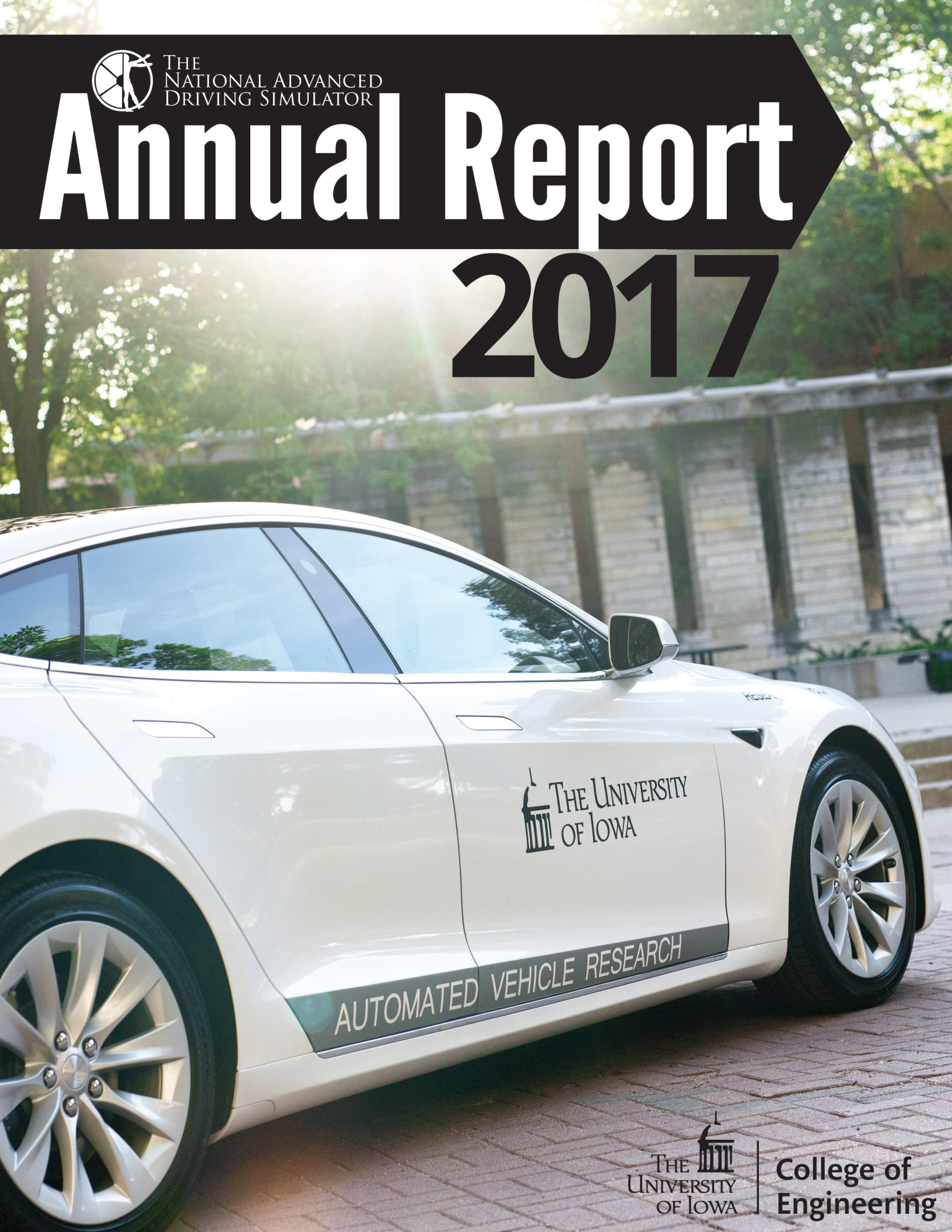
The National Advanced Driving Simulator
Annual Report
2017
The University of Iowa
AUTOMATED VEHICLE RESEARCH
The University of Iowa
College of Engineering

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@DrivingSim

FOR MORE INFORMATION ON THE CONTENTS OF THIS REPORT, CONTACT:

NADS Communications
(319) 335-4680

The National Advanced Driving Simulator is a research unit within the UI College of Engineering's Center for Computer-Aided Design

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NADS AT A GLANCE

MISSION:
Improving safety by researching the connection between drivers, motor vehicles, and road users

25 YEARS OF DRIVING RESEARCH, FULLY FUNDED THROUGH EXTERNAL CONTRACTS

42 NADS-AFFILIATED STUDENTS, STAFF, AND FACULTY

230 MILES OF ROAD IN THE NADS-DEVELOPED SPRINGFIELD SIMULATED ROAD NETWORK VIRTUAL PROVING GROUND

12,298 IOWANS IMPACTED BY THE SAFER-SIM UNIVERSITY TRANSPORTATION RESEARCH CENTER IN FY17

303% INCREASE IN NON-FEDERAL FUNDING

&

6.4% INCREASE IN FEDERAL FUNDING FROM FY16

FY17 NON-FEDERAL FUNDING: $4,314,513
FY17 FEDERAL FUNDING: $2,772,286

68 NADS-DEVELOPED MINISIMS IN USE WORLDWIDE

THE NATIONAL ADVANCED DRIVING SIMULATOR

MESSAGE FROM THE DIRECTOR

Driving excellence: Transforming the future

For more than 20 years, the National Advanced Driving Simulator (NADS), the nation's largest and first simulator of its kind anywhere in the world, has made the University of Iowa (UI) an international leader in vehicle research. Research and development conducted at NADS saves lives, improves quality of life, advances technology, and improves efficiency and productivity of the automotive and supporting industries. Most importantly, it also serves as a place where our outstanding students can learn firsthand about how innovation occurs in science and engineering. Our students go on to industry, academia, and government laboratories.

In August 2016, I had the great honor of assuming the role of Director of NADS. The past year has been one of tremendous accomplishments and it has truly been a privilege to lead this talented, dedicated group of people.

We are firmly committed to maintaining our reputation as a top research institution. Together, with our partners at the Center for Computer-Aided Design (CCAD), we have dedicated ourselves to engaging in a broader, more holistic approach toward automotive safety research at the UI. Recognizing the benefits of collaboration across different fields of expertise, over the last year NADS became the most interdisciplinary research unit on campus, partnering with nearly every college at the university. This multidisciplinary approach continues to expand our opportunities and helps us remain at the forefront of our field.

The past fiscal year has been marked with a number of exceptional honors. In fall 2016, we were awarded another $1.4 million University Transportation Center grant from the US DOT Research and Innovation Technology Administration. The interdisciplinary center, named Safety Research Using Simulation (SAFER-SIM), addresses the US DOT's research priority of promoting safety. Additionally, in early 2017, the US DOT designated the Iowa City/Cedar Rapids corridor as one of ten Automated Vehicle Proving Grounds (AVPG) nationwide. The prestigious designation encourages testing and information sharing around automated vehicle technologies in the region and is the next logical step in an effort to advance the safe deployment of more highly automated vehicle technology. As we move forward, our region's diversity is what sets us apart, as the corridor features variety in climate, road users, and roadway landscapes, including the nation's largest and most expansive simulated virtual proving ground at NADS.

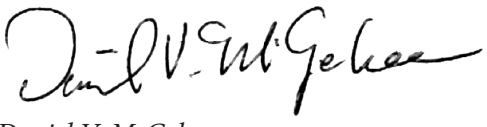
Simulation is still the core of what we do. It provides the ideal mechanism for exploring research that is infeasible, too costly, or unsafe in the real world. This includes assessing cognitive or physical ability, gaining understanding of driver performance and behavior, testing vehicle design, and training drivers. But we're also dedicating ourselves to meeting the rapidly changing demands of the world of driving research. This past fiscal year, we expanded our fleet of on-road vehicles to include a Tesla Model S 75D to support the next generation of research. This is in addition to a Volvo XC90, equipped with numerous advanced vehicle technologies, as well as an instrumented Toyota Camry XLE that also supports a simulator mode of operation.

As an organization, during the last fiscal year we looked inward and tackled the important task of developing a strategic plan to organize our priorities, focus our resources, and ensure that our faculty, staff, and students are working toward common goals. We reached out to all staff to provide input in refining our mission and developing a vision statement, strategic plan, and core values. Already, we have committed ourselves to this plan by posting visuals around our facility, reminding us each day of what drives us. As we enter fiscal year 2018, we are setting to work on putting the strategic plan into action.

DANIEL V. MCGEHEE

Our researchers at the UI are dedicated to transforming the future of transportation and making the roads safer for everyone. I take great pride in the fact that we are continuously striving to innovate and elevate our reputation as an international leader in driving safety research.

My first year at NADS has been a rewarding and exciting one. It has been a privilege to witness firsthand our research and partnerships with federal and state government entities, organizations, other academic institutions, and industry sponsors continue to expand by leaps and bounds. There is truly something unique about the research taking place at NADS and the UI. As our vision statement says, we are driving excellence. I look forward to the year and many successes ahead.



