



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

Submitted to: US Department of Transportation,
Research and Innovative Technology Administration

Federal Grant No: DTRT13-G-UTC53

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

Program Director: Susan Chrysler, Ph.D.
Director of Research
National Advanced Driving Simulator
2401 Oakdale Blvd
Iowa City, IA 52242
Phone: 319-335-4306
Fax: 319-335-4658
Email: susan-chrysler@uiowa.edu

Submitting Official: Same as PD

DUNS and EIN Nos.: UI DUNS 062761671; EIN 42-6004813

Submission Date: May 10, 2014

Recipient Organization: The University of Iowa
5 Gilmore Hall
Iowa City, IA 52242

Recipient Identifying Grant Program No.: 15311500

Project/Grant Period: 10/21/13 – 9/30/2017

Reporting Period End Date: 4/20/2014

Report Term or Frequency: Semi-annual

Signature of Submitting Official: 

Overview

The SAFER-SIM center was established in October 2013. Since that time we have begun the research projects included in the initial grant proposal and completed our first grant competition for new projects. We also participated in several outreach events. Much of the activity during this period was administrative in order to establish sub-awards and hire staff.

1. 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 7 areas of activity:

- 1. Conduct safety research using simulation techniques.** Researchers at all of the consortium institutions began work on the initial collaborative projects and individual institution research programs that were proposed in the 2013 Center proposal. Both of the collaborative projects are underway and some of the individual institution project PIs elected to delay the start until summer 2014 to better support graduate students.

The Consortium held a competition for additional research projects with FY13 funding in February. Proposers submitted a two-page project description. All of the SAFER-SIM Associate Directors reviewed these and provided comments and rankings. Eleven proposals were received. Each school selected one project to begin in June or September 2014. All 10 of the current projects are show in the table on the next page. The table includes projects from the original grant proposal (2 collaborative and 4 individual institution projects) plus the 4 new individual institution projects awarded through the Feb 2014 competition.

During this initial competition we established the infrastructure for submission and review of proposals that will be used in subsequent competitions. The RFP for projects funded with FY2014 money will be issued in July. This competition will invite proposals for large collaborative multi-institution projects as well as individual institution projects. The larger projects will be reviewed by Advisory Board Members.

This group of initial projects will support approximately 14 graduate and 8 undergraduate students. Faculty and students from Engineering, Public Health, Psychology, and Computer Science will participate in these projects.

Research projects selected for funding with FY13 money.

Project Title	Project Type	Institution (s)	PI Co-PI	PI Departments	# of Grad Students	# of Undergrad Students
Using Connected Vehicle Technology to Deliver Timely Warnings to Pedestrians						
	Individual	Iowa	Cara Hamman Susan Chrysler	Public Health NADS	1	1
Examination of Driver Behavior in Response to Pedestrian and Bicyclist Behaviors						
	Individual Completed	Iowa	Joe Kearney Jodie Plumert	Computer Sci Psychology	1	2
Cross-Platform Driving Simulator Scenarios to Use in the Roadway Design and Planning Process						
	Collaborative	Iowa Wisconsin	Shawn Allen David Noyce	NADS Civil Eng	2	1
Effectiveness of In-Vehicle Virtual Traffic Control Devices						
	Individual Completed	Wisconsin	David Noyce	Civil Eng	2	1
Driving Simulators for Virtual Road Safety Audits						
	Individual	Wisconsin	David Noyce	Civil Eng	2	1
The Effect of Roadside Vegetation and Clear Zone Design on Driver Behavior						
	Individual	UMass	Mike Knodler	Civil Eng	1	1
Development and Evaluation of Infrastructure Strategies for Safer Cycling						
	Individual Completed	UMass	Mike Knodler	Civil Eng	1	20+ (class project)
Operational and Safety-Based Analyses of Varied Toll Lane Configurations						
	Collaborative	UMass UCF UPRM	Mike Knodler M. Abdel-Aty Didier Valdes	Civil Eng	3	0
Integration of Microscopic Big Traffic Data in Driving-Simulation-Based Safety Analysis						
	Individual	UCF	M. Abdel-Aty	Civil Eng	2	1
Dynamic Simulation Models for Road Safety and its Sustainability Implications						
	Individual Completed	UCF	M. Tatari	Civil Eng	1	0

2. Leadership Development

As described in the grant proposal, we are planning on having a research symposium where students supported by our center will be able to present. We are fortunate in that the University of Central Florida won the bid to host the Road Safety and Simulation conference October 6-8

2015. SAFER-SIM will be providing financial support to host a student networking meeting the day before the conference. At this meeting, there will be presentations on business etiquette, resume building, professional society service, and research presentations. A special session during the conference is being reserved for poster presentations of SAFER-SIM funded projects.

