VIRGINIA TECH TRANSPORTATION INