SAFER-SIM Accomplishments

October 1, 2018 – March 31, 2019

1. Accomplishments

Paper/poster awards – 4 awards received

- Yalda Ebadi presented preliminary results of this research during the SaferSim Symposium in November 2018. She received 1st prize for best poster presentation.
- Shannon Roberts presented preliminary results of this research during the Hybrid Session (entitled "Intriguing Research About the Performance of Transportation Users") during the TRB Annual Meeting in January 2019. She received 1st prize for best poster presentation.
- AND30's 2019 Outstanding Paper Award at TRB for 'Can Virtual Reality Headsets Be Used to Measure Accurately Drivers' Hazard Anticipation Performance: The Promise of VR Headsets' – awarded to authors Ganesh Pai Mangalore, Yalda Ebadi, Siby Samuel, Michael Knodler and Donald Fisher
- Nominated for the 2019 Honda Outstanding Paper Award at Driving Assessment 2019 for the paper 'Can Virtual Reality Headsets be Used to Measure Accurately Drivers' Anticipatory Behaviors?' – Ganesh Pai Mangalore, Yalda Ebadi, Siby Samuel, Michael Knodler and Donald Fisher

External grants related to SAFER-SIM – 4 proposals submitted, 2 funded

Funded

- "Evaluation of Training Programs to Accelerate Hazard Anticipation Skills in Novice Teen Drivers" Dan McGehee (PI), Jodie Plumert (Co-PI), Michelle Reyes (Co-PI), Elizabeth O'Neal (Co-PI), Shaun Vecera (Co-PI), Shawn Allen (Co-PI), Neil Lerner (Co-PI), Philip Kellman (Co-PI). AAA Foundation for Traffic Safety, 2/15/18 – 8/31/19, $378,321 in total costs. **Not reported previously**
- "Developing Connected Simulation to Study Interactions between Drivers, Pedestrians, and Bicyclists" Dan McGehee (PI), Joseph Kearney (Co-PI), Jodie Plumert (Co-PI), Chris Schwarz (Co-PI), Stephen Baek (Co-PI). DOT Federal Highway Administration, Broad Agency Announcement for Exploratory Advanced Research Program, 9/29/17 – 9/28/19, $1,217,530 in total costs, Award No. 693JJ31750016. **Not reported previously**

Submitted, funding status not yet known

- Christofa, E. (PI), NCHRP 17-91: Assessing the Impacts of Automated Driving Systems (ADS) on the Future of Transportation, National Cooperative Highway Research Program. University Transportation Centers Program: National Center for Congestion Research Community Surveys for the Mobility Challenge, Rhode Island DOT. This proposal builds off SaferSim preliminary research.
- Roberts, S. C. (PI), Deep Explanations to Enable Social Interactions with AI Systems, National Science Foundation – Early-concept Grants for Exploratory Research on Artificial Intelligence (AI) and Society, $300,000, 09/01/2019-08/31/2021, co PI with PI Shlomo Zilberstein and co-PI Laurel Smith-Doerr. This proposal uses the same approach, experimental design, and methods that were developed through the current SaferSim grant.
- Negrut has submitted with colleagues from the Department of Civil and Environmental

Engineering (David Noyce, Sue Ahn, Jon Riehl, Madhav Chitturi) a WARF Discovery Initiative UW2020 project for investigating how computer modeling and simulation can assist with assessing the safety of autonomous vehicles. The proposal, which is due on December 3, 2018, will seek approximately $400,000 in funding to investigate topics related assessing safety via simulation.

- David Noyce, Sue Ahn, Jon Riehl, Madhav Chitturi, Radu Serban, John Lee, and Parmesh Ramanathan of UW submitted a $3 million DOT proposal in March of 2019. **Also reported in outputs; Requested more information**

Previously submitted, not funded

- Rector, K. K. (PI), Joseph K Kearney (PI), J. K., Plumert, J. M. (PI) CHS: Small: Ability-Based Mobile Technology to Help Older Pedestrians Make Safe Street Crossing Decisions, submitted to the National Science Foundation ($499,954.00). SAFER-SIM project to collected pilot data.
- Roberts, S. C. (PI), What forms a mental model? Exploring how different consumer groups acquire knowledge about automated driving systems, AAA Foundation for Traffic Safety, $250,000, 01/07/2019-12/31/2019, co-PI, subcontracting to Purdue University. This proposal used the same experimental design and methods that were developed through the current SaferSim grant.
- Roberts, S. C. (PI), Human Training and Interaction with Hybrid Autonomous Transportation Systems, National Science Foundation – Smart and Autonomous Systems, $1,000,000, 02/01/2019-01/31/2022, co-PI with PI Wayne Burleson and co-PI Hossein Pishro-Nik. This proposal used the same experimental design that was developed through the current SaferSim grant.
- Roberts, S. C. (PI), From driver to passenger: discovering and transforming the relationship between humans and driving automation systems, National Science Foundation – CAREER, $615,000, 09/01/2019-08/31/2023, sole PI. The findings of the current SAFER-SIM project, as it relates to the design of warning messages for automated vehicles, was used to inform this proposal.
- John D. Lee is a CoI on a project funded by NIJ titled "Mitigating distraction for police officers" **Requested more information**
- John D. Lee is a PI for a project funded by Toyota tilted "Modeling driver response to takeover requests from vehicle automation" **Requested more information**
- John D. Lee is a PI for a project funded by NHTSA titled "Detecting drowsy drivers with naturalistic video data" **Requested more information**

Invited Workshops – 2 workshops

- TRB Doctoral Student Session (Knodler)
- Public Engagement Fellowship Program (Knodler)

Invited Presentations – 17 presentations

- Abdel-Aty, Mohamed. Connected-Automated Vehicles (CAV): Background and Opportunities, Keynote Speech, Data Science Summit: Smart Cities of the Future, UCF, Oct 19, 2018.
- Abdel-Aty, Mohamed. Connected and Automated Vehicles Research and Benefits, Keynote, 32 ANPET, Congresso De Pesquisa E Ensino Em Transportes, Brazil, Nov. 4, 2018.
- Abdel-Aty, Mohamed. Macroscopic Level Safety Analysis: Integrating Safety and

Planning at the Zonal Level, Seminar, University of Sao Paolo, Nov. 2018.

- Abdel-Aty, Mohamed. Connected and Automated Vehicles Research using Simulation and Data Analysis, Hanyang University, Korea, Dec. 2018.
- Abdel-Aty, Mohamed. Traffic and Safety Management in Smart Cities, Institute of Traffic Engineering, Shanghai, Dec. 2018.
- Abdel-Aty, Mohamed. Keynote Speech, Current Trends in Traffic Safety Research and the Future Opportunities for Practice, 2019 Traffic Safety Conference, Riyadh, Saudi Arabia, March 2019.
- Abdel-Aty, Mohamed. Panelist: 2019 ASHE Transportation Summit: Smart Cities, February 2019.
- Qing Cai, "Using Deep learning Approach for Transportation Safety Analysis" the 22nd COTA Winter Symposium Program. Jan, 2019.
- Eleni Christofa, Teaching AVs and Impacts on Bicycles and Pedestrians, Virtual panel discussion hosted by the TRB Joint Subcommittee on Pedestrian and Bicycle University, 8 February 2019.
- A lectern presentation in the First International Forum on Highway Safety Metropistas-Abertis (Primer Foro Internacional de Seguridad Vial Metropistas-Abertis), San Juan, PR., October 2018.
- Performance Evaluation of Speed Reduction Compliances Strategies in School Zones, Poster presentation in Open Capstone, Mayaguez, PR, December 5th, 2018.
- Research Opportunities in Transportation using Driving Simulation, Open House ITE UPRM, Mayaguez, PR, March 2019.
- Overview on Driving Simulation Applicable to Transportation Systems Operations, Metropistas, San Juan, PR, March 2019.
- Jon Riehl, Automated and Connected Vehicles: Preparing Fond du Lac and the Region. Fond du Lac Stakeholder Group Fond du Lac, WI, November 28, 2018
- Jon Riehl, Automated and Connected Vehicles at the Wisconsin Automated Vehicle Proving Grounds, Bureau of Project Development Annual Meeting. Madison, WI., January 29, 2019.
- Jon Riehl, Cap East Connector Route – Stakeholder Summit, American Family Insurance and invited stakeholders, Madison, WI., February 27, 2019.
- Dan Negrut was invited by NVIDIA to give a presentation at their headquarters in San Jose California on this project's topic. NVIDIA is interested in AVs and wanted to understand whether they can use some of the outcomes of this SAFER-SIM project. There is an ongoing discussion into using the vehicle dynamics engine for the Drive Constellation product that NVIDIA is working on.

Panels & Advisory Committees

2 TRB Committees Chaired by 2 individuals

- AND20(1) – Subcommittee on Human Factors of In-Vehicle Systems
  - Dawn Marshall, Chair
- ANB10(3) - Subcommittee on Transportation Safety Planning
  - Jaeyoung Lee, Co-Chair

12 TRB Committee Memberships held by 11 Individuals

- ABG20(6) – Ahead of the Curve
  - Jacob Heiden, Member

- AHB25
  - Eleni Christofa, Member
- AHB30
  - Chris Schwarz, Member
- AHB55
  - Benjamin Colucci, Member
- AHB65
  - Alberto Figueroa, Member
- ANB10
  - Mohamed Abdel-Aty, Member
- ANB20
  - Mohamed Abdel-Aty, Member
- ANB50
  - Tim Brown, Member
  - Jaeyoung Lee, Member
- AND20
  - Dawn Marshall, Member
  - John Gaspar, Member
  - Mohamed Abdel-Aty, Member
- AND25
  - Mohamed Abdel-Aty, Member
- AND30
  - Benjamin Colucci, Member
- AND50
  - Mike Knodler, Member

1 TRB Task Force Memberships held by 1 Individuals

- TADD55 Task Force on Arterials and Public
  - Eleni Christofa, Member

14 Advisory Board and other Positions held by 8 Individuals

- New England Railroad Club
  - Mike Knodler, Member
- UMass Transportation and Parking
  - Cole Fitzpatrick, Advisory Committee Member
- Phasing Subcommittee for New England Institute of Transportation Engineers (ITE) Technical Committee Project "Guidelines for Design & Implementation of Advanced Traffic Signal Functions."
  - Eleni Christofa, Member
- Applied Human Factors and Ergonomics
  - Didier Valdes, Scientific Advisory Board
  - Benjamin Colucci, Scientific Advisory Board
- NCHRP Project (SN4811): Practices in One Lane Traffic Control on a Two-Lane Rural Highway
  - Benjamín Colucci, Panel Member
- Puerto Rico-State Transportation Innovation Council (STIC)
  - Benjamín Colucci, Advisory Committee

- US Virgin Island-State Transportation Innovation Council (STIC)
    - Benjamín Colucci, Advisory Committee
- Latin American and Caribbean Consortium of Engineering Institution (LACCEI)
    - Benjamín Colucci), Advisory Committee
- International Multi-Conference for Engineering, Education, and Technology
    - Benjamin Colucci, Scientific Advisory Board
- Traffic Enforcement Committee, International Road Federation.
    - Benjamín Colucci, Co-chair of the Traffic Enforcement Committee
- International Symposium on Accident Analysis and Prevention, Changsha
    - Mohamed Abdel-Aty, Chair
- 5th International Symposium on Transportation Safety
    - Mohamed Abdel-Aty, Co-Chair
- Road Safety on 5 Continents, Korea
    - Mohamed Abdel-Aty, Scientific Committee Member
- NATO Exploratory Team (ET-194) on "Mobility Assessment Methods and Tools for Autonomous Military Ground Systems" (UW)
    - Dan Negrut, Member
    - Radu Serban, Member

Journal Editorships – 11 individuals

Dr. Mohamed Abdel-Aty (UCF)

- Editor-in-Chief (July 2013 – present), Accident Analysis and Prevention, Elsevier

Dr. Jaeyoung Lee (UCF)

- Academic Editor (May 2018 – present), Journal of Advanced Transportation, Wiley/Hindawi
- Editorial Member (2019-), Advances in Transportation Studies
- Associate Editor (2019-), Transportation Safety & Environment

Samiul Hasan (UCF)

- Associate Editor, Highway Transportation System Security and Emergency Response, *Journal of Transportation Safety and Security (JTSS)*

Jodie Plumert (UI)

- *Spatial Cognition and Computation,* editorial board
- *Journal of Experimental Psychology: Applied,* editorial board
- *Journal of Experimental Child Psychology, editorial board*

Stephen Baek (UI)

- Editorial Board Member, International Journal of Digital Human

Eleni Christofa

- Guest Editor for Transportation Research Part C: Emerging Technologies Special Issue on "Trajectory-based Modeling, Design, Operation and Assessment of Road Transportation Systems."

Didier Valdés

- Applied Human Factors and Ergonomics (AHFE 2017-Present) Scientific Advisory Board.
- 15th LACCEI International Multi-Conference for Engineering, Education, and Technology.

Benjamín Colucci

- Applied Human Factors and Ergonomics (AHFE 2017-Present) Scientific Advisory Board
- 15th LACCEI International Multi-Conference for Engineering, Education, and Technology.
- Dimension Journal of the College of Engineers and Surveyors of Puerto Rico, Editor-in-Chief.