In other leadership development activities, the associate directors will take part in our visiting scholar program beginning fall semester 2014. All of the directors will travel to one school for a mini-symposium at that school to present current work, review student projects at that school, and to interact with faculty at the host school interested in safety and simulation. During these visits, a graduate student involved with one of the collaborative research projects will accompany the associate director in order to interact directly with his or her counterparts on the project. The first visit will be to UMass-Amherst in the fall.

Finally, a webinar series showcasing each institution's laboratory facilities is planned for the 2014-2015 academic year.

3. Education and Workforce Development

The SAFER-SIM consortium members organized several education events and made plans for future collaborative efforts in education and workforce development.

Dr. Mike Knodler at **UMass-Amherst** will spend this summer developing curriculum units about traffic safety and simulation to incorporate into the freshman general engineering course. The material developed by Dr. Knodler will then be made available to the other consortium members (and eventually to the public) to encourage interest in transportation engineering among incoming freshman.

The **University of Central Florida** is establishing an internship with MetroPlan Orlando to support a student (either graduate or undergraduate) to work full time in summer 2014 and part time in fall 2014 on a pedestrian safety project at the agency site in downtown Orlando. The cost of the partnership will be split 50-50. It is believed that this cooperative activity will gain the selected student an excellent hands on experience with how metropolitan planning organizations conduct technical assessment and this will build a bridge with this organization for potential future activities.

The **University of Puerto Rico – Mayaguez** hosted its annual Transportation Week (March 31st to April 3rd) that included technical presentations and other transportation related activities. One day was dedicated to the issues related to highway safety. Notable guests during that week included, Eng. Miguel Torres (Puerto Rico Secretary of Transportation and Public Works), Eng. Javier Ramos (Executive Director of the Highway and Transportation Authority), Dr. Alberto Figueroa (President and General Manager of the Metropolitan Bus Authority), Eng. Edgar Rodríguez (President of the Professional College of Engineers and Surveyors of Puerto Rico), Mr. José A. Delgado (Executive Director of the Traffic Safety Commission of Puerto Rico), Eng. Juan Carlos Rivera (Highway Safety Office of the Puerto Rico Highway and Transportation Authority), Eng. Francisco Klein (President, Klein Engineering), and Dr. Benjamín Colucci (Director of Puerto Rico LTAP Center). The Transportation week is an event organized by our student chapter of the Institute of Transportation Engineers. SAFER-SIM Associate Director Dr. Didier Valdés is the

Faculty Advisor of this organization. The presentations, workshops and all the activities during the transportation week were open to the engineering professionals and the academic community. Engineers from local municipalities were in the audience as well as civil engineering students and professors.

The **University of Wisconsin** Driving Simulator lab hosted students from ITT Tech campus, a leading private college system focused on technology-oriented programs of study. Students enrolled in the Civil3D Drafting course at the School of Drafting and Design Technology were given a tour of the driving simulator. Members of the TOPS Lab shared with the students how 3D drawings such as those created using Civil 3D form the basis for simulator scenarios. The tour concluded with the students driving different simulator scenarios which were created from proposed roadway designs that were created using Civil 3D software by the TOPS Lab team. The visit to the UW Driving Simulator provided a rare opportunity for the students to learn how the skills they learn in the course could translate into real world applications that can have profound impact on the transportation system and benefit the society at large. Many of the ITT Tech students that visited are non-traditional students, with many returning to college for gathering new skills in mid-career and looking for career opportunities in emerging fields. This visit provided a unique opportunity for the TOPS Lab team to not only share their expertise with a technical college in the community but also get them interested and excited about careers in transportation.

The TOPS Lab invited medical students to the UW Driving Simulator for a demonstration and a visit as a part of CEE 970: Colloquium in Transportation Management and Policy. This class focuses on health and safety. The TOPS Lab team demonstrated to about 20 students from the Medical School (future doctors) how the simulator can be used to show the effects of drunk driving. The class had several other components which were all conducted in the Driving Simulator lab and included:

- what the drivers see and feel during a drunk driving experience,
- how the crash reconstruction happens while the driver comes to the ER and sees the doctors, (explained by a law enforcement officer) and
- how a driver goes through the court system and maybe through rehabilitation.

