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The Virginia Tech Transportation Institute (VTTI) conducts research to save lives, save time, save money, and protect the environment. Researchers and students from multiple fields are continuously developing the techniques and technologies to solve transportation challenges from vehicular, driver, infrastructure, and environmental perspectives.

As one of seven premier research institutes created by Virginia Tech to answer national challenges, VTTI has effected significant change in public policies for driver, passenger, and pedestrian safety and is advancing the design of vehicles and infrastructure to increase safety and reduce environmental impacts.
which is more than **40 million miles** of data

enough to drive from Earth to Mars at their closest point

creating automated-vehicle systems with more than **50 collaborators**

We house **90%** of the naturalistic driving data in the world

[2.5 petabytes]

**350+ active projects**

**475 employees** [368 in 2013]
at a glance

~$40,000,000+
in annual sponsored research
[includes VTT, LLC]

$30,000,000+
in connected-vehicle research and development conducted to date

78 vehicles
in the VTTI fleet
covering more than
200,000 miles
of research
in FY2016
Institute Infrastructure

VTTI has an infrastructure worth more than $110 million that includes four test beds used extensively for real-world, impactful transportation research; more than 90,000 square feet of building space located on-site in Blacksburg, Va.; and more than 60 owned and leased instrumented vehicles, including connected-automated Cadillac SRXs and an International Lone Star tractor-trailer that will soon be instrumented for automation research.

01. Test Beds

Headquartered at VTTI, the Virginia Smart Road is a 2.2-mile, controlled-access facility managed by the institute and owned and maintained by the Virginia Department of Transportation (VDOT). The road itself is built to Federal Highway Administration specifications and features seven roadside equipment units and two mobile roadside equipment sites that facilitate connected-vehicle communications; an optical fiber communication system; Ethernet fiber transceivers and Ethernet switches; a connected-vehicle-compatible intersection controller model; varying pavement sections and in-pavement sensors; 75 weather-making towers capable of producing snow, rain, and fog; a differential GPS base station for precise vehicle locating; a signalized intersection with complete signal phase and timing control; a wireless mesh network variable control system; and variable pole spacing designed to replicate 95 percent of national highway lighting systems.

In 2014, VTTI partnered with VDOT to unveil the Virginia Connected Corridors (VCC), which comprise the Smart Road and Interstates 66 and 495, as well as U.S. 29 and U.S. 50 (one of the most congested corridors in the U.S.). The VCC is facilitating the real-world development and deployment of connected-vehicle technology via dedicated short-range communications and cellular technology. Using more than 60 roadside equipment units (RSEs) located along the corridors, VDOT and researchers from multiple institutes across the Commonwealth are already implementing connected applications that include traveler information and work zone and incident management. Under the umbrella of the Tier 1 U.S. Department of Transportation Connected Vehicle/Infrastructure University Transportation Center, VTTI, the University of Virginia, and Morgan State University are conducting more than 20 connected projects along the VCC.

In 2015, VTTI partnered with VDOT, Transurban, the Virginia Department of Motor Vehicles, and HERE (a high-definition mapping business) to unveil the Virginia Automated Corridors (VAC). This new initiative will provide an automation-friendly environment that government agencies, auto manufacturers, and suppliers can use to test and certify their systems, providing a system migration path from test-track to real-world operating environments. The VAC will leverage extensive experience in on-road safety research to provide efficient solutions to automated-vehicle testing. The VAC was developed in answer to the Virginia governor’s 2015 proclamation declaring Virginia “open for business” in the realm of automated vehicles.

The Virginia International Raceway in Alton, Va., was established as a cooperative agreement through which VTTI can conduct connected and automated projects in a multi-use testing environment that includes both closed-course and open traffic conditions. On site at the raceway is a resort that features a 12-unit complex of residential villas, a lodge, a club house, a full-service restaurant and tavern, administrative offices, and a spa. The raceway track can be configured to five different courses ranging from 1.1 miles to 4.2 miles and includes such topography as hairpin curves and blind passes. The Virginia International Raceway is also home to the Virginia Motorsports Technology Park, which contains the Global Center for Automotive Performance Simulation, an affiliated company of VTTI that features the globe’s premier force-and-moment tire test facility.
The Institute is now working towards the creation of a new Virginia Smart Village, which will eventually cover more than 300 acres—including the Smart Road—that will facilitate multiple testing scenarios across numerous automated-vehicle platforms. The village is envisioned to encompass a residential/suburban layout that features real buildings and reconfigurable buildings, roundabout/stop-controlled intersections, automation-compatible pavement markings, hills and curves, and connectivity to the Smart Road. The village will be developed in consultation with campus representatives and industry stakeholders.

02. Blacksburg Facilities

The traditional laboratories at VTTI are housed in two buildings totaling more than 52,000 square feet. Building I is 30,000 square feet and houses office, laboratory, and garage facilities. Low-service laboratories include facilities dedicated to driver interface development, eye-glance data reduction, lighting research, accident analysis, accident database analysis, pavement research, and traffic simulation. The National Surface Transportation Safety Center for Excellence building comprises 22,000 square feet of office and laboratory space and was occupied in July 2006. VTTI expanded its on-site capacity by 7,000 square feet of warehouse space and housing for a shock tube lab, a paint booth facility, and a lighting lab. An additional 24,400 square-foot annex was opened during August 2013.

To supplement and support the focused transportation research of the institute, facilities feature a fully staffed garage and machine shop to instrument experimental vehicles. Technicians and engineers use full-scale machine and welding shops, electronics laboratories, and garage facilities to customize transportation hardware and software designed to collect large amounts of data. These facilities are also used to support the maintenance and expansion of the Smart Road systems and capabilities. Additionally, VTTI occupies an adjacent four-bay, 7,200-square-foot garage. This facility is used to store the VTTI instrumented vehicle fleet and the equipment necessary for research and Smart Road operations.

During FY16, VDOT and VTTI launched the accelerated pavement testing program. The program features a heavy-vehicle simulator—which is housed at VTTI—to continuously apply a weighted load to test pavements. Such testing is conducted across several months and simulates the wear and tear placed on road surfaces. The program is expected to result in cost savings and will enable VDOT to determine how different pavement designs and materials respond to load testing prior to integration on roadways.

03. VTTI Vehicle Fleet

The VTTI vehicle fleet is uniquely instrumented for specific experiments. Researchers use the vehicle fleet for Smart Road tests, and experimental test vehicles are used to develop new instrumentation packages and complement research endeavors. Several of the vehicles are long-term loaners from vehicle manufacturers, VDOT, and other partnering organizations. All vehicles are maintained in-house when possible with fully functional garages and a machine shop. Loaned vehicles are maintained in cooperation with the organization that provided the vehicle. During FY16, VTTI exceeded 200,000 miles across its fleet of 78 motorized, road-legal vehicles (owned, leased, and loaned).
Groundbreaking Studies

1. Under sponsorship of the National Academy of Sciences (NAS), VTTI continued to work with researchers across the transportation industry on projects using the Second Strategic Highway Research Program Naturalistic Driving Study (SHRP 2 NDS) data sets. The data continue to be used by internal and external clients to answer the greatest transportation challenges of today and into the future, with VTTI managing more than 100 active data use licenses with researchers around the globe. These licenses, along with analysis projects performed with VTTI as the primary contractor, have generated more than $1 million in research contracts for the institute.

2. VTTI continues to provide SHRP 2 NDS training, data support, and data access to the Federal Highway Administration (FHWA) in support of its Safety Training and Analysis Center. This center will provide training and assistance to state departments of transportation (DOTs) and other federal partners related to the SHRP 2 NDS database.

3. VTTI researchers recently completed a $4 million congressionally mandated study for the Federal Motor Carrier Safety Administration (FMCSA). The study, which is currently under agency review, assessed the impact of the 34-hour restart provision under naturalistic driving conditions.

4. The FMCSA awarded $2.5 million to VTTI to demonstrate how hours-of-service regulatory flexibility for sleeper berth use in conjunction with fatigue management program training could be used to improve driver rest and alertness.

5. Researchers from the institute performed the Google-sponsored Automated Vehicle Crash Rate Comparison using Naturalistic Data study to investigate whether or not self-driving cars are more prone to crashes. The study first examined national crash data and data from NDSs to provide a better estimate of existing crash rates; this information was then compared to data from the Google Self-Driving Car program. Current data suggest that self-driving cars may have low rates of more severe crashes when compared to national rates or rates from naturalistic data sets, but there is too much uncertainty in self-driving rates to draw this conclusion with strong confidence. As self-driving cars continue to increase exposure, it is expected that the uncertainty in their event rates will decrease.

6. VTTI was awarded the Mixed-Function Automation NDS project under the National Highway Traffic Safety Administration (NHTSA) Vehicle Electronic Systems Safety Indefinite Delivery/Indefinite Quantity contract, with funding from the Intelligent Transportation Systems Joint Program Office (ITS JPO). This $1.5 million project will investigate real-world driver interactions with market-ready mixed-function automation through an NDS. Driver interactions with mixed-function automation features will be observed in operation during mixed traffic under a variety of roadway types, driving conditions, and speeds. The study will involve 120 drivers in
The following are highlighted achievements of the VTTI community during FY16.

7. VTTI researchers were part of a successful team led by the Palo Alto Research Center (PARC) that was awarded a $3.68 million project aimed at developing a novel traveler signaling system to reduce the transportation network-wide energy consumption.

8. VTTI researchers were awarded several competitive projects as part of the Mid-Atlantic Transportation Sustainability (MATS) University Transportation Center (UTC). These projects include developing novel variable parking charging strategies and eco-cooperative adaptive cruise control (Eco-CACC) in the vicinity of signalized intersections for buses and hybrid electric vehicles.

9. NHTSA awarded VTTI with one of several Broad Agency Announcement (BAA) contracts to apply the crash trifecta model to an analysis of crash hotspots in the SHRP 2 NDS database. If successful, Phase II funding could be provided up to $750,000.

10. VTTI completed a project (C-22) for NAS through the Transportation Research Board (TRB) Transit Cooperative Research Program (TCRP). Entitled Bus Operator Workstation Design for Improving Occupational Health and Safety, this investigation into transit bus design resulted in the production of practical guidance documents and tools applicable to the procurement process and bus design. The guidelines will assist transit agencies and bus manufacturers in integrating improved and emerging technologies, with a focus on the integration of such key stakeholders as bus operators.

11. VTTI continued its strong support of FMCSA research goals by completing the first five-year period of on-road evaluations of technologies that can increase safety and efficiency in the FMCSA Advanced System Testing utilizing a Data Acquisition System (FAST DASH) program. In the second of three evaluations, VTTI measured the performance of an onboard monitoring system that tracks aggressive driving, speeding activity, and safety-belt usage. In the third
15. The Commercial Driver Individual Differences Study research team at VTee finalized recruitment in February 2016, reaching its goal of 21,000 commercial drivers during a 33-month effort.

16. VTee researchers conducted a SHRP 2 NDS data analysis to examine relationships between crash risk and chronic health conditions.

17. The VTee-affiliated Global Center for Automotive Performance Simulation (GCAPS), which encompasses the National Tire Research Center (NTRC), the Southern Virginia Vehicle Motion Lab (SoVa Motion), and the Virtual Design and Integration Laboratory (VDIL), continues to provide revolutionary services for both vehicle and tire, including testing, simulation, and modeling. NTRC has achieved significant expansion into new global markets supporting both tire testing and modeling, while SoVa Motion has seen great success supporting teams from multiple racing series. VDIL has developed new modeling and data analysis tools that are being heralded as tremendous steps towards making data analysis and manipulation simple and affordable.

18. VTee researchers completed the first phase of an investigation into the visibility of police vehicles based on alternatives for lighting and markings. The institute will now embark on a field operational test of the investigated systems.

19. VTee completed a two-year evaluation of work zone lighting, considering the possible safety implications of glare from work zone lighting and maintenance vehicles. Limits to lighting within the work zone were developed.

20. Through the support of the National Surface Transportation Safety Center for Excellence (NSTSCE), VTee completed a project considering the use of active delineators in a roadway during adverse weather conditions.

21. VTee and partners were awarded a project that evaluation, VTee performed a pre-market evaluation of a novel convex mirror design to determine indirect visibility performance and driver acceptance for application among heavy-vehicle mirrors that are essential to vehicle operations, though they are not required by Federal Motor Vehicle Safety Standards (FMVSS).

12. VTee is leading a study sponsored by the AAA Foundation for Traffic Safety to estimate the societal benefits and costs of heavy-truck advanced safety technologies, including: automatic emergency braking, lane departure warning, video-based onboard safety monitoring, and air disc brakes. The results of this study will provide new data related to the benefits and costs associated with implementing advanced safety technologies on large trucks.

13. The Supervised Practice Driving and Driver Coach databases at VTee continue to be analyzed, with several publications in process. Several new proposals have also been submitted to further investigate the supervised practice driving period of the graduated driver’s licensing process, international teenage NDSs, and teenage risky driving behavior using the Naturalistic Teenage Meta-Database. The meta-database comprises previous teen NDSs conducted at the institute and teen drivers within the SHRP 2 NDS database. Collectively, the meta-database covers 380 16- and 17-year-old drivers, 12 to 24 months of continuous driving data per teen, 321 crashes and 675 near-crashes, and more than 700,000 trips and 200,000 hours traveled.

14. VTee began a new project sponsored by Clear Roads and the Minnesota DOT to study snowplow equipment causing operator fatigue during winter maintenance operations. This project will result in cost-effective, actionable recommendations to reduce, or eliminate, fatigue caused by snowplow equipment during winter operations.
considers the impact of roadway lighting on soybean growth and maturity.

22. VTTI researchers completed a second phase of work focused on assessing winter roadway conditions using intrinsic onboard sensors. This information will be shared via connected vehicles to enhance both winter driving safety and winter road maintenance operations of agencies.

23. In collaboration with the Crash Avoidance Metrics Partnership (CAMP; a consortium of auto manufacturers), VTTI researchers worked on a cooperative agreement with the FHWA to identify vehicle-based data that may be shared via connected vehicles to enhance safety applications.

24. The VTTI Center for Injury Biomechanics saw more than $3 million in expenditures, $1.5 million in awards, and submitted proposals totaling nearly $3 million from such sponsors as NHTSA and original equipment manufacturers (OEMs). The center continues to perform innovative research investigating human tolerance to impact loading, with applications in automobile safety and military restraints.