John D. Lee

- Human Factors and Ergonomics in Manufacturing and Service Industries, Associate Editor
- Cognitive Engineering and Decision Making, Editorial board
- Theoretical Issues in Ergonomics Science, Editorial board
- IIE Transactions on Occupational Ergonomics Human Factors, Editorial Board
- Journal of Experimental Psychology: Applied, Principal reviewer
- Committee on Maritime Safety, Transportation Research Board
- Cognition, Technology, and Work, Editorial board member
- Human Factors, Associate editor

Radu Serban

- Mathematics and Computers in Simulation

Dan Negrut

- Multibody System Dynamics

Journal Reviews

- Accident Analysis and Prevention (Reyes, O'Neal, Kearney, Knodler, and Christofa)
- ACM SIGGRAPH (Kearney)
- ACM Transactions on Applied Perception (Plumert)
- Advances in Civil Engineering (Kearney)
- Attention, Perception, & Psychophysics (Vecera)
- Child Development Perspectives Reviewer (Plumert)
- Ecological Psychology (Plumert)
- Human Factors: The Journal of the Human Factors and Ergonomics Society (Marshall)
- Human Movement Science (Plumert)
- IEEE Transactions on Human-Machine Systems (Kearney)
- IEEE Virtual Reality Conference 2018 (Kearney, Plumert)
- Journal of Experimental Psychology: Applied (Plumert)
- Journal of Experimental Psychology: Human Perception & Performance (Vecera)
- Journal of Transportation Engineering, Part A: Systems (Marshall)
- Journal of Virtual Reality and Broadcasting (Kearney)
- Nature (O'Neal)
- Public Library of Science One (O'Neal)
- Spatial Cognition and Computation (Plumert)
- The 2nd Annual Workshop on Materials Science and Mechanical Engineering (Kearney)
- The American Society of Mechanical Engineers (ASME) Press (Kearney)

- The Research Foundation - Flanders (Fonds Wetenschappelijk Onderzoek - Vlaanderen, FWO) (Kearney)
- Traffic Injury Prevention (Marshall)
- Transportation Research Board Annual Meeting (Kearney)
- Transportation Research Part D: Transport and Environment (Christofa)
- Transportation Research Part F: Psychology and Behaviour (Kearney)
- Transportation Research Record (Reyes, O'Neal, Knodler, and Christofa)

Leadership positions in professional organizations – 6 individuals, 23 positions held

Dr. Mohamed Abdel-Aty

- Department of Civil, Environmental & Construction Engineering at the University of Central Florida, Department Chair

Dr. Jaeyoung Lee

- Center for Advanced Transportation Systems Simulation at the University of Central Florida, Safety Program Director

Dawn Marshall

- Road Safety & Simulation Conference 2019, Local Organizing Committee Co-Chair
- University of Iowa Engineering Staff Advisory Council, Secretary

Jacob Heiden

- Road Safety & Simulation Conference 2019, Local Organizing Committee
- University of Iowa Engineering Staff Advisory Council, Treasurer
- University of Iowa Femineer Summit 2019, Planning Committee
- Johnson County, IA Fair STEM Day coordinator

Enid Colón

- Vice-President of the ITE UPRM Student Chapter, August 2017 to Present, Student.

Benjamín Colucci

- Member, Board of Directors of the Pan-American Academy of Engineering (PAE), 2018-2020.
- Vice-President of the Board of Trustees of the Society of Engineers of Puerto Rico, 2017-2019.
- President of the International Relations Commission of the College of Engineers and Surveyors of Puerto Rico (CIAPR), 2017-2019.
- President of the Pan-American Transport Systems Committee (UPADI), 2017-2020.
- Vice-President Caribbean Region of the Pan-American Union of Engineers in Association (UPADI), 2015-2019.
- Vice-President of the International Society for Maintenance and Rehabilitation of Transport Infrastructures (iSMARTi).
- Spokesperson for the Decade of Action Road Safety of Puerto Rico 2011- 2020.
- Co-Chair of the Traffic Enforcement Committee, International Road Federation.
- UPRM Manager of the Dwight D. Eisenhower Transportation Fellowship Program for Hispanic Serving Institutions.
- Director of Abertis Chair of Puerto Rico.
- Member of the Board of Director of the College of Engineering of Surveyors of Puerto Rico-Mayaguez Chapter.
- Founder and Director of the Puerto Rico Transportation Technology Transfer Center (PR-LTAP).

- Every Day Count (EDC) Program Technical Oversight Director of Puerto Rico PRHTA and U.S. Virgin Island DPW.
- El Puente Newsletter, Puerto Rico LTAP Editor-in-Chief, 1986 to present.

