$1.7 MILLION
DOT Funding at Vanderbilt, from FY 2015 to FY 2019

$5.2 MILLION
TDOT Funding at Vanderbilt, from FY 2015 to FY 2019

$21.5 MILLION
DOT R&D Funding to Tenn., from FY 2015 to FY 2019

Vanderbilt Center for Transportation and Operational Resiliency

Established in 1988, the Vanderbilt Center for Transportation and Operational Resiliency (VECTOR) has been a hub for interdisciplinary research and educational activities involving freight and passenger transportation. VECTOR researchers integrate transport engineering, social sciences, planning, and risk analysis to assist in decision-making by the private and public sectors. Major government sponsors of the center include the federal Departments of Transportation (DOT), Housing and Urban Development, Defense, and Homeland Security, the National Science Foundation, the Tennessee Department of Transportation (TDOT), the Tennessee Department of Economic and Community Development, and local government agencies. The VECTOR portfolio includes projects ranging in scope from the local to national levels and across the transportation modes of water, highway, and rail.

VECTOR faculty are leaders in the transportation research community. They serve on the Transportation Review Board’s (TRB) Marine Board and Committee on Extreme Weather Resilience; on the American Society of Civil Engineers (ASCE) Committee for America’s Infrastructure—with a focus on dams and levees—and the Connected and Autonomous Vehicle Impacts Committee; and as the U.S. Alternative Representative for the World Association for Waterborne Transport Infrastructure.

Collaborating to improve air quality

Vanderbilt, in partnership with TDOT and Metro Nashville–Davidson County, received a $4.5 million DOT Congestion Mitigation and Air Quality Improvement grant to reduce single-occupancy trips to campus. Vanderbilt—the largest private employer in Middle Tennessee—will match the grant, bringing the total for this effort to $9 million. The university’s strategic transportation and mobility plan, MoveVU, received a major boost from the grant and will fund shuttle operations and shelters, bike share shelters, a new commute hub, incentives for sustainable commutes, and more. The university’s administration and School of Engineering are also working together to employ sophisticated sensors and advanced data analytics techniques to better understand transportation patterns around campus, measure the effectiveness of the program, and adapt our program as appropriate. A successful program will result in a reduction of traffic congestion and improved air quality on campus and throughout the region.

Dwight David Eisenhower Transportation Fellowships

In 2020, five engineering Ph.D. students associated with VECTOR received prestigious Dwight David Eisenhower Transportation Fellowships. Their success, combined with the success of 2019’s four Eisenhower Fellows, highlights Vanderbilt’s flourishing position as an epicenter of connected cities and resilience research. The awards are made by DOT’s Federal Highway Administration. Several of the students are also involved in MoveVU, linking their research with the transportation challenges facing Nashville and Vanderbilt alike.
Investing in the future of transportation

VECTOR has participated as a member of DOT University Transportation Center (UTC) consortiums for years. At present, Vanderbilt is one of five universities in the MarTREC UTC, the only DOT-funded UTC focused on the maritime domain. Through MarTREC, VECTOR researchers are working to better understand the impacts of extreme flooding on transportation assets and community emergency response capabilities. The UTC also aims to improve our ability to recover from disruptive events by optimizing how goods are transported using water, highway, and rail networks.

Improving safety for rail transportation of hazardous materials

Vanderbilt engineers, in partnership with a private rail shipper, work through DOT’s Pipeline and Hazardous Materials Safety Administration to improve automatic detections of disruptions to the rail transportation of hazardous materials. They are also evaluating new methods to identify potential tampering and other incidents to advance the safety and security of rail transportation.

Addressing key transportation issues in Tennessee

VECTOR has an extensive portfolio of research supported by TDOT’s State Planning and Research (SPR) Program. SPR receives DOT formula funding through the Federal Highway Administration for transportation research and development. VECTOR researchers analyze crash data and use predictive models to help inform safety improvements on Tennessee highways; evaluate High Occupancy Vehicle lane utilization and violation rates to improve efficiency; facilitate the use of innovative information technologies in long-term planning; evaluate opportunities for cyber-physical systems to improve efficiency, safety, security, and sustainability of freight transportation; and consider ways to address the opioid epidemic through investments in transportation.

Vanderbilt engineers also work with TDOT personnel to determine ways to put research into practice and to pilot test technologies including, for example, as part of the Interstate 24 SMART Corridor between Nashville and Murfreesboro.

Road test proves adaptive cruise control can add to traffic jam problem

A new, open-road test of adaptive cruise control, conducted by a Vanderbilt researcher, demonstrated that the feature, designed to make driving easier by continuously adjusting a vehicle’s speed in response to the car ahead, doesn’t yet solve the problem of phantom traffic jams. Because human drivers are responsible for the creation of this type of jam—which occurs without an obvious cause—the widespread use of these types of driver-assist technologies holds promise to eliminate the jams, if designed appropriately. Today’s driver-assist systems are not yet able to overcome the worst driving behaviors of humans that lead to extremely frustrating traffic jams, according to VECTOR researchers. The team’s work, supported by DOT’s Federal Highway Administration, builds on earlier research that showed adding even a few specially designed autonomous vehicles could eliminate phantom jams by keeping an optimal separation between cars and avoiding sudden stops.

For more information, please contact Vanderbilt’s Office of Federal Relations:
Christina West (202) 216-4370 · Heather Bloemhard (202) 216-4368
federalrelations@vanderbilt.edu

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