Another student group hosted by UW was the Madison Media Institute which has been training individuals for careers in the media arts since 1969. One of the several programs offered is Game Art and Animation designed to give the skills, hands-on technical training, and practical business skills to pursue a career in the digital animation field. The TOPS Lab has forged a synergistic relationship with Madison Media Institute to provide real world experience to their Game Art and Animation students. Currently, four students are working on various projects with at the UW Driving Simulator Lab. Two students are creating high resolution assets with low polygon count that do not adversely affect the simulator performance. Two other students are creating a driving engine that would enable UW to create our own portable driving simulator that can use the same scenario files that are used in the full scale driving simulator. These would enable us to provide a more realistic view of signing and pavement markings in the driving simulator while at the same time providing invaluable real-world experience to MMI students. This experience could also encourage MMI graduates to consider careers related to Transportation which they might not have otherwise done.

The **University of Iowa** organized the Iowa DOT University Research Collaboration meeting, held at the National Advanced Driving Simulator with a focus on safety research. This meeting provides a forum for faculty and students from Iowa, University of Northern Iowa, and Iowa State University to discuss state research priorities, available state safety data, and opportunities for continuing education programs for DOT employees.

4. **Technology Transfer** – Work has begun on re-establishing the Driving Wiki website created in 2008 to support the development of the Handbook on Driving Simulation. Two students from the University of Wisconsin are leading this effort. The Wiki will be a place for all simulator users to share scenario specifications, computer code, visual objects, and technical reports. <http://www.drivingwiki.org/>
5. **Collaboration** - Opportunities for collaboration across schools was also considered in research funding decisions. For example, UMass received a proposal on infrastructure and bicycle safety and selected it over other qualified proposals in order to collaborate with the Iowa investigator looking at driver behavior around bicycles.

UMass-Amherst has established a collaborative student exchange with UPRM. As part of the exchange a UPRM student will travel to UMass in April to begin development of experimental protocol using the UMass driving simulator (programming, human subjects, etc.). The student will then return to work in the UMass lab during the summer of 2014 as part of the collaborative research project between UMass, UCF, and UPRM.

The consortium members have been sharing outreach and classroom activity ideas and materials. We have also reached out to our Regional UTCs for outreach and education activities.

6. **Program Efficacy.** As a new center, start-up activities dominated the past six months. Administrative activities in this period including the negotiation and establishment of sub-contracts with each consortium member. This process took nearly six months to complete due to delays in sponsored program contracts offices at all of the universities. We also established internal accounting and budget procedures to track expenditures and matching funds. Templates for proposals and progress reports were developed. The program administrator, Kathy Holeton, completed her job transition by hiring a replacement for herself to perform her former duties at the Public Policy Center. An undergraduate student, Mallory Price, was hired as an office and outreach event assistant. A logo was designed and website established. An office for Dr. Chrysler is now located in the Public Policy Center so she can be on campus (her primary office at the Driving Simulator is in the Research Park which is 8 miles from campus). Bi-weekly conference calls among the consortium members were held to jump start collaboration, planning, and sharing of outreach event ideas. Initial concept approval from Institutional Review Boards was obtained for initial research projects.

The Advisory Board is currently being established with invitations having been sent to 12 people. To date, we have received positive responses from:

- Dr. David Yang – Human Factors Team Leader, FHWA Turner-Fairbank Highway Research Center
- Dr. Richard Romano – President, Realtime Technologies, Inc. (simulator provider)

- Dr. Bill Horrey - Research Scientist, Liberty Mutual Research Institute
- Dr. Linda Boyle – Associate Professor, Civil & Environmental Engineering, University of Washington; Associate Director of Research PacTrans Region 10 UTC

7. **Diversity.** The SAFER-SIM director has met with representatives of several diversity offices at the University of Iowa to introduce the Center to them and to begin to coordinate activities. These include Women in Science and Engineering, Military and Veteran Student Services, Associate Dean for Diversity and Outreach, Engineering First Year Experience Director, Engineering Diversity Program coordinator.

An alliance has been established with Creative Visions Marketing, a Des Moines based firm operating traffic safety outreach events aimed at minority populations funded by the Iowa Governor’s Highway Safety Board and State Farm Insurance (<http://creativevisionsia.org/>). This non-profit organizes four major events a year attracting thousands of African-American and Hispanic community members. It also produces a traveling traffic safety program for high school students. SAFER-SIM will be teaming with Iowa State University Region 7 UTC to provide a mobile driving simulator for these events. With UTC funding, the University of Iowa will support students to create a driving simulator scenario that can be used to illustrate the dangers of texting and driving. Materials concerning transportation careers will also be developed to distribute at these events. The first event will take place in September.

