SAFER-SIM Accomplishments

October 1, 2019 – March 31, 2020

1. Accomplishments

1.1 Research Accomplishments

1.1.1 Peer-reviewed journal publications

Published

1. Deliali, A., Campbell, N., Knodler, M. and Christofa, E., 2020. Understanding the Safety Impact of Protected Intersection Design Elements: A Driving Simulation Approach. Transportation Research Record, https://doi.org/10.1177/0361198120909382.
2. Fournier, N., Bakhtiari, S., Valluru, K.D., Campbell, N., Christofa, E., Roberts, S. and Knodler Jr, M., 2020. Accounting for drivers' bicycling frequency and familiarity with bicycle infrastructure treatments when evaluating safety. Accident Analysis & Prevention, 137. https://doi.org/10.1016/j.aap.2019.105410
3. D. Valdés, B. Colucci, A. Figueroa-Medina, M. Rojas, E. Colón, and Y. Taveras. 2019. Seguridad de Peatones en Zonas Escolares Utilizando Simulador de Conducción. Revista Técnico-Científica del Colegio Dominicano de Ingenieros, Arquitectos y Agrimensores (CODIA), Vol. 2, pp. 10-20, Dec. 2019.
4. D. Valdés, B. Colucci, J. Ruiz, R. Garcia, B. Ruiz, E. Colón, and Y. Taveras. 2019. Uso de Simuladores de Conducción para Evaluar el Comportamiento de los Conductores y Mejorar la Seguridad en las Carreteras. Revista Técnico-Científica del Colegio Dominicano de Ingenieros, Arquitectos y Agrimensores (CODIA), Vol. 2, pp. 46-57, Dec. 2019.
5. D. Valdés, A. Figueroa-Medina, B. Colucci, M. Rojas, A. Bustillo and Y. Taveras. October 2019. Innovation in Transportation Safety and Driving Simulation: Puerto Rico Experience. FLITE Magazine, Vol. 61. No. 2 pp 10-13. ITE Florida Section.

Accepted for publication

1. O'Neal, E. E., Zhou, S., Jiang, Y., Kearney, J. K., & Plumert, J. M. (in press). Let's cross the next one: Parent-child road crossing in a virtual environment. Child Development.
2. Renski, H. C., Smith-Doerr, L., Wilkerson, T., Roberts, S. C., Zilberstein, S., & Branch, E. H. (in press). Racial Equity and the Future of Work. Technology | Architecture + Design.

Submitted

1. A. Elmquist and D. Negrut, "Methods and Models for Simulating Autonomous Vehicles" revisions submitted to IEEE transactions on intelligent vehicles (under second review).
2. Mitropoulos-Runduc, C., Schwarz, C., McGehee, D., (submitted). Driver Response

in Crash Avoidance Using Regenerative and Service Braking, Ergonomics.
3. Jiang, Y., O'Neal, E. E., Zhou, S., Plumert, J. M., & Kearney, J. K. (2020). Crossing roads with a computer-generated agent: Persistent effects on perception-action tuning. Manuscript submitted for publication.

1.1.2 Book chapters

1. Christofa, E., Esentehr, S., Pollitt, K., 2019. Chapter 16: Incorporating Health Impacts in Transportation Project Decision Making, Transport and Health, Elsevier.
2. Roberts, S. C., Smith-Doerr, L., Zilberstein, S., Renski, H., Branch, E. H., & Wilkerson, T. (2019). Automation, work, and racial equity: How human systems engineering 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 (pp. 191-214). Boca Raton, FL: CRC Press.

1.1.3 Edited books

Nothing to report

1.1.4 Conference papers, posters, and symposia

<u>Presented</u>

1. H. Nassereddine, K. R. Santiago-Chaparro, and D. A. Noyce, "Advanced Warning System for Safer Interaction Between Vehicles and Vulnerable Road Users," presented at the 2020 Transportation Research Board Annual Meeting, Washington, DC, 2020.
2. H. Nassereddine, K. R. Santiago-Chaparro, and D. A. Noyce, "Modeling Vehicle-Pedestrian Interactions Using a Non-Probabilistic Regression Approach," presented at the 2020 Transportation Research Board Annual Meeting, Washington, DC, 2020.
3. Paper and presentation: A. Elmquist, D. Hatch, R. Serban, D. Noyce, D. Negrut, "Sensing Simulation for the Virtual Testing of Autonomous Vehicle Safety and Performance", Road Safety and Simulation Conference, 2019
4. D. Valdés, C. Lopez, B. Colucci and A. Figueroa-Medina. 2020. Developing an Educational Module to Increase Construction Engineering Students´ Knowledge of Work Zones and Temporary Traffic Control Plans. Paper accepted to the 127th Annual Conference & Exposition of the American Society for Engineering Education (ASEE), Montreal, Canada, June 20-24, 2020.
5. A. Figueroa-Medina, D. Valdés, B. Colucci, M. Rojas, A. Bustillo, and N. Cardona. 2020. Simulation of Driver-Pedestrian Conflicts at a Mid-Block Location in an Urban Setting. Paper accepted to the 2020 International Conference on Transportation and Development (ICTD). American Society of Civil Engineers, Seattle, Washington, May 2020.
6. D. Valdes, A. Figueroa-Medina, B. Colucci, M. Rojas and E. Colon. 2019. Evaluation of Driver Performance in an-Urban Arterial Highway Using a Driving

Simulator. Poster presented at 2019 Road Safety & Simulation Conference. Oct. 14-17, 2019, Iowa City, Iowa, USA.

7. A. Figueroa-Medina, D. Valdés, B. Colucci, M. Rojas, A. Bustillo and N. Cardona. 2020. Simulation-Based Analysis of a Driver-Pedestrian Conflict at an Uncontrolled Location in an Urban Multi-lane Arterial. 99th Annual Meeting of the Transportation Research Board (TRB) of the National Academies, Wash., D.C., Jan. 12-16, 2020.
8. A. Figueroa-Medina, M. Abid, H. Nieves, and B. Santiago. 2019. The Experience with the Electric Scooter Shared-ride Service in Mayaguez, Puerto Rico. ITE Florida-Puerto Rico District Annual Meeting. Hotel La Concha, Nov. 8, 2019, San Juan, PR.
9. Deliali, A., Campbell, N., Knodler, M., Jr., Christofa, E., 2019. Does the existence and configuration of protected intersections affect bicycle safety at intersections? A driving simulator approach. Road Safety and Simulation Conference, 14-17 October 2019 - Iowa City, IA, USA.
10. Deliali, A., Campbell, N., Knodler, M., Jr., Christofa, E., 2020. Understanding The Safety Impact of Protected Intersection Design Elements – A Driving Simulation Approach. Transportation Research Board 99th Annual Meeting, January 12-16, Washington D.C.
11. Zhang, F., Russo, L., Landry, S., Sharma, P., Roberts, S. C., Seppelt, B., & Reimer, B. (2020). Perceptions of automated driver assistance systems (ADAS): Using text mining to uncover insights from drivers with real-world ADAS experience. In Proceedings of the Transportation Research Board 99th Annual Meeting 2020.
12. Zhang, F., Petit, J., & Roberts, S. C. (2019). A Simulator Study on Drivers' Response and Perception Towards Vehicle Cyberattacks. Human Factors and Ergonomics Society Annual Meeting Proceedings, 63, 1498–1502.
13. Rahman, R., Hasan, S., and Zaki, M. H. (2020) Towards Reducing the Number of Crashes during Hurricane Evacuation: Assessing the Potential Safety Impact of Adaptive Cruise Control Systems, TRB Annual Meeting 2020, D.C. Washington.
14. Guo, Z. (2020). Spatial Pricing of Ride-sourcing Services in a Congested Transportation Net- work. Presentation at the Transportation Research Board 99th Annual Meeting, Washington D.C.
15. Guo, Z., Huang, J., Zhou, Y., Macal, C. (2020). Agent-Based Modeling for Electrified Ride- Sourcing Services. Presentation at the Transportation Research Board 99th Annual Meeting, Washington D.C.

<u>Accepted/Not yet presented</u>

1. S. Gupta and M.Zaki "A Simulation Platform for Evaluating Ad-Hoc Networks in Shared Facilities using Video-based movement trajectories" Accepted as a Poster ASCE-T&DI, Seattle, May 2020
2. Subramanian, L. D., O'Neal, E., Plumert, J. M., & Kearney, J. K. Using Simulation to Assess Right-Hook Conflicts Between Bicycles and Cars at Protected and Unprotected Intersections. Paper to be presented at the 2020 EUROPEVR Driving Simulation Conference.

Submitted

1. Paper submitted to IROS 2020: A. Elmquist, D. Negrut "A Sensor Simulation Framework for Robot and Autonomous Vehicle Testing"
2. Paper submitted to GVSETS 2020: D. Negrut, A. Tasora, R. Serban, A. Elmquist, S. Benatti, J. Taves, A. Young, "Enabling Artificial Intelligence Studies In Off-road Mobility Through Physics-based Simulation Of Multi-agent Scenarios.

1.1.5 Paper/poster awards

1. Mdhasibur Rahman (UCF) – won the Milton Pikarsky Memorial Award for best Master's thesis in the field of science and technology in transportation studies.
2. Rezaur Rahman (UCF) - Best MS Thesis Award in the College of Engineering and Computer Science at UCF. This award has been given among all the submissions from engineering schools at UCF.

1.1.6 External grants related to SAFER-SIM

Awarded

1. The Future of the Curb, Massachusetts Department of Transportation, $100,000, 06/01/2020-05/31/2021, Eleni Christofa co-PI with PI Eric Gonzales.
   The objective of this grant is to explore the demands on the curbside lane, identify future demands on the curbside lane, and identify strategies for re-purposing and managing the curbside lane. It logically builds on the current SaferSim work that is focused on understanding how future technology (driving automation systems) will impact the driving landscape. More specifically, the literature review and results from the SaferSim project will be used to inform this grant.
2. Effects of Automation on Material Handlers' Productivity and Efficiency, Toyota Material Handling North America, $150,000, 06/01/2020-05/31/2021, Shannon Roberts - The goal of this proposal is to understand how automated technologies implemented in forklifts affect the job of material handlers'. It logically builds on the current SaferSim work that is designed to investigate how driving automation technology affects driver performance.
3. "A Parent-Based Intervention Program for Training Road-Crossing Skills in Children" Ariel Kim (PI). American Psychological Foundation Lizette Peterson-Homer Injury Prevention Grant, 2/25/20 – 2/24/21, $5,000 in total costs.

Submitted

1. Serban submitted a proposal for a U.S. Army GVSC project, for $325,000. The focus of the proposal is on enhancements to ground vehicle simulation support in Chrono.
2. Samiul Hasan, UFC
   Agency: FHWA, USDOT
   Program: EAR 2020
   Proposal title: RAPID-TIM: A Real-time Artificial and Predictive Intelligence

Driven Traffic Incident Management System

3. K99/R00 Career Development Award, “Improving Novice Driver Roadway Hazard Identification Through a Parent-Focused Intervention” submitted to the National Institute for Child Health and Development (NICHD) on October 12th, 2019.
4. National Science Foundation Smart Connected Communities-IRG Track 1
5. A field study to examine driver use of Adaptive Cruise Control. This project involves a field study on an instrumented vehicle to examine drivers use of Adaptive Cruise control and errors committed under varying system conditions.

