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.
MESSAGE FROM THE DIRECTOR

-Tom Dingus, Ph.D., CHFP
Director of VTTI
President of VTT, LLC
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VTTI: Surpassing milestones, advancing transportation solutions

The transportation landscape is rapidly evolving, and VTTI — along with its affiliated corporation in Southern Virginia, the Global Center for Automotive Performance Simulation (GCAPS) — is keeping pace to address industry needs while ensuring the safety of transportation users.

This year, the institute surpassed several milestones, including:

- Expendng more than $40 million in externally sponsored research funding, accounting for approximately $1 out of every $7 of external research in the Virginia Tech portfolio in fiscal year 2018.
- Exceeding $51 million in new external contracts and awards received in fiscal year 2018, resulting in a total active portfolio that now exceeds $200 million. This funding supports the institute’s 300 active projects, all of which aim to save lives, time, money, and protect the environment. The institute rapidly expanded, with 40 open positions for new faculty, staff, and students.
- Diversifying funding, with more than 50 percent of funding coming from private-sector partners, including 14 auto manufacturers and more than 50 suppliers.
- Employing more than 500 faculty, staff, and students, a number that included 280 undergraduate and graduate students from five Virginia Tech colleges and more than one dozen university departments who gained hands-on experience in conducting cutting-edge transportation research.

The transportation institute’s $110 million infrastructure, which was built largely via external partnerships with public and private-sector partners, includes GCAPS. Originally funded by General Motors, the Virginia Tobacco Indemnification Commission, and Virginia Tech, the center now generates more than $5 million in revenue each year and has created 70 direct and indirect jobs in the Southern Virginia region. The institute’s infrastructure also includes the recent Virginia Smart Roads expansion project, developed in partnership with the Virginia Department of Transportation (VDOT). The cornerstone of the transportation institute, Smart Roads research and outreach use this year neared 3,000 hours — or approximately 60 hours per week — across multiple sponsors.

Institute researchers are currently working with sponsors such as GM, Ford, Nissan, and the National Highway Traffic Safety Administration (NHTSA) to investigate advanced driver-assistance systems and vehicle automation, both of which are quickly transforming the transportation industry. This is certainly exciting in terms of safety and mobility innovations but carries with it serious challenges and questions that need to be answered. For example, how should these cars and trucks be designed, tested, and deployed so they will be able to navigate all road types in all weather and lighting conditions, avoid unexpected obstacles, and ensure that all transportation users are safer as a result?

To help address these questions, VTTI researchers are acquiring large quantities of naturalistic driving data via a methodology pioneered by VTTI. Such data can be used in advanced analytics and simulation methods to help industry leaders determine if advanced safety systems and vehicle automation can operate reliably or cause unintended consequences for drivers, such as distraction or reliance upon the system. This approach is ultimately designed to provide a foundation for the safe, efficient development and deployment of advanced vehicles and systems.

Another key issue in transportation is teen driving risk and injury prevention. Teen drivers — particularly novice drivers — are overrepresented in national fatality and injury crash statistics. One out of every five young drivers in the U.S. is involved in a crash within the first six months of driving. Researchers at VTTI are dedicated to reducing these high crash rates and saving teen lives through research and outreach.

The future of transportation holds many challenges, but VTTI — home to the largest group of driving researchers in the world — is diligently working to confront these issues and many others. By working with more than 100 sponsors that include industry partners, government agencies, and suppliers, the institute has positioned itself to address critical transportation issues, delivering imaginative safety and design solutions.
VTTI has an infrastructure worth more than $110 million that includes four test beds used extensively for real-world, impactful transportation research across both broad and edge-and-corner scenarios; more than 120,000 square feet of building space in Blacksburg and Alton, Va.; and more than 100 owned and leased instrumented vehicles, including connected-automated light and heavy vehicles. VTTI is also purchasing an autonomous micro-transit shuttle connected-automated light and heavy vehicles. VTTI is owned and leased instrumented vehicles, including space in Blacksburg and Alton, Va.; and more than 100 scenarios; more than 120,000 square feet of building research across both broad and edge-and-corner extensively for real-world, impactful transportation ceremony with partners VDOT and Virginia Tech to In 2017, the institute held a ribbon cutting/groundbreaking in the corridors, VDOT and researchers from multiple in- than 60 roadside equipment units (RSEs) located along the Virginia Smart Roads and facilitating short turnaround projects focused on advanced-vehicle testing in collaboration with VTTI researchers, industry leaders, and Virginia Tech students, among others. The Virginia Smart Roads are designed to complement the public testing capabilities offered by the Virginia Connected and Automated Corridors. 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 implementing connected applications that include traveler information, lane closure alerts, and work zone and incident management. Under the umbrella of the recently completed Tier 1 U.S. Department of Transportation (USDOT) Connected Vehicle/Infrastructure University Transportation Center, VTTI, the University of Virginia, and Morgan State University conducted more than 20 connected projects along the VCC, including emergency vehicle-to-vehicle communications, motorcycle crash warning systems, eco-speed control, intersection management, and pavement assessment and management. 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 initiative provides 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 leverages 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 proclamation allows the testing of any automated vehicle on Virginia roads under the guidance of VTTI. The Virginia Department of Motor Vehicles will support research efforts performed by VTTI in accordance with the proclamation. With assistance from the Commonwealth of Virginia, the VAC will advance the development, testing, and deployment of automated-vehicle technology, with the ultimate goal of helping stakeholders create robust automated and autonomous vehicles. Faculty and students associated with the USDOT-awarded Safety through Disruption National University Transportation Center (Safe-D National UTC)—a consortium led by VTTI with partners Texas A&M Transportation Institute and San Diego State University—have access to the Virginia Smart Roads and the Connected and Automated Corridors to perform research into disruptive technologies, such as automated and connected vehicles, big data analytics, and transportation as a service. Current UTC projects include modeling driver responses during automated-vehicle failures, evaluating the response of autonomous vehicles to emergency response vehicles, designing and evaluating a connected work zone hazard detection and communication system for connected and automated vehicles, examining senior drivers’ adaptation to automated vehicles, identifying railroad requirements for the future automated-and-connected-vehicle environment, assessing safety perceptions of transportation.
network companies by the blind and visually impaired, and evaluating factors surrounding child seat usage in ride-share services.

02. Blacksburg Facilities
The traditional laboratories at VTTR are housed in four buildings totaling more than 90,000 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. VTTR expanded its on-site capacity by 7,000 square feet of warehouse space and housing for 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 research endeavors 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 Roads systems and capabilities. Additionally, VTTR occupies an adjacent seven-bay, 12,600-square-foot garage. This facility is used to store the VTTR instrumented vehicle fleet and the equipment necessary for research and Smart Roads operations.

03. Southern Virginia Facilities
Affiliated with VTTR and Virginia Tech is the Global Center for Automotive Performance Simulation (GCAPS), located in Alton, Va. GCAPS is a world-class facility that provides revolutionary services for both vehicle and tire, including testing, simulation, and modeling. GCAPS comprises the National Tire Research Center (NTRC), the Southern Virginia Vehicle Motion Labs (SoVa Motion), and the Virtual Design and Integration Laboratory (VDIL). Collectively, these initiatives provide the full range of services essential for creating a more dynamic product through both virtual and physical development.

GCAPS also works closely with amateur, semi-pro, and pro race teams to provide cutting-edge services that help race cars perform at the top levels.

Located adjacent to GCAPS is the Virginia International Raceway, to which VTTR has access for the performance of connected and automated projects in a multi-use testing environment that includes both closed-course and open traffic conditions. The raceway track can be configured to five different courses ranging from 1.1 miles to 6.8 miles and includes such topography as hairpin curves and blind passes.

04. Accelerated Pavement Testing
VDOT and VTTR launched an accelerated pavement testing program in 2015, 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. Since its inception in 2015, the program has resulted in approximately $1.66 million in expenditures.

05. VTTR Vehicle Fleet
The VTTR vehicle fleet is uniquely instrumented for specific experiments. Researchers use the vehicle fleet for Smart Roads 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.
1. In September 2017, a VTTI-led team was awarded $4.9 million to provide the National Highway Traffic Safety Administration (NHTSA) with the information needed to make informed decisions regarding the technical translations of existing Federal Motor Vehicle Safety Standards (FMVSS) and the related test procedures. Automated driving systems that may not have manually operated driving controls (such as steering wheels and brakes) and may or may not have onboard occupants have necessitated a fresh look at many FMVSS. The focus of this project is to investigate options for removing barriers posed by the existing standards and test procedures. The second phase of this project, with additional funding, is expected to follow after the completion of this first phase.

2. VTTI continued to collaborate with 38 organizations, including Booz Allen Hamilton, Bosch, GM, Google, Honda, Mercedes-Benz, Nissan, Southwest Research Institute, and Volkswagen/Audi, under the NHTSA Vehicle Electronic Systems Safety IDIQ contract. This team was organized to respond to all aspects of the NHTSA project, including electronics safe reliability, cybersecurity, vehicle automation, and related human factors considerations. To date, VTTI has received awards of nearly $16 million under this contract.

3. VTTI continued to propose task orders released under a contract from the Transportation Research Board (TRB) of the National Academy of Sciences potentially worth an initial $2 million (with the possibility of additional funds). The task orders are designed 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. VTTI is completing work on the National Cooperative Highway Research Program (NCHRP) 20-102(07) Implications of Automation for Motor Vehicle Codes, which explored the impact of automated driving systems on motor vehicle codes and other related domains.