Professional awards - 6 awards by 3 individuals

Dr. Mohamed Abdel-Aty

- Francis C. Turner award, ASCE, 2019.-"outstanding leadership in the field of road safety nationally and internationally"
- MetroLAB Network, Innovation of the Month, Jan. 2019.
- Korean Society of Transportation, 2018 Achievement Award, Dec. 2018. -"your many innovative ideas that changed much of the safety research and practice as one of the top safety researchers that are recognized worldwide"
- Institute of Traffic Engineering, Shanghai, 2018 Excellence in Traffic Safety Improvement Service Award. -"The award is based on your credentials as a world known traffic safety expert"

Dr. Mike Knodler

- Public Engagement Fellowship

Katerina Deliali

- Women's Transportation Seminar Ann Hershfang Scholarship, Boston Chapter

Transportation-related MA and PhD theses – 10 students obtained degrees in transportation disciplines

- Scott Castro, MSC in Transportation Management Systems - UCF
- Rezaur Rahman, MSC in Transportation Systems Engineering- UCF
- Aikaterini Deliali, MS Civil Engineering - UMass
- Francis Tainter, M.S. Civil Engineering – UMass
- Nicholas Campbell, M.S. Civil Engineering and M.S. Regional Planning – UMass
- Rajiv Nair, M.S. Industrial Engineering – UMass
- Alyssa Ryan, M.S. Civil Engineering – UMass
- Aamani Parthasarthy, M.S. Civil Engineering – UMass
- Foroogh Hajiseyedjavadi, PhD Civil Engineering
- Ricardo E. García Rosario, M.S, Civil Engineering UPRM

Curriculum modules developed – 6 modules developed

- Shannon Roberts and Jodie Plumert co-developed a boot camp on experimental design methods during the SaferSim Symposium in November 2018.
- Researchers at the University of Iowa developed 5 modules for a simulation boot camp. Simulation Boot Camp is a webinar series on using simulation technology to study transportation problems. Participation is open to individuals in academia, government, and industry who are interested in learning about how to use simulation technology in their research. This workshop will cover topics such as simulation hardware and software, scenario development, best practices for testing participants using simulation technology, and simulation data reduction and analysis. The sessions will take place in April 2019.

Student internships related to SAFER-SIM – 2 internships by 1 individual

- Areen Alsaid completed two internships at Ford Motor Company to apply skills gained through a SAFER-SIM project to their automated vehicles development research (UW)

Graduating student placement - 3 students found full time employment, 1 undergraduate student was accepted into a graduate program

- Shiwen Zhou will join the PhD program in Engineering Psychology, Georgia Tech
- Foroogh Hajiseyedjavadi, Post-Doc, University of Leeds
- Ricardo E. García Rosario, Master of Science in Civil Engineering, Federal Highway Administration, Sterling, VA.

Presentations to student groups or classes – 18 presentations, over 1650 students

- STEM Festivals/events – 7 events; 1288 students
- Engineering@Iowa – 3 events; 145 students
- AAA Teen Driver Workshop – 50 teens from local drivers education
- Horn Elementary School – 76 students
- Iowa Mennonite School – 60 students
- Belchertown High School – 30 students
- Shannon Roberts presented concepts on Industrial Engineering and Human Factors to prospective UMass freshmen in February 2019. The students were also given a tour of the lab facilities, including the driving simulator.
- Ganesh Mangalore – Presentation to Virtual Reality Group at UMass
- Five technical presentations by the research team to civil engineering students enrolled in the Undergraduate Research Course entitled "Driving Simulation for Geometric Design and Highway Safety Analysis". (UPRM)
- Negrut (March 21, 2019) presented in his "High Performance Computing for Applications in Engineering" class a segment on AV simulation. The presentation drew on SAFER-SIM work and its purpose was to recruit two or three students interested in independent studies related to AV modeling and simulation. (UW)

Schools visited and students present – 6 colleges/universities, 171 students

- University of California, San Diego (October, 2018): 40 students present (department seminar)
- Jet Propulsion Lab (Cal Tech) (October, 2018): no students present, only technical staff (department seminar)
- University of California, Berkeley (October, 2018): 6 students present
- Georgia Tech (November, 2018): 40 students present (department seminar)
- MIT (November, 2018): 8 students present
- Des Moines Area Community College – Boone: 77 students

Summer institutes

- None this period

<u>Diversity</u> – 1 event with 40 individuals, 16 projects involving 18 diverse/underrepresented students

- Girls Tech Career Day – 40 girls in grades 5-8

Projects involving diverse students		
Research Project Title	**Site**	**# Students**
Assessing the Effectiveness of Connected Vehicle Technologies based on Driving Simulator Experiments	UCF	1
Using Driver State in Automated Driving	UI	.5