1.2 Leadership Development Accomplishments

1.2.1 Invited presentations

1. Radu Serban, “Vehicle Mobility with the Chrono Multiphysics Library,” October 2019, Aarhus University, Denmark
2. Dan Negrut, “Chrono: a multi-physics simulation framework for computational dynamics,” January 15, 2020, Hong Kong University of Science and Technology, China
3. Dan Negrut, “Chrono: a multi-physics simulation framework for computational dynamics,” February 14, 2020, University of Washington, Seattle, Washington
4. Alberto M. Figueroa Medina, invitation to present the VR research study at the 1st Congress of Traumatic Brain Injury of Puerto Rico (CLT2020) during the session titled Crashes and Road Safety: Challenges and Opportunities in the Prevention of Crashes, Injuries and Interventions in Puerto Rico. The event was planned for March 19, 2020 at the Rio Piedras Campus of the University of Puerto Rico, but the event was postponed for a future date due to the COVID-19 emergency.
5. Benjamín Colucci, invitation to present road safety efforts and awareness campaigns related to the initiatives of the Decade of Action for Road Safety 2011-2020 in Puerto Rico, at the 1st Congress of Traumatic Brain Injury of Puerto Rico (CLT2020) during the session titled Crashes and Road Safety: Challenges and Opportunities in the Prevention of Crashes, Injuries and Interventions in Puerto Rico. The event was planned for March 19, 2020 at the Rio Piedras Campus of the University of Puerto Rico, but the event was postponed for a future date due to the COVID-19 emergency.
6. Benjamín Colucci, invitation to present in a Roundtable entitled 25 Years of the Urban Train: History and Future, held at the Rio Piedras Campus of the University of Puerto Rico. February 12, 2020.
7. Benjamín Colucci, invitation to present at the 2020 Indiana Constructors, Inc. (ICI) Annual Conference in San Juan, Puerto Rico in a panel with FHWA and AGC officials with the presentation entitled Hurricane Maria and Earthquakes Experiences in Puerto Rico and its Impact to the Transportation System, February 10, 2020.
8. Benjamín Colucci, invitation to present at the Asphalt Rubber Research Project Kick-off Meeting with FHWA, NCAT and EPA officials from Puerto Rico and the US at Mayaguez, Puerto Rico. February 7, 2020.
9. Benjamín Colucci, invited as Moderator at the Dwight David Eisenhower Doctoral Research Showcase at the 99th Transportation Research Board (TRB) Annual Meeting held in Washington D.C., January 12, 2020.

10. Alberto M. Figueroa Medina, presentation entitled New Model of Performance-Based Geometric Design of Highways, as keynote speaker in the closure session of the 1st International Congress on Highway Engineering. The congress was held at Cauca University in Popayan, Colombia. October 2, 2019.
11. Benjamín Colucci, presentation entitled Present and Future of Highway Safety, as keynote speaker in the opening session of the 1st International Congress on Highway Engineering. The congress was held at Cauca University in Popayan, Colombia. October 2, 2019.
12. Dr. Christofa participated in a panel titled: "Infrastructure Design for Bicyclists and Pedestrians" during the 2019 Road Safety and Simulation conference where she presented work related to this Protected Intersections Designs project.
13. Shannon Roberts was invited to present her work on automation, equity, and the future of work at the Future of Work Listening Session at Bose in Framingham, MA on November 13, 2019.
14. Reyes, M.L. Teen Drivers. 2019 Traffic & Safety Forum. Iowa Department of Transportation. Des Moines, IA, October 2, 2019.
15. Kearney, J.K. My Adventures in VR. Invited presentation at the 4CAST'20: Through the Looking Glass: Augmented and Virtual Reality, Office of Teaching, Learning & Technology, University of Iowa, January 16, 2020.
16. John Lee – Keynote at Road Safety & Simulation Conference. Iowa City, IA. October 2019.

1.2.2 Invited papers

Nothing to report

1.2.3 Invited workshops

1. Radu Serban, Training and Tutorials on Chrono and Chrono::Vehicle, March 3-6, U.S. Army Engineer Research and Development Center (ERDC), Vicksburg, MS
2. Benjamín Colucci, Transportation Innovation Education Stakeholders (TIES), Office of Innovative Program Delivery (OIPD), Federal Highway Administration (FHWA), Arlington, Virginia February 26, 2020.
3. Dr. Christofa participated in a panel titled: "Infrastructure Design for Bicyclists and Pedestrians" during the 2019 Road Safety and Simulation conference where she presented work related to this project.
4. Kearney, J.K. Distributed simulation: The experimental elements. Invited presentation at the TRB Mid-year Workshop: Use of Driving Simulators to Evaluate Driver Behaviors in the Changing Transportation Landscape: Measures and Countermeasures, jointly sponsored by the Transportation Research Board and the National Academy of Sciences Tongji University, Shanghai, China. Shanghai, China, October 28-29, 2019.
5. Kearney, J.K. Distributed simulation: The experimental elements. Invited presentation at the TRB Mid-year Workshop: Use of Driving Simulators to Evaluate Driver Behaviors in the Changing Transportation Landscape: Measures and Countermeasures, jointly sponsored by the Transportation Research Board and the

National Academy of Sciences Tongji University, Shanghai, China. Shanghai, China, October 28-29, 2019.

6. Mohamed Zaki was invited to develop and chair the session: Artificial Intelligence Tools and Algorithms for Safer Roads. at the 2020 T&DI ASCE, May 26-29th in Seattle
7. Road Safety & Simulation Conference Workshop – Automated Vehicles
8. Road Safety & Simulation Conference Workshop - Simulation Bootcamp
9. Xun Zhou gave a short presentation of spatial big data analytics in UI internal workshop on Big Data, Environmental Health, and Geospatial Science collaboration. The work in this project was used in the presentation.

1.2.4 Grant review panels

1. Shannon Roberts continues to serve on a BTSCRP panel for BTS-01: Guidance for Employer-Based Behavioral Traffic Safety Programs for Drivers in the Workplace. For the panel, she provide guidance for the contractor in terms of how drivers will respond to traffic safety programs.
2. UTC National Center for Transportation Infrastructure Durability & Life-Extension (TriDurLE) Proposal ad-hoc reviewer (Knodler)

1.2.5 Advisory committees

1. Serban is member of the NATO Research Group AVT-341 on "Mobility Assessment Methods and Tools for Autonomous Military Ground Systems" and the NATO Research Group AVT-327 on "STANREC Development for the Next-Generation NATO Reference Mobility Model"
2. Scientific Committee of the 3rd Symposium on Management of Future Motorway and Urban Traffic Systems, 6–8 July, Luxembourg, Luxembourg (Christofa)
3. Scientific Review Committee for Road Safety and Simulation Conference, October 14-17, Iowa City, Iowa. (Christofa)
4. TRR Editorial Board Working Group (Christofa)
5. Yina Wu-Member, TRB Committee on Surface Transportation Weather (AH010) (2020 – ongoing)
6. TRB AHB25 Traffic Signal Systems Committee Member and Paper Review Coordinator (Christofa)
7. Member of the Phasing Subcommittee for New England Institute of Transportation Engineers (ITE) Technical Committee Project "Guidelines for Design & Implementation of Advanced Traffic Signal Functions." (Christofa)
8. TRB AND 50, Standing Committee on Traffic Control Devices (Knodler)
9. Didier Valdés, Applied Human Factors and Ergonomics (AHFE 2017-Present) Scientific Advisory Board.
10. Benjamín Colucci, Applied Human Factors and Ergonomics (AHFE 2017-Present) Scientific Advisory Board.
11. Benjamín Colucci, Member TRB Committee AHB55 Work Zone Traffic Control.
12. Benjamín Colucci, Member Best Paper Award TRB Committee AHB55 Work Zone Traffic Control.
13. Benjamín Colucci, Member of the Advisory Committee of the Puerto Rico - State

Transportation Innovation Council (STIC).

14. Benjamín Colucci, Member of the Advisory Committee of the US Virgin Islands - State Transportation Innovation Council (STIC).
15. Benjamín Colucci, 2020 Latin American and Caribbean Consortium of Engineering Institution (LACCEI) International Multi-Conference for Engineering, Education, and Technology Scientific Advisory Board.
16. Benjamín Colucci, Member, TRB Standing Committee AND30 Simulation and Measurements of Vehicle and Operator Performance, 2019-2022.
17. Benjamín Colucci, Co-Chair of the Traffic Enforcement Committee, International Road Federation (IRF).
18. Benjamín Colucci, Member, Transportation Forensics and Risk Management (T-FARM), Institute of Transportation Engineers (ITE), 2018 – Present.
19. Benjamín Colucci, Member, Transportation Education Council, Institute of Transportation Engineers (ITE), 2017 – Present.
20. Benjamín Colucci, Member, Transportation Safety Council, Institute of Transportation Engineers (ITE), 2019 – Present.
21. Benjamin Colucci, Member of the Executive Committee of the National Institute for Congestion Reduction (NICR), University Transportation Center (UTC). January 2020 - Present.
22. Benjamin Colucci, American Association of State Highways and Transportation Officials (AASHTO) Co-Liaison representing the National Local Technical Assistance Program Association (NLTAPA). August 2019 - Present.
23. Benjamin Colucci, Partnership Workgroup, representing the National Local Technical Assistance Program Association (NLTAPA). July 2018 - Present.
24. Benjamin Colucci, Safety Workgroup representing the National Local Technical Assistance Program Association (NLTAPA). July 2018 - Present.
25. Benjamin Colucci, Innovation and Implementation Workgroup representing the National Local Technical Assistance Program Association (NLTAPA). July 2018 - Present.
26. Benjamin Colucci, Strategic Highway Safety Plan (SHSP) - Puerto Rico, stakeholder representing Puerto Rico LTAP - T2; Traffic Incident Management (TIM) workgroup, 2013 - Present.
27. Alberto M. Figueroa-Medina, Member of TRB Standing Committee, Operational Effects of Geometrics AHB-65, 2013-2022.
28. Alberto M. Figueroa-Medina, Member, Transportation Education Council, Institute of Transportation Engineers (ITE).
29. Alberto M. Figueroa-Medina, Member, Transportation Safety Council, Institute of Transportation Engineers (ITE).
30. Alberto M. Figueroa-Medina, Member of the Executive Committee of the National Institute for Congestion Reduction (NICR), University Transportation Center (UTC). January 2020 - Present.
31. TRB committee on vehicle automation (Schwarz)
32. SAE On Road Automated Driving Simulation Task Force (Schwarz)
33. Engineering Staff Advisory Council – Jacob Heiden
34. Engineering Staff Advisory Council – Dawn Marshall
35. TRB AHB25 Traffic Signal Systems Committee Member and Paper Review

Coordinator (Christofa)
36. TRB TADD55 Task Force on Arterials and Public Health Member (Christofa)
37. TRB AND 50, Standing Committee on Traffic Control Devices (Knodler)

1.2.6 Journal editing

1. Mathematics and Computers in Simulation (Radu Serban, associate editor)
2. ASME Journal of Computational and Nonlinear Dynamics (Radu Serban, associate editor)
3. Multibody System Dynamics (Dan Negrut, associate editor)
4. ASME Journal of Computational and Nonlinear Dynamics (Dan Negrut, guest editor)
5. Anuj K. Pradhan - Journal of Law and Mobility – Contributing Editor
6. International ACM SIGACCESS Conference on Computers and Accessibility, reviewer (Rector)
7. Spatial Cognition and Computation, editorial board (Plumert)
8. Journal of Experimental Psychology: Applied, editorial board (Plumert)
9. Journal of Experimental Child Psychology, editorial board (Plumert)
10. IEEE Access, reviewer (Kearney)
11. IEEE Virtual Reality Conference, reviewer (Kearney)
12. Journal of Intelligent Transportation Systems: Technology, Planning, and Operations, reviewer (Kearney)
13. Accident Analysis and Prevention, reviewer (Kearney)Samiul Hasan, Trial Editor (Engineering), Natural Hazards Review
14. Samiul Hasan, Associate Editor, Highway Transportation System Security and Emergency Response, Journal of Transportation Safety and Security (JTSS)
15. Samiul Hasan, Associate Editor, Journal of Advanced Transportation
16. Guest Editor for Transportation Research Part C: Emerging Technologies Special Issue on “Trajectory-based Modeling, Design, Operation and Assessment of Road Transportation Systems.” (Christofa)
17. Handling Editor, Transportation Research Record (Christofa)
18. Didier Valdés, Applied Human Factors and Ergonomics (AHFE), Scientific Advisory Board, 2017-Present.
19. Didier Valdés, Road Safety & Simulation Conference, October 2019, Iowa City, Iowa.
20. Didier Valdés, 18th LACCEI International Multi-Conference for Engineering, Education, and Technology.
21. Didier Valdés, 99th TRB Annual Meeting, January 2020, Washington DC.
22. Benjamin Colucci, Editor of International Journal of Natural Disasters, Accidents and Civil Infrastructure (RIDNAIC), Scipedia, February 2020 - Present.
23. Benjamín Colucci, Applied Human Factors and Ergonomics (AHFE), Scientific Advisory Board, 2017-Present.
24. Benjamín Colucci, 18th LACCEI International Multi-Conference for Engineering, Education, and Technology.
25. Benjamín Colucci, Road Safety & Simulation Conference, October 2019, Iowa City, Iowa.
26. Benjamín Colucci, 99th TRB Annual Meeting, Washington DC.