Expanding Collaborations

1. VTTI is a partner on a multidisciplinary VT team that was awarded a $1.1 million grant from the National Science Foundation (NSF) to develop a framework that integrates techniques from various areas (e.g., network science, machine learning, wireless communications, power systems, and psychology) to develop processes that can provide smart city systems the resiliency to recover from failures that may occur, such as natural disasters or malicious attacks. The team will be focused on designing resilient techniques that consider technologies and the humans who use them. This grant is part of the NSF initiative known as Critical Resilient Interdependent Infrastructure Systems and Processes (CRISP).

2. VTTI researchers continue to collaborate with 34 organizations that include Booz Allen Hamilton, Denso, Google, General Motors (GM), Mercedes-Benz, Volkswagen, and Bosch under the NHTSA Vehicle Electronic Systems Safety Indefinite Delivery/Indefinite Quantity contract. This team was organized to answer all aspects of the NHTSA project, including electronics safe reliability, cybersecurity, vehicle automation, and related human factors considerations.

3. The Virginia DOT (VDOT) and VTTI launched an accelerated pavement testing program, which uses a heavy-vehicle simulator that continuously applies a weighted load
to test pavements for several months. This testing simulates the natural wear and tear caused by heavy trucks on road surfaces. The program is expected to result in cost savings in road maintenance and will enable VDOT to determine how different pavement designs and materials respond to load testing prior to integration on the road.

4. VTTI continues to propose task orders released under a contract from TRB of NAS worth an initial potential of $2 million, with the possibility of additional funds, to: 1. Identify critical issues associated with connected and automated vehicles that state and local transportation agencies and the American Association of State Highway and Transportation Officials (AASHTO) will face; 2. Conduct research to address those issues; and 3. Conduct related technology transfer and information exchange activities.

5. In partnership with VT electrical and computer engineering faculty, VTTI continued development of a wearable roadside worker safety system (vest and hard hat) that warns workers and drivers of impending conflicts in highway work zones and other areas.

6. VTTI continued to work with FHWA and AASHTO to provide data sets and support to nine state DOT research teams working on Phase II Implementation Assistance Program projects. The goal of these efforts is to identify safety problems and generate countermeasures that reduce risk and prevalence.

7. VTTI worked with FHWA to provide data sets to six research teams working in their respective BAA efforts. These efforts are targeted towards the generation of safety interventions that reduce the incidence and severity of vehicular crashes.

8. In collaboration with the University of Utah, VTTI submitted a National Institutes of Health (NIH) R21 proposal to estimate the overall prevalence of obesity, diabetes mellitus and medication use, kidney disease, dipstick urinalysis results, and hypertension in a large cohort of truck drivers.

9. VTTI submitted a National Institute of Occupational Safety and Health (NIOSH) R21 proposal to assess the prevalence of mental disorders on long-haul truck drivers.

10. Institute researchers submitted an internal NIOSH proposal (i.e., acting as a subcontractor for NIOSH) to evaluate a fatigue management program in commercial trucking operations.

11. VTTI is collaborating with NSTSCE and the National Occupational Research Agenda (NORA) Oil and Gas Extraction Sector, through affiliates within the Center for Disease Control (CDC) and NIOSH, to investigate factors among oil and gas service fleets (e.g., shift, roadway, and driver performance) that are associated with a high number of vehicle-related fatalities. A pilot study has been completed, and new efforts are underway to identify good practices among large fleets and distribute them among small fleets while collecting naturalistic driving and in-vehicle monitoring system data.

12. VTTI is continuing its collaboration with Intelligent Automation, Inc. (IAI) to develop a robust Multi-modal Driver Distraction and Fatigue Detection/Warning System (MDF) for commercial vehicle operations. This FMCSA-sponsored Small Business Innovation Research (SBIR) project was recently awarded Phase II funding. VTTI is providing expertise in the areas of driver fatigue, drowsiness, and distraction; access to its large naturalistic collection of approximately 10 million commercial vehicle miles; and testing of the MDF system with drivers on a heavy-vehicle/commercial vehicle simulator.
13. VTTI researchers reached out to the Federal Transit Administration (FTA) in an effort to collaborate on a fatigue management program for the transit industry. A proposal was submitted to design and implement a fatigue management program for transit operators.

14. VTTI researchers met with a representative of the VT Department of Human Nutrition, Foods, and Exercise to initiate collaborative work targeting commercial drivers and behavioral health interventions.

15. VTTI collaborated on a recent proposal effort with Transit Resource Center, a consulting and management organization dedicated to serving bus transit systems, school bus operations, and privately owned fleet operations. Although the proposal was not funded, a relationship for future collaborations was established.

16. VTTI researchers hosted several meetings with potential collaborators, including: 1. Trucking representatives from the Old Dominion Chapter to discuss driver health and sleep apnea; 2. Health Promotion Solutions to discuss opportunities within the areas of health and commercial motor vehicle safety; and 3. Volvo truck group representatives to be considered for priority university status.

17. VTTI researchers completed a study with NIOSH that assessed sleep patterns of truck drivers; the results were recently published in Accident Analysis and Prevention.

18. VTTI began a collaboration with the VT Extension Service and the Illinois DOT for a study about the impact of roadway lighting on the growth of soybeans.

19. VTTI has partnered with Texas Transportation Institute for an FHWA Office of Safety Indefinite Delivery/Indefinite Quantity contract.

20. VTTI researchers met with Liebherr Mining to discuss collaborative research opportunities.

21. The I-81 Corridor Coalition at VTTI recently finished a project focused on providing information to heavy vehicles for overnight parking. A framework for a commercial mobile application system was developed for locating and reserving parking spaces.

22. VTTI researchers have submitted a proposal to the Intelligent Transportation Society of America (ITSA) that focuses on evaluating driving performance when drivers are engaging in secondary tasks using voice command technologies. The study will assess driving performance metrics that have a known association with crash occurrence (e.g., eyes-off-road metrics) and will incorporate device familiarity and training.

23. VTTI was a subcontractor to North Carolina A&T State University on its Tier 1 UTC submission for a Center for Advanced Transportation Mobility to address Americans with Disabilities Act (ACT) paratransit offerings. The study
will focus on new and innovative methods of expanding public transportation access to vulnerable users, ensuring equitable and appropriate connectivity while allowing transit operators to improve the sustainability of their operations.

24. VTTI was a subcontractor to a Drexel-led NSF submission titled Predictive Analytics of Driver’s Engagement for Transitioning to Semi-Autonomous Driving. The goal of this project is to leverage the SHRP 2 NDS database to develop predictive analytics tools that will address Level 2 automated-vehicle driving challenges by detecting a driver’s disengagement from the driving task.

Innovative Technologies

1. A provisional patent was obtained for the VTTI-developed connected motorcycle helmet. The helmet system, which incorporates dedicated short-range communications (DSRC), allows motorcyclists to participate in a connected-vehicle network. The helmet was designed by VTTI so that motorcyclists can take advantage of the safety benefits that other vehicles gain when they are able to communicate with each other and with surrounding infrastructure. The helmet is able to receive messages so that it can alert the rider to traffic and road conditions, general emergency alerts, and any other scenario for which the system is programmed. The motorcycle helmet is also able to transmit messages.