Plan for Next Reporting Period

Now that the Center has been established administratively, the next reporting period will bring more activity in research, education, and outreach. Planned activities are:

- UPRM student to spend the summer at UMass-Amherst working on the collaborative research project on toll plaza operations
- UI will develop a distracted driving and transportation career simulator demonstration for outreach events.
- UMass will be developing freshman engineering course components related to safety and simulation
- All FY13 funded research projects will be underway
- Competition for new projects with FY14 funds will be complete
- UW will be developing the DrivingWiki site
- Agenda for the first visiting scholar mini-symposium meeting will be set
- Webinar series on lab facilities will be scheduled

b. Products

The SAFER-SIM website was established <http://safersim.nads-sc.uiowa.edu/>. The website was used to facilitate the research grant competition. News about outreach event is also shared there. In designing the architecture for the website, we left room for future expansion as more products are created.

c. Participants & Collaborating Organizations

Other collaborations across other universities are described in the Accomplishments section because collaboration is a stated goal of our center. In addition, SAFER-SIM co-sponsored a webinar with the Mid-America Transportation Center this spring on the topic of autonomous vehicles. The presentation included simulator renderings of future automated transportation systems.

<http://matc.unl.edu/webinarseries.php>

It is significant to note that in both collaborative research projects, the universities have teamed across simulator platforms. This means that the projects will, by design, be able to be implemented on the two major simulator systems used in the U.S. This will widen the impact of our work.

The table below lists organizations collaborating on research, education, and outreach activities.

Organization	Project/Activity	Partner University	Partner's Contribution
Puerto Rico Highway and Transportation Authority Commonwealth of Puerto Rico	Research Project	UPRM UCF UMass	Collaborative research; in-kind support
Toyota Collaborative Safety Research Center Ann Arbor, MI	Research Project	Iowa	Financial support
Creative Media Des Moines IA	Outreach	Iowa	Collaborative outreach; in-kind support
MetroPlan Orlando Orlando, FL	Education	UCF	Personnel exchange; student internship

d. Impact

Because our center is so new, it is hard to assess the impact to date beyond attendance at events which is noted in the photo captions below. Clearly, within each institution, the establishment of SAFER-SIM has had an impact on students and researchers through new projects. Through the outreach events, we believe we have had an impact on those students and community members who attended.

One facility impact of the center is that UCF will be purchasing a MiniSim desktop simulator. This system, provided by the University of Iowa, uses the same software as Iowa's larger simulators. UPRM is also considering the purchase of a simulator.

The re-establishment of the DrivingWiki site will enable shared access to technical simulation information worldwide.

1. Additional information regarding Products and Impacts

SAFER-SIM consortium members participated in many community, professional, and STEM outreach events during the past six months. The outreach activities described, particularly presentations to the general citizenry, have served to promote traffic safety topics and inform the public about driving simulation.

At the University of Iowa, the Public Policy Center hosted a weekly series of public lectures called the What If series. These events attracted 75-100 citizens to the Iowa City Public Library for an interactive presentation and discussion of pressing policy issues. Dr. Chrysler presented driving simulation renderings of future transportation systems including autonomous vehicles at the session titled “What If Gas Cost \$10/gallon”?

Dr. Abdel-Aty delivered the keynote speech at the 2nd Forum on Traffic Safety, Saudi Traffic Safety Council, Dammam, Saudi Arabia, November 2013 on the topic of “Non-Governmental and Societal Organizations and their Role in Improving Traffic Safety in the United States”.

Dr. Abdel-Aty 2nd Forum on Traffic Safety, Saudi Traffic Safety Council, Dammam, Saudi Arabia, November 2013



Dr. Abdel-Aty with seminar attendees at the American University of Dubai, October 2013.

The University of Wisconsin’s driving simulator was featured in an ESPN spot shown in a commercial break during the telecast of the football game between Wisconsin and Northwestern in Fall 2013. A video of the footage is available at: www.topslab.wisc.edu/galleries/espn





Dr. Sue Chrysler at the EPX Studio Animation and Gaming Expo - University of Iowa Student Organization April 2014. The event was attended by 80-100 people.

<http://www.uiowa.edu/~epx/>



Dr. Chris Schwarz offers a tour of the NADS facility to the Future Problem Solving team after discussing autonomous vehicles with the group. NADS hosted two groups for a total of 45 students (and the team later won the state competition!)

<http://iowafutureproblemsolving.com/>



Dr. Sue Chrysler speaking with a middle school student at the FirstTech Challenge Super Regional Competition Robotics Competition April 2014. This pre-competition event hosted by the College of Engineering was attended by 800 people.

<http://www.usfirst.org/roboticsprograms/ftc>

e. Changes/Problems

The sub-contracting process for the consortium members took an extraordinarily long time due to staff shortages and changes in many of the universities' sponsored programs offices. All sub-awards are now in place and the director appreciates the consortium members' cooperative attitude during that process. Now that contract negotiations are complete, future modifications to award additional funds should go more smoothly.