27. Benjamín Colucci, ASCE Journal of Legal Affairs and Dispute Resolution, 2019.
28. Benjamín Colucci, ASCE Journal of Surveying Engineering, 2019.
29. Benjamín Colucci, 2nd Sustainable Solutions for Growth (SSG) International Conference, Wroclaw, Poland, 2019.
30. Benjamin Colucci, 2019 Report Card for Puerto Rico's Infrastructure: Roads Chapter, ASCE.
31. Alberto M. Figueroa-Medina, Reviewer for Road Safety & Simulation Conference, October 2019, Iowa City, Iowa.
32. Alberto M. Figueroa-Medina, Reviewer for 99th TRB Annual Meeting, Washington DC.
33. Alberto M. Figueroa-Medina, Reviewer for Transportation Research Record.
34. Alberto M. Figueroa-Medina, Reviewer for Accident Analysis and Prevention Journal, Elsevier.
35. Alberto M. Figueroa-Medina, Reviewer for the 6th International Symposium on Highway Geometric Design, Transportation Research Board, Amsterdam, June 28-July 1st, 2020.
36. Alberto M. Figueroa-Medina, Reviewer for the 6th Urban Street Symposium, Transportation Research Board, Amsterdam, June 28-July 1st, 2020.
37. Alberto M. Figueroa-Medina, Reviewer for 2019 Report Card for Puerto Rico's Infrastructure: Roads Chapter, ASCE.
38. Alberto M. Figueroa-Medina, Reviewer for Validating Cost Estimates: Roads and Bridges. Homeland Security Operational Analysis Center.
39. John D. Lee, Human Factors and Ergonomics in Manufacturing and Service
40. Industries, Associate Editor
41. John D. Lee, Cognitive Engineering and Decision Making, Editorial board
42. John D. Lee, Theoretical Issues in Ergonomics Science, Editorial board
43. John D. Lee, IIE Transactions on Occupational Ergonomics Human Factors,
44. Editorial Board
45. John D. Lee, Journal of Experimental Psychology: Applied, Principal reviewer
46. John D. Lee, Committee on Maritime Safety, Transportation Research Board
47. John D. Lee, Cognition, Technology, and Work, Editorial board member
48. John D. Lee, Human Factors, Associate editor

1.2.7 Leadership positions in professional organizations

1. Shannon Roberts serves as the Program Chair Elect for Surface Transportation Technical Group of the Human Factors and Ergonomics Society.
2. 22nd International ACM SIGACCESS Conference on Computers and Accessibility, Program Committee (Rector)
3. ACM CHI Conference on Human Factors in Computing Systems, Program Committee and Organizing Committee (Rector)
4. Xun Zhou, ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (GIS) 2020, Poster Co-chair
5. Benjamín Colucci, Member, Board of Directors of the Pan-American Academy of Engineering (PAE), 2018-2020.
6. Benjamín Colucci, Member Board of Trustees of the Society of Engineers of Puerto Rico, Scholarship Committee 2019 - Present.

7. Benjamín Colucci, President of the Pan-American Transport Systems Committee (UPADI), 2017-2020.
8. Benjamín Colucci, Vice-President of the International Society for Maintenance and Rehabilitation of Transport Infrastructures (iSMARTi).
9. Benjamin Colucci, Dimension Journal of the College of Engineers and Surveyors of Puerto Rico, Member of Editorial Commission, 2019 - Present.
10. Alberto M. Figueroa-Medina, Dimension Journal of the College of Engineers and Surveyors of Puerto Rico, Member of Editorial Commission, 2019 - Present.

1.2.8 SAFER-SIM Webinars

Webinar	**Date**	**Registrants**	**Archived Views**
1. Can Regenerative Braking Save Your Life?	10/8/2019	23	13
2. Driver Behavior and Performance Study on In-Vehicle Display Based Speed Compliance	11/5/2019	33	12
3. Evaluation of Managed Lane Facilities in a Connected Vehicle Environment	11/19/2019	31	12
4. Assessing Crash Risks of Evacuation Traffic: A Simulation-based Approach	2/18/2020	20	4
5. Assessing the Effectiveness of Connected Vehicle Technologies based on Driving Simulator Experiments	3/17/2020	42	18
6. A Machine Vision Approach for Estimating Motion Discomfort in Simulators and in Self-Driving Vehicles	3/31/2020	30	11
		179	70

1.2.9 Professional awards

1. Greek Diaspora Fellowship, Institute of International Education, funding from the Stavros Niarchos Foundation (Christofa)
2. On October 16, Shannon Roberts received the Stephanie Binder Young Professional Award from the Human Factors and Ergonomics Society – Surface Transportation Technical Group for her contribution to transportation Human Factors.
3. On January 29, Yalda Ebadi won the WTS Boston Helene M. Overly Memorial/Ann Hershfang Memorial Scholarship to help her pursue a career path in transportation.
4. Francis Tainter (UM) received the CUTC Student of the Year award from our

center.

5. Award winner: UCF SST team
   Prince Michael International Road Safety Awards, Dec 2019
6. Benjamín Colucci, American Society of Civil Engineers (ASCE) Fellow Member, January 2020
7. Jinghui Yuan – University of Central Florida, Graduate SAFER-SIM Excellence Award
8. Morgan Parr – University of Iowa, Graduate SAFER-SIM Excellence Award
9. Francis Tainter – University of Massachusetts, Graduate SAFER-SIM Excellence Award
10. María Xelena Rojas Ibarra – University of Puerto Rico-Mayaguez, Graduate SAFER-SIM Excellence Award
11. Jorge Ugan – University of Central Florida, Undergraduate SAFER-SIM Excellence Award
12. Hanxi Tang – University of Iowa, Undergraduate SAFER-SIM Excellence Award
13. Jaydeep Radadiya – University of Massachusetts-Amherst, Undergraduate SAFER-SIM Excellence Award