2. VTTI is serving NHTSA in an active investigation of the range of heavy-vehicle configurations, including single-unit trucks, buses, and such combination vehicles as tractor-trailers and combination buses that may require alternative parameters to communicate vehicle operations among vehicle-to-vehicle DSRC safety applications. A significant initiative in this project involves the development of a technology solution set to automatically measure trailer lengths among tractor-trailers. VTTI is leveraging its broad range of industry, trade association, and research affiliates to disseminate and deliver results that can serve our nation’s entire heavy-vehicle transportation network.

3. VTTI is engaged in discussions with a heavy-vehicle manufacturer, suppliers, and technology providers to develop an automated tractor-trailer vehicle demonstrator that can be applied for testing and evaluation of a range of automated-vehicle control and monitoring capabilities.

4. VTTI has developed two alternative lighting measurement configurations for its internally developed Roadway Lighting Measurement System, including a towed version for tunnel lighting and a robot version for the measurement of sidewalks and in off-roadway conditions.

Enhancing Outreach and Education

1. VTTI, Transurban, and VDOT offered federal and state officials a hands-on experience with advanced vehicular technology during a demonstration held in Northern Virginia as part of the Virginia Connected and Automated Corridors initiatives. Participants traveled a 10-mile stretch of an interstate highway in automated and connected vehicles to learn how such vehicles can improve safety, increase mobility, enhance sustainability, and reduce congestion. U.S. Sen. Mark Warner, U.S. DOT Assistant Secretary for Research and Technology Greg Winfree, VT President Tim Sands, Virginia
Secretary of Technology Karen Jackson, VDOT Commissioner Charles Kilpatrick, and Virginia Department of Motor Vehicles Commissioner Richard Holcomb were among the participants.

2. VTTI created a new center (the Center for Public Policy, Partnerships, and Outreach) to assist with the needed models of rules and regulations for advanced vehicles, provide research to ensure state and federal policies are based on relevant data, develop partnerships to assist in the development of new systems, and enhance VTTI research areas and sponsorship diversity. The center works with stakeholders whose interests are affected by governmental decisions on federal, state, local, or international levels in the development and implementation of automated-vehicle systems. The nature of this work is intended to inform policymakers, OEMs, and automotive suppliers on a range of issues related to transformational transportation technologies, including those associated with connected- and automated-vehicle systems; shared mobility networks; and the development of Smart City solutions, including the resiliency of these systems and networks.

3. Planning is well underway for the Fifth International Naturalistic Driving Research Symposium, which will be hosted by VTTI in late August 2016. Ron Medford of X (formerly Google[x]) and Dr. Bruce Simons-Morton of NIH will be keynote speakers. Eight sessions of panels and papers, plus a poster session, are scheduled for this biennial event that attracts representatives from government, industry, and academia worldwide. The symposium will be followed by two additional conferences: the Motorcycle Research and Technology Workshop and the Women in Transportation Seminar – The Future of Transportation. Keynote speakers for the Women in Transportation Seminar are Deborah Hersman of the National Safety Council and Dr. Ann Brach of TRB.

4. With support from the VT Graduate School and in collaboration with affiliated faculty in civil and environmental engineering, industrial and systems engineering, psychology, and statistics, VTTI continues to offer the next generation of researchers the opportunity to gain in-depth understanding and hands-on experience and guidance in the area of transportation safety through the Human Factors of Transportation Safety Graduate Certificate Program. Four graduate students are currently enrolled in the certificate program, and three certificates have been awarded since the program began in 2014.

5. An NSTSCE project focused on disseminating results of completed studies was conducted and completed. Two-page fact sheets were created that summarized select studies to a non-technical audience. The fact sheets were made available on the VTTI website.

6. VTTI researchers worked with six students from various institutions of higher education in support of their
submissions for the SHRP 2 Student Paper Competition. The winners of the competition will present the results of their research at the Naturalistic Driving Research Symposium in Blacksburg, Va.

7. GCAPS has provided internships for VT mechanical engineering students and has actively supported the Patrick Henry Community College Motorsports Program. Center representatives also sit on advisory committees for Danville Community College and host interns from the Danville-area Academy for Engineering and Technology program, which encompasses high school students interested in engineering careers.

8. A VT mechanical engineering senior design team, co-advised by VTTI, presented its work at the Insurance Institute for Highway Safety (IIHS) Roundtable. The team designed a bumper to limit damage to vehicles under-riding the back of tractor-trailers.

9. Several VTTI researchers completed the National Highway Institute Instructor Certification Program.

10. VTTI hosted the Direct Delivery Leadership Council (DDLC), during which several institute researchers gave presentations on leading-edge research being conducted at VTTI that would benefit DDLC members. Opportunities for collaborative research were also discussed.

11. As part of the relationship between VTTI, NSTSCE, and the NORA Oil and Gas Extraction Sector, VTTI spoke to the Oil and Gas Extraction Council, Motor Vehicle Working Group in Houston, Tex., about the VTTI and NIOSH In-Vehicle Monitoring System Project.

12. Following completion of the TCRP Project C-22 investigation into transit bus operator workstation design and procurement process, VTTI shared the project purpose and tools available with the transit industry during the following meetings: NAS, TCRP Oversight and Project Selection (TOPS) Committee Meeting in June 2016 in Irvine, Cal.; the Washington State Transit Insurance Pool (WSTIP), 2nd Quarter Board Meeting in June 2016 in Walla Walla, Wash.; and the 1st Annual MTA Bus Safety Symposium in May 2016 in New York City, N.Y. These dissemination activities have provided opportunities to also discuss the needs of bus operators in the transit industry as our nation seeks to arrive at solutions that eliminate pedestrian fatalities related to public transportation. These solutions require novel approaches to bus design, collision avoidance applications, and deterministic testing protocols supported by government guidance based on performance standards.

13. VTTI researchers presented on truck- and bus-related safety topics nationally and internationally, including the 22nd Intelligent Transportation Systems World Congress in Bordeaux, France; the VDOT 2015 Richmond District Snow Conference; the Michigan 2015 Winter Operations Conference; and the Travelers/Northland Insurance Safety Day Symposium.

14. VTTI researchers used the first large-scale, crash-only naturalistic driving database (i.e., SHRP 2 NDS) to publish new findings in the Proceedings of the National Academy of Sciences. The study found that drivers more than double their crash risk when they choose to engage in distracting activities that require them to take their eyes off the road (e.g., using a handheld cell phone, reading or writing, or using touchscreen menus on a vehicle instrument panel). Drivers also engage in some type of distracting activity more than 50 percent of the time they are driving. The study also found that drivers increase their crash risk nearly tenfold when they get behind the wheel while observably angry, sad, crying, or emotionally agitated.
VTI researchers co-authored a manuscript published in the journal SLEEP. The paper, titled “Nonadherence with Employer-Mandated Sleep Apnea Treatment and Increased Risk of Serious Truck Crashes,” was a result of institute collaboration with the University of Minnesota, Harvard Medical School, and Schneider National Inc. on an obstructive sleep apnea case study project.

A VTTI researcher authored a systematic literature review on the prevalence of metabolic syndrome among commercial motor vehicle drivers in the United States. The manuscript was accepted to the Journal of Transport and Health and will be published in 2016.

In co-sponsorship with FMCSA, TRB, and the National Transportation Safety Board, VTTI will co-host the 10th International Conference on Managing Fatigue to be held in San Diego in March 2017. This conference series is an established and respected forum for research updates and discussions within the fatigue management community. Each conference has primarily focused on the effects of fatigue in the transportation sector and has involved support from government, industry, and academia. Sectors beyond transportation – including natural resources, mining, healthcare, and the military – have also played an important role in the event.

Additional Accomplishments

1. VTTI was named “Best of R&D in Virginia” by Southern Business & Development magazine, as selected by a group of approximately 50 economic developers, educators, economists, site consultants, and chief executive officers in the south.

2. Using the SHRP 2 NDS database, more than 20 new naturalistic study findings are in the process of being submitted to— or have already been submitted to— high-impact journals, including Accident Analysis & Prevention, Adolescent Health, Gerontology, and the New England Journal of Medicine.

3. VTTI researchers developed an award-winning automatic congestion identification model that can map and calculate the impact of weather and road visibility on traffic. The researchers recently received the best paper award for this model at the Second International Conference on Vehicle Technology and Intelligent Transport Systems in Rome, Italy.

4. Two graduate students working with VTTI each won a scholarship award from the Dwight David Eisenhower Transportation Fellowship Program.
INSTITUTE
ORGANIZATION

VTTI Centers, Groups, and Initiatives

Center for Advanced Automotive Research
(Created in 2013; Zac Doerzaph, Director)
The Center for Advanced Automotive Research focuses on the research, development, and evaluation of next-generation automotive systems. The center is staffed by a multidisciplinary team of dedicated individuals who are passionate about improving the safety and efficiency of our nation’s transportation system. This team strives to solve a broad set of challenges associated with integrating cutting-edge technologies into the vehicles of tomorrow. The primary research areas of the center include crash warning/avoidance/mitigation systems, connected vehicles, driver-vehicle interfaces, crash causation, and vehicle automation.

Center for Automated Vehicle Systems
(Created in 2013; Shane McLaughlin, Director)
The Center for Automated Vehicle Systems uses an interdisciplinary approach to studying all aspects related to the automation life cycle in the field of transportation. The center conducts pragmatic research based on a scientific approach that emphasizes the importance of safety, security, reliability, and user acceptance. The center is anchored in applied research and is strengthened by collaborations with national and international partners in vehicle automation, including Google, General Motors, and other groups involved in the research, planning, policy, and production of automated vehicles. The goal of this center is to strengthen the safety benefits of automation across all levels of the transportation industry.

Center for Data Reduction and Analysis Support
(Created in 2013; Miguel Perez, Director)
The Center for Data Reduction and Analysis Support provides standardized access to and analysis of naturalistic driving study data sets housed at the Institute; these data sets currently comprise 2.5 petabytes of information about real-world driver behavior and performance. Users include researchers within and outside of the Institute, government entities, and automotive manufacturers and suppliers. Center services include coding of video and audio data, data quality assurance, data standardization, data mining, event selection, and data analysis. The center actively supports data analysis collaborations with external institutions.

Center for Infrastructure-based Safety Systems
(Created in 2010; Ron Gibbons, Director)
The Center for Infrastructure-based Safety Systems focuses on roadway-based safety systems, such as lighting, visibility treatments, pavement markings, signage, signals, barriers, the interaction of visibility with roadway design,
and weather considerations. The center is conducting research into myriad topics that include: increasing active sign legibility during foggy conditions; evaluating the effects of lighting source, type, and power on driver performance; assessing airport garage lighting; and determining the durability of pavement markings. The center contains the Eco-Transportation and Alternative Technologies Group, which is currently conducting an investigation into the potential use of paired types of commercially available vehicle detection technologies designed to reduce false readings at intersections that result in inefficient traffic flow.

**Center for Injury Biomechanics**  
(Created in 2006; Warren Hardy, Director)  
The Center for Injury Biomechanics is a partnership between VTTI, the Virginia Tech Department of Mechanical Engineering, and the Virginia Tech-Wake Forest University School of Biomedical Engineering and Sciences. The center conducts research into injury biomechanics, injury modeling, and transportation-related injury biomechanics. Center work includes an in-depth study of road-departure crashes in the U.S. to determine conditions such as speed and topography. Other transportation-related injury research includes car crash tests, large-scale tissue testing, NASCAR-Indy restraint testing, advanced restraint tests, guardrail evaluations, child seat evaluations, airbag-induced eye injuries, the development of a synthetic eye, elbow joint injuries from side airbags, wrist injuries, upper extremity dummy design, posterior rib fractures from side airbags, child dummy neck evaluations, small female neck interactions with side airbags, airbag out-of-position testing, and the development of a pregnant occupant model.

**Center for Public Policy, Partnerships, and Outreach**  
(Created in 2016; Myra Blanco, Director)  
The Center for Public Policy, Partnerships, and Outreach assists with the needed models of regulations for advanced vehicles, such as driver assistance systems and connected and/or automated vehicles. The center provides research to ensure state and federal policies are based on relevant data, develops partnerships to assist in the advancement of new systems, and enhances the research areas and sponsorship diversity of VTTI. The center works with stakeholders whose interests are affected by governmental decisions on federal, state, local, or international levels in the development and implementation of automated-vehicle systems.
Center for Sustainable Mobility
(Created in 2004; Hesham Rakha, Director)
The Center for Sustainable Mobility conducts research relevant to society’s transportation mobility, energy, environmental, and safety needs. The center translates the results of research into realistic and workable applications, creates and provides tools needed to apply developed knowledge and processes, and educates qualified engineers to meet today’s transportation demands and tomorrow’s transportation challenges in the areas of transportation network control, large-scale transportation system modeling, traffic state prediction using large data and artificial intelligence techniques, transit bus real-time routing and scheduling, vehicle energy and environmental modeling, transportation system modeling, and eco-transportation applications. The Center for Sustainable Mobility has worked and is currently working on numerous projects funded by the U.S. Department of Transportation, the U.S. Department of Energy, the Virginia Department of Transportation, and the Federal Transit Association. The center is developing eco-routing, eco-cooperative adaptive cruise control systems, and traffic signal control systems that enhance the efficiency, mobility, environmental impacts, and safety impacts of the transportation system.

Center for Sustainable Transportation Infrastructure
(Created in 2006; Gerardo Flintsch, Director)
The Center for Sustainable Transportation Infrastructure focuses on asset management; pavement design, analysis, rehabilitation, and safety; infrastructure management; civil engineering materials; non-destructive testing; and life-cycle cost analyses. The center houses the Infrastructure Management Group and the Sensing, Modeling and Simulation Group. The center initiated a consortium of state highway agencies and equipment manufacturers dedicated to enhancing pavement surfaces. The center also tested a product that extends the life of the road surface and retains de-icing chemicals on the surface, giving road crews time to deploy during inclement weather. The center was instrumental in developing a way to include the environmental impact of road materials in the decision-making processes during road construction. In 2015, VTTI welcomed the first Sideway-force Coefficient Routine Investigation Machine to the United States in a project funded by the Federal Highway Administration; the project objective is to assist states in the development of Pavement Friction Management Programs and demonstrate continuous friction and macro-texture measurement equipment.