Human-Machine Interfaces to Convey Feedback in Automated Vehicles	UI	.5
Using Simulation to Assess and Reduce Conflicts between Drivers and Bicyclists	UI	1
Mobile Applications to Help Older Adults Make Safe Street-Crossing Decisions	UI	1
Extended Evaluation of Training Programs to Accelerate Hazard Anticipation Skills in Novice Teen Drivers	UI	3
Safely and Effectively Communicating Non-Connected Vehicle Information to Connected Vehicles through Field- and Driving Simulator-Based Research	UW	1
Enhancing School Zone and School Bus Safety	UPR	1
Assessing the Impact of Smartphone Usage While Driving in Work Zones	UPR	1
Evaluation of Safety Enhancements in School Zones with Familiar and Unfamiliar Drivers	UM, UPR	1
Using Simulation to Assess and Reduce Conflicts between Drivers and Bicyclists	UM	.5
Development and Testing of an In-Vehicle Interface for Use in Automated Driving Contexts	UM	.5
Protected Intersection Design for Safer Cycling	UM	.5
Risk Awareness and Perception Training using Virtual Reality (RAPT-VR)	UM	.5
Integrating Traffic Control Devices via Augmented Reality	UM	4
To Trust or Not to Trust? A Simulation-based Experimental Paradigm	UM	3
	Total	**18**

Result dissemination – 8 final reports, 8 summaries, 6 webinars, 11 news digests to 338 individuals, 2212 community members engaged

3. Outputs

Journal publications – 3 publications, 2 under review

- Cai, Q., Abdel-Aty, M., Castro, S. (2019). Explore Effects of Bike Facility and Activity on Bike Safety at Intersections. International Journal of Sustainable Transportation (under review).
- Saad, M., Abdel-Aty, M., Lee, J., and Cai, Q (2019). Bicycle Safety Analysis at Intersections Using Crowdsourced Data. Transportation Research Record: Journal of the Transportation Research Board.
- Rahman, M.H., Abdel-Aty, Lee, J., Rahman, M.S. (2018). Enhancing Traffic Safety At School Zones by Operation and Engineering Countermeasures: A Microscopic Simulation Approach, Submitted to the Simulation Modelling Practice and Theory (under review)
- O'Neal, E. E., Jiang, Y., Brown, K., Kearney, J. K., & Plumert, J. M. (in press). How

does crossing roads with friends impact risk taking in young adolescents and adults? Journal of Pediatric Psychology.

- Mangalore, G. P., Ebadi. Y., Samuel, S., Knodler, M. A., Fisher, D. L. (2019). Can Virtual Reality Headsets Be Used to Measure Accurately Drivers' Hazard Anticipation Performance: The Promise of VR Headsets. Accepted for publication on Transportation Research Record 2019

Book chapters: - 2 chapters

- Roberts, S. C., Smith-Doerr, L., Zilberstein, S., Renski, H., Branch, E., & Wilkerson, T. (accepted). Automation and Racial Equity: How Human Factors Can Shape the Future of Work. In R. D. Roscoe, E. K. Chiou, & A. R. Wooldridge (Eds.), Advancing Diversity, Inclusion, and Social Justice through Human Systems Engineering. CRC Press.
- "A Connected Autonomous Vehicle Emulator (CAVE) for testing multi-agent, conventional/autonomous mixed-vehicle traffic scenarios" Dan Negrut, Asher Elmquist, Dylan Hatch, Parmesh Ramanathan and Radu Serban – under second review, ASME's Advances in Computers and Information in Engineering Research

Other publications, conference papers and presentations: 3 conference presentations, 9 symposia presentations

- Mangalore, G. P., Ebadi. Y., Samuel, S., Knodler, M. A., Fisher, D. L. (2019, January). Can Virtual Reality Headsets Be Used to Measure Accurately Drivers' Hazard Anticipation Performance: The Promise of VR Headsets. In proceedings for the 98th Annual Meeting of the Transportation Research Board, Washington D.C.
- Saad, M., Abdel-Aty, M., Lee, J., and Cai, Q. (2019). The use of STRAVA data as an input when estimating safety performance functions. Transportation Research Board 98th Annual Meeting, pedestrian and bicycle safety analysis Committee (ANB20, ANB25, ANF10, ANF20).
- Saad, M., Abdel-Aty, M., Lee, J., and Cai, Q. (2019). Bicycle Safety Analysis at Intersections Using Crowdsourced Data. Transportation Research Board 98th Annual Meeting (Lectern session).
- Rahman, M.H., Abdel-Aty, M., Lee, J., Rahman, S. (2019). Improvement of Traffic Safety at School Zones: Engineering and Operational Countermeasures. International Symposium on Safety of Vulnerable Road Users
- Parr, M. N., Tang, H., & Plumert, J. M. (March, 2019). Relations between Attention-Deficit Hyperactivity Disorder symptomatology and performance on simple and complex timing tasks. Poster presented at the 2019 Biennial Meeting of the Society for Research in Child Development, Baltimore, MD.
- Plumert, J. M., & Kearney, J. K. (2019, March). The development of perception-action tuning: Implications for children's road-crossing safety. In N. Fears & J. Lockman (Chairs), The development of visual-motor integration during activities of daily living: From research to translation. Symposium at the 2019 Biennial Meeting of the Society for Research in Child Development, Baltimore, PA.
- Kashef, O., Shull, E., Gaspar, J.G. (2018) Using Driver State in Automation. SAFER-SIM Symposium, Amherst, MA
- Shull, E., Gaspar, J.G., & Schwarz, C.W. (2018). Human-Machine Interfaces to Convey Feedback in Automated Vehicles. Poster presentation at SAFER-SIM Symposium, Amherst, MA.
- Jeehan Malik, Zachary Nelson, Kyle Rector, Jodie M. Plumert, and Joseph K.