1.3 Education and Workforce Development Accomplishments

1.3.1 Peer-reviewed journal publications w/ student authors

1. Deliali, A., Campbell, N., Knodler, M. and Christofa, E., 2020. Understanding the Safety Impact of Protected Intersection Design Elements: A Driving Simulation Approach. Transportation Research Record, https://doi.org/10.1177/0361198120909382.
2. Fournier, N., Bakhtiari, S., Valluru, K.D., Campbell, N., Christofa, E., Roberts, S. and Knodler Jr, M., 2020. Accounting for drivers' bicycling frequency and familiarity with bicycle infrastructure treatments when evaluating safety. Accident Analysis & Prevention, 137. https://doi.org/10.1016/j.aap.2019.105410
3. D. Valdés, B. Colucci, A. Figueroa-Medina, M. Rojas, E. Colón, and Y. Taveras. 2019. Seguridad de Peatones en Zonas Escolares Utilizando Simulador de Conducción. Revista Técnico-Científica del Colegio Dominicano de Ingenieros, Arquitectos y Agrimensores (CODIA), Vol. 2, pp. 10-20, Dec. 2019.
4. D. Valdés, B. Colucci, J. Ruiz, R. Garcia, B. Ruiz, E. Colón, and Y. Taveras. 2019. Uso de Simuladores de Conducción para Evaluar el Comportamiento de los Conductores y Mejorar la Seguridad en las Carreteras. Revista Técnico-Científica del Colegio Dominicano de Ingenieros, Arquitectos y Agrimensores (CODIA), Vol. 2, pp. 46-57, Dec. 2019.
5. D. Valdés, A. Figueroa-Medina, B. Colucci, M. Rojas, A. Bustillo and Y. Taveras. October 2019. Innovation in Transportation Safety and Driving Simulation: Puerto Rico Experience. FLITE Magazine, Vol. 61. No. 2 pp 10-13. ITE Florida Section.

1.3.2 Book chapters w/ student authors

Nothing to report

1.3.3 Conference posters and papers w/ student authors

1. H. Nassereddine, K. R. Santiago-Chaparro, and D. A. Noyce, “Advanced Warning System for Safer Interaction Between Vehicles and Vulnerable Road Users,” presented at the 2020 Transportation Research Board Annual Meeting, Washington, DC, 2020.
2. H. Nassereddine, K. R. Santiago-Chaparro, and D. A. Noyce, “Modeling Vehicle-Pedestrian Interactions Using a Non-Probabilistic Regression Approach,” presented at the 2020 Transportation Research Board Annual Meeting, Washington, DC, 2020.
3. Paper and presentation: A. Elmquist, D. Hatch, R. Serban, D. Noyce, D. Negrut, “Sensing Simulation for the Virtual Testing of Autonomous Vehicle Safety and Performance”, Road Safety and Simulation Conference, 2019
4. A. Figueroa-Medina, D. Valdés, B. Colucci, M. Rojas, A. Bustillo, and N. Cardona. 2020. Simulation of Driver-Pedestrian Conflicts at a Mid-Block Location in an Urban Setting. Paper accepted to the 2020 International Conference on Transportation and Development (ICTD). American Society of Civil Engineers, Seattle, Washington, May 2020.
5. D. Valdes, A. Figueroa-Medina, B. Colucci, M. Rojas and E. Colon. 2019. Evaluation of Driver Performance in an-Urban Arterial Highway Using a Driving Simulator. Poster presented at 2019 Road Safety & Simulation Conference. Oct. 14-17, 2019, Iowa City, Iowa, USA.
6. A. Figueroa-Medina, D. Valdés, B. Colucci, M. Rojas, A. Bustillo and N. Cardona. 2020. Simulation-Based Analysis of a Driver-Pedestrian Conflict at an Uncontrolled Location in an Urban Multi-lane Arterial. 99th Annual Meeting of the Transportation Research Board (TRB) of the National Academies, Wash., D.C., Jan. 12-16, 2020.
7. Deliali, A., Campbell, N., Knodler, M., Jr., Christofa, E., 2019. Does the existence and configuration of protected intersections affect bicycle safety at intersections? A driving simulator approach. Road Safety and Simulation Conference, 14-17 October 2019 - Iowa City, IA, USA.
8. Deliali, A., Campbell, N., Knodler, M., Jr., Christofa, E., 2020. Understanding The Safety Impact of Protected Intersection Design Elements – A Driving Simulation Approach. Transportation Research Board 99th Annual Meeting, January 12-16, Washington D.C.
9. Rahman, R., Hasan, S., and Zaki, M. H. (2020) Towards Reducing the Number of Crashes during Hurricane Evacuation: Assessing the Potential Safety Impact of Adaptive Cruise Control Systems, TRB Annual Meeting 2020, D.C. Washington.
10. Guo, Z., Huang, J., Zhou, Y., Macal, C. (2020). Agent-Based Modeling for Electrified Ride- Sourcing Services. Presentation at the Transportation Research Board 99th Annual Meeting, Washington D.C.

1.3.4 Paper/poster awards w/ student authors

1. Mdhasibur Rahman (UCF) – won the Milton Pikarsky Memorial Award for best Master's thesis in the field of science and technology in transportation studies.

1.3.5 Graduate students working on and supported by SAFER-SIM related projects

Site	**Number**
University of Iowa	8
University of Wisconsin Madison	3
University of Massachusetts Amherst	13
University of Central Florida	9
University of Puerto Rico Mayaguez	6

1.3.6 Undergraduate students working on and supported by SAFER-SIM related projects

Site	**Number**
University of Iowa	10
University of Wisconsin Madison	0
University of Massachusetts Amherst	11
University of Central Florida	0
University of Puerto Rico Mayaguez	2

1.3.7 Student attendance and presentations at the SAFER-SIM symposium

19 students attended

1.3.8 Transportation-related M.A. and PhD theses

1. Aikaterini Deliali's dissertation chapter. Title of the dissertation: "Modelling the Interactions Between Cyclists and Motorists Under the Presence of Bicycle-Specific Infrastructure Treatments."
2. Yalda Ebadi successfully defended her PhD proposal on November 7. This SaferSim project is the focus of her PhD dissertation.

1.3.9 Curriculum modules developed

1. Developed and Taught in Fall 2019 the graduate course at UCF:
   TTE5531: Active mobility and Technologies: Synergy and Challenges
2. Developed a module related to multi-stage learning and control based on micro-simulation for civil engineering graduate course CGN 5617, Infrastructure Systems Optimization and Identification.
3. Use the Iowa motor vehicle crash data analysis as course projects in MSCI:4220 Advanced Database Management and Big Data, and MSCI:6610 Big Data Management and Analytics.