Center for Technology Development
(Created in 2003; Andy Petersen, Director)
The Center for Technology Development specializes in developing, implementing, and maintaining innovative systems for transportation research. The center includes the Mechanical Systems Group, which is responsible for mechanical fabrication to suit the needs of all research projects; the Data Acquisition Group, which is responsible for electronic hardware design; and the Advanced Development Group, which is responsible for software development. The Data Acquisition Group is a pioneer in distributed data acquisition systems. The Advanced Development Group includes specialists in machine vision, road tracking, and data analysis.
Center for Technology Implementation
(Created in 2016; Mike Mollenhauer, Director)
The Center for Technology Implementation was created to facilitate technology deployment and leverage existing research investments. The center makes it possible for the Institute and its sponsors and clients to participate in early-stage technology implementation programs. Center personnel can help develop a toolbox of modular software solutions that can be applied in new jurisdictions, building smart solutions that combine the best commercial products with customization that can fully address agency goals.

Center for Truck and Bus Safety
(Created in 2005; Rich Hanowski, Director)
The Center for Truck and Bus Safety focuses on the research, development, and evaluation of heavy-vehicle systems. The center is dedicated to the design, delivery, and implementation of leading-edge research and development efforts aimed at improving the health and safety of heavy-vehicle drivers. The center comprises the Behavioral Analysis and Applications Group, the Human Factors and Advanced System Testing Group, and the Safety and Human Factors Group. Center research includes refining and testing rear-lighting configurations to reduce the number and severity of rear-end crashes, determining safe hours of service for commercial motor vehicle drivers, evaluating causes of drowsiness and providing countermeasures, and developing education programs to keep drivers healthy and alert.

Center for Vulnerable Road User Safety
(Created in 2013; Jon Antin, Director)
The Center for Vulnerable Road User Safety conducts research and outreach designed to enhance safety for all vulnerable road users, including senior and teen drivers, bicyclists, and pedestrians. Vulnerable road users comprise all age groups and a variety of demographics; their one shared trait is an increased risk of suffering a traffic-related crash or injury. The center includes the Teen Risk and Injury Prevention Group and the Senior Mobility Awareness, Safety, and Health Group. Research includes a naturalistic driving study of novice teen drivers with the aim of providing real-time feedback, gathering information for driver training, and keeping teens’ parents informed. The center has undertaken outreach initiatives designed to provide recommendations for coordinating public and private services for the aged, disabled, and indigent populations.
Connected Vehicle/Infrastructure University Transportation Center
(Created in 2012; Thomas A. Dingus, Director)
Virginia Tech/VTTI, the University of Virginia, Morgan State University, and the Virginia Department of Transportation teamed to develop a Tier 1 University Transportation Center headquartered at VTTI. Robust vehicle-to-vehicle, vehicle-to-infrastructure, and vehicle-to-device communication will enable applications addressing the U.S. Department of Transportation strategic goals of safety, state of good repair, economic competitiveness, livable communities, and environmental sustainability. The center conducts connected-vehicle research using the Virginia Connected Corridors, which comprise the Virginia Smart Road and Interstates 66 and 495, as well as U.S. 29 and 50. The corridors are equipped with wireless roadside communication technology. The center has more than 20 active research projects that include in-vehicle notifications of a stopped school bus ahead—especially when the bus is stopped over a hill or around a blind curve—and communication devices installed in safety vests worn by road workers to alert workers and vehicle operators when an on-foot worker is in danger of being struck.

Global Center for Automotive Performance Simulation
(Created in 2010, Opened in 2013; Frank Della Pia, Director)
The Global Center for Automotive Performance Simulation is a world-class facility that provides revolutionary services for both vehicle and tire, including testing, simulation, and modeling. The center comprises the National Tire Research Center, the Southern Virginia Vehicle Motion Labs, and the Virtual Design and Integration Laboratory. Collectively, these initiatives provide the full range of services essential for creating a more dynamic product through both virtual and physical development. The center is affiliated with Virginia Tech and VTTI and is located in Southern Virginia.

International Center for Naturalistic Driving Data Analysis at Virginia Tech
(Created in 2008; Clark Gaylord, Chief Information Officer)
The International Center for Naturalistic Driving Data Analysis incorporates Virginia Tech’s petabyte-scale, high performance data storage system into the VTTI data infrastructure. This allows data from multiple naturalistic driving studies to be analyzed using high performance computational systems to perform more complex computational algorithms and data mining.

The 48-node compute cluster of the Institute moves data between the field and the data center, decrypts data, prepares data files for ingestion to a 500-terabyte scientific data warehouse, processes video files, and provides a platform for advanced analytical processing. A peta-scale archive file
system will ultimately facilitate the long-term storage of numerous petabytes of data while maintaining data in an online state.

VTI data center features include a computational cluster, the application of the Virginia Tech High Performance Computing Storage System, and a significant upgrade to the storage system supporting the scientific data warehouse environment at VTTI. These systems compose the foundation for data-intensive scientific research programs conducted at VTTI, particularly the Second Strategic Highway Research Program Naturalistic Driving Study.

**Motorcycle Research Group**  
(Created in 2007; Shane McLaughlin, Group Leader)  
The Motorcycle Research Group was born from a history in transportation research; concern about an increasing number of motorcyclist fatalities and injuries; and the excitement of a large number of VTTI engineers, staff, researchers, and family who are riders. The group focuses on riders and their machines while considering other factors in the surrounding transportation system. Group researchers have conducted the first large-scale naturalistic motorcycle study, the aim of which is to explore motorcycle crash causation and to develop crash countermeasures.

**National Surface Transportation Safety Center for Excellence**  
(Created in 2006; Jon Hankey, Director)  
The National Surface Transportation Safety Center for Excellence was established by the Federal Public Transportation Act of 2005 to develop and disseminate advanced transportation safety techniques and innovations in both rural and urban communities. Center research focuses on four major objectives: 1) To develop and test transportation devices and techniques that enhance driver performance; 2) To evaluate the roadway environment and infrastructure-based safety systems; 3) To address mobility for vulnerable road users; and 4) To examine driver impairment issues.
Sponsors, Clients, and Partners

The continued success of VTTI is due, in large part, to its sponsors, partners, clients, and stakeholders. VTTI would like to acknowledge the contributions and support of the following organizations:

- 3M
- AAA
- AAA Foundation for Traffic Safety
- AAA Mid-Atlantic
- Acclaro Research Solutions, Inc.
- ACF
- Alliance of Automobile Manufacturers
- American Association of Motor Vehicle Administrators
- American Association of State Highway and Transportation Officials
- American Transportation Research Institute
- Amoco
- Applied Research Associates
- Arete Associates
- Arlington County, Va.
- Association for Unmanned Vehicle Systems International
- Association of Global Automakers
- Assured Information Security
- Atkins Global
- Atlantic Construction Fabric
- Attention Technologies, Inc.
- Auburn University
- AutoLiv
- Automotive Events
- B&W Pantex
- Battelle
- B-Con Engineering, Inc.
- Beam Brothers

- Bedford County, Va.
- Bekkaert
- Betty Serian and Associates
- Bishop Consulting
- BMW
- Booz Allen Hamilton
- Bosch
- BP Amoco
- Bridgestone
- Brigham Young University
- California Department of Transportation
- Calspan
- Cambridge Systematics
- Canadian Council of Motor Transport Administrators
- Capital Area Transit System in Baton Rouge
- Carnegie Mellon Robotics Institute
- Carnegie Mellon University
- CARPI USA
- Case Western Reserve University
- Catapult Transport Systems
- Center for Innovative Technology
- Cernet Corp.
- Chen Ryan Associates
- Chrysler
- Cisco Systems
- City of Flagstaff
- City of Richmond
- Civilogix, Inc.

- Clanton & Associates, Inc.
- Clean Air Tech International
- Clear Roads
- Clemson University
- Cohda Wireless
- Colorado Department of Transportation
- Commercial Vehicle Safety Alliance
- Continental Automotive Systems, Inc.
- Con-Way
- Cooper Tire
- Corning Cable Systems
- Crash Sealant Consortium
- Crash Avoidance Metrics Partnership (CAMP)
- Crash Safety Research
- CUBRC
- Delaware Department of Motor Vehicles
- Delaware Technical and Community College
- Delft University of Technology
- Delphi Electronics
- Robert Denaro
- DENS
- DGE, Inc.
- District Department of Transportation
- DLA Piper
- DMD & Associates
- Donovan Hatem
- Draper Laboratory
- Drexel University
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Outreach and Community Engagement

During FY16, numerous partners, potential sponsors, marketing groups, and conference groups visited VTTI and/or spoke with institute representatives, including:

- American Association of Motor Vehicle Administrators
- Congressional staffers
- Continental Corporation (Mexico)
- Direct Delivery Leadership Council
- Ellen Partridge, Chief Consul, Federal Transit Administration
- Federal Aviation Administration (FAA)
- Girls in Transportation
- Syamal Gupta, Chairman, TCE Consulting Engineers Limited
- Major automobile manufacturers and suppliers
- NanoSonic
- National and local media (see Media Coverage)
- Nicholas Devereux, aide to Senator Mark Warner
- Ohio State University
- Roanoke Valley Governor’s School
- Robert Bosch
- Senator Mark Warner
- Teen Safe Driving Summit
- Travelers Insurance
- U.S. Department of Transportation
- Valeo
- Virginia and North Carolina high school students
- Virginia Department of Transportation commissioner and engineers/staff
- Virginia Tech Board of Visitors and spouses
- Virginia Tech Center for Research and Development in International Education
- Virginia Tech Lifelong Learning Institute
- Virginia Tech Police Department Community Day (VTTI participated)
- Virginia Tech President Timothy Sands
- Virginia Tech Science and Engineering for Regional Growth Enterprise
- Virginia Tech students
- Virginia Transportation Research Council
- Virginia Unmanned Systems Commission
- Women’s Transportation Seminar International

VTTI staff, in partnership with other employees from the Virginia Department of Transportation (VDOT), also hosted an open house for the general public and a school day event attended by more than 200 students in grades K-12.

VTTI was well represented at several international and national industry conferences, including:

- Direct Delivery Leadership Council Meeting
- ITS America Capitol Hill Tech Showcase
- ITS World Congress
- ITSA Annual Meeting
- Lifesavers Conference
- SAE Government Industry Meeting
- SAE World Congress
- Transportation Research Board Annual Meeting
- Travelers’ Transportation Safety Symposium
- Virginia Department of Transportation Career Fair
- Virginia Department of Transportation Roadeo
- Virginia Science Festival
• #follownews
• 10TV
• 1110AM: WBT
• 9News
• ABC 10 News
• ABC 13 News Now*
• ABC 5 Eyewitness News
• ABC News*
• Aiken Standard
• Akron Beacon Journal
• Alaska Dispatch News
• Allembru Local
• Alphr
• American Trucker
• Arab News
• ASHE Scanner
• Asia One
• Augusta Free Press*
• The Australian Business Review
• Auto Connected Car News
• Auto World News
• Automated Vehicle Symposium
• Automotive News
• Awful Announcing
• AZCentral
• Bacon’s Rebellion
• Baynet World Inc.
• Berkeley Register-Herald
• Beta Boston
• Better Roads
• Bharat Press
• Bidness Etc.
• Blue Mountain Eagle
• Brainerd Dispatch
• Bristol Herald Courier
• The Brownsville Herald
• Bulk Transporter
• Business Insider*
• Business Insurance
• Bustle
• Butler Eagle
• Canadian Underwriter
• Cantechnote
• Cape Cod News
• Cape Cod Times
• Carrentals.co.uk
• CBC News
• CBS DC
• Charleston Gazette-Mail
• Charleston Post Courier
• Chicago Tribune*
• The Citizens’ Voice
• The Christian Science Monitor
• City Lab
• Civil Engineering News
• Online
• Claims Journal
• Cleveland Sun Times
• Click On Detroit
• CNN Indonesia
• Cody Enterprise
• Collegiate Times*
• Computer World
• Construction Manager
• Contexto
• Counsel & Heal
• Culpeper Star Exponent
• The Daily Athenaeum
• The Daily Courier
• Daily Herald
• Daily Journal of Commerce
• Daily Mail
• Daily News 724
• Daily News Journal
• Daily News*
• The Daily Progress*
• Daily Rx News
• The Daily Telegraph
• Daily Times Chronicle*
• DC Velocity
• Defense Video & Imagery Distribution Center
• Del Mar Times
• Delmarva Now
• Department of Motor Vehicles
• Digital Journal*
• The Dispatch
• East Oregonian
• eCanada Now*
• ECB Publishing, Inc.
• The Edwardsville Intelligencer
• EHS Today
• El Sol News
• Electronic Engineering Times
• Emergency Management
• Equipment World’s Better Roads
• EurekAlert*
• Executive Biz
• Extreme Tech
• Eyewitness News
• Fairfax County Times
• Family Circle
• Faribault Daily News
• Fast Company
• Federal News Radio
• Fleet Equipment
• Fleet Owner*
• Fleet Point
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<td>*Denotes media outlets that covered VTTI more than once.</td>
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<td>Sioux City Journal</td>
<td>Tulsa World</td>
<td>Independent</td>
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<td>Sleep Review</td>
<td>UberTopic</td>
<td>Wicked Local*</td>
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<td>Wired</td>
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<td>Wireless Goodness</td>
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</tbody>
</table>
Jon Antin

Rajaram Bhagavathula


Received the Emerging Professional Sponsorship to attend the Illuminating Engineering Society Annual Conference 2015 in Indianapolis, IN.

Myra Blanco


Hao Chen

Tom Dingus


U.S. Drivers Are Distracted More Than Half the Time They’re Behind the Wheel, CityLab, March 8, 2016, http://www.citylab.com/commute/2016/03/major-distractions-for-drivers/472656/

Driving while angry or sad increases your risk of crashing by nearly 10 times, ScienceAlert, February 26, 2016, http://www.sciencealert.com/driving-while-angry-or-sad-increases-your-risk-of-crashing-by-nearly-10-times


Distraught Drivers Are Even More Dangerous Than You Thought, Huffington Post, February 24, 2016, http://www.huffingtonpost.com/entry/distracted-driving-study_us_56ccd2a9e4b041135f18a7aa


Zac Doerzaph


Cristian Druta


Jianhe Du


Mohammed Elhenawy


Gerardo Flintsch
Active member, Hispanic Caucus


Member, American Society of Civil Engineers: Infrastructure Systems committee.

Member, American Society of Testing Materials: E-17 – Vehicle-Pavement Systems committee.
Member, Transportation Research Board: Sustainable Pavements AFD00(1) subcommittee (founder); and AFD80 Strength and Deformation Characteristics of Pavement Sections, AFD10(3) International Conferences on Managing Pavements, and AFD20 Pavement Data Collection committees.

Member, Virginia Department of Transportation Asphalt Research Advisory committee.

Member, Virginia Department of Transportation Pavement Research Advisory committee.

Member, Virginia Tech Department of Civil and Environmental Engineering, Curriculum committee.

Member, Virginia Tech College of Engineering, College Diversity committee.

Member, World Road Association/Permanent International Association of Road Congresses: TC D.1 Asset Management committee (secretary and vice-chair).

Speaker (2015): Road Asset Management in Latin-America in Comparison with Other Countries (Gestión de Activos Viales en Latinoamérica y el Caribe vis-à-vis otros países) outreach seminar at the Inter-American Development Bank, October 7, 2015, Washington, DC.

Ronald Gibbons

Dirt Depreciation on LED Luminaires. (2015). Presented at the Street and Area Lighting Conference 2015, Savannah, GA.


Received the Illuminating Engineering Society Illumination 2015 Award of Merit for the design and Development of the Lighting on Demand system for the Smart Road.

Warren Hardy


Received the 2015 John Paul Stapp Award.

Jeff Hickman

Arash Jahangiri*


Andrew Kemper
Received the Elaine Wodzin Young Achiever Award from the Association for the Advancement of Automotive Medicine.

Received the distinction of “Leader in Research- Assistant Professor Level” from the Virginia Tech Department of Biomedical Engineering and Mechanics.

Charlie Klauer
Invited lecturer (2015): University of Saskatchewan, Department of Psychology.


Invited presenter (2015): Third Annual Virginia Distracted Driving Summit, September 17-18, Virginia Beach, VA.

Member, Beyond Boundaries, Virginia Tech: Finding Funding committee.

Member, Blue Ridge Transportation Safety Board.

Member, International Organization for Standardization: Naturalistic Driving Studies committee.

Member, Transportation Research Board: Vehicle User Characteristics, Operator Education and Regulation committees and Young Driver subcommittee.


Panelist (2016): National Science Foundation review panel.
Participant (2015): State Farm Electronic Data Interchange planning meeting.

Presenter (2016): Transportation Research Board, Young driver subcommittee.

Presenter (2015): Family and Domestic Court Judicial Conference, Williamsburg, VA.


Presenter (2015): Transportation Research Board, Young driver subcommittee.


Alvaro J. Calle Laguna*

Shane McLaughlin


McCall, R., McLaughlin, S., Fritz, S., Buche, T. (in press). Riding-day Motorcyclists Riding Frequencies. Presented at the Fifth International Symposium on Naturalistic Driving Research (podium presentation), Blacksburg, VA.

McCall, R., Rainey, C., Williams, McLaughlin, S. (in press). Curves as a Risk Factor for Motorcyclists. Presented at the Fifth International Symposium on Naturalistic Driving Research (podium presentation), Blacksburg, VA.


Williams, V., McLaughlin, S., & Buche, T. (in press). Selected Lane Position as Motorcyclists Approach and Traverse Intersections. Paper to be presented at the Fifth International Symposium on Naturalistic Driving Research, August 30-Sept 1, 2016, Blacksburg, VA.

Williams, V., McLaughlin, S., McCall, R., & Buche, T. (in press). Motorcyclists’ Self-Reported Riding Mileage Versus Actual Riding Mileage in the Following Year. Paper to be presented at the Fifth International Symposium on Naturalistic Driving Research, August 30-Sept 1, 2016, Blacksburg, VA.

Luke Neurauter


Demo of SAE Levels of Automation, https://youtu.be/9PUPb-ks0Q4

Demo of Virginia Automated Corridors and Virginia Connected Corridors, https://vimeo.com/142905461
In technology test, senator is along for the ride — the driver-less ride, The Washington Post, October 19, 2015, https://www.washingtonpost.com/local/trafficandcommuting/2015/10/19/9bc0e078-7697-11e5-a958-d889fa561dc_story.html


Justin Owens

Introduction to VTTI, the Smart Road, and the Senior Mobility, Awareness, Safety & Health Group (2015). Lifelong Learning Initiative, Blacksburg, VA.


Miguel Perez


Virginia Tech study finds emotion spikes risk of car accidents, WFXR (Virginia First), February 2016, Roanoke, VA.

Hesham Rakha

Member, Consortium for Energy Efficiency: Honorarium and P&T committees.

Member, Intelligent Transportation Society of America, Benefits, Evaluation and Cost Committee.

Member, Transportation Research Board: Air Quality, Traffic Flow Theory, Highway Capacity, and Quality of Service committees and Traffic Modeling subcommittee.


Tara Reel
Vice President of the Virginia Tech Graduate Student Assembly.

Selected as Member: Virginia Tech Graduate Student Representative, Board of Visitors (Appointment begins July 1, 2016).

Served as a teaching assistant for the Sustainable Policy Making and Planning in Europe course at Virginia Tech in summer 2016.
Miao Song

Tammy Trimble
Completed the National Highway Institute FHWA-NHI-420018 Instructor Development Course in November 2015.


Received Virginia Tech's Ten Years of Service award.

*Denotes presentation made by a VTTI student author.

**Denotes presentation made by a lead author not affiliated with VTTI.


Williams, V., McLaughlin, S., McCall, R., & Buche, T. (in press). Motorcyclists' self-reported riding mileage versus actual riding mileage in the following year.

**STUDENT PUBLICATIONS**

*The following denotes publications for which a VTTI student served as an author.*


*Denotes work published since the 2015 Annual Report or work published in a new format.
<table>
<thead>
<tr>
<th>Name</th>
<th>Department/College</th>
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<tbody>
<tr>
<td>Thanassis Rikakis</td>
<td>Office of the Provost</td>
</tr>
<tr>
<td>Dwight Shelton</td>
<td>Office of the Vice President for Finance and Chief Financial Officer</td>
</tr>
<tr>
<td>Theresa Mayer</td>
<td>Office of the Vice President for Research and Innovation</td>
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<tr>
<td>Don Taylor</td>
<td>College of Engineering</td>
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<tr>
<td>Pam VandeVord</td>
<td>Biomedical Engineering and Mechanics</td>
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<tr>
<td>Sam Easterling</td>
<td>Civil and Environmental Engineering</td>
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<tr>
<td>Azim Eskandarian</td>
<td>Mechanical Engineering</td>
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<tr>
<td>Luke Lester</td>
<td>Electrical and Computer Engineering</td>
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<tr>
<td>Eileen Van Aken</td>
<td>Industrial and Systems Engineering</td>
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<tr>
<td>Robert Sumichrast</td>
<td>Pamplin College of Business</td>
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<tr>
<td>Paul Herr</td>
<td>Marketing</td>
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<td>Sally Morton</td>
<td>Science</td>
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<td>Ron Fricker</td>
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<td>Robert Schubert</td>
<td>College of Architecture and Urban Studies</td>
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<tr>
<td>Hunter Pittman</td>
<td>Architecture + Design</td>
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<tr>
<td>Karen Hult</td>
<td>Political Science</td>
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<tr>
<td>Tom Dingus</td>
<td>Virginia Tech Transportation Institute</td>
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Virginia Tech
Transportation Institute