on the reporting process.

- 7. Diversity.** SaferSim Research projects are providing funding for several students from minority groups. Minority students are involved in projects each SAFER-Sim consortium site. The minority groups represented include various people of color, Asian and Hispanic ethnic origins, and women. Some projects have had more than one minority student employed sequentially that are counted here.

Table 3 Minority students supported by SAFER-Sim projects

	Number of Minority Students
University of Central Florida	2
University of Iowa	8
University of Massachusetts	2
University of Puerto Rico	5
University of Wisconsin	4

The diversity of the professional backgrounds of SAFER-SIM researchers is significant and has expanded. Departments and colleges represented are: Civil Engineering, Computer Science, Education Psychology, Emergency Medicine, Industrial Engineering, Kinesiology, NADS, Psych. & Quant. Foundations, Psychology, Radiology, Science Education.

Two (2) on-going research projects involving freeway simulation using the Phase One Toll Plaza scenarios and Phase Two, the simulation of the Dynamic Toll Lane, have been developed in collaboration with University of Massachusetts- Amherst and The University of Wisconsin - Madison research teams. The first phase was conducted with subject drivers in Puerto Rico at University of Puerto Rico-Mayaguez and subject drivers registered primarily in the State of Massachusetts and using the University of Massachusetts-Amherst driving simulator. These collaborative efforts are of direct benefit to the Hispanic ethnic group in Puerto Rico as well as American, afro-American and others ethnic groups whose domicile is in Massachusetts.

At the University of Puerto Rico-Mayaguez three major diversity activities have been designed for the participation of minority students at the University of Puerto Rico-Mayaguez SAFER-Sim research project. These are: the Phase One Toll Plaza Project, 2015 Summer Transportation Institute Research Project and the Phase Two Toll Plaza Project.

Four (4) major recruitment events were hosted using the University of Puerto Rico-Mayaguez Driving Simulator. These are: the 2015 STI Tenth-grade public and private student recruitment, 2015 Civil Engineering and Surveying Department Freshman Students Orientation, 2015 Civil Engineering and Surveying Department Transfer Students Orientation and 2015 Pre-Engineering Summer Camp. All these recruitment events include primarily students from the Hispanic ethnic group, from the Latin American and Caribbean countries, of which approximately 40% are females.

In terms of applicants to University of Puerto Rico-Mayaguez graduate programs, six (6) students applied to the transportation option of the Master of Science in Civil Engineering (MSCE) program. Thirty-three (33%) of the applicants were directly involved in the University of Puerto Rico-Mayaguez SAFER-Sim research projects. Six (6) undergraduate students enrolled in Science, Technology, Engineering and Mathematics (STEM) academic programs towards Bachelor Science Degree.

Juan Rivera, of University of Puerto-Mayaguez, was hired as a Traffic Engineer of the Florida DOT. Jon Freeman, of University of Massachusetts-Amherst, is now a transportation engineer at

Green International Affiliates, Inc. Morgan Price, of University of Iowa graduated with Master's degree and has been accepted to a doctoral program in Industrial Engineering at the University of Wisconsin-Madison.

Four graduate students continue their work in the HANK lab at the University of Iowa. One minority student graduated from the University of Iowa and went on to a higher graduate degree program at the University of Wisconsin-Madison. Three (3) undergraduate STEM students were accepted to continue working as undergraduate research student in the second phase of the University of Puerto Rico-Mayaguez Driving Simulator Project. Two (2) graduate students were also hired to participate in the completion of the first phase of the toll plaza project and the beginning of the second phase of the Dynamic Toll Reversible Lane (DTL).

Plan for Next Reporting Period

As projects funded by the center begin to report results, the next reporting period will bring more activity in dissemination of information and technology transfer. The relationships that have been built will also produce more activity in education and outreach. Planned activities are:

- Planning for the fourth SAFER-SIMposium at the University of Wisconsin – Madison Spring/Summer 2016
- Schedule date for the fifth SAFER-SIMposium at the University of Iowa in Fall of 2016
- Call for proposals for FY15 funding
- Attendance at the CUTC Winter Meeting in January 2016
- Advisory Board meeting in conjunction with TRB in January 2016
- Invite new Advisory Board members from Iowa and Massachusetts
- Schedule events with the Texting & Driving demonstration on the portable simulator in middle and high schools in the spring semester
- Contact educators about the Exploring the Science of Driving curriculum and schedule events in middle and high schools
- Submission of proposals to the STEM Innovator program at the Kirkwood Community College Regional Center in Johnson County Iowa
- Continue and complete redesign of the SAFER-SIM website to better support technology transfer and efficacy based on user feedback
- Improve periodic reporting from project principal investigators and site directors through online forms and automated posting of news items
- Final reports and two-page summaries from completed projects will become available on the SAFER-SIM website
- Continue work on videos on how to use simulation aimed at students and professionals
- Transform lecture series into webinar series
- Continued participation in events organized by Workplace Learning Connection and other STEM outreach and educational events
- Continue efforts toward reactivation of the Driving Wiki or transfer of content to the SAFER-SIM website
- Establish goals based on identified evaluation criteria
- Continue monthly Directors' calls to support collaboration and progress toward evaluation criteria goals

Products

Completed project reports will be available online. Eleven (11) reports are expected to be available before the end of the next reporting period. Two-page summaries for all projects aimed at transportation professionals will also be available. Combined with the journal articles and conference presentations of SAFER-Sim project results, access to key information and findings will be widely available.

The lecture series at the University of Iowa will become webinars. This will allow individuals and groups not in Iowa City to participate as both attendees and presenters. The webinars will be recorded and posted online for later viewing.

Development of the Global Road Safety course curriculum for in person classes will be offered for the second semester at the University of Iowa. This curriculum will also be developed into an on-line format to broaden the availability to students both in Iowa and in other locations.

The SAFER-Sim News Listing is available by subscription at our website. This email digest gathers news stories, program announcements, and conference information from around the world in the areas of transportation safety and simulation. (<http://safersim.nads-sc.uiowa.edu/>).

The Texting & Driving demonstration is available to schools and other organizations. Within the next reporting cycle the Exploring the Science of Driving curriculum will be available for use in schools including the collection of driving performance data using the portable driving simulator.

Videos about using simulation as a research tool aimed at high school students and college freshman will be available. These videos will stimulate interest in using simulation and participation research activities.

Participants & collaborating organizations

In addition to the twenty-five (25) principal investigators across the five consortium sites, several organizations are also involved in SAFER-Sim activities. SAFER-Sim researchers collaborate with, provide events for and participate in events organized by several other centers and organizations.

Community Organizations:

- STEM Innovator at the Kirkwood Community College Regional Center in Coralville, Iowa
- Workplace Learning Connection at the Kirkwood Community College
- Boy Scout Troops in Johnson county Iowa

University Centers and Administrative Offices

- University of Iowa's Office of Admissions
- University of Iowa Public Policy Center
- Puerto Rico Local Technical Assistance Program

Professional associations

- Institute for Transportation Engineers (ITE)
- Puerto Rico Professional College of Engineers and Land Surveyors (CIAPR)
- Institution of Civil Engineers(IIC)

- Florida Chapter of the College of Engineers and Surveyors of Puerto Rico

Regional Health and Safety Centers:

- Great Plains Center for Agricultural Health (GPCAH)
- Iowa Center for Agricultural Safety and Health (ICASH)

Other UTCs:

- Crash Imminent Safety UTC (led by Ohio State University)

Impact

SAFER-Sim researchers have significant and extensive participation in conferences, journals and advisory boards. Through these interactions their expertise is shared with the wider road user safety community.

The conference presentations, journal articles and the publication of project reports and summaries makes the results of SAFER-Sim funding project available to the road safety and simulation communities.

Interactions with a significant number of K-12 and college students broaden awareness of educational and professional options in science, math, engineering, computer science, and technology fields.

Collaboration with local community colleges and other UTCs facilitates continued interactions with students of all ages.

Collaboration across SAFER-Sim sites generates synergy and supports across discipline interactions.

Creation of middle school, high school, and college curricula support education in STEM fields.

SAFER-Symposium events promote leadership development and extended interaction among current and future transportation safety professionals.

Changes/Problems

Advisory board members from Iowa, Massachusetts, and Wisconsin have either retired or moved on to other positions. A new advisory board member from Wisconsin has accepted an invitation to join. Individuals from Iowa and Massachusetts are being approached about joining the board. It is expected that the other new members will join the board by the end of 2015. Three projects experienced delays that were outside the control of the principal investigators. One was due to the hospitalization of a PI and two were due to delays in leveraged non-SAFER-Sim projects. All projects on track to successfully complete on updated timelines.