1.3.10 Student internships related to SAFER-SIM

1. Kabir Khurana, an undergraduate researcher on this project, plans to take an internship in WSP in 2020 because of his experience in this SAFER-SIM project working on the CVAT software for video segmentation algorithm training.
2. Logan Bruck internship at University of Iowa

3. Omkar Yadav internship at the University of Iowa

1.3.11 Presentations to student groups or classes

1. 10/11/2019 Maria Rojas, Alcibiades Bustillo, Cindy Sierra, and Natacha Cardona, presentation entitled Innovation in Traffic Safety Using Driving Simulation, offered at the Open House event held at the University of Puerto Rico at Mayaguez. 30 people present.
2. 11/6/2019 Shannon Roberts discussed her research and Industrial Engineering coursework to 20 Industrial Engineering undergraduate students from IISE—Institute of Industrial and Systems Engineers
3. Present multi-stage learning and control based on micro-simulation for CGN 5617, Infrastructure Systems Optimization and Identification.
4. 10/30/2019 Traffic Safety Merit Badge 15
5. 11/5/2019 Project Lead the Way Tours 49
6. 11/11/2019 Kirkwood Academy Tour 10
7. 2/1/2020 Explore Engineering @ Iowa 50
8. 3/2/2020 FTC Competition Outreach 170
9. 3/7/2020 APO Merit Badge University 2
10. 3/7/2020 Explore Engineering @ Iowa 40
11. 3/8/2020 Traffic Safety Merit Badge 31

1.3.12 # Schools visited and # students present

1. Aarhus University (October, 2019): 30 students present (invited lecture)
2. Hong Kong University of Science and Technology: 20 students present (invited lecture)
3. University of Washington, Seattle: 5 students present
4. 11/14/2019 Bettendorf Classroom Visit 148
5. 11/22/2019 Oelwein Classroom Visit 222

1.3.13 # Career fairs visited and # of attendees

1. 11/26/2019 STEAM Institute 168
2. 2/18/2020 Linn County STEM Festival 320
3. 2/22/2020 Southeast Iowa STEM Festival 155
4. 2/23/2020 Career Caravan 50

1.3.14 Summer institutes and programs and # of students participating

1. UCF, Hasan – we organized a Data Science Competition which could be considered as similar to curriculum development. This is the closest area where I thought we can describe this activity. Under this activity, we organized a Data Science Challenge among the engineering students participating in the ASCE Southeast Regional Conference. In this competition, students were given a dataset of infrastructure disruption collected from a social media platform with a task was to label the type and extent of disruption. 12 teams registered for the competition.

Unfortunately, due to COVID-19 UCF had to cancel the event.
Details about the competition:
https://studentconferences.asce.org/southeast/competitions/big-data-challenge/

1.4 Technology Transfer

1.4.1 SAFER-SIM webinars

6 webinars

1.4.2 Registrations for webinars

179 registrations

1.4.3 Views of archived webinar content

70 views

1.4.4 Press releases for SAFER-SIM related research

Nothing to report

1.4.5 Media requests

Title	**Publisher**
1. There's an $80 million driving simulator in Iowa, and we tried it out	Ars Technica
2. Automated Vehicle Technology with Dr. Dan McGehee	Insight on Business
3. Bicycle safety tips to keep you cruising through the winter months	KWWL
4. Experts stress winter driving safety following recent snowfall	KCRG
5. Experts seeing more phone-related injuries	KCRG
6. Iowa researchers prepare rural roads for the future	University of Iowa
7. President Harreld: As the semester ramps up, remember the importance of undergraduate research	Iowa Now

1.4.6 Tours of facilities

1. 10/3/19 State Farm tour NADS
2. 10/14/19 Road Safety & Simulation Conference Hank Lab open house
3. 10/14/19 Road Safety & Simulation Conference - National Advanced Driving Simulator open house
4. 10/23/19 Daily Iowan tour of Hank Lab
5. 11/18/19 FHWA tour of NADS
6. 12/17/19 Hyundai Motors
7. 11/6/19 Haylie Miller, UNT Health Sciences, DeLTA Center speaker
8. 11/6/19 Aisin Technical Center of America
9. 1/31/20 University of Nebraska, Faculty in Theatre and Journalism
10. 2/12/20 Toyota Media Event at NADS
11. 3/4/20 Colorado DOT
12. 3/12/20 Iowa DOT

1.4.7 Website traffic

Metric	This Period	Lifetime
Total Users	4011	9641
New Users	3938	9641
Sessions	6992	16,392
Page Views	11,515	39,219

1.4.8 Patents filed

Nothing to report

1.4.9 DOT requests for presentations or proposals related to SAFER-SIM

1. Effectiveness of Bicycle Boxes in Massachusetts, Massachusetts Department of Transportation

1.4.10 Practitioner attendance at events

35 industry members registered for webinars

1.4.11 Number of improved or new simulation technologies, software, methods, or processes

1. The VR simulation code was made in four levels: (i) Set up the VR environment to reflect an urban city context with commercial and residential buildings (ii) Include a pedestrian pathing system to add pedestrian avatars along sidewalks in the scenario (iii) Modify traffic flow patterns with different vehicle speeds and vehicle gaps between subject runs (modification to the original code supplied by Dr. Kearney from University of Iowa), and (iv) Incorporate a counter of subject runs and a counter of vehicle-pedestrian collisions and is shown on a display board for the subject to be aware of the number of runs and crashes in the experiment.
2. This project established a new capability in our lab to run “wizard of Oz” experiments where a participant drives our full simulator and the experimenter can control a second virtual vehicle in the same world.
3. Data reduction protocols for eye data and driving measures.
4. The research team is currently finalizing a software package for eye-tracking video analysis, object identification, and integration with eye-tracking trace.
5. we are developing a new agent-based simulation framework based on Repast Simphony to better capture the dynamic decision making of vehicles and V2I.
6. Ongoing work (1) new Chrono::Sensor module and (2) sensor models for producing realistic data for testing autonomous vehicle control algorithms. For Chrono::Sensor, the focus is creating a framework for users to test, with software-in-the-loop, various safety critical scenarios involving automated vehicles. For (2), the focus is exploration, development, and implementation of sensor models that seek to produce synthetic data with appropriate noise, distortion, and degradation.

1.5 Collaboration

1.5.1 Attendance at the SAFER-SIMposium

35 attendees

1.5.2 Interdisciplinary research projects within and across sites

1. Using Simulation to Assess and Reduce Conflicts between Drivers and Bicyclists (Computer Science/Psychological & Brain Sciences)
2. Multi-modal Distributed Simulation Combining Cars, Bicyclists, and Pedestrians (Computer Science/Psychological & Brain Sciences)
3. Using Simulation to Study Communication between Autonomous Vehicles and Vulnerable Road Users (Computer Science/Psychological & Brain Sciences)
4. Understanding Bicyclists' Behaviors Through Learning from Big Trip Data (Business/Public Health/Urban & Regional Planning)

1.5.3 Collaborative research projects across SAFER-SIM or other UTC sites

1. Multi-modal Distributed Simulation Combining Cars, Bicyclists, and Pedestrians (UI/UW/UM)
2. Using Simulation to Assess and Reduce Conflicts between Drivers and Bicyclists (UI/UM/UCF)
3. Enhancing School Zone and School Bus Safety (UCF/UPR)
4. Evaluation of Safety Enhancements in School Zones with Familiar and Unfamiliar Drivers (UPR/UM)
5. The Impact of Driver's Mental Models of Advanced Vehicle Technologies on Safety and Performance (UI/UM)
6. Analyzing the Performance of Remote-Drivers on Transit Shuttle Short Routes (UW/UPR)
7. Interfacing Synchrono and NADS for Virtual Simulation of Conventional & Connected and Autonomous Vehicles (UW/UI)
8. AAAFTS/SaferSim Cooperative Research Program (UI/UM/UW/UCF)

1.5.4 Collaborations with industry partners and government agencies

Organization Name	*Location*	*Contribution*
1. Aisin Technical Center of America	Northville, MI	Financial support
2. AAA Foundation for Traffic Safety	Washington D.C.	Financial support Collaborative research
3. InSight Learning Technologies	Pacific Palisades, CA	Personnel exchange
4. Mandli Communications Inc.	Madison, WI	In-kind support Facilities Collaborative Research
5. Continental Mapping Consultants	Madison, WI	In-kind support

Inc		Facilities Collaborative Research
6. Council of University Transportation Centers	Washington D.C	Financial support
7. Hyundai America Technical Center Inc. **Previously not reported**	Superior Township, MI	Financial support
8. City of Orlando **New this period**	Orlando, FL	Collaborative Research
9. Recreative Association of Sport Buenaventura **New this period**	Mayaguez, PR	Facilities
10. Mayaguez Bureau of Highway Patrol **New this period**	Mayaguez, PR	Facilities Personnel Exchange
11. Club de Oficinistas de Mayagüez **New this period**	Mayaguez, PR	Facilities
12. Puerto Rico LTAP Center, University of Puerto Rico at Mayaguez **New this period**	Mayaguez, PR	Facilities

1.5.5 Collaborative peer-reviewed journal publications

Nothing to report

1.5.6 Collaborative book chapters

Nothing to report

1.5.7 Student exchanges with other SAFER-SIM sites

Nothing to report

1.5.8 Students pursuing advanced degrees at other SAFER-SIM sites

Nothing to report

1.5.9 Programs involving community colleges

1. Dawn Marshall is a member of the Workplace Learning Connection's Johnson County Team through Kirkwood Community College. The purpose of this team is to provide support, access and advice, connecting the Workplace Learning Connection staff to local business professionals for the purpose of Job Shadows, Internships, Speakers, Events, Tours, etc.

1.5.10 Graduates hired at other SAFER-SIM or UTC sites

Nothing to report

1.6 Diversity

1.6.1 # SAFER-SIM projects involving underrepresented/minority (U/M) students

1. Safely and Effectively Communicating Non-Connected Vehicle Information to Connected Vehicles through Field- and Driving Simulator-Based Research – UW
2. Augmented Reality for Safer Pedestrian-Vehicle Interactions – UW
3. Detailed Analysis of Roadway Users Interactions at Intersections with Flashing Yellow Arrows - UW
4. V2I Infrastructure Placement and Safety Implications of CAVs in an Interconnected Network - UCF
5. Assessing the Effectiveness of Connected Vehicle Technologies based on Driving Simulator Experiments - UCF
6. Enhancing School Zone and School Bus Safety - UPR
7. Assessing the Impact of Smartphone Usage While Driving in Work Zones - UPR
8. Evaluation of Safety Enhancements in School Zones with Familiar and Unfamiliar Drivers – UPR
9. Study of Gap Acceptance and Walking Speeds of Pedestrians using Virtual Reality Simulation - UPR
10. DRIVER' SAFETY ASSESSMENT IN TWO-LANE RURAL ROADS WORK ZONES - UPR
11. ASSESSING A TWO-STEP POSTED SPEED REDUCTION AS A POTENTIAL COUNTERMEASURE TO IMPROVE SAFETY IN SCHOOL ZONES USING DRIVING SIMULATION - UPR
12. Drivers' Performance and Brain Workload Activities after Alcohol Consumption using Driving Simulation – UPR
13. The Impact of Driver's Mental Models of Advanced Vehicle Technologies on Safety and Performance – UM
14. Training to Improve Situational Awareness Regarding Operational Design Domain in Driving Automation Systems – UM
15. Multi-modal Distributed Simulation Combining Cars, Bicyclists, and Pedestrians – UM
16. Development and Testing of an In-Vehicle Interface for Use in Automated Driving Contexts – UM
17. Protected Intersection Design for Safer Cycling – UM
18. Risk Awareness and Perception Training using Virtual Reality (RAPT-VR) – UM
19. Integrating Traffic Control Devices via Augmented Reality – UM
20. To Trust or Not to Trust? A Simulation-based Experimental Paradigm – UM
21. Using Simulation to Assess and Reduce Conflicts between Drivers and Bicyclists – UM
22. The Influence of Unmanned Aerial Systems on Driving Performance – UM
23. Using Simulation to Study Communication between Autonomous Vehicles and Vulnerable Road Users – UI
24. Multi-modal Distributed Simulation Combining Cars, Bicyclists, and Pedestrians - UI

25. Understanding Bicyclists' Behaviors Through Learning from Big Trip Data – UI
26. Using Simulation to Assess and Reduce Conflicts between Drivers and Bicyclists – UI
27. Extended Evaluation of Training Programs to Accelerate Hazard Anticipation Skills in Novice Teen Drivers – UI
28. Mobile Applications to Help Older Adults Make Safe Street-Crossing Decisions – UI

1.6.2 # U/M events attended

1. Tech Chicks Career Day – 28 students

1.6.3 # U/M students at attended events

28 female students

1.6.4 Graduating U/M student placement

Nothing to report