Kearney. Mobile Applications to Help Older Adults Make Safe Street-Crossing Decisions. SAFER-SIM Symposium - UMass, November 16 - November 18, 2018.

- Poster presentation entitled "Performance Evaluation of Speed Reduction Compliance Strategies in School Zones" in the SAFER-SIM Symposium, November 2018, Amherst, MA.
- Poster presentation entitled "Evaluation of Safety Enhancements in School Zones with Familiar and Unfamiliar Drivers" in the SAFER-SIM Symposium, November 2018, Amherst, MA.
- Saad, M., Abdel-Aty, M., Lee, J., and Cai, Q. (2018). Bicycle Safety Analysis at Intersections Using Crowdsourced Data. Presented at UMass SAFER-SIM Symposium.

Technology Transfer Plan Output Performance Measures

SAFER-SIM Webinars: - 6 webinars, 308 registrants, 217 archived views

Webinar	Date	Site	Registrants	Archived Views
Using Driver State Detection in Automated Driving	10/30/2018	UI	52	57
Connected Vehicles (CV) Transition and Market Penetration	11/13/2018	UCF	28	34
Augmented Reality for Safer Pedestrian-Vehicle Interaction	1/29/2019	UW	78	39
Geographically Distributed and Multi-Agent Driving Simulation Using the Unity Game Engine	2/12/2019	UW, UI	44	42
School Zone Safety and Effective Countermeasures: A Micro Traffic Simulation Study	2/26/2019	UCF	57	12
Using Simulation to Assess and Reduce Conflicts Between Drivers and Bicyclists	3/26/2019	UM	49	33

Tours of Facilities – 26 tours, over 725 attendees

- 10/1/2018 John Deere Engineers - 4
- 10/4/2018 Johnson County Sherriff's Office Board - 30
- 10/9/2018 Foxconn - 6
- 10/10/2018 NADS Open House – 246
- 11/1/2018 Transportation engineers visiting UW campus - 4
- 11/1/2018 UMass Campus – Safer Symposium - 40
- 11/6/2018 AAA Foundation for Traffic Safety Conference Demo (Hank) - 35
- 11/6/2018 AAA Foundation for Traffic Safety Conference Tour (NADS) - 35
- 11/8/2018 Legislators in the Lab – tour for State of Iowa legislators (Hank) - 4
- 11/30/2018 Muscatine Community College Physics Tour – 11
- 1/7/2019 Iowa Advisory Council on Automated Transportation - 15
- 1/9/2019 Department of Criminal Investigations Tour – 2
- 1/20/2019 Researcher Western New England visited HPL - 5

- 1/29/2019 National Association of Fleet Administrators - 40
- 2/5/2019 Mitsubishi Electric - 1
- 2/7/2019 Introduction to Transportation Engineering Students - 52
- 2/15/2019 NE Iowa Chapter of American Society of Safety Professionals - 20
- 2/22/2019 Phil Kellman - 1
- 3/4/2019 Junior Science and Humanities Symposia Program - 20
- 3/5/2019 Wisconsin State Patrol – 12
- 3/20/2019 UW Prospective Grad Students - 22
- 3/27/2019 Parkinson's Foundation Conference – 40
- 3/27/2019 Cub Scout Pack 216 – 20
- 3/28/2019 Lone Tree Tour 1 - 23
- 3/28/2019 Lone Tree Tour 2 - 22
- 3/28/2019 Rudd Rockford Marble Rock Tour - 25

Website – 715 website users, 6 YouTube videos, 9 datasets (this period)

Center's website http://safersim.nads-sc.uiowa.edu/ - containing descriptions of research projects and final reports, news articles about our work, contact information, and other important information related to the center. Traffic measures from this period are below:

- 715 total users (692 of those being new)
- 1107 sessions
- 3421 page views

Center's YouTube channel https://www.youtube.com/channel/UCE8CN3JX8_mkAf8d8-UPzKQ - containing webinar presentations and other videos related to our work including a virtual symposium, and scenario creation playlist. Metrics from videos this period are below:

- 6 videos
- 728 views
- +6 subscribers

Center's data repository https://dataverse.harvard.edu/dataverse/safersim - containing final data from research projects.