4. VTTI and partners Texas A&M Transportation Institute and San Diego State University — with support from the Virginia Department of Transportation (VDOT) — continued to conduct cutting-edge research via the Safety through Disruption National University Transportation Center (Safe-D UTC). The Safe-D UTC grant totals approximately $28 million across a five-year span, funding the study of how best to maximize the safety benefits of integrating technologies such as automation and connectivity into the transportation system. Motivated by an overall desire to promote safety on U.S. roadways, the Safe-D UTC is focusing on three key areas: 1) Performing innovative research that is led by the largest consortium of transportation safety researchers in the nation and is largely focused on advanced-vehicle technologies, transportation as a service, and “big data” analytics; 2) Education and workforce development; and 3) Sharing research findings with the broader transportation community through a robust technical transfer process. The Safe-D UTC award is representative of the next generation of vehicles and technologies, informing national discourse about how best to mitigate rapidly growing transportation challenges, offer students unique hands-on experience in the field of transportation research, and provide more opportunities in the workforce.

5. VTTI continued to serve an integral role in the Virginia Tech Intelligent Infrastructure initiative, particularly in the area of advanced-vehicle research and development. In partnership with VDOT, the institute is expanding its Smart Road testing capabilities. The Surface Street Expansion and Live Roadway Connector were both completed during FY18, and completion of the first two phases of the Rural Roads expansion is anticipated next year. Collectively, the expansions are dubbed the Virginia Smart Roads and will facilitate edge-and-corner, tailored, advanced, unique test-bed options for self-driving ground vehicles.

6. The Virginia Smart Roads also includes construction of the Automation Hub, located adjacent to the Surface Street expansion. The building will house advanced-vehicle initiatives that will facilitate cutting-edge collaborations focused on advanced-vehicle research and development. The Automation Hub will also serve as home to the Intern Hub program, which was initiated with soft-start partner Continental Automotive. The Intern Hub fosters collaboration between industry partners, VTTI researchers, and leading students from Virginia Tech. Student interns work for industry partners while in Blacksburg through collaborative sponsored research with VTTI faculty. Each summer, the interns leave Blacksburg for positions at their respective industry employer for a direct integration into the company’s business and engineering processes. This experiential learning program, which starts as early as a student’s sophomore year, will go into full effect during FY19, with plans for growth to at least four industry partners.

7. VTTI continued to develop relationships with both public and private sponsors. This year, VTTI initiated several new relationships with proprietary sponsors, which are likely to result in continued funding in future years.

8. VTTI continued to work on a contract sponsored by NHTSA to study how driver expectations for partial vehicle automation change how drivers interact and use partial vehicle automation with different capabilities. This unique project uses a vehicle customized by VTTI that operates at different capability levels to manipulate capability independently from driver expectation. This work is scheduled to conclude in January 2019.
VTTI was awarded a contract with Transurban to conduct motorcycle safety-related research.

VTTI worked on a project funded by the National Surface Transportation Safety Center for Excellence (NSTSCE), the objective of which is to develop an algorithm that can provide likelihood estimations for the potential paths of lead vehicles. The scenarios of particular interest in this project are those in which the lead vehicle is approaching an intersection or parking lot at which the driver has an option of turning right.

Another NSTSCE-funded project served as a proof of concept, varying the nature and onset of countermeasure interventions intended to target drowsy driving episodes. Interventions to combat drowsiness addressed driver workload, either physical or cognitive, under the assumption that low workload environments may occasion drowsy driving episodes. Results suggest that workload-based countermeasures (physical or cognitive) can effectively combat drowsiness and re-engage drivers.

In conjunction with VDOT, VTTI continued to expand the capability and utility of the Virginia Connected and Automated Corridors (VCC/VAC), with expenditures during FY18 of nearly $600,000. VTTI extended the VCC architecture to support the broadcast of signal phasing and timing data for 30 intersections on the Route 7, US 29, and US 295 corridors in Arlington County, Va. VTTI also added a real-time process that makes VCC data available to the VDOT smarterroads.org public data-sharing website.

In partnership with VDOT, VTTI created a proof-of-concept work zone builder (WZB) application. The WZB is a tablet application that allows VDOT work zone inspectors and construction contractors to lay out their work zone designs over a photo map while suggesting placement of various work zone features out their work zone designs over a photo map while suggesting placement of various work zone features.

VTTI procured and installed a real-time kinematic GPS correction system on the VCC in Northern Virginia to support higher accuracy GPS data. The system provides additional GPS information to GPS receivers, enabling greater accuracy in location coordinates. The GPS real-time kinematic system will be used by VTTI to support demonstrations and research activities that require greater accuracy, such as lane-level connected-vehicle applications and pedestrian applications.

VTTI completed the VCC to support testing of new standardized message concepts for the Advanced Message Concept Development project with the Crash Avoidance Metrics Partnership (CAMP). These message extensions supported the test and evaluation of concepts in a real operational traffic environment. Follow-up work to create a nationally interoperable message strategy with the US DOT and CAMP is in the planning stage, with an award expected early FY19.

VTTI continued to serve as a subcontractor to Morgan State University on its Tier 1 research center through the Fixing America’s Surface Transportation (FAST) Act. UMEC seeks to bolster the scientific foundation and discern equity implications for policies that focus on urban mobility. UMEC will contribute to the body of knowledge on which planning and policies are based by researching transit/paratransit and freight planning and operations; drivers’ acceptance, affordability, and government promotion of connected and automated vehicles; and the distribution of transportation costs and benefits, including user fees and taxes. Research focus areas include increasing access to opportunities, smart cities, novel modes of transport, systems integration, analytical tools to optimize movement, and regional planning.

VTTI was awarded two competitive projects as part of UMEC: one on devising eco-driving strategies for transit buses and one on multi-modal traffic signal control.

VTTI was awarded a Ford effort on developing multi-modal travel-time prediction models.

The Xerox Palo Alto Research Center (PARC) and VTTI continued their work on an ARPA-E-funded project developing the Collaborative Optimization and Planning for Transportation Energy Reduction (COPTER) control architecture. The architecture represents a complete solution for the TRANSMART goal, with comprehensive transportation network modeling, a decision-theoretic approach for system optimization, and explicit human behavior and influence modeling to maximize real-world impact. This project leverages PARC competencies in model-based control of complex systems and human cognitive modeling, the recognized leadership of VTTI in transportation modeling and control, and substantial incumbency of Xerox as a provider of transportation service solutions to U.S. cities to create a project that is meaningful, executable, and transitionable.

VTTI continued its work on a U.S. Department of Energy project to develop a novel Eco-Cooperative Automated Control (Eco-CAC) system that integrates vehicle dynamics control with connected- and automated-vehicle applications. The approach is revolutionary in that it develops a next-generation, vehicle dynamics-controlled connected- and automated-vehicle system that builds on existing connected- and automated-vehicle technologies to reduce the energy/fuel consumption of internal combustion engine vehicles (ICEVs), battery-only electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), and hybrid electric vehicles (HEVs). The development of the Eco-CAC system will involve the following key steps and components: 1) Develop a connected-vehicle eco-routing controller that can be used with the above vehicle types. This unique eco-router will compute vehicle routing optimized for the individual user and entire system. 2) Develop a speed harmonization controller that regulates the flow of traffic approaching bottlenecks in the network. This controller will be fully integrated with the vehicle router, resulting in a unique strategic controller that can route traffic away from congested areas and regulate the flow of traffic entering congested areas. 3) Develop a multi-modal (ICEVs, BEVs, PHEVs, and HEVs) Eco-Cooperative Adaptive Cruise Control (Eco-CACC) controller that computes and implements optimum vehicle trajectories along multi-intersection roadways in consideration of dynamic vehicle queue predictions. 4) Develop an Eco-CACC-I controller that provides local longitudinal energy-optimal control in consideration of the homogenous and non-homogeneous vehicle platooning of ICEVs, BEVs, PHEVs, and HEVs.

VTTI continued to work with the Federal Highway Administration (FHWA) and AASHTO to provide data sets and support to several state department of transportation research teams working on Phase III Implementation Assistance Program projects. The goal of these efforts is to identify safety problems and generate countermeasures that reduce risk and prevalence. The projects have moved on to the implementation phase, resulting in the deployment of research-driven countermeasures expected to improve traffic safety.

VTTI worked with FHWA to provide data sets to several research teams working in the second phase of the FHWA Broad Agency Announcement related to traffic safety countermeasures. These efforts have transitioned from a pilot research phase into full investigations and continue to leverage the VTTI naturalistic driving data to decrease risks across all roadway users.

As part of its role as operator of the Second Strategic Highway Research Program Naturalistic Driving Study (SHRP 2 NDS) data set, VTTI provided data to support dozens of research projects, primarily geared toward advancing transportation safety as sponsored and performed by academic institutions, state departments of transportation, the federal government, research institutes, and not-for-profit organizations. VTTI provided a suite of data sets that met the needs of researchers aiming to develop new safety countermeasures. VTTI helped to fill an immediate need by providing access to a repository of naturalistic driving data from the SHRP 2 NDS study. This data set was critical for advancing transportation safety by enabling research that could inform the development of safety countermeasures. VTTI continues to support research in this area, collaborating with various organizations to ensure that the latest advancements in naturalistic driving data are available to researchers working on improving transportation safety.
organizations, and private industry partners. VTTI is in the planning stages for the next phase in the operation of this data set, which will begin in January 2020.

24 VTTI was awarded additional projects to increase accessibility to and improve the research value of the SHRP 2 NDS data, including approaches to increase the amount of data accessible outside of secure environments, approaches to de-identifying location information, and methods to allow for remote access to the data.

25 Institute researchers continued work with the FHWA to provide support and expand the capabilities of a secure data enclave at the Safety Training and Analysis Center, which allows secure access to the SHRP 2 NDS data for federal employees, state departments of transportation, and their research partners.

26 VTTI submitted for the approval of the International Organization for Standardization (ISO) definitions and annotations for naturalistic driving studies. The goal of the submission is to provide a standard vocabulary for coding the characteristics of safety-critical events (e.g., crashes, near-crashes) occurring in naturalistic driving studies such that a common terminology is created for monitoring, coding, and analyzing naturalistic driving data.

27 VDOT and VTTI continued its 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. Since its inception in 2015, the program has resulted in approximately $1.66 million in expenditures.