Daniel V. McGehee
Director, National Advanced Driving Simulator
Associate Professor
Mechanical & Industrial Engineering
Emergency Medicine
Public Health
Public Policy

FACILITIES & ENVIRONMENTS

NADS-1 SIMULATOR

NADS is best known for its high-fidelity ground vehicle driving simulator, NADS-1. The NADS-1 has the largest motion envelope of any driving simulator that can be utilized by external sponsors. The NADS-1 uses an actual vehicle cab mounted on a 13 degree-of-freedom motion base that can independently provide yaw, roll, pitch, turning, lateral, and longitudinal cues to the driver. Scenery is projected in 360 degrees around the driver on the interior walls of the dome. The combined motion, graphics, audio, driver controls, and software systems on the NADS-1 deliver the closest experience possible to driving an actual vehicle. The motion system's unique capabilities enable the NADS-1 to accurately reproduce motion cues for sustained acceleration and braking maneuvers, movement across multiple lanes of traffic, and interaction with varying road surfaces, realistic reproduction of which is not possible in fixed-base or limited lateral movement simulators. Motion cues for NADS-1 are therefore correlated with other sensory stimuli, providing the highest fidelity real-time driving experience in a simulated environment.

The NADS-1 has enough space to house a full-size vehicle cab which can be swapped in and out of the dome. The current collection of vehicle cabs include a passenger sedan, a mid-sized sports utility vehicle, a heavy truck semi cab, and an agricultural tractor cab. Each cab is instrumented to respond to driver inputs and provide feedback that replicates driving the vehicle on a real road.

Recent enhancements to the NADS-1 include the addition of a new Toyota Camry vehicle cab which features a fully programmable driver infotainment system. The control room has also been updated, undergoing cabling organization and consolidation, as well as being outfitted with new displays. These new control room displays allow researchers to see the driver's vehicle on a top-down map and provide sophisticated overlays with data on driver steering, acceleration, and brake input. Improvements to covering and insulation were also made to simulator bay walls, with additional facility work to be completed in the upcoming fiscal year.

Watch videos and view additional images on our website:

www.nads-sc.uiowa.edu/media

NADS-2 SIMULATOR

Our facility also houses the NADS-2, a high-fidelity fixed base simulator that employs the same underlying software technology as the NADS-1, featuring three front visual channels with a field of view of 135 degrees. A monitor behind the cab can also be added to simulate rear view, if needed. The NADS-2 uses the same interchangeable cabs as the NADS-1 and is an ideal complement to the NADS-1 for simulation needs that don't require motion or wrap-around visuals.

SPRINGFIELD VIRTUAL PROVING GROUND

The NADS-developed, 285 square mile virtual proving ground, Springfield, replicates the look and feel of urban, suburban, residential, rural highway, and interstate settings. The photo-realistic driving environment contains roads, signs, and lane markings based on international standards, with buildings and scenery inspired by real-world locations. Realistic pedestrian and bicyclist models with accurate bio-motion allow for driver interactions with other road users. Springfield provides flexibility in modifying roadway environments, traffic conditions, and many other features, allowing for greater adaptability in study design. Springfield can been driven and used in the NADS-1, NADS-2, and miniSim™ simulators.

During fiscal year 2017, a number of enhancements were performed to the Springfield world, such as creating and integrating an additional rural roadway and new freeway rest areas.

miniSim™

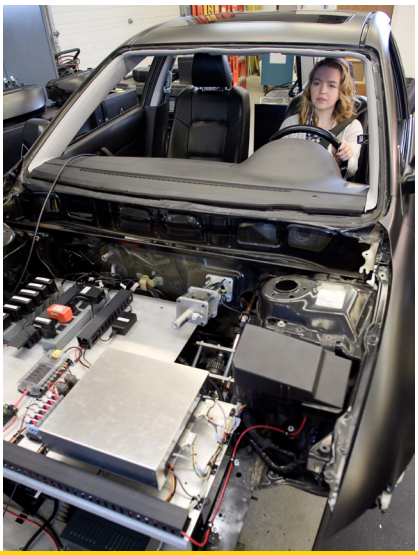
ANDREW VEIT, MINISIM PROGRAM MANAGER

The NADS miniSim™ is a versatile and cost-effective driving simulation software platform suited to human factors and clinical research, product development applications such as user-interface design and evaluation, and driver training. The miniSim utilizes technologies and know-how developed over decades of simulator engineering and research at NADS. It facilitates research-based connections and community across many disciplines and institutions. There are nearly 70 simulators at 50 sites in the US, Canada, and Europe, including universities, laboratories, and vehicle manufacturers and their suppliers. Since 2009, total funding for miniSim projects has exceeded $4.1 million. Ongoing yearly user license fees fund support activities and new software releases.

The miniSim is a software platform that can be deployed over a rage of simulator fidelities. All miniSim simulators utilize a single PC and are capable of driving multiple displays. Accessories include synchronized video recording and eye-tracking systems. These systems are reliable and lower cost than many commercially-available systems. A team of dedicated NADS staff members design, integrate, and support these systems, and students in the engineering and computer science fields contribute to their design and development.

While many miniSim systems are compact Quarter-Cab, Simplified-Cab, or Desktop systems, we routinely engineer simulators to meet a sponsor's specific requirements; most recently, for Yale University's Developmental Neurocognitive Driving Simulation Research Center.

The Yale system utilizes a custom-built half-cab with a large curved projection screen. The system is synchronized with additional instrumentation including EEG, eye-tracking, and video capture to create a unique experimental tool for neurocognitive and related medical research.



Custom-built half-cab miniSim™ for Yale University's Developmental Neurocognitive Driving Simulation Research Center

WWW.NADS-SC.UIOWA.EDU/MINISIM

VEHICLES

Automated vehicle technology is revolutionizing transportation and mobility unlike any other technology of the past several decades. Vehicles and their underlying technologies are changing at a rapid pace. The UI College of Engineering has been studying such technology for 25 years now, and many of the advanced driver assistance technologies and vehicle safety systems have been in research and development programs at the UI. The UI specializes in driver performance and behavior and how to design the user interface of such systems. As vehicles become increasingly automated, the UI is leading a number of advanced research projects in automated and connected vehicles, funded by government and industry.

To this end, together with our industry partners, the NADS automated vehicles division is being built with a broad range of capabilities. These vehicles will be used to collect data for research programs funded through industry and government contracts. Usage fees are charged to funding agencies to utilize and support these vehicles.

During fiscal year 2017, NADS added a Tesla Model S 75D to our world-class on-road fleet. The Tesla was acquired as a part of industry-funded research to study driver response to advanced automated technologies. Selected other research vehicles in our fleet include a Volvo XC90, equipped with all advanced driver assistance system technologies available on the market today, and a Toyota Camry XLE. The Toyota Camry XLE is an on-road vehicle that also supports a simulator mode of operation. To support data collection, the vehicle is instrumented with cameras, sensors, and a custom addressable multi-function touchscreen dashboard display.

Additionally, NADS often receives vehicles as long-term loans from vehicle manufacturers and other partnering organizations for research. All vehicles are maintained in-house, with the UI, or in cooperation with partnering manufacturers/organizations.

IOWA'S AUTOMATED VEHICLE PROVING GROUNDS

In 2017, the US DOT named the Iowa City/Cedar Rapids corridor as one of the nation's ten designated Automated Vehicle Proving Grounds (AVPG). These ten AVPGs were selected from a competitive group of more than 60 applicants. The prestigious designation recognizes our 25-year history in automated vehicle research and encourages testing and information sharing around automated vehicle technologies in the region. It is also the next logical step in an effort to advance the safe deployment of more highly automated vehicle technology.

The Iowa AVPG focuses on the **diversity** of automated vehicle testing environments that Iowa has to offer, including both physical roads and virtual simulation environments. Unlike other proving grounds, the Iowa City/Cedar Rapids corridor features variety in climate, road users, and roadway landscapes, including the nation's largest and most expansive simulated virtual proving grounds at NADS. As one of the few proving grounds in the Midwest and, with agriculture as a building block of our past and essential part of our future, we are uniquely positioned to be a leader in assessing and effectively deploying advanced technologies to benefit the safety of those traveling our rural roadways.

The AVPG is developing through a partnership between the UI, the Iowa City Area Development Group (ICAD), and the Iowa DOT.

AUTOMATED.UIOWA.EDU

IOWA AVPG FOUNDING PARTNERS:

IOWA DOT

THE UNIVERSITY OF IOWA

IOWA CITY AREA DEVELOPMENT
DRIVING INNOVATION

AUTOMATED VEHICLE PROVING GROUNDS ACROSS THE US

1. City of Pittsburgh and the Thomas D. Larson Pennsylvania Transportation Institute
2. Texas AV Proving Grounds Partnership
3. U.S. Army Aberdeen Test Center
4. American Center for Mobility (ACM) at Willow Run
5. Contra Costa Transportation Authority (CCTA) & GoMentum Station
6. San Diego Association of Governments
7. Iowa's Automated Vehicle Proving Grounds
8. University of Wisconsin-Madison
9. Central Florida Automated Vehicle Partners
10. North Carolina Turnpike Authority

"This designation will further bolster opportunities for STEM education and energize the next generation of scientists and engineers in Iowa."

- Iowa Governor Kim Reynolds

"This U.S. designation reinforces the long history of advanced vehicle safety research at the University of Iowa and our strong public and private partnerships across the state. Iowa is poised to be a leader in vehicle innovation."

- Former Iowa Governor Terry Branstad

PROJECT HIGHLIGHTS

ADVANCED VEHICLE TECHNOLOGIES

At NADS, we are continuously expanding our work and expertise in the field of advanced vehicle technologies. With a wide knowledge base, our researchers strive to build on our already impressive areas of strength to explore new topics of vehicle safety research. From education campaigns to warning systems to driver responses with advanced displays, we are leading the way in the study of high-impact advanced vehicle technology.

Human Factors/Safety and Automated Vehicle Program

The State of Iowa is taking a proactive approach to preparing for increasing levels of vehicle automation and creating an environment where automated driving and advanced transportation technologies can thrive. For this project, the Iowa DOT is partnering with NADS, other academic institutions, and the private sector to develop and deploy a set of key capabilities centered around providing automotive-grade information to drivers, machines, and the transportation system in preparation for higher levels of vehicle automation in Iowa. The UI team developed and conducted several demonstrations featuring automation in the vehicle. The demonstrations provided information to the driver (to make safe and timely decisions in their driving) and to the vehicle (to better enhance and improve the safety of automated vehicles).

National Driver Safety Education Campaign

The UI was selected as the prime recipient to develop a comprehensive education campaign to educate the public about advanced vehicle safety technologies and defensive driving techniques to improve safety on American roadways. The education campaign, titled MyCarDoesWhat, was built on the foundational research collected by the UI in the National Consumer Survey of Driving Safety Technologies. To date, MyCarDoesWhat has achieved more than six billion media impressions and paved a path forward for providing the driving public with information and education about life-saving vehicle safety technologies. The campaign is described in more detail in the Program Spotlight section of this report.

Technology Demonstration Study

The UI-led study utilized both pre- and post-visit surveys to comprehensively measure driver attitudes toward and knowledge about five advanced driver assistance systems (ADAS) following initial exposure to the technologies. The surveys included questions assessing participants' knowledge of the ADAS technology purposes, functions, and limitations, as well as questions relating to attitudes toward ADAS technologies, including usefulness, trust, and apprehension. Questions were also asked to address interest in purchasing vehicles with these technologies and preferences for learning how to use them. As the first of its kind, the study serves as a model base to continue to measure and evaluate drivers' attitudes toward and knowledge about current and future vehicle technologies.

Examining Motorists' Experiences with, Reactions to, and Training Needs for ADAS

Previous NADS studies indicate that, while a fair amount of the general public has interacted with a number of ADAS technologies, there is significant uncertainty on the knowledge of these systems. In early 2017, NADS researchers partnered with the AAA Foundation for Traffic Safety to investigate the knowledge, attitudes, behaviors, and experiences of drivers who own or lease vehicles equipped with adaptive cruise control, lane departure warning, lane keeping assistance, blind spot monitoring, rear cross traffic alert, and parking assist systems. The study features a large-scale national survey and represents one of the first of its kind, providing significant insight into how drivers' experiences with ADAS technologies relate to their understanding, attitudes, and usage of the systems. This work will help better identify ADAS educational needs for the driving public.

Haptic Warning Characteristics for Vehicle-to-Vehicle Safety

As part of an on-going NHTSA program investigating connected vehicle technologies and the potential display modalities associated with these systems, NADS is conducting an investigation of characteristics of haptic in-vehicle alerts and their effect on driver responses. This effort follows a previous exploration of auditory alert characteristics. Three characteristics of a vibrating seat will be evaluated for differences in driver response in a potential severe collision scenario. The results will inform future versions of the human factors design guidance for driver-vehicle interfaces.

Aftermarket Safety Device Driver Vehicle Interface Guidance Development

As connected vehicle technology becomes more available, the potential for aftermarket collision warning systems increases. The focus of this effort was to determine whether the types of displays expected in aftermarket systems elicit different responses from drivers than original equipment manufacturer (OEM)-installed systems. Audio only and audio-visual represented the potential aftermarket display types, while an integrated display represented an OEM-installed system. While there were differences in driver response type across three connected vehicle application events, the different aftermarket interfaces did not elicit different response types within each connected vehicle application. The performance of the integrated display across all three connected vehicle applications suggests aftermarket collision warning systems without integrated displays may be less effective than OEM-installed systems.

Transfer from Highly Automated to Manual Control: Performance & Trust

While the projected benefits of automated vehicles are many and varied, so are the concerns over their perceived limitations and challenges. This NHTSA-funded study examined transfers of control from high levels of automation to manual control. An independent variable of automation failure was used to study the degree of trust that a driver has, and potentially loses, in the automation. The NADS-1 high fidelity motion base simulator was used to capture the 'feel' of riding in an automated vehicle while potentially disengaging completely from the driving and monitoring tasks.

Safety Benefits of Adaptive Headlight Systems for Drivers, Pedestrians, and Bicyclists

Adaptive headlight systems may offer safety benefits, not only to drivers of the equipped vehicles, but also to vulnerable road users, including pedestrians and bicyclists. However, these systems may also have unintended consequences that emerge in the behaviors of the affected parties. The objective of this industry-funded project is to conduct a benefits analysis of an adaptive headlight system. This research makes use of the NADS-1 and NADS-2 simulators to measure driver responses, as well as the Hank Virtual Environments Lab simulators in the UI Department of Computer Science to measure pedestrian and bicyclist responses. To date, NADS researchers are near completion on the technical development needed to simulate more realistic headlights, as well as adaptive headlamp features required. Phase 2 experiments are planned to be completed over the next fiscal year.

PROJECT HIGHLIGHTS

ADVANCED VEHICLE TECHNOLOGIES (CONTINUED)

Advanced Displays and Controls

Recent focus on driver distraction has caused renewed focus on the design of in-vehicle displays and controls to ensure that they can be safely operated in the vehicle. As automobile manufacturers continue to integrate new technology into vehicles, additional focus is warranted on how to best evaluate some of these less traditional approaches in the vehicle. This project focuses on identifying near-term displays and controls for new vehicles and methods for assessing safety impacts.

Extension of a Driver Model for Driver Response in Lane Departure Scenarios

Since 2013, this multi-year partnership with the University of Wisconsin has sought to develop driver models for driver response and crash avoidance behavior in advanced driver assistance systems (ADAS). This effort on driver modeling for lane departures is the precursor to research aimed at more fully addressing the modeling needs for take over requests (TOR) in automated driving. The project concluded in February 2017.

Evaluation of Intersection Collision Warning Systems

A regional DOT is investing significant resources into Intersection Collision Warning Systems (ICWS) based on preliminary evidence of effectiveness. The goal of this project was to further examine the effectiveness of ICWS, as well as potential negative changes in driver behavior at intersections where the systems are installed. As part of this project, NADS developed a coding scheme to quantify driver scanning behavior at intersections with and without ICWS installed. This coding scheme was used by collaborators at a partner institution to measure the effectiveness of ICWS.

NOVICE DRIVERS

The UI and NADS have a long history in studying the developmental, social, technological, educational, and policy issues involved with novice drivers. Our reputation in this area precedes us, taking our researchers to places like South America this fiscal year to provide their expertise.

Census of Young Drivers in Iowa and Analysis of Licensing Trends

Annual counts of Iowa driver's licenses do not differentiate young drivers by what type of license they hold, the age segments used are broad, and cyclical trends are hidden. This project quantifies how many individuals were at each stage of licensure, their age when they began that stage, and how long they remained at each stage. Additionally, the project seeks to make this data widely available for the use of those conducting young driver traffic safety research and evaluate whether there have been significant changes in young driver licensing trends over time.

Approaches to Research of Novice Driver Outcomes After Driving Simulator Training

In recent years, the Federative Republic of Brazil made modifications to the driver training process, requiring candidates to now complete five lessons in a driving simulator before beginning on-road practical lessons. For the project, NADS researchers visited Brazil to observe this process. In a report, our researchers shared their novice driver and driving simulator expertise and made research recommendations that will evaluate and quantify outcomes related to novice driver training in Brazil.

Passenger Restriction Waiver Impact on Young Driver Crash Rates

In fiscal year 2017, the Iowa DOT awarded NADS this project to examine young driver crash rates for drivers who are and are not subject to the passenger restriction in the first six months of licensure. Data for the subsequent six months will also be analyzed in order to see if rates change after the restriction has ended.

NATURALISTIC DRIVING

Naturalistic data collection is an important tool for understanding driver behavior and transportation safety. During fiscal year 2017, NADS researchers continued work with our partners and sponsors in this field.