- 9 datasets

Patents filed

- Not applicable this period

Press releases for SAFER-SIM related research

- Not applicable this period

DOT requests for presentations or proposals related to SAFER-SIM – 1 DOT proposal

- David Noyce, Sue Ahn, Jon Riehl, Madhav Chitturi, Radu Serban, John Lee, and Parmesh Ramanathan of UW submitted a $3 million DOT proposal in March of 2019

Media requests – 14 media requests

- Corridor's autonomous car research 'very competitive'
- Iowa City continues looking into impact of autonomous vehicles in town
- UI's Driving Simulator celebrates 20 years of vehicle safety research
- UI National Advanced Driving Simulator facility celebrates 20 years
- New study hoping to inspire healthier equipment for farmers
- A tale of two autonomous vehicles
- UCF Joins Ford, Uber as Semifinalists in National Competition to Make Driving Safer

- Cruise control a bad idea during icy, rainy conditions
- Steering Iowa toward automated vehicles
- Graduate students propose plans to prepare Iowa City for self-driving vehicles
- Ely Road to be used for automated vehicle testing starting March 11
- Tractor simulator studies farm safety
- UI researchers to study distracted driving with autonomous Tesla
- Shannon Roberts was asked to speak about transfer of control in automated vehicles as well as the interaction between conventional and automated vehicles for the UMTC Transportation Takeaway Video Series.

Practitioner Attendance at events – 161 individuals attending 2 events

- 2018 Forum: Impact of Vehicle Technologies & Automation on Users, co-hosted by the AAA Foundation for Traffic Safety and The University of Iowa
  - 97 individuals attended (25 from UI, 11 from AAA or AAAFTS, 10 speakers, 51 from industry and other institutions)
  - Gathering of representatives and experts from the research community, government and industry to continue discussion on the impact of vehicle technologies and automation with a focus on the impact to vulnerable road users and on driver behavior and performance. Key research gaps and direction were identified via interactive discussion and exchanges with experts and stakeholders. Summary report: https://aaafoundation.org/2018-forum-on-the-impact-of-vehicle-technologies-and-automation-on-vulnerable-road-users-and-driver-behavior-and-performance-a-summary-report/
- UMass Symposium November 16-18, 2018
  - 64 registrations, 3 keynote speakers
  - **Deb Bruce from NTSB** on the first fatal crash involving an autonomous vehicle and the investigation that followed.
  - **Shannon Bliven from ValleyBike** presented the new electric-assist bike share which had just launched in Western Massachusetts. Segways and Oxboards (i.e. hoverboards) were also demonstrated with discussion about how these alternative modes would integrate into the transportation system and potential challenges. After the presentation, attendees experienced the e-bikes, Segways and Oxboards.
  - **Don Fisher from the Volpe Lab** provided an address on the range of simulation research he had conducted throughout his career.
  - Small-group tours of the UMass campus, simulation facilities, including the full-scale driving simulator, mini simulator, and air traffic control simulator.
  - Professional development activity - a light-hearted skit on proper interactions during poster sessions.
  - "Transportation mini-camps" – four topics over two days chosen by attendees, were using virtual reality for driving simulation, the impact of e-scooters on mobility and the application of drones in transportation, and curbside management. During each mini-camp, there was open discussion along with short structured activities to stimulate conversation.
  - Experimental design boot camp led by Dr. Shannon Roberts from UMass and Dr. Jodie Plumert from UI.
  - Virtual poster session - Students who were working on a SaferSim project presented their posters on large video monitors in an integrated classroom. Other students and attendees visited the posters and voted for the best presentation. Yalda Ebaldi from UMass was awarded 'Best Poster' for her research on "Development and Testing of an In-Vehicle

Interface for Use in Automated Driving Contexts".

Number of improved or new simulation technologies, software, methods or processes – 5 items

- Three simulator scenarios, each embedded with 14 potential hazards that can be compared across the three scenarios, were created for the project. These have potential for use in future experiments by this and other research teams. This project is establishing a new methodology to conduct linked simulator experiments
- Through this project, Yalda Ebadi has become more familiar with the Altia Design software that is used to create the warning interface in our driving simulator. As a result, Yalda Ebadi, along with other graduate students, have developed a guide for users of the Altia Design software and it has been shared amongst students in the lab.
- Prototype of simulated environment to understand interplay between autonomous and connected vehicles and agents, where sensing, physics, and communication all contribute to inter-agent decision making. Current simulation progress includes 1) an initial test of a scene generated in partnership with Continental Mapping that replicates a corridor along Park St. In Madison, Wisconsin; 2) multiple CAVs including sedans and vans; 3) GPS and LiDAR sensors mounted on vehicles for path following and collision prevention; 4) broadcasting of MAP messages from connected intersections for connected vehicles to use in intersection navigation.