28 In 2014, VTTI began work in collaboration with several departments across campus to develop a health and injury control center. This evolving center is designed to enhance research opportunities that promote driver health and wellness and reduce injuries. To date, collaborating departments include Fralin: Psychology; Biomedical Engineering; Human Nutrition, Foods, and Exercise; the Virginia Tech Child Center for Autism Research; Computer Science; Gerontology; Construction; the Virginia Tech Carillon Research Institute; the Virginia Tech Child Study Center; and the Virginia Tech Child Development Center. During FY18, faculty and researchers working under this initiative submitted white papers and proposals to several organizations, including the Center for Transformative Research on Health Behaviours (CTRHB), the Motor Carrier Safety Assistance Program (MCSAP), NTSB, the Federal Motor Carrier Safety Administration (FMCSA), the National Institutes of Health (NIH), the National Institute of Occupational Safety and Health (NIOSH), the NCHRP of the TRB, and the Federal Transit Administration (FTA). Through these efforts, the team continues to search for funding opportunities and possible collaborations.

29 Institute researchers collaborated with Virginia Tech departments, including Biomedical Engineering and Mechanics (BEAM), to foster dual appointment opportunities among VTTI faculty where strategically advantageous. Two VTTI researchers now hold appointments, with one additional researcher beginning an appointment in Fall 2018.

30 VTTI continued as a subcontractor to North Carolina A&T State University on its Tier 1 Center for Advanced Transportation Mobility (CATM) UTC. CATM is a consortium consisting of three higher education institutions: North Carolina Agricultural and Technical State University (lead), Virginia Tech, and Embry-Riddle Aeronautical University – Daytona Beach. These institutions collaborate on projects focused on identifying solutions to mobility concerns within two primary areas: 1) Enabling safe and efficient mobility for vulnerable road users and 2) Optimizing mobility in emergencies. The center conducts research, outreach, and educational activities to address the transportation needs of an extremely broad spectrum of the U.S. population, thereby helping the nation maintain its competitive advantage in the global economy. VTTI researchers are leading CATM UTC studies focused on providing first and last-mile connectivity for vulnerable road users (VRUs); providing an application development platform to assist VRUs in moving through any space from a current location to a destination; and surveying VRUs to better understand their unique mobility problems, perspectives, needs, and hoped-for solutions.

31 VTTI continued to work with the University of Alabama at Birmingham (UAB) and the NIH-National Eye Institute on a naturalistic driving study assessing vision impairment among older drivers. Driving is a highly visual task, and older adults have a high prevalence of vision impairment compared to other ages. Most studies addressing visual risk factors for MVCs by older drivers use vehicle accident reports as the primary outcome, an approach that has several methodological limitations. Naturalistic driving research methods overcome these challenges and involve installing a high-tech yet unobtrusive data acquisition system (DAS) in an older driver’s own vehicle, operating whenever the vehicle is turned on. The DAS continuously records multi-channel video of driver and roadway, sensor-based kinematics, GPS location, and presence of nearby objects in front of the vehicle, providing an objective measure of driving exposure (miles driven), which are all recorded onto a data drive in the DAS. In this naturalistic driving study, the purpose is to examine the relationship between seniors’ vision and crashes and near-crashes, lane-keeping, turning at intersections, driving performance during secondary task demands, and the role of front-seat passengers. Results of the on-road driving evaluation are compared to objective indicators of driving safety derived from the naturalistic data. Data collection is expected to continue through late 2018.

32 VTTI researchers with the Safe-D UTC examined senior drivers’ adaptation to mixed-level automated vehicles. The aging of society will continue to impact all of society’s major institutions in a variety of ways for decades...
to come. Major areas that will be affected include finance, housing, health, and transportation. Automated-vehicle technology has the potential to assist older drivers by reducing exposure to hazards. Such technology can help compensate for declining functional health and related abilities often seen in seniors (e.g., cognition, perception, psychomotor skill, and physical abilities such as strength, balance, flexibility, stamina, and reaction time). However, this can only work if technology designers, policy makers, and other stakeholders fully consider the needs and feelings of this growing cohort. The objective of the proposed project is to examine seniors’ attitudes toward automated-vehicle technology prior to any substantive exposure or use, then again after having the opportunity to explore and use automated-vehicle technology in the real world for six weeks. Participants were asked to fill in before/after surveys, weekly surveys, and to contribute to focus group sessions. Results and data will be productized and shared with key stakeholders.

33 VTTI continued to collaborate with the University of New South Wales (UNSW) on the Australian Naturalistic Driving Study. Led by researchers at the Transport and Road Safety Group at UNSW and Monash University Accident Research Centre, the Australian consortium supporting this research effort also included funders and stakeholders from the central government and a broad array of industry partners. The goals for this effort are to document normative driving behaviors in Australia and to investigate the interactions of motor vehicles with bicyclists and pedestrians. Data collection was completed, and preparations are being made for data analysis.

34 VTTI collaborated with researchers from the Texas A&M Transportation Institute and partners in the ride-share industry to identify factors that affect when parents of young children use or do not use child safety seats in ride-share vehicles. This information is being used to create an informational website designed to educate both parents and ride-share drivers about existing laws and regulations across the country, as well as the benefits and guidelines for usage of child safety seats.

35 VTTI worked with researchers at the University of Virginia to investigate the driving performance of newly licensed teen drivers with autism compared to newly licensed drivers without autism and experienced adult drivers. This study uses a unique dual-methodology interface, where the same participants drive in a driving simulator followed by driving an instrumented vehicle on a similar course on real roads.

36 VTTI partnered with the University of Michigan Transportation Research Institute and Chalmers University on a project sponsored by the Automobile Alliance that is evaluating various epidemiological methods of estimating crash risk using naturalistic driving data.

37 VTTI researchers worked with the Transportation Association of Canada and the Canadian Council of Deputy Ministers of Transport to develop a website for the Canada Naturalistic Driving Study. This website will provide a public portal to allow researchers and interested safety professionals a method to assess what type of data are available within this public data set, as well as a query tool to assess not only the type of data but also the quantity of data available within this naturalistic driving data set.

38 VTTI researchers conducted additional data coding to better assess parent/teen interactions and secondary task engagement by teen drivers using the Uniform Naturalistic Teenage Driving Database. This additional data coding was performed by VTTI researchers in collaboration with researchers at the National Institutes of Child Health and Human Development and EMMES, Corp.

39 VTTI researchers evaluated the prevalence of the engagement of driver assistance systems by drivers and secondary task engagement and errors when using driver assistance systems. This work is sponsored by the State Farm Mutual Automobile Insurance Company.

40 The impact of driver monitoring and feedback on teen driver secondary task engagement was evaluated for an NSTSCE project. This study used the Driver Coach Study database where case-cohort control segments were identified and coded by trained data coders. Using these newly coded data, the prevalence of secondary task engagement was evaluated as compared to the control study, which indicated a decrease in high-risk secondary tasks in the presence of a monitoring and feedback system.

41 An onboard multimedia training program was developed by VTTI researchers to teach drivers about the automated-vehicle systems that are present and available on a vehicle. This multimedia presentation used a tablet display on the center stack and an instrument panel display. This project was conducted for the Safe-D UTC.

42 VTTI was awarded an FMCSA project to research how developers of highly automated commercial vehicles (HACVs) and their applications can ensure safe testing and deployment. VTTI is developing a safety performance baseline to apply to future HACVs from existing commercial vehicle human-driver road data. The investigation is designed to assess which drivers should be used to define a baseline across a range of operational design domains and vehicle conflict types (i.e., low-level conflicts, near-crashes, and crashes). VTTI is also investigating how developers can ensure sensor integrity and performance, how vehicle maintenance and inspection can be handled, and the roles FMCSA may have in these processes.

43 VTTI was awarded an FMCSA project to research the barriers that are limiting the adoption of automatic emergency braking (AEB) technology on commercial vehicles. VTTI is investigating technology and market barriers that are affecting fleets’ decision-making on AEB and is developing strategies for overcoming those barriers to accelerate the adoption of AEB systems.

44 VTTI continued working with NHTSA to acquire approval from the U.S. government Office of Management and Budget to proceed with the Field Study of Newer Generation Heavy Vehicle AEB Systems, which was originally awarded in September 2016. Once approval is acquired, VTTI will instrument data recorders on 130 heavy vehicles equipped with AEB systems during revenue-producing operations. The study will use the data to evaluate real-world performance, understand how drivers interact with the systems, and provide data for modeling the safety benefits of the technology.

45 VTTI partnered with San Diego State University on the development of models for predicting individual crash involvement based on driver characteristics (e.g., driving style, demographics, behavioral history) using naturalistic driving data. The project also involved collaborations with Delt University in The Netherlands and the driving analytics company SmartDrive.

46 VTTI collaborated with NSTSCE to investigate truck following distances and car cut-in behavior in naturalistic conditions. Cut-in is often mentioned as one of the possible hurdles for wide-scale deployment of truck platoons. Even if a platooning application can safely handle cut-ins, they can disrupt the platoon and greatly reduce the benefits in terms of fuel savings, safety, and transport efficiency. The project will leverage existing naturalistic driving data housed by VTTI to study car cut-in behavior relative to large trucks in manual driving. The key expected result from this analysis is a function estimated from the naturalistic data representing the relation between truck-to-truck following distance and car cut-in rate. This may enable the identification of a following distance “cut-off point” below which car drivers typically refrain from cutting in between trucks. This information will be useful both for the engineering of platooning applications and policy development.

47 VTTI collaborated with RMI Technologies and was awarded a project through the National Academy of Sciences Transit IDEA program to evaluate a computer-based operator education and training program in a transit agency.
VTI completed a Transport Canada-funded project to develop guidelines for limiting driver distraction for devices with visual displays.

VTI was awarded a contract with Volvo Trucks to work in the QUADRAE national Swedish project on driver modeling and simulation. The project involves several other new collaboration partners that include Volvo Cars, Autoliv, and VTI (the Swedish National Road and Transport Research Institute).

VTI was invited to submit a sole-source proposal for an internal NIOSH proposal (i.e., acting as a subcontractor for NIOSH) to evaluate a fatigue management program in commercial trucking operations. The proposal is expected to be awarded in August 2018.

VTI collaborated with NTSCE 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 was completed, and 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.

In collaboration with STI, Inc., VTI submitted a Phase 2 SBIR to NIOSH. If awarded, the proposed study will evaluate the efficacy of a simulator-based hazard detection training program for commercial motor vehicle drivers. The novel feature of this proposed study is the evaluation of the training program, which will occur in the real world on open roads.

VTI partnered with the Virginia Tech Psychology Department and Texas A&M University to evaluate tacit communication behaviors of drivers at pedestrian crosswalks. The data collected in this project were used to successfully defend a psychology department dissertation.

VTI and the Virginia Center for Coal and Energy Research at Virginia Tech were awarded a subcontract under the University of Kentucky to introduce an autonomous shuttle car into room-and-pillar coal mines. Funding originates from the Alpha Foundation, which was established to improve mine safety and health. This is a four-year project involving a cognitive work analysis on the framework of the organizational work domain, which is important for understanding and outlining the constraints in replacing manual roles with automated systems. Further work involves development and testing of the autonomous shuttle car vehicle.

The VTTI-affiliated Global Center for Automotive Performance Simulation (GCAPS) worked to establish clients in the India tire and transportation market. GCAPS also realized significant growth in China, establishing clients in the India tire and transportation market. GCAPS also realized significant growth in China, providing great upside potential.

VTI was awarded the U.S. Department of Energy project Investigating the Health Impacts of Outdoor Lighting. This project comprises the measurement of the impact of lighting on melatonin levels in realistic outdoor lighting levels. Using a variety of correlated color temperatures, the lighting impact on drivers, pedestrians, and those experiencing light trespass will be measured in a naturalistic environment for a period of two to four hours. The results should provide guidance for decision makers selecting light sources for outdoor spaces and inform the public on the potential health impacts of outdoor lighting. This project is a partnership between VTTI and Thomas Jefferson University.

VTI was selected for the NCHRP 5-23, which will study the threshold of lighting that can possibly have an impact on the alertness and health of drivers.

VTI was awarded two projects studying the lighting needs at intersections in Virginia and in Illinois. These efforts will be collaborative and will include testing of lighting on the Smart Road and in real-world conditions. The results should inform the development of new lighting standards in each of the sponsoring states.

VTI continued to investigate the impact of lighting on driver behavior through continued studies of measured lighting in Washington and North Carolina, comparing it to the driver behavior measured in the SHRP 2 NDS data set.

Researchers completed a project developing the needs for lighting in parking lots and parking garages. Sponsored by the California Energy Commission and the Illuminating Engineering Society (IES), the project considered the visibility of pedestrians, trip hazards, and moving vehicles in parking lots and parking garages. The results have been used as input to the California Title 24 legislation.

VTI performed a demonstration project for the implementation of solid state lighting in Richmond, Va. The city was shown three different luminaires and a dimming control system, which was characterized by the VTTI lighting measurement system. A final specification is being developed.

VTI completed a study of the impact of roadway lighting, specifically the impact of the spectral content on soybean growth and yield for the Illinois Center for Transportation. The results showed little significant impact from the spectral content of the LED and HPS lights on the soybeans. The study results were published in a report in June 2018. The first volume, pertaining to light intensity versus varietal and location, was published in 2017.

VTI completed research showing how alternative cooperative dynamic headlights for two vehicles approaching each other could be used to reduce glare to both drivers. The project, entitled 4U Lighting, used vehicle-to-vehicle communications to sense the proximity of each car by the other and automatically turned on a light on the side of each vehicle to help light the way for both drivers. The system showed great benefits for increasing the visibility distance for pedestrians in an unlit environment.
RESEARCH PROJECTS

64. VTII conducted a before-and-after study that examined the effects of various curve warning and curve delineation systems on a curvy rural road. Active and passive treatments were examined on nine curves using participants in a human factors study, as well as naturalistic data collected via pneumatic tubes. The results were used to provide guidance for VDOT in selecting appropriate curve warning and delineation systems on rural roads.

65. In an effort to improve how VDOT conveys travel information to truck drivers, VTII conducted surveys and interviews of truck drivers and other industry personnel to find out how they receive such information, what information is most important, and in what ways dissemination of the information could be improved.

66. VTII has completed a study investigating the potential for a moth effect of drivers being drawn to bright lights and flashing objects, particularly during the period of driver inattention.

67. VTII continued its efforts in working with the visibility of police vehicles. Eight agencies, including state police in Virginia, have had new lighting and markings added to their vehicles to assess visibility and officer comfort.

68. VTII worked on a project investigating the potential for a virtual reality environment to be used for pedestrian and roadway research.

69. VTII developed an application to be used in assessing lighting in a work zone and to measure glare threshold.

70. VTII conducted an assessment of parking lot crashes using the SHRP 2 NDS data set to address a knowledge gap by identifying driver behavior in parking lots and the infrastructure and environmental characteristics associated with safety-critical events in parking lots. By mining the SHRP 2 NDS database, crashes, near-crashes, and baselines in parking lots were identified and odds ratios were calculated to approximate the relative critical event risk compared to normal baseline conditions. This work is an important step toward a better understanding of everyday driver behavior, crash risk, and crash causation in parking lots.

71. VTII was awarded a project to investigate contributing factors and their impacts on fixed-object crashes. The project uses the SHRP 2 NDS data, which include detailed video files, time-series data, and roadway information for nearly 2,000 events relevant to fixed-object crashes. This study provides insights into how and why fixed-object crashes occur and what countermeasures can be used to prevent such crashes.

72. VTII was awarded an FHWA project to quantify the lives saved and injuries prevented nationwide due to the use of a selected number of safety infrastructure categories. This is the first attempt made nationwide to estimate the safety benefits of key transportation safety infrastructure devices. The project will enable federal and state transportation agencies to qualitatively demonstrate the fatalities and injuries prevented by transportation infrastructure investments and provide justification for needed infrastructure.

73. VTII provided extensive support for lighting and visibility applications within the Commonwealth of Virginia. The color of light sources, particularly LED, has been a major topic of discussion.

74. VTII partnered with the Mid-Atlantic Aviation Partnership (MAAP) on a project to evaluate air-to-air and air-to-ground deconfliction on the Virginia Smart Roads Surface Street Expansion. Dedicated short-range communications (DSRC) and proprietary systems were tested.

75. VTII worked with Nanosonic, Inc., on an FHWA project to investigate how motive batteries removed from electric vehicles could be reused for such transportation infrastructure applications as uninterruptable power supplies for traffic signals and communication systems.

76. VTII integrated a tethered drone system with a VDOT Safety Service Patrol vehicle to provide real-time aerial observation of traffic incidents via streaming video to the Salem Traffic Operations Center. The tethered system provides power to the unmanned aerial vehicle (UAV), allowing persistent flight and monitoring.

77. VTII worked with VDOT to obtain aerial imagery of a landslide that resulted in U.S. 460 lane closures. Use of the VTII drone allowed collection of high-resolution graphical data that would otherwise be difficult to collect using traditional means.

78. VTII worked with TruWeather Solutions and VDOT on a project to provide highly granular and timely predictions of winter road weather conditions using climatic models informed by mobile sensors installed on VDOT Safety Service Patrol vehicles in the Salem and Staunton districts.

79. The VTII-affiliated Center for Injury Biomechanics continued to conduct groundbreaking research into injury biomechanics, injury modeling, and transportation-related injury biomechanics. During FY18, the center director saw new funds totaling more than $10 million. Transportation-related projects awarded included: The NHTSA-funded project Assessment, Evaluation, and Approaches to Modification of FMVSS that may Impact Compliance of Innovative New Vehicle Designs Associated with Automated Driving Systems (VTII serves as the principal investigator); providing biomechanics guidelines for ATD design and responses in automated-vehicle crashworthiness; an Insurance Institute for Highway Safety (IIHS)-funded project to investigate potential for a moth effect of drivers being drawn to bright lights and flashing objects, particularly during the period of driver inattention.

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VTTI maintains a small data center on its campus and has a much larger high performance computing (HPC) infrastructure co-located at the Virginia Tech Andrews Information Systems Building (AISB) to take advantage of internal and external high-speed networking and the physical space required to house clustered servers, multi-petabyte HPC storage systems, and a multi-petabyte DB2 data analytics system. During FY18, VTTI more than doubled its research compute resources housed at AISB and approximately quadrupled the GPU accelerated compute resources, an essential resource for advancing VTTI research into artificial intelligence and analysis of unstructured data.

As part of the overall technology maintenance plan of the institute, VTTI acquired and installed next-generation storage technology in support of a data analytics platform.

VTTI installed a replicated, database disaster recovery system at the Virginia Tech Carilion Research Institute (VTCRI) facilities in Roanoke to support critical project data.

VTTI migrated SHRP 2 InSight and other applications to the Amazon Web Service (AWS) cloud platform, providing greater availability of sponsors’ websites accessed by the research community and more agile system deployment.

In response to growing cybersecurity needs, VTTI established a designated Information Security Officer (ISO).

VTTI configured a Disaster Recovery Site for research data at remote locations.

The institute continued to be one of the university’s leading data-intensive research programs. VTTI HPC storage platforms from Isilon and Qumulo continued to grow and now host more than 5 petabytes of critical research data assets.

The network backbone between the Virginia Tech campus and the VTTI facility upgraded from 4G to 10G; all network switches within the VTTI facility upgraded to support 10 gig interswitch links. This infrastructure is essential for greater data demands, including higher resolution (e.g., 4K) video formats and the support of all data-intensive research programs at the institute.

The continued advancement of the current Internet Protocol, IPv6, throughout the VTTI and Virginia Tech networks enables enhanced security and flexibility for connectivity between researchers, data reduction labs, and HPC resources, as well as being an essential technology for connected-vehicle research.

Through the Virginia Tech Internet2 connection, the high capacity network of VTTI was extended to provide an essential link to national and international research partners, enabling data gathering and dissemination.
VTI houses close to 90% of national and international naturalistic driving data in the world. With onsite data reduction labs and extensive analysis experience, the institute realized the role it could play in helping others mine and reduce its data to answer subsequent research questions about driver behavior and performance. From a student perspective, the labs provide myriad opportunities for both undergraduates and graduates to receive advanced training and participate in data reduction and analysis activities conducted at VTTI. During FY18, the data reduction lab at VTTI employed 63 Virginia Tech students, of which 58 (92%) were undergraduates.

VTI provided internships for Virginia Tech mechanical engineering students and actively supported the Patrick Henry Community College Motorsports Program. GCAPS representatives also sat on advisory committees for Danville Community College and hosted interns from the Danville-area Academy for Engineering and Technology program, which comprises high school students interested in engineering careers. Currently, GCAPS is providing 10 paid apprenticeships in the IT area. The apprentices will receive a certificate upon completion and are using advanced modeling and simulation tools.

VTI researchers continued to serve on the Virginia Tech Intelligent Infrastructure initiative. In collaboration with affiliated faculty in the departments of civil and environmental engineering, industrial and systems engineering, psychology, and statistics, VTTI is offering the Human Factors of Transportation Safety Graduate Certificate Program (HFTS GCP). The certificate program is designed to create and deliver to students in-depth knowledge and marketable skills applied to the research, evaluation, maintenance, improvement, and protection of all ground transportation users and their communities, all from a human factors perspective. Students enrolled in the program will become leaders in the field of transportation safety within the Commonwealth, across the nation, and internationally. Four graduate students are currently enrolled in the certificate program; four certificates have been awarded since the program began in 2014.

An application to support and enhance VRU mobility and safety.

In collaboration with TRB of the National Academy of Sciences, VTTI generated and made available transportation data sets that were delivered free-of-charge to nine graduate students around the country, selected through a competitive process, to support their theses and/or dissertation research.

At the request of VDOT, VTTI created a Connected and Automated Vehicle training program for VDOT employees. The program was designed to provide information to VDOT employees to keep them informed about connected- and automated-vehicle deployment relative to VDOT operations. The program addressed connected-vehicle technologies and standards, connected- and automated-vehicle deployment timelines, technical details about connected-vehicle equipment deployed on the VCC, and roles and responsibilities of VTTI and VDOT system operators. An initial training session was delivered to 100 VDOT employees at their PSTOC facility in Fairfax, Va. Based on feedback from the initial session, VDOT will be offering this program again to a broader set of VDOT employees in the near future.

VTI developed and deployed a VCC website that describes all aspects of the VCC, including the purpose, goals, technical description, and how interested third parties can become involved. More information is available at https://www.vtti.vt.edu/vcc/.

The Safe-D National UTC is dedicated to fostering education and workforce development opportunities. Each research project funded through the Safe-D UTC must include student support at any level (i.e., undergraduate and/or graduate). During FY18, Safe-D UTC researchers reported supporting 34 university-level students on their projects, including 20 students from underrepresented populations. Safe-D encourages project teams to include students in every aspect of research, such as reviewing literature and methods, assisting with the development of experimental design and study protocols, assisting in executing a research experiment, contributing to project reports and publications, and...
PROJECT HIGHLIGHTS

EDUCATION AND OUTREACH

presenting research results at conferences and seminars. Most research projects funded through Safe-D also contribute to a student’s thesis or dissertation.

Safe-D UTC researchers were actively engaged in teaching efforts at each of the consortium universities. During FY18, researchers reported teaching 15 graduate courses, reaching 218 students, and teaching 16 undergraduate courses, reaching 738 students.

At all levels of education, Safe-D UTC activities aim to inspire and educate the next generation of transportation professionals. Safe-D research projects must include an education and workforce development component as an output of each project. This requires project teams to identify specific education and workforce development products from their projects for development and dissemination. These products can include K-12 curriculum modules to be used by teachers at various levels to educate students about the results of project research; full university-level course development; outreach to the public; and educating the public about various aspects of research and transportation safety. For example, the Safe-D UTC project K-12 STEM Program: Exploring the Science of Retroreflectivity developed a draft STEM curriculum and associated materials. Allen Academy (Bryan, Texas) 5th- and 6th-grade science classes used and evaluated this curriculum and materials developed to introduce students to the scientific principles of visible light, including retroreflectivity. These materials were also used during the Virginia Tech Science and Engineering Festival in October 2017. Another Safe-D UTC project, Countermeasures to Detect and Combat Driver Inattention While Driving Partially Automated Vehicle Inroads, was held at NSF headquarters in Alexandria, Va. A multidisciplinary group of 60 researchers discussed the unanswered questions and potential solutions regarding the convergence of automated trucks and truck drivers.

Safe-D UTC researchers focused on encouraging students to pursue STEM fields and enter the transportation workforce through outreach at events such as the VDOT Northern Virginia District Annual Transportation Career Fair, the Virginia Tech Science Festival, and outreach performed with K-12 teachers and directly with students in their classrooms.

The Safe-D National UTC supported a collaborative summer internship program held at Texas A&M Transportation Institute during Summer 2018. Through this program, interns are matched with mentors and research projects, including many led by Safe-D faculty, to gain hands-on experience in transportation research.

The Safe-D National UTC is committed to supporting partners at consortium members’ respective state departments of transportation. For example, the UTC participated in the 15th annual VDOT Transportation Career Fair. This event targets high school students from the surrounding area, introducing them to careers involving the transportation industry. Along with more than 400 exhibitors spanning the industry (construction, military, government, etc.), Safe-D researchers and students spoke with hundreds of students about the mission of Safe-D and VTTI, the types of projects that are conducted, and careers in transportation. The event provided an opportunity to display innovative endeavors happening within the transportation industry and to inform students and excite them about the future of transportation.

The Safe-D National UTC developed plans to support the VTTI Intern Hub. With support from public and private sponsors and Safe-D, the Intern Hub will provide advanced training and practical hands-on experience to students in a variety of transportation-related areas and the opportunity to collaborate with faculty across Safe-D consortium universities.

Safe-D UTC researchers presented at various science fairs and science nights held at schools across Virginia.

Safe-D National UTC was a stakeholder and partner in the planning and realization of the next Choices and Challenges forum, a local community event that will be held in Spring 2019 focusing on the impact of automated vehicles in rural areas.

VTTI contributed to the National Operations Center of Excellence workshop on educating future transportation professionals, showcasing the institute’s novel educational programs, such as those associated with the Safe-D National UTC and VTTI Intern Hub.

VTTI maintained membership within the ISO Road Vehicle Ergonomics subcommittee and coordinated the development and publication of two technical reports: 1) Automated-vehicle terms and definitions and 2) Automated-vehicle visual external communication.

VTTI was awarded a project through the FMCSA High Priority program to provide key information to driver education students on how to safely share the road with commercial motor vehicles. This project will involve on-site education and hands-on demonstrations at 25 high school driver education programs. VTTI submitted a proposal to the FMCSA High Priority program to expand the scope of its current Share the Road education project.

VTTI was awarded a National Science Foundation (NSF) proposal to conduct a workshop on the challenges, benefits, and research needs of displaced workers from autonomous trucks. This workshop was held at NSF headquarters in Alexandria, Va. A multidisciplinary group of 60 researchers discussed the unanswered questions and potential solutions regarding the convergence of automated trucks and truck drivers.


VTTI sponsored the Entrepreneurship Challenge hosted by the Virginia Tech Apex Center for Innovation and Entrepreneurship in Blacksburg, Va. There were more than 500 attendees, including students, alumni, and corporate representatives. These attendees watched as 12 finalist teams pitched their business ideas for a chance at $60,000 in prizes.

VTTI currently employs more than 20 undergraduate and graduate students as on-road and in-vehicle experimenters.

Planning began for the Seventh International Naturalistic Driving Research Symposium to be held in Blacksburg in August 2018. Select papers from the Fifth Symposium, which was held in Blacksburg in August 2016, were published in a special edition of the Journal of Safety Research in December 2017.

The Driving Healthy website was continually updated to provide tips and information for commercial motor vehicle drivers. The information includes Eating & Living Healthy and Prevention & Screening. The website is useful not only to professional drivers but also to the general public.

VTTI continued the development of the FMCSA Data Repository, which, when opened, will host a number of FMCSA data sets that researchers can use to...
improve traffic safety and operations. Many of these data sets will be available to researchers at no cost.

30 VTTI continued to operate the InSite website, which makes information and data elements of the SHRP 2 NDS available to researchers around the world at no cost.

31 VTTI hosted several research groups in its secure data enclave, which allows for access to sensitive portions of the naturalistic driving data housed at the institute.

32 The InSite Canada Data Access website went live. VTTI will continue to operate this website, making data elements from the Canada Naturalistic Driving Study available to researchers around the world at no cost.

33 A VTTI researcher continued to serve on the TRB Human Factors Workshop Committee, providing valuable input into the full-day workshops that bring together the international transportation human factors community to work on the most pressing problems in the field.

34 A VTTI researcher participated in the Virginia Tech Big Data Science Workshop and the NSF West Big Data Hub Transportation Data Challenge kick-off to assess and improve VTTI capabilities as a transportation data repository.

35 A representative from the Safe-D National UTC presented program activities to high school students at the Thomas Jefferson Symposium to Advance Research (tJSTAR). VTTI emphasized careers available in transportation and opportunities available to students under the Safe-D Education and Workforce Development Program. tJSTAR is an annual, day-long symposium at the Thomas Jefferson High School for Science and Technology, the Governor’s School for Science and Technology in Northern Virginia. The event offers the opportunity to share student research projects and learn about future research opportunities and potential careers.

36 A VTTI researcher was selected to serve as chair of the TRB Operator, Education, and Regulation Committee.

37 VTTI research staff organized and planned the TRB Young Driver Subcommittee Mid-Year Meeting. The topic for this meeting was Teen Drivers and Vehicle Technology. Several speakers were invited, discussion groups were organized, and research priorities were identified to ensure teen driver safety as the field of transportation moves toward automated-vehicle systems.

38 VTTI research staff served on the organizing committee for the Teen Driving Research Track for the LifeSavers Conference held in San Antonio, Tex.

39 VTTI staff remained active on the Illuminating Engineering Society (IES) Roadway Lighting Committee, the Resilient Lighting Committee, and the Outdoor Environmental Lighting Committee.

40 VTTI remained active in the International Commission on Illumination (CIE), with one faculty member sitting on the CIE board and in charge of a research division on outdoor lighting.

41 VTTI researcher was named the conference chair of the 2019 Quadrennial meeting of the CIE.

42 VTTI researchers organized and co-sponsored an event with AAA-MidAtlantic and the Blue Ridge Transportation Safety Board to host a Teen Safe Driving Event at the Roanoke Civic Center. This event was attended by more than 200 driver’s education students from five area high schools in Roanoke and Montgomery counties. Hands-on demonstrations were set up by area volunteers to teach teens about the dangers of distracted driving and impaired driving, the importance of seat belt use, how to navigate a construction zone, and the physics of a crash.

43 VTTI co-hosted the inaugural conference of the newly established Association for Unmanned Vehicle Systems International (AUVSI) Ridge and Valley Chapter and provided automated-vehicle demonstrations on the Smart Road.

44 VTTI supported driver’s education programs at four regional high schools in Montgomery, Roanoke, Bedford, and Mercer counties. During these programs, VTTI truck and bus researchers spoke to teens about how to safely share the road with large trucks. These programs included an in-class discussion and a hands-on demonstration with a VTTI tractor-trailer.

ADDITIONAL ACCOMPLISHMENTS

1. Best Paper Award, 4th International Conference on Vehicle Technology and Intelligent Transport Systems (VEHITS), Madeira, Portugal, March 2018. (Hesham Rakha)


4. SAE Forest R. McFarland Award for Service (Warren Hardy)

5. Outstanding New Assistant Professor, Virginia Tech College of Engineering (Andrew Kemper)
**Center for Advanced Automotive Research**
Zac Doezema, 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. 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**
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**
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**
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 houses the Lighting Infrastructure Technology Group, which conducts research in such topics as sign legibility in foggy conditions and the effects of lighting sources, and the Eco-Transportation and Alternative Technologies Group, which represents a partnership between the institute, the Virginia Department of Transportation/Virginia Transportation Research Council, the Virginia Tech Institute for Critical Technology and Applied Science, the Virginia Tech College of Engineering, and the Virginia Tech Office of the Vice President for Research and Innovation.

**Center for Injury Biomechanics**
Warren Hardy, Director
The Center for Injury Biomechanics is a partnership between the institute, the Virginia Tech Department of Mechanical Engineering, and the Virginia Tech-Wake Forest University Engineering, and the Virginia Tech College of Engineering, and the Virginia Tech Office of the Vice President for Research and Innovation. The center conducts research in the development and implementation of automated-vehicle systems, including crash warning/avoidance/mitigation systems, connected vehicles, driver-vehicle interfaces, crash causation, and vehicle automation. The center also tests 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.

**Center for Technology Development**
Andy Peterson, 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 is a pioneer in distributed data acquisition systems; and the Advanced Development Group, which is responsible for software development and includes specialists in machine vision, road tracking, and data analysis.

**Center for Public Policy, Partnerships, and Outreach**
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 the institute. 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**
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. The center is a multi-disciplinary organization that 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. The center is a multi-disciplinary organization that 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.

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The Center for Vulnerable Road User Safety conducts programs to keep drivers healthy and alert. Providing countermeasures, and developing education for vehicle drivers, evaluating causes of drowsiness and determining safe hours of service for commercial motor vehicle drivers, the center focuses on the safety of heavy-vehicle drivers. The center comprises the Behavioral Analysis and Applications Group, the Human Systems Group, and the Vulnerable Road Users Group. 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 goal of providing real-time feedback, gathering information for driver training, and keeping teens’ parents informed. The center has conducted outreach initiatives designed to provide recommendations for coordinating public and private services for the aged, disabled, and indigenous populations.

Global Center for Automotive Performance Simulation
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 (SoVa Motion), 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 the institute is located in Southern Virginia.

I-81 Corridor Coalition
Andy Alden, Executive Director
The I-81 Corridor Coalition is a consortium of stakeholders dedicated to improving the safety, continuity, and efficiency of commercial and personal travel along the I-81 corridor that extends from Tennessee to the Canadian border in New York. This partnership comprises state Departments of Transportation, Metropolitan and Regional Planning Organizations, non-governmental organizations, and private entities from the six corridor states. The focus of the coalition is to study and implement innovative solutions to challenges specific to travel on a freight-intensive highway serving a variety of geopolitical regions and users. Current focus areas include incident management, development planning, and truck parking.

International Center for Naturalistic Driving Data Analysis at Virginia Tech
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 data infrastructure of the institute. This allows analyses of data from multiple naturalistic driving studies 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 1-petabyte 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.

Motorcycle Research Group
Shane McLoughlin, 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 institute 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 conducted the first large-scale naturalistic driving study of motorcyclists, which was designed to explore motorcycle crash causation and develop crash countermeasures.

National Surface Transportation Safety Center for Excellence
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.

Safety through Disruption (Safe-D) National University Transportation Center (UTC)
Zac Doerzaph, Director
Fueled by the inevitable changes in our transportation system, the Safety through Disruption (Safe-D) National University Transportation Center (UTC)—which comprises the institute, the Texas A&M Transportation Institute, and San Diego State University—endeavors to maximize the potential safety benefits of disruptive technologies through targeted research that addresses the most pressing transportation safety questions. The center focuses on four potential disruptive technologies: connected vehicles, automated vehicles, transportation as a service, and big data analytics. The U.S. Department of Transportation awarded the center in November 2016 as a highly competitive national UTC grant. The national grant entails a planned $2.8 million each year in federal funding for five years, matched by an equal amount of cost-share funds from university, state, and private sources. The nation’s top safety researchers will perform work under the center while leveraging existing and upcoming world-class research facilities across the universities, such as the Virginia Automated and Connected Corridors and the Virginia Smart Roads, all of which will collectively enable robust real-world testing of automated and connected vehicles.
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
- 5G Automotive Association
- AAA
- AAA Foundation for Traffic Safety
- AAA Mid-Atlantic
- Acclaro Research Solutions, Inc.
- ACF
- Alliance of Automobile Manufacturers
- Alpha Foundation
- American Association of Motor Vehicle Administrators
- American Association of State Highway and Transportation Officials
- American Transportation Research Institute
- Amoco
- Applied Research Associates
- Arete Associates
- Arity (a subsidiary of Allstate Insurance)
- Arizona State University
- Arlington County, Va.
- Asia University
- 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.
- Bekart
- Betty Seran and Associates
- Bishop Consulting
- Blackberry
- BMW
- Booz Allen Hamilton
- Bosch
- BP Amoco
- Bridgestone
- Brigham Young University
- California Department of Transportation
- California Energy Commission
- Calspan
- Cambridge Mobile Telematics
- 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
- Cermet 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
Crack Sealant Consortium
Crash Avoidance Metrics Partnership (CAMP)
Crash Safety Research Center
CSAA Insurance Group
CUBRC
Delaware Department of Motor Vehicles
Delaware Technical and Community College
Delft University of Technology
Delphi Electronics
Robert Denaro
DENSO
DGE, Inc.
District of Columbia Department of Transportation
DLA Piper
DMG & Associates
Donovan Hatem
Draper Laboratory
Drexel University
DRP Performance
Duke University
Dunlap and Associates, Inc.
Dynamic Research, Inc.
Eaton
eDriving
Education Logistics, Inc.
EMMES
Encon Services, Inc.
Engineering & Software Consultants, Inc.
Ergonomic Analysis, Inc.
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Federal Highway Administration
Federal Motor Carrier Safety Administration
Federal Railroad Administration
FEV
Fleetmatics
Florida A&M University
Fluor, Va.
Ford Driving Skills for Life
Ford Motor Company
Foundation for Outdoor Advertising Research and Education
Fugro Roadware
General Motors
General Motors OnStar Division
Georgia Mason University
Georgia Department of Transportation
Glenwood Consulting
Goodyear
Google
Guard Rail of Roanoke, Inc.
Halifax County, Va.
Hanford Tire
Harmonia
HERE
Honda
Honda R&D
Honda Research Institute - Europe
Hoosier Racing
Howard/Stein-Hudson Associates, Inc.
Hubbell Lighting, Inc.
Human Factors North
Hume Center
Hyundai Fire and Insurance
Hyundai Kia
Hyundai Motor Company
IAOV Chemnitz
IDEA Programs
Illinois Department of Transportation
Illuminating Engineering Society of North America
Institute for Critical Technology and Applied Science
Institute for Transportation Research and Education at North Carolina State University
Institute for Work Organizational and Transport Research
Insurance Institute for Highway Safety
Intelligent Automation, Inc.
Intelligent Transportation Society of America
Interactive Design and Development
Iowa State University
Iteris, Inc.
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Kimley-Horn and Associates
Korea Advanced Institute of Science and Technology
Kumho Tire
Last Resource
Leidos
Lisboa, Inc.
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Long Road Racing
Lord Corporation
Loughborough University
Louisiana Public Transit Association
MacVector
MaineWay Services
MAN Truck & Bus AG
Massachusetts Institute of Technology
MCI Federal
Mercedes-Benz
Meritor WABCO
Merritt C. Becker, Jr. University of New Orleans Transportation Institute
Mesilla Valley Transportation
Michelin
Mid-Atlantic Aviation Partnership
Mid-Atlantic Broadband
Minnesota Department of Transportation
James A. Misener (Consultant)
Mississippi Department of Transportation
The MITRE Corporation
Mobis
ModComp
Montana State University-Western Transportation Institute
Monterey Technologies, Inc.
Montgomery County, Va.
Morgan State University
Motor Coach Industries
Motorcycle Safety Foundation
MRI Global
Munich Reinsurance America, Inc.
Nanosonic, Inc. LLC
National Academy of Sciences Transit-IDEA Program
National Academy of Sciences
• National Chiao Tung University
• National Cooperative Highway Research Program
• National Highway Traffic Safety Administration
• National Institute for Occupational Safety and Health
• National Institute of Advanced Industrial Science and Technology in Japan
• National Institute of Aerospace
• National Institutes of Health
• National Private Truck Council
• National Renewable Energy Laboratory
• National Science Foundation
• National Surface Transportation Safety Center for Excellence
• National Transit Institute
• National Transportation Research Center, Inc.
• NAUTO, Inc.
• Navistar International
• NEC Laboratories
• Neusoft
• New Orleans Amalgamated Transit Union
• New River Valley Planning District
• Outdoor Advertising Association of America
• PACCAR, Inc.
• Pacific Northwest National Laboratory
• Pacific-Sierra Research
• Parsons Brinckerhoff
• PB Farradayne, Inc.
• PB World
• Peloton Technology
• Penn State University
• Pennsylvania Department of Transportation
• Performance Fuels System
• Phillips Lighting
• Pierce Transit
• Pitt Ohio
• Plymouth Rock Assurance
• Princeton Lightwave
• Professional Truck Driving Institute
• PSAU Resources, Inc.
• Purdue University
• Qatar National Research Fund
• Qualcomm
• Queens University
• Realtime Technologies, Inc.
• REI Safety Services, Inc.
• Rensselaer Polytechnic Institute
• Research and Special Programs Administration
• RGS Associates, Inc.
• Ricardo, Inc.
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• Tom Tom
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• TLV Rheinland Mobility, Inc.
• United Defense, L.P.
• Universidad del Pais Vasco
• University of Alabama at Birmingham

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• University of New South Wales
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• University of North Carolina Highway Safety Research Center
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• U.S. Department of Energy
• U.S. Department of Justice
• U.S. Department of Transportation
• Valeo Comfort and Driving Assistance Systems North America
• Vehicle Safety Communications 3
• Veridian
• Virginia Center for Autonomous Systems
• Virginia Department of Conservation and Recreation
• Virginia Department of Environmental Quality
• Virginia Department of Motor Vehicles
• Virginia Department of Rail and Public Transportation
• Virginia Department of Transportation
• Virginia Department of Transportation Operations and Security Division
• Virginia Rail Policy Institute
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• Washington State Department of Transportation
• Waymo
• Wayne State University
• Weigh-In-Motion
• West Virginia State
• WESTAT
• Western Research Institute
• Windwalker Corporation
• Wisconsin Department of Transportation
• Wyle Laboratories
• ZF TRW
During FY18, numerous representatives of current and potential sponsoring/partnering organizations, marketing groups, and conference groups visited VTII and/or the Virginia Smart Roads, including:

- All Traffic Solutions
- American Society of Civil Engineering
- APLU
- CISCO
- Federal Aviation Administration
- Unmanned Aerial Systems Test Site National Meeting
- Federal Transit Administration
- Governor Mark Warner's Office
- Greater Washington Partnership
- Heavy Vehicle Simulator International Alliance Group
- International students and visitors (China, Shandong University)
- Lead Virginia
- Mid-Atlantic Aviation Partnership
- Montgomery Board of Supervisors
- NASA
- National and local media
- National Highway Traffic Safety Administration
- National Institute for Occupational Safety and Health
- New River Economic Alliance
- New River Valley Leadership Program
- New River Valley Regional Commission
- Numerous proprietary partners and sponsors
- Pavement Surface Properties Consortium
- Roanoke Valley Transportation Planning Organization/New River Valley Metropolitan Planning Organization
- University Transportation Center consortia
- Virginia Department of Transportation
- Virginia Economic Development
- Virginia Higher Education
- Virginia Highlands Community College Governor's School
- Virginia Military Institute
- Virginia Representative Chris Hurst
- Virginia Tech Architecture
- Virginia Tech Building Construction
- Virginia Tech Civil Engineering
- Virginia Tech Computer Science
- Virginia Tech Corporate Research Center
- Virginia Tech Development
- Virginia Tech German Fulbright students
- Virginia Tech - Japanese University
- Virginia Tech Language and Culture Institute
- Virginia Tech Library
- Virginia Tech University Relations
- Virginia Tech Women’s Club
- Visiting scholars

In partnership with employees from VDOT, the institute hosted an open house for the general public and a school day event (grades K-12) in April 2018, with nearly 400 in attendance.

VTII and its facilities were well represented at several international and national industry conferences, symposia, and meetings, including:

- 4th International Conference on Vehicle Technology and Intelligent Transport Systems (Portugal)
- 55th Annual Road & Street Maintenance Supervisors’ Conference
- 61st Annual Scientific Conference of the Association for the Advancement of Automotive Medicine
- 2018 Women’s History Month Celebrating Women in Transportation – Land, Air, and Sea
- AAA Forum on the Impact of Vehicle Technologies and Automation on Users
- American Meteorological Association AV Conference
- American Psychological Science Conference
- Annual Conference of the Association for Unmanned Vehicle Systems International (AUVSI) Ridge and Valley Chapter
- Annual Meeting of the National Organization for Youth Safety
- ATA Management Conference and Exhibition
- ATA Technology & Maintenance Council
- Automated and Connected Vehicle Testing Symposium
- Automated Driving System Conference
- Automated Vehicles Symposium
- Automation for Commercial Vehicles (Germany)
- Autonomous Vehicle Test & Development
- Better Buildings by Design
- Biomedical Engineering Society Annual Meeting
- Canadian Council of Motor Transport Administrators Annual Meeting
- Conference on Traffic and Granular Flow
- Consumer Electronic Show (CES)
- CVSA Brake Symposium
- Decision Sciences Institute Annual Meeting
• Direct Delivery Leadership Council (DDLC) Meeting
• ESRI User Conference
• Fleet Safety Conference
• FMVSS Considerations for Automated Driving Systems
• From ADAS to Automated Driving Symposium
• Future Active Safety Technology Towards zero traffic accidents (FAST-zero) Conference (Japan)
• Human Factors and Ergonomics Society Annual Meeting
• Illuminating Engineering Society (IES) Light + Human Health Symposium
• Illuminating Engineering Society (IES) Street and Area Lighting Conference
• INFORMS Conference
• International Commission on Illumination (CIE) Smart Lighting Conference (Taiwan)
• International Commission on Illumination (CIE) Workshop on a New Vision of Visibility for Roadway Lighting (Germany)
• International Conference on Models and Technologies for Intelligent Transportation Systems
• International Conference on Transport and Health
• International Joint Conference on Biometrics
• International Research Council on the Biomechanics of Injury (IRCOBI) Conference (Belgium)
• International Rider Education and Training Systems
• IRF World Road Meeting (India)
• ISO TC22/SC39 WG8 Meeting (Prague)
• ITEA Annual Conference and School on Transportation Economics (Hong Kong)
• ITS World Congress
• ITSA Annual Meeting
• Joint Statistical Meeting
• LifeSavers Conference
• National Association of Women Highway Safety Leaders Meeting
• National Operations Center of Excellence Workshop
• National Tank Truck Carriers Safety and Security Council Annual Meeting
• North Carolina A&T State University Center for Advanced Transportation Mobility (CATM) Symposium
• NSF Autonomous Truck Workshop
• PEGASUS Symposium (Germany)
• Road Safety on Five Continents (South Korea)
• SAE Government/Industry Meeting
• SAE Variable Performance Testing for Automated Driving Systems (ADS) Workshop
• SAE World Congress
• SIP-adus Workshop (Japan)
• SPIE Optics and Photonics Conference
• Tech.AD Detroit
• TedX Salon Talk
• Teen Safe Driving Event
• Transportation Research Board Annual Meeting
• Trucking Association of New York, 50th Annual Conference and Membership Meeting
• Urbanism Next Conference
• USA Science and Engineering Festival
• Virginia Department of Transportation Career Fair
• Women in Transportation Seminar
MEDIA COVERAGE FY 2018

*Denotes media outlets that covered VTTI more than once during 2018

American Journal of Transportation
ARL Now*
Ars Technica
Augusta Free Press
Auto Connected Car News
Auto Week
AutoExpert (Polish)
Automoblog.net
Automotive News
Bacon’s Rebellion
Bluefield Daily Telegraph
Branson Tri-Lakes News
Business Insider
Business Insurance
Car and Driver
Carlisle Sentinel
CBS FOX 59
City Lab
Claims Journal*
Clemson
Clemson Newsstand
Collegiate Times*
Commercial Carrier Journal
Doct
Delaware Business Times
Deseret News
Fleet Owner
Florida Politics
FOX5
Fredericksburg
Fredericksburg.com
Freight Waves*
Herald-Mail Media
Huffington Post
Independent Mail
India Times
International Business Times
KNBC (L.A.)
KOMO News
KSL.com
Landline Magazine
LEDs Magazine
Legal Examiner
Livetrucking.com
Local Memphis (via CNN)
Markets Insider
MobilityLab
Motorcycle and Power Sports News
Motoring
Nasdaq
NBC Boston
NBC Nightly News with Lester Holt
NBC Turn to 10
NBC4 Washington*
New Atlas
New Straits Times
Newswire*
NPR’s All Things Considered
Ocala Star Banner
One News Page
Overdrive
PBS Blue Ridge
PC Magazine
Phys.Org
Politico
PR Underground
Public Opinion
Radio Australia
Richmond Times-Dispatch
Sarasota Herald-Tribune
Savannah Morning News
Science Daily
Scroll.in
Smithsonian Magazine
Southwest Times
Technically Delaware
Teen Vogue
The Augusta Chronicle
The Auto Channel
The Chronicle of Higher Education
The Conversation
The Daily Telescope
The Detroit News*
The Franklin News-Post
The Gazette-Virginian
The Guardian
The Indian Express
The Irish Times
The Kittanning Paper
The New York Times*
The Roanoke Star*
The Roanoke Times*
The Southwest Times*
The Telegraph
The Virginian Pilot
The Week Magazine
TIME
Times-Mail
Traffic Technology International
Transport Topics
Transportation Communication Network
University of Kentucky
Up & Coming Weekly
USC Viterbi School of Engineering
Virginia Business
Virginia Tech News*
Washington Post*
WCVE (Richmond, VA)
WDBJ (Roanoke, VA)*
WDIV (Detroit, MI)
WEHC (Emory, VA)
WHEC (Rochester, NY)
WINA (Charlottesville, VA)
WIRE Magazine*
WJLA (Washington, D.C.)
WMAL (Washington, D.C.)
WRIC (Richmond, VA)*
WSET (Lynchburg, VA)
WSLS (Roanoke, VA)*
WSVN (Miami, FL)
WTOP (Washington, D.C.)*
WVEC (Norfolk, VA)
WWNS (Lewisburg, WV)*
WTIF (Roanoke, VA)*
WVVA (Bluefield, WV)
Yahoo! Finance
PRESENTATIONS


Alden, A. (2017, November). The I-81 Corridor Coalition Program. Presented at the Bristol MTPO Executive Board Meeting, Bristol, TN.

Alden, A. (2017, November). The I-81 Corridor Coalition Program. Presented at the Kingsport MPO Executive Board Meeting, Kingsport, TN.


Atwood, J. (2017, November). Investigating Natural Reliance on, and Behavioral Adaptation to, Use of Mixed

HONORS, AWARDS, & SERVICES

Alden, A. (2017, November). The I-81 Corridor Coalition Program. Presented at the Kingsport MPO Executive Board Meeting, Kingsport, TN.


Atwood, J. (2017, November). Investigating Natural Reliance on, and Behavioral Adaptation to, Use of Mixed

PRESENTATIONS


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PRESENTATIONS

Alden, A. (2017, November). The I-81 Corridor Coalition Program. Presented at the Bristol MTPO Executive Board Meeting, Bristol, TN.


Atwood, J. (2017, November). Investigating Natural Reliance on, and Behavioral Adaptation to, Use of Mixed
Function Automated Vehicles over Time. Presented at the National Surface Transportation Safety Center for Excellence, Blacksburg, VA.


Hanowski, R. (2017, November). Evaluating Truck Drivers’ Speed and Seat-Belt Use Before and After the Implementation of a Non-Video Onboard Monitoring System. Presented at the IIR World Road Meeting, Delhi, India.


McCall, R. M. (2018, April). Getting to where we want to be. keynote presentation, Virginia Tech Services for Students with Disabilities Access & Inclusion Awards, VT SSD, Blacksburg, VA.


Turturici, M. (2018). Effects of driver impairment on crash risk: Results from 40 million miles of Naturalistic Driving Data in the SHRP 2 Database. Presented at the Transportation Research Board 97th Annual Meeting, Washington, DC.


STUDENT PRESENTATIONS

Includes presentations made in collaboration with student author(s)


HONORS, AWARDS, AND SERVICE TO THE PROFESSION

Andy Alden

• Vice-Chair and Paper/Session Coordinator, TRB ADC 60, Standing Committee on Resource Conservation and Recovery
• Chair, TRB ADC60(2), Subcommittee on Transportation Infrastructure, Facilities, and Right-of-Ways
• Member and Paper Coordinator, TRB Subcommittee on Unmanned Aerial Systems/Remotely Piloted Aircraft (AV050, AV020, AV010)
• Board Member, AUVSI Ridge and Valley Chapter
• Member, Virginia Safe Wildlife Corridors Collaborative

Matt Camden

• Awarded high scoring abstract, Researcher category, 2018 International Conference on Transport and Health
• Member, TRB Standing Committee on Winter Maintenance

Tom Dingus

• Member, Board of Directors, Intelligent Transportation Society of America
• Member, Board of Directors, Association for Unmanned Vehicle Systems International
Johan Engström
- Member, Scientific Advisory Committee of the Towards Zero HMI Distraction project, funded by VicRoads and led by the Australian Road Research Board
- Member, SAE Automated and Connected Vehicle Symposium Executive Program Committee
- Voting Member, SAE Safety and Human Factors Standards Steering Committee
- Elected Chair, SAE Driver Metrics, Performance, Behaviors and States Technical Committee

Ron Gibbons
- 2017 Taylor Technical Talent Award, best paper in lighting-based research for "Dirt Depreciation in Solid State Luminaires" (Matthew Palmer, J. Meadow, and Travis Terry)

Kevin Grove
- Elected Chair, SAE Truck and Bus Human Factors Committee

Jon Hankey
- Chair, ISO Task Force on Naturalistic Driving

Rich Hanowski
- Editorial Manager, SAE
- Invited to serve on the Advisory Committee of the Occupational Injury Prevention Research Training program, University of Utah
- Invited by the National Safety Council to serve on the ANSI Subcommittee for the development of standards to address automated vehicles in fleets
- Invited to serve on the SAE COMVEC Executive Council

Warren Hardy
- SAE Forest R. McFarland Award for Service
- Named General Chair, 2018 Stapp Car Crash Conference
- Appointed to the SAE Human Biomechanics and Simulations Standards Committee
- Named Chair, SAE Automated Driving Systems Crashworthiness Task Group

Andrew Kemper
- Member, AAAM Scientific Program Committee
- Vice Chair, AAAM Scientific Program Committee Student Program Subcommittee
- Outstanding New Assistant Professor, College of Engineering, Virginia Tech

Charlie Klauer
- Chair, ANB30: Operator, Education, and Regulation Committee of the Transportation Research Board
- Member, Virginia State Office of Highway Safety Teen Traffic and Speeding Task
- Co-organizer, Transportation Research Board Subcommittee Mid-year Meeting on Teens and Technology in the Vehicle, Woods Hole, MA

Andrew Krum
- Invited Member, National Occupational Research Agenda (NORA) Transportation, Warehousing, and Utilities Sector Council (National Institute for Occupational Safety and Health)
- Invited Secretary, Technology Maintenance Council, S4 Cab and Controls Study Group

Erin Mabry
- Chair, Truck and Bus Operator Health and Wellness Subcommittee

Shane McLaughlin
- Appointed to the U.S. DOT Motorcycle Advisory Council by the Secretary of Transportation

Andrew Miller
- Subcommittee Chair, Truck and Bus Data Subcommittee, TRB ANB70 Truck and Bus Safety
- Committee Member, TRB ANB70 Truck and Bus Safety

Ryan Naff
- Became Certified Research Administrator

Justin Owens
- Session Co-organizer, Breakout Session #13: Challenges and Opportunities for the Intersection of Vulnerable Road Users and Automated Vehicles, 2017 Automated Vehicles Symposium, San Francisco, CA.

Hesham Rakha
- Chair, Session T53 – Improving Energy Efficiency of Personal Transportation, INFORMS Meeting, Oct. 22-25, 2017, Houston, TX
- Associate Editor, IEEE Transactions on ITS
- Member, Transportation Research Board Sub-Committee on Traffic Modeling
- Member, Transportation Research Board Committee on Air Quality
- Member, ITS America Benefits, Evaluation and Cost Committee
- Member, Virginia Tech CEE P&T Committee
- Member, Virginia Tech CEE Honorarium Committee

Angie Robinson
- Became Certified Research Administrator

Sheldon Russell
- Reviewer, Automated Vehicles Symposium Posters
- Reviewer, Naturalistic Driving Research Symposium Posters and Oral Presentations
- Reviewer, Human Factors

Andy Schaudt
- Reviewer, Automated Vehicles Symposium Posters
- Reviewer, Naturalistic Driving Research Symposium Posters and Oral Presentations
- Reviewer, Accident Analysis & Prevention

Costin Umanatu
- Elected ASME Fellow
Includes technical reports, journal articles, and conference proceedings.


19(2), 156-194.


Bicyclists. Chapel Hill, NC: Pedestrian and Bicycle Information Center.


**STUDENT PUBLICATIONS**

Denotes publications on which student(s) served as an author


**STUDENT PUBLICATIONS**

Denotes publications on which student(s) served as an author


VTTI STAKEHOLDERS

NAME

Cyril Clarke
Dwight Shelton
Theresa Mayer
Julia Ross
Pam Vandevord
Sam Easterling
Azim Eskandarian
Luke Lester
Eileen Van Aken
Robert Sumichrast
Paul Herr
Sally Morton
Ron Fricker
Robert Schubert
Hunter Pittman
Joel Peters
Tom Dingus
Pascha Gerni
Jon Hankey

DEPARTMENT/COLLEGE

Office of the Provost
Office of the Vice President for Finance and Chief Financial Officer
Office of the Vice President for Research and Innovation
College of Engineering
Biomedical Engineering and Mechanics
Civil and Environmental Engineering
Mechanical Engineering
Electrical and Computer Engineering
Industrial and Systems Engineering
Pamplin College of Business
Marketing
Science
Statistics
College of Architecture and Urban Studies
Architecture + Design
Public Administration & Policy
Virginia Tech Transportation Institute
Virginia Tech Transportation Institute