Using Naturalistic Data to Develop Simulator Scenarios

The extent to which the results from simulator studies translate to real-world behavior is still an open question. To enhance the generalizability of simulation, it is critical to develop simulator scenarios that better mirror the features drivers utilize in the real world. The objective of this project was to develop realistic simulator scenarios from real-world locations where naturalistic (SHRP2) data were collected. The simulator tiles developed in this process were then used to collect data from a large diverse sample of drivers under different impairment conditions, providing an initial proof of concept. This project was completed in June 2017, with researchers presenting a webinar on the project.

Pilot Analysis of Driver Safety Belt Use, Timing, and Position in Naturalistic Driving

While seatbelt use continues to slowly rise, further increasing belt use is still the most effective way to reduce fatalities and minimize injuries in motor vehicle crashes, as millions still do not buckle-up. In 2013, nearly half of all passenger vehicle occupants who died in crashes were unrestrained at the time of the crash. This industry-sponsored study used a naturalistic approach to observe participant videos from a previous foot pedal behavior study, analyzing seatbelt timing sequences and seatbelt fit.

PROJECT HIGHLIGHTS

DROWSY, IMPAIRED, & DISTRACTED DRIVING

NADS simulators are ideal for studying situations too dangerous to be tested on-road. At NADS, we have extensive experience in studying drowsy, impaired, and distracted driving. During fiscal year 2017, we continued our commitment to examining the risks and evaluating new technologies that can help to prevent these types of crashes from occurring.

Quantifying Drowsy Driving

By exploring and linking variables and estimates in the different datasets, NHTSA hopes to create new statistical models and cross-validate findings to establish valid estimates of drowsy driving crash risks. The SHRP2 project has yielded a large dataset, which can be used to evaluate the impact that drowsiness plays on driver behavior and performance in traffic safety. A pilot phase has been completed for this NHTSA-sponsored project in which NADS researchers have accomplished a number of objectives. These objectives include obtaining a data sample from the SHRP2 database with a high likelihood of drowsy driving, testing existing algorithms for drowsy detection, obtaining a crash and near-crash data sample from SHRP2, coding observer rating of drowsiness (ORD) values leading up to safety-critical events, developing drowsiness classifiers using driving data variables and driver-facing camera images, and testing correlations of driver survey data with ORD data.

In-Vehicle Drowsy Driving Detection and Alerting

Vehicle technology may be able to keep drivers alert or motivate them to pull over to stop and rest. Sponsored by NHTSA, this project seeks to understand and evaluate in-vehicle drowsiness countermeasures. The initial phase involved meeting with vehicle manufacturers to assess the current state of these technologies and the development of a protocol to test drowsiness countermeasures in the NADS-1 high-fidelity driving simulator in the context of long multi-hour drives. Recently, NHTSA awarded the optional second phase of the research to conduct a large-scale evaluation of drowsiness mitigation technology using the NADS-1 driving simulator. This research will consist of a large overnight simulator study to test the effectiveness of different vehicle technologies for drowsy drivers. Preparations are ongoing.

Defining Drowsiness with the Driver Monitoring System

Driver state detection will be critically important in future vehicles, particularly as automated capabilities increase. Driver drowsiness represents a continuum from fully awake to asleep, and the point at which a state detection system can identify drowsiness significantly influences the available countermeasures. In collaboration with Aisin Technical Center of America, Inc., this project intends to understand the range of drowsiness and what can be captured using a camera-based driver monitoring system. It includes an overnight data collection in the NADS-1 simulator with four-hour drives, some of the longest to ever be completed at NADS. In fiscal year 2017, NADS researchers were awarded additional funds to extend the project, including support for an upcoming SAFER-SIM project to understand driver state in highly-automated vehicles and to carry out additional research on sensors that can be used to identify driver state.

Cannabinoid Dosing and Safe Driving in Medical Marijuana Patients

A pressing question to both patients and physicians concerns the pattern of marijuana dosage and administration that offers therapeutic benefits while preserving the capacity to safely perform a key activity of daily life–operation of a personal motor vehicle. This study employs observational and experimental methods to assess the performance of medical marijuana patients and controls in the NADS miniSim™. The information gathered will elucidate whether regular daily users of medical marijuana can safely operate motor vehicles under conditions that model a typical morning drive to work, or shortly after a common dose of oral THC medication. As a partner in this work, NADS provides guidance on driving simulator methodology to collect performance data and regulatory issues, as well as reducing the simulator data.

Driving After Distal Radius Fractures

Distal radius fractures are a common orthopaedic injury. Though patients often ask their physicians when they can safely return to driving, there is no current consensus on when it is safe to do so. Utilizing a driving simulation protocol, this ongoing study aims to address the question of returning to driving after a distal radius fracture by evaluating patients at two, six, and 12 weeks after operative fixation. General driving performance and crash avoidance are evaluated and compared to both normative data and clinical data, including range of motion and splint usage. Survey data regarding subject perception of driving efficacy is also obtained. Preliminary results show differences in normal vehicle control at two weeks after surgery relative to normal healthy subjects. The data collected will help guide physician recommendations regarding return to driving and provide information on driving performance after an upper extremity injury.

Drugged Driving: Effects of Pain and Anxiety Medications on Driving Performance in a Simulator

Opioid analgesics and benzodiazepine are commonly used together, either therapeutically or recreationally, which enhances the effects of each. This work examined the effects of Xanax and Norco (Vicodin) on electrical brain activity using EEG, as well as applied driving performance on the NADS miniSim. The study drive employed has been utilized in examinations of many different impairing substances including alcohol, cannabis, antihistamines, caffeine, amphetamines, and benzodiazepines. By using the same driving scenario, and a similar protocol to previous work, researchers were able to compare pharmacodynamic effects between drug classes, providing a clearer look at the effects of these drugs, both alone and in combination, on driving performance.

Task Evaluation for Hyundai-Kia Motors

Over four years, NADS researchers have been working with Hyundai America Technical Center, Inc. to conduct distracted driving task acceptance testing to determine compliance to the Visual-Manual NHTSA Driver Distraction Guidelines For In-Vehicle Electronic Devices. The NADS team has evaluated more than 225 tasks on nine media systems. Interface locations include a media display in the central column, buttons on the steering wheel, a heads-up display, and a cluster-display in front of steering wheel for tasks such as radio, media, Bluetooth phone, navigation, setup, and climate controls. Task development, preparation for testing, participant recruitment, data collection, verification, analysis, and reporting are all completed six weeks following the receipt of a media system.

PROJECT HIGHLIGHTS

ADDITIONAL STUDIES

With staff expertise in a wide variety of fields and constantly expanding collaborations with faculty affiliates in nearly every UI college, condensing the research projects conducted by NADS staff into just a few categories isn't a simple task. The following are additional projects of note carried out during fiscal year 2017.

Replicating Emergency Events in a Controlled and Safe Environment

Sudden unintended acceleration (UA) is a rare but dangerous event where the vehicle rapidly and unexpectedly accelerates. While a fair amount is known about the factors that precipitate UA, little is known about how drivers respond in such events leading to crashes. The goal of this study was to investigate driver response to UA in a controlled yet realistic experimental setting with the high-fidelity NADS-1 driving simulator. The study examined a combination of driver characteristics, such as age and gender, in addition to driver distraction, to study responses to sudden UA during low-speed parking maneuvers and higher-speed left turns. These data suggest variable response patterns in sudden UA events, which often lead to diminished control of the vehicle. While drivers often expressed confidence in their ability to control the vehicle in emergency situations, results indicate that the unexpected nature of sudden UA led to indecision and crashes for a large percentage of drivers.

TraumaHawk

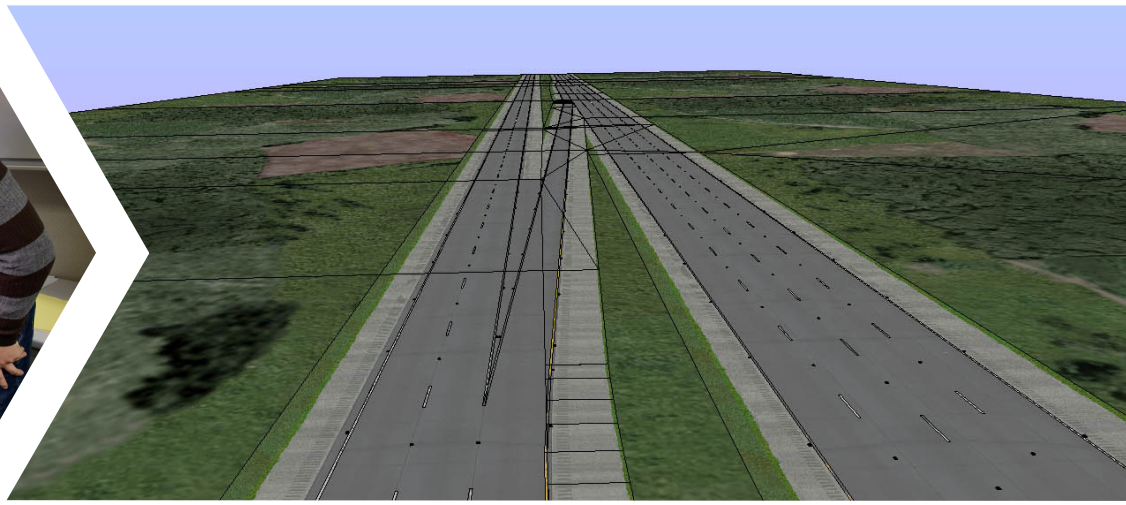
Under sponsorship from the Iowa DOT and the Federal Highway Administration (FHWA), TraumaHawk successfully closed out Phase III of the project during fiscal year 2017. In May 2017, TraumaHawk continued with Phase IV. More detail about the TraumaHawk program is provided in the Program Spotlight section of this report.

Understanding the Context of Unintended Accelerations: An Engineering Analysis

This study aimed to generate a better understanding of the variety of situations that are factors in low-speed unintended acceleration (UA) events. These include situations like parking in garages, driveways, streets, and parking lots. In this collaborative project, NADS researchers provided the engineering perspective and the UI Department of Geographical and Sustainability Sciences researchers offered a GIS perspective to develop an ontology of parking behaviors. Naturalistic driving data that consisted of real trip data from instrumented vehicles was used. Data analysis and algorithm exploration with machine learning techniques took place at NADS to make use of vehicle location and trajectory data and discovered parking classifications to develop elements of a system that could be used to detect UAs. The project concluded in 2016.

Estimating the Costs of Traumatic Injuries to Unbelted Occupants in Motor Vehicle Crashes

In late fiscal year 2017, the Iowa DOT awarded NADS this project, which aims to estimate the costs of traumatic injuries suffered by adult occupants in motor vehicle crashes in Iowa from 2012 to 2016. This will be the first in-depth analysis of the effect of seatbelt use on the cost of motor vehicle injuries in Iowa in 30 years. The analysis will compare costs for occupants who are belted and not belted and also examine the financial burden of the injuries by payer (e.g., private insurance, Medicare, Medicaid, self-insured, uninsured). The analysis will also consider the effects of different crash, vehicle, and occupant characteristics on costs of injuries for unbelted occupants. For example, seating position (i.e., driver vs. passenger, front seat vs. rear seat), number of vehicles, vehicle type, manner of crash or collision, number of occupants in the vehicles, location, or alcohol/drug involvement.



INNOVATIVE GRAPHICS & PROGRAMMING

Working behind the scenes, the NADS development team supports researchers and programs to create and refine virtual environments. In addition to the previously mentioned NADS-1 and Springfield upgrades, the NADS development team has also been busy creating and testing innovative graphics and programming scenarios.

SAFER-SIM Converter

The goal of this project was to import CAD transportation design models into NADS simulators. The imported models can be used within the existing NADS tool set and visualized on NADS simulators. Currently, the converter generates source data files that must be integrated into the tile model library. This development is a crucial link to support simulator visualization of third party models.

3D & Models

During the fiscal year, the development team released a new update to the Tile Mosaic Tool and Tile Model Library. This update included 336 tile models (an increase from 91) and a graphical user interface (GUI)-integrator tool for importing third party models into the library. Tile and object models were also developed for miniSim™ managed lane research.

Additionally, the team developed three new vehicle models for the NADS model fleet, which are ready for testing in the NADS-1, NADS-2, and miniSim simulators.

Interactive Scenario Authoring Tool (ISAT)

ISAT is a mature GUI-based tool used by researchers and experiments to design scenarios for more than a decade. During fiscal year 2017, the team developed several scripts to automate object placement and control to streamline and facilitate scenario authoring tasks. These enhancements were used to automate complex authoring activities, including scenario development for the ophthalmology miniSim, consisting of hazard object detection at night with glare condition tasks.

Programming Capabilities/Enhancements

A number of programming enhancements were developed in order to increase efficiency, reduce error and, in some cases, to provide an automated solution to complicated processes (such as scenario authoring and tile model construction). These include:

- A tool to create control room world maps from Logical Road Information (LRI) files.
- A GUI-integrator tool to import models into the NADS Tile Model Library. This procedure requires special formatting of the tile model, data associated with the model, all files to be integrated into the Library in the proper location, etc.
- A script to define unique objects from collections of objects (used in Correlated Virtual Environment Database (CVED)/BLI). Previously, to calculate object IDs, each had to be manually generated or created with the help of a spreadsheet. With this script, any number of objects can be rapidly defined within the modeling environment.
- A script to generate Hierarchical Concurrent State Machine (HCSM) options and groups for ISAT scenarios. This was used by Aisin and in drowsiness studies conducted in the NADS-1 simulator. Seven hundred unique objects were modified during a single scenario. Previously, each object would have required multiple manual edits.
- A script to clone and manipulate source data in order to produce complex tile models. This tool was used to produce a complex parking lot model containing 28 intersections and 45 roads. By comparison, a directional three-leg interchange model contains seven intersections and 13 roads.

PROGRAM SPOTLIGHT: TRAUMAHAWK

On average, personnel at the UI Hospitals and Clinics have only seven to eight minutes of warning from a trauma page before an ambulance arrives at the emergency department (ED) with a crash victim. TraumaHawk is a smartphone app for law enforcement designed by the UI to connect first responders to hospital trauma teams. At the scene of a crash, first responders use TraumaHawk to generate and send a report to the receiving trauma center with vital collision information, as well as photographs showing extent of intrusion and damage in a vehicle's occupant compartment. This TraumaHawk alert provides ED physicians and nurses with a better sense of the severity of a patient's injuries and, as a result, allows for better preparation of resources, such as rooms, equipment, and personnel.

Officially deployed in east-central Iowa in the fall of 2013, TraumaHawk was designed so that on-scene personnel can prepare a report in about one minute. The app alerts trauma staff to the exact location of the crash, sends relevant photos (law enforcement can select views of the crash through a simple user interface), and allows for the addition of contextual information. Icons help first responders focus on relevant areas of interest, such as looking for steering wheel deformation, A-pillar compromise, roof crush, and other intrusions into the occupant compartment.

IN 75% OF CASES, TRAUMAHAWK ALERTS OCCURRED 9–29 MINUTES PRIOR TO A TRAUMA PAGE

Completed during fiscal year 2017, Phase III of the program revised the app and backend software, enhanced training modules for law enforcement and emergency department staff, increased the geographical area with Iowa State Patrol, and monitored outcomes.

Through Phase III of TraumaHawk, 69 crashes presented to the UI Hospitals and Clinics ED utilized the TraumaHawk app. Forty of the 69 TraumaHawk alerts had corresponding ED trauma pages available, allowing for comparison. About 63% of the TraumaHawk alerts occurred before the trauma page. When the TraumaHawk alert occurred first, the median time was 12 minutes prior to the trauma page. In 75% of cases, the TraumaHawk alert came in nine to 29 minutes prior to the trauma page. The maximum amount of time a TraumaHawk alert came in prior to the trauma page was 90 minutes.

These results continue to show that there is a significant time advantage for the ED when a TraumaHawk alert is issued. This increase in the notification time allows for the appropriate facility and human resources to be prepared and standing by, provides more time to organize necessary care plans for the incoming trauma patients, and additional time to alert appropriate specialists prior to patient arrival.

Phase IV of TraumaHawk, begun in fiscal year 2017 and continuing into fiscal year 2018, will upgrade the program's server, increase the geographical area of service, integrate central Iowa law enforcement, and monitor outcomes.

AUTOMOTIVE TRAUMATOLOGY

The University of Iowa Emergency Medicine

THE NATIONAL ADVANCED DRIVING SIMULATOR

PROGRAM SPOTLIGHT: MyCarDoesWhat™.org

Know More. Drive Safer.

In January 2014, the UI brought in the National Safety Council (NSC) and a number of other partners to embark on an automotive safety research program. The goal was to develop and implement a National Educational Campaign aimed at helping drivers understand advanced driver assistance systems (ADAS) and other safety-related features in their vehicles. The campaign sought to fill a major void in driver and consumer education: understanding the critical safety technologies that can save lives and prevent injuries on American roadways.

During fiscal year 2017, the MyCarDoesWhat (MCDW) campaign celebrated its third and final year. In Year 3, the campaign continued to grow and expand the brand, messaging, and various media efforts. The team built upon the successful launch in Year 2 and gathered insight from the media metrics to improve the overall reach of the campaign. Year 3 highlights include:

- Innovative campaign launch targets and strategies
- Expanded social media targets
- Website updates and upgrades
- Industry and safety professional outreach and partnership development
- Research projects finalization, reporting, and publication efforts
- Achievement of more than six billion media impressions

With the conclusion of Year 3 and all major project tasks and deliverables completed, the UI is continuing to invest in sustaining the MCDW campaign along with our partners.

WWW.MYCARDOESWHAT.ORG

"As fast as new safety features are coming online, it's not difficult to see why people are having trouble catching up. Thanks to the National Safety Council and the University of Iowa, the MyCarDoesWhat campaign will help change that. It's understandable, it's interesting, and it will help you keep yourself and your passengers safer. I urge you to take MyCarDoesWhat.org for a test drive today."

- Anthony Foxx, former Secretary of Transportation
US DOT

TOP YEAR 3 ACCOMPLISHMENTS:

- Achieved more than **6 billion** media impressions
- Recipient of Platinum PR Award for public service announcement
- Recipient of North American Excellence Award

THE UNIVERSITY OF IOWA

NATIONAL SAFETY COUNCIL®

PROGRAM SPOTLIGHT: SAFER-SIM

DAWN MARSHALL, SAFER-SIM DIRECTOR

Safety Research Using Simulation (SAFER-SIM) is comprised of a multidisciplinary, synergistic team of researchers in human factors, engineering, computer science, and psychology who use innovative simulation approaches ranging from microsimulation to human-in-the-loop simulation to promote safety. SAFER-SIM sponsors research, outreach activities in STEM areas, and workforce development efforts in transportation safety.

SAFER-SIM's multidisciplinary team studies how road users, roadway infrastructure, and new vehicle technologies interact and interface with each other using microsimulation and state-of-the-art driving, bicycling, and pedestrian simulators. SAFER-SIM's platform is used to not only understand present needs, but also to evaluate and develop futuristic technologies.

In the fall of 2016, the US DOT awarded the SAFER-SIM University Transportation Center (UTC) a Tier 1 UTC grant with a research priority of promoting safety, continuing efforts from its 2013 UTC-awarded program. The grant provides $1.4 million to the SAFER-SIM program in the first year, with up to $7 million in funding over five years.

The SAFER-SIM UTC consortium consists of the UI, University of Central Florida, University of Massachusetts-Amherst, University of Puerto Rico-Mayagüez, and University of Wisconsin-Madison. These sites worked together on the 2013 UTC and built strong relationships through collaboration that has led to the further advancement of transportation safety research, education, and workforce development.

At the end of fiscal year 2017, SAFER-SIM sites were working diligently on completing projects and submitting deliverables associated with the 2013 UTC. During the year, SAFER-SIM researchers continued to participate extensively in leadership development, including participation with seven invited presentations, 29 advisory committees, six editorships, 15 editorial boards, and 14 positions in professional organizations. Education and workforce development activities reached 1,182 K-12 students, as well as 30 university and continuing education students, including 27 student employees (18 minority students), in addition to supporting three Masters and Doctoral theses.

Also during the year, SAFER-SIM continued successful technology transfer and collaboration through webinars, nine press releases, 35 media requests, facility tours, events attended by 120 practitioners, and a news digest that reaches 309 individuals.

WEBSITE:
SAFERSIM.NADS-SC.UIOWA.EDU

YOUTUBE CHANNEL:
WWW.NADS-SC.UIOWA.EDU/MEDIA

"I think the greatest thing about the center is that it creates a community of researchers that work in different areas, capitalizing on their strengths to solve a set of problems that don't fit neatly into one discipline. This program really links researchers together in a way that would be very difficult to do otherwise."

- Joseph Kearney, professor of computer science
UI College of Liberal Arts and Sciences
SAFER-SIM associate director overseeing research activities

"SAFER-SIM complements the University of Iowa's unique, interdisciplinary approach to transportation safety. The center's innovative STEM-education activities, research, and workforce development will lead to safer roadways, and enhance Iowa's position as a national leader in ground transportation."

- Iowa Governor Kim Reynolds

SAFER-SIM BY THE NUMBERS...

The SAFER-SIM UTC boasts the following fiscal year 2017 successes:

OUTREACH

- 12,298 individuals interacted with, including K-12 students, college students, and community members of all ages
- 19 events participated in, such as the Iowa State Fair and STEM festivals
- 15 tours of NADS conducted
- 5 in-school visits

WEBINARS

- 16 webinars hosted
- 844 registrations to attend live webinars
- 1,348 YouTube views of recorded webinars

SAFER-SIM SYMPOSIUM

- 3-day symposium hosted at the UI in October 2016
- 64 attendees (researchers and students)
- 5 institutions represented

SAFER-SIM CONSORTIUM MEMBERS:

University of Iowa
University of Wisconsin-Madison
University of Massachusetts-Amherst
University of Central Florida
University of Puerto Rico-Mayagüez

COMMUNITY OUTREACH

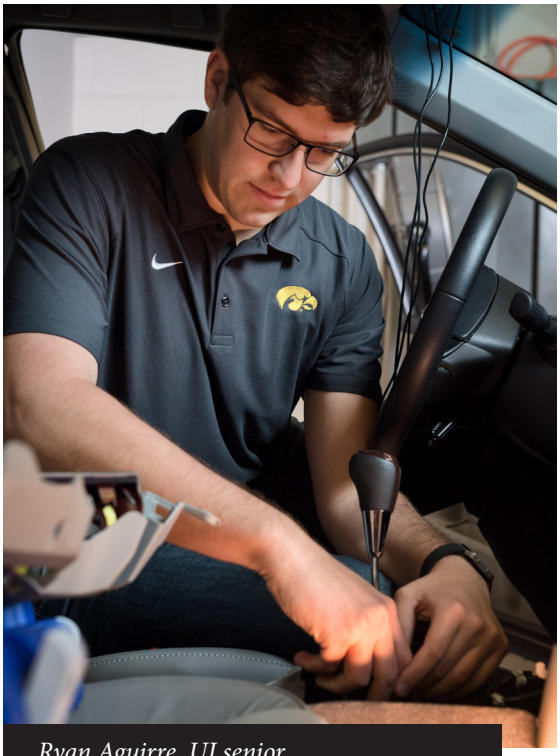
Commitment to outreach is one of our core values. At NADS, we are passionate about sharing our message and educating UI faculty, staff, and students, community members, Iowans, and the general public about the work we do.

> *"We want to create a climate and culture for the kind of ambition that will help to develop the next generation of car. We are striving to inspire visitors of all ages, building a place where they can discover how they can make an impact in this field and beyond."*
>
> - Daniel V. McGehee, Director
> National Advanced Driving Simulator

In addition to the groups that visit through our SAFER-SIM program, NADS also hosts tours, open houses, and informational meetings for businesses, organizations, government entities, schools, and the general public. During fiscal year 2017, NADS provided tours for the Iowa State Patrol, Farm Bureau Insurance, eastern Iowa local government leaders and staff, foreign delegations, and many others.

NADS is also a part of the UI Mobile Museum, helping inspire Iowa communities to understand the world with exhibits featuring cutting-edge research, one-of-a-kind artifacts, and interactive digital media.

INVESTING IN OUR STUDENTS



Ryan Aguirre, UI senior
Mechanical Engineering Assistant

As a research unit within the College of Engineering, NADS strives to be an active contributor to the UI and college's initiatives. This includes working diligently to involve students across the entire spectrum of our work, preparing them to be experts in their disciplines and leaders in a variety of fields. From graphics to program development to mechanics to working with research participants, students at NADS are receiving a holistic, transformative educational experience that leads them to be engaged citizens.

As we move into fiscal year 2018 and beyond, a key objective of NADS' strategic plan is involving students even further in our research and development activities. We recognize not only the impact that our work can have for students' careers, but also that they can aid us in expanding our minds as well.

"My work at NADS has given me a lot of experiences that I didn't know I was going to have. It made my college experience a lot more interesting, and I believe it has made me a more well-rounded person and a better engineer."

- Alec LaVelle, UI senior
Undergraduate Researcher

OUR STUDENTS

During fiscal year 2017, NADS fostered student learning and career development through the following employment and internship opportunities:

- 24 UI students employed
- 1 undergraduate internship
- 6 high school student internships

"My work with the simulators at NADS has helped me think about my career and my future. I'm looking at graduate programs that focus on automation and simulation. It's something that I could see myself doing in the long run."

- Emma Ciborowski, UI senior
Research Assistant

STRATEGIC PLANNING

OUR CORE VALUES:

- INNOVATION
- COLLABORATION
- EMPOWERMENT
- INTEGRITY
- COMMITMENT TO OUTREACH

MESSAGE FROM DEPUTY DIRECTOR OMAR AHMAD

During fiscal year 2017, NADS staff tackled the challenge of creating a new five-year strategic plan. The process was a collaborative one, seeking input from staff at each step along the way. A core group of Strategic Plan Leads were involved in working to translate our employee input into a focused plan for the road ahead.

Putting down on paper the vision that drives us and creating a road map to achieve our goals was no easy task. Determining the focused set of core values that guide us in the varied work we do was a challenge as well. But staff came together and the results speak for themselves. We refined our mission statement, defined our vision, established our core values, and developed a strategic plan full of goals, objectives, and strategies. Though translating ideas into actual words on paper can be daunting, our staff carried out the task with relative ease.

The hardest part of any goal setting process isn't the planning, but the follow through. As we enter fiscal year 2018, our team has already begun efforts to put our plan into action. Perhaps, most importantly, we've agreed that the plan is more than just words on paper; it's a living document that is certain to change over time. I'm proud of the work our entire staff has done to guide NADS through the next five years and look forward to seeing our plan and visions become reality.

MISSION: Improving safety by researching the connection between drivers, motor vehicles, and road users
VISION: Driving excellence: Transforming the future

DRIVING ASSESSMENT 2017

9TH INTERNATIONAL DRIVING SYMPOSIUM ON HUMAN FACTORS IN DRIVER ASSESSMENT, TRAINING, AND VEHICLE DESIGN

The UI and NADS hosted the 9th International Driving Symposium on Human Factors in Driver Assessment, Training, and Vehicle Design June 26-29, 2017 in Manchester Village, Vermont.

Founded in 2001, this biennial symposium focuses on providing an interdisciplinary forum for scientific exchange between users of driving assessment tools, applications, and technology. Attendees include researchers and practitioners from countries worldwide, working on applications of driving assessment from the perspectives of engineering, psychology, medicine, and public health.

THE 2017 CONFERENCE BOASTED 165 ATTENDEES FROM 8 COUNTRIES

The conference includes world-renowned keynote speakers, breakout meetings, poster sessions, outstanding student awards, exhibitors, and local activities.

The 2017 Driving Assessment conference featured Toyota Distinguished Keynote Speaker Ron Medford, Director of Safety for Google Car/Waymo and Distinguished Keynote Luncheon Speaker Dr. John Senders, Emeritus Professor, University of Toronto.

Principal sponsors were Toyota Collaborative Safety Research Center (CSRC) and Honda American Motor Company, Inc. Co-Sponsors included the AAA Foundation for Traffic Safety, Human Factors and Ergonomics Society (HFES), Liberty Mutual Insurance, Lytx, US DOT Federal Highway Administration (FHWA), University of Kansas Medical Center, and the National Highway Traffic Safety Administration (NHTSA).

WWW.DRIVING-ASSESSMENT.ORG

HONDA OUTSTANDING STUDENT AWARDS

The Driving Assessment 2017 Honda Outstanding Student Paper Award program, sponsored by American Honda Motor Company, Inc., provides a certificate and cash award to the student who conducts outstanding research accepted for presentation at the Driving Assessment conference.

David Anderson, University of Nebraska Medical Center (runner-up), Ja Young Lee, University of Wisconsin-Madison (first), Timothy Dick (Honda), and Danielle Filio, University of Guelph - Canada (runner-up)

"The caliber of student papers we receive for the Driving Assessment Conference is always outstanding, and this year is no exception. The Organizing Committee had a difficult task in selecting the 2017 winners," said Dr. Daniel McGehee, Organizing Committee Co-Chair.

Timothy Dick from Honda R & D of the Americas presented the award. "Today's student awards highlight the importance of understanding driver behavior in the areas of distraction, fitness, and experimental methods. We look to these bright students for fresh thinking and innovation."

MEMBERSHIPS, HONORS, & WORK

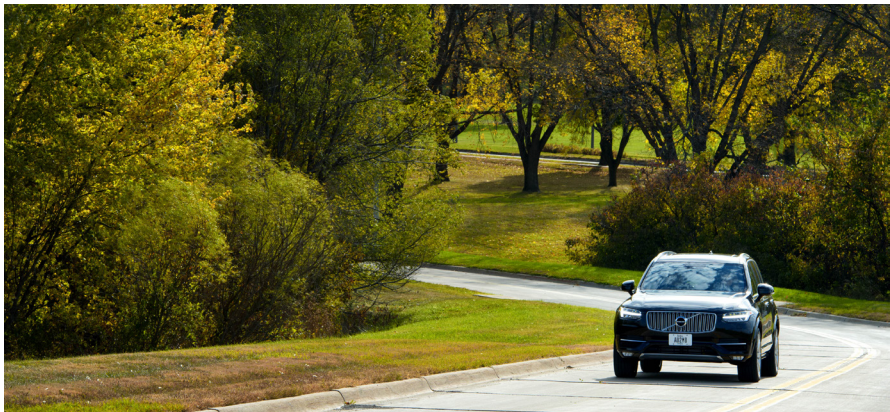
OMAR AHMAD
Co-Chair, Transportation Research Board Committee on Simulation and Measurement of Vehicle and Operator Performance, AND30
Member, Transportation Research Board Committee on Motorcycles and Mopeds, ANF30

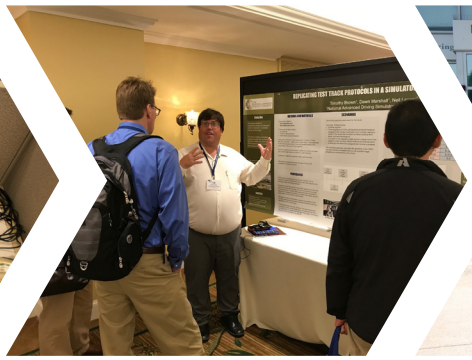
TIMOTHY BROWN
Chair, Transportation Research Board Joint Subcommittee on Human Factors of In-Vehicle Systems, AND20(1)
Friend, Transportation Research Board Committee on Alcohol, Other Drugs, and Transportation, ANB50
Friend, Transportation Research Board Committee on Simulation and Measurement of Vehicle and Operator Performance, AND30
Friend, Transportation Research Board Committee on Truck and Bus Safety, ANB70
Friend, Transportation Research Board Committee on Vehicle User Characteristics, AND10
Friend, Transportation Research Board Committee on User Information Systems, AND20
Member, Association for the Advancement of Automotive Medicine
Member, Human Factors and Ergonomics Society
Member, Transportation Research Board Human Factors Workshop Planning Committee
Reviewer, Accident Analysis and Prevention
Reviewer, Applied Ergonomics
Reviewer, Canadian Medical Association Journal
Reviewer, Human Factors Journal
Reviewer, Psychopharmacology Journal
Reviewer, Transactions on Intelligent Transportation Systems
Reviewer, Transportation Research Board

CHER CARNEY
Co-Organizer, 2017 International Symposium on Human Factors in Driver Assessment, Training, and Vehicle Design
Friend, Young Driver Sub-Committee, National Academy of Sciences, Transportation Research Board
Member, Consortium of Adolescent Road Safety
Reviewer, International Symposium on Human Factors in Driver Assessment, Training, and Vehicle Design
Reviewer, Transportation Research Board Annual Meeting (ANB30 Operator Education and Regulation)

JOHN GASPAR
Invited participant, NHTSA Situational Awareness Meeting
Member, Society of Automotive Engineers
Member, Transportation Research Board Joint Subcommittee on Human Factors of In-Vehicle Systems, AND20(1)
Member, Human Factors and Ergonomics Society, Surface Transportation Technical Group
Reviewer, Human Factors journal
Reviewer, Transportation Research Part F: Psychology and Behavior journal
Reviewer, Traffic Injury Prevention journal
Reviewer, Ergonomics journal
Reviewer, International Journal of Injury Control and Safety Promotion
Reviewer, International Symposium on Human Factors in Driver Assessment, Training and Vehicle Design
Reviewer, Human Factors and Ergonomics Society conference
Reviewer, Enhanced Safety of Vehicles conference
Reviewer, Transportation Research Board
Reviewer, Society of Automotive Engineers World Congress
Secretary, Transportation Research Board AND20 Committee on User Information Systems

JACOB HEIDEN
Invited presenter, 2017 Council of University Transportation Centers Annual Summer Meeting
Member, SAFER-SIM Symposium Planning Committee




DAWN MARSHALL
Invited Presenter, 2017 OST-R Transportation Innovation Series
Reviewer, Image Visual Simulation conference
Reviewer, Traffic Injury Prevention journal
Reviewer, Accident Analysis and Prevention journal
Reviewer, Transportation Research Board
Reviewer, International Symposium on Human Factors in Driver Assessment, Training, and Vehicle Design
Reviewer, Human Factors and Ergonomic Society Annual Meeting

ASHLEY MCDONALD
Member, Project Management Institute
Member, American Association for Public Opinion Research
Recipient, 2017 University of Iowa College of Engineering Staff Research Award

DANIEL MCGEHEE
Appointed Member, United States—European Union Distraction Working Group
Chairman, Data Needs Subcommittee, National Academy of Sciences, Transportation Research Board
Co-Chair/Organizer, International Symposium on Human Factors in Driver Assessment, Training, and Vehicle Design
Founder, International working group on 'The First Crash'
Member, Society of Automotive Engineers Safety and Human Factors Committee
Member, Trilateral US-EU-Japan working group in human factors in automated vehicles
Member, Young Driver Committee, National Academy of Sciences, Transportation Research Board
Reviewer, Accident Analysis and Prevention
Reviewer, Human Factors journal
Reviewer, International Symposium on Human Factors in Driver Assessment, Training and Vehicle Design
Reviewer, Transportation Research Part F
Reviewer, Transportation Research Record
Vice-Chair, Society of Automotive Engineers Safety & Human Factors Committee

MICHELLE REYES
Member, Transportation Research Board Standing Committee on Operator Education and Regulation ANB30
Member, Iowa Statewide Traffic Records Coordinating Committee
Member, Society of Automotive Engineers
Reviewer, Transportation Research Board Annual Meeting (ANB30 Operator Education and Regulation and AND10 Vehicle User Characteristics)
Reviewer, International Symposium on Human Factors in Driver Assessment, Training, and Vehicle Design
Reviewer, Accident Analysis and Prevention journal

CHRIS SCHWARZ
Friend, Society of Automotive Engineers On-Road Automated Driving Committee
Member, Society of Automotive Engineers
Member, Transportation Research Board Committee on Vehicle-Highway Automation (AHB30)
Organizer, Transportation Research Board Human Factors Workshop
Reviewer, Control Engineering Practice
Reviewer, IEEE Transactions on Intelligent Transportation Systems
Reviewer, IEEE Transactions on Systems, Man, and Cybernetics
Reviewer, International Symposium on Human Factors in Driver Assessment, Training and Vehicle Design
Reviewer, Journal of Aerospace Engineering
Reviewer, Journal of Computing and Information Science in Engineering
Reviewer, Simulation: Transactions of the Society for Modeling and Simulation International
Reviewer, Transportation Research Board
Senior Member, Institute of Electrical and Electronics Engineers

ANDREW VEIT
Licensed Professional Engineer (PE)

GREGORY WAGNER
Member, Society of Automotive Engineers

PUBLICATIONS, POSTERS, & PRESENTATIONS

Brown, T., Marshall, D., Lerner, N., & **Gaspar, J.** (2017). Replicating Test Track Protocols in a Simulator: What Needs to Be Matched? Paper presented at the 9th International Driving Symposium on Human Factors in Driver Assessment, Training, and Vehicle Design, Manchester Village, VT.

Brown, T., Schwarz, C., Lee, J.D., & **Gaspar, J.** (2017). Mitigating Drowsiness During Short Drives: Implications of Staged and Discrete Alert. Paper presented at the 10th International Conference on Managing Fatigue, San Diego, CA.

Cox, D.J., **Brown, T.**, Ross, V., Moncrief, M., **Schmitt, R.**, Gaffney, G., & Reeve, R. (2017). Can Youth with Autism Spectrum Disorder Use Virtual Driving Simulation Training to Evaluate and Improve Performance? An Exploratory Study. Journal of Autism Developmental Disorders, 47(8): 2544-2555. https://doi.org/10.1007/s10803-017-3164-7

Gaspar, J.G. (2017). Measuring the effectiveness of interventions. Presentation at Beyond the Bedroom Human Factors Workshop at Transportation Research Board 96th Annual Meeting, Washington, DC.

Gaspar, J.G., & Allen, S. (2016). Using naturalistic data to develop simulator scenarios. Poster presented at SaferSim Symposium.

Gaspar, J., Brown, T., & Marshall, D. (2017). Incentivizing Distraction: The Impact of Performance-Based Incentives on Secondary Task Engagement. Paper presented at the Transportation Research Board 96th Annual Meeting, Washington, DC.

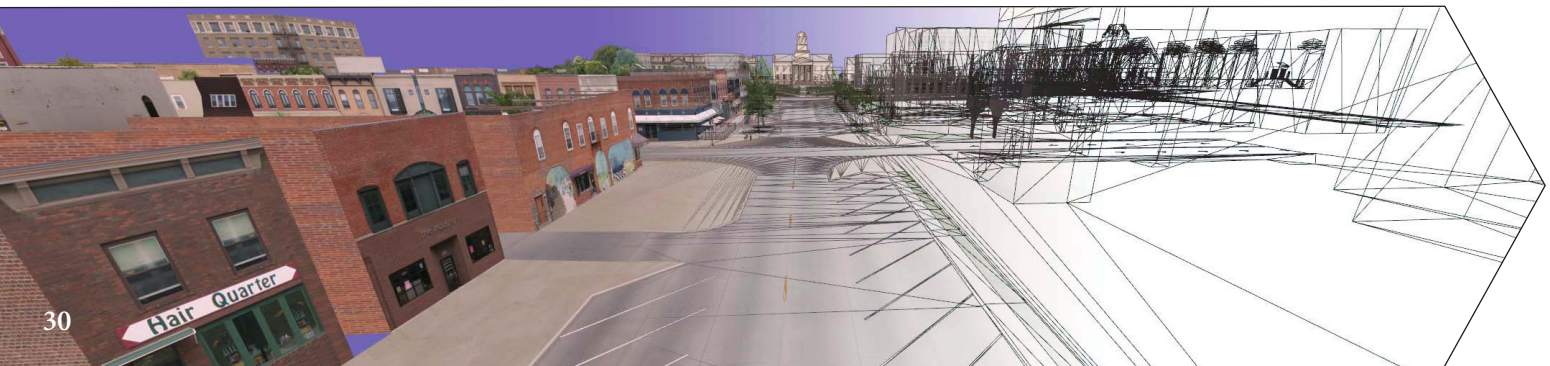
Gaspar, J., Brown, T., Schwarz, C., Lee, J.D., Lerner, N., Kang, J., & Higgings, J. (2017). Evaluating Driver Drowsiness Countermeasures. Paper presented at the Enhanced Safety of Vehicles.

Gaspar, J.G., Brown, T.L., Schwarz, C., Lee, J.D., Kang, J., & Higgins, J.S. (2017). Evaluating Driver Drowsiness Countermeasures. Traffic Injury Prevention, 18 (Supplement 1), S58–S63.

Gaspar, J.G., Schwarz, C.W., & Brown, T.L. (2017). Examining the effectiveness of forward collision warnings for drowsy drivers. Poster presented at the 9th International Driving Symposium on Human Factors in Driver Assessment, Training, and Vehicle Design, Manchester Village, VT.

Harland, K.K., **Carney, C., & McGehee, D.** (2016). Analysis of naturalistic driving videos of fleet services drivers to estimate driver error and potentially distracting behaviors as risk factors for rear-end versus angle crashes. Traffic Injury Prevention, 17(5), p.461-71. https://doi.org/10.1080/15389588.2015.1118655

Hartman, R.L., **Brown, T.L.**, Milavetz, G., Spurgin, A., Pierce, R., Gorelick, D. A., Gaffney, G., & Huestis, M.A. (2016). Cannabis Effects on Driving Longitudinal Control with and without Alcohol. Journal of Applied Toxicology. https://doi.org/10.1002/jat.3295



Heitbrink, D., Schwarz, C., Wang, W. Simulation of Automotive Headlights for Human Factors Research. Paper presented at the Image Conference, Dayton, OH.

Marshall, D., Wu, X., **Brown, T.**, & Ng Boyle, L. (2017). Connected Vehicle Alerts: One Size Doesn't Fit All Scenarios. Paper presented at the Transportation Research Board 96th Annual Meeting, Washington, DC.

Reyes, M., Roe, C., McDonald, A., Friberg, J., & McGehee, D. (2017). Adaptive Cruise Control: First Impressions Matter. SAE International.

McDonald, A., Friberg, J., & McGehee, D. (2017). Evaluation of Vehicle Owners' Understanding of their Advanced Vehicle Safety Technologies: Knowledge Score Analysis. Paper presented at the Transportation Research Board 96th Annual Meeting, Washington, DC.

McDonald, A., McGehee, D.V., Reyes, M.L., & Roe, C.A. (2016). A Drive into Understanding Consumer Mental Model and Trust About Advanced Vehicle Safety Systems. Automated Vehicles Symposium, San Francisco, CA.

McGehee, D., McDonald, A., Reyes, M., & Roe, C. (2017). Driver Understanding of ADAS and Evolving Consumer Education. Proceedings of the 2017 International Technical Conference on the Enhanced Safety of Vehicles, US National Highway Traffic Safety Administration.

Oneyear, N., Hallmark, S., **Carney, C., & McGehee, D.V.** (2016). Prediction of lane encroachment on rural two-lane curves using the SHRP2 naturalistic driving study data. Transportation Research Record.

Peek-Asa, C., **Reyes, M.L.**, & Hamann, C. (2017). In-Vehicle Video Feedback Systems and Parent Engagement: A Randomized Intervention to Improve Safe Teen Driving. Paper presented at the Transportation Research Board 96th Annual Meeting, Washington, DC.

Schwarz, C., Brown, T.L., Gaspar, J.G., & Keum, C. (2017). Transfer from Highly Automated to Manual Control: Performance and Trust. In Proceedings of the 25th Enhanced Safety of Vehicles Conference. Detroit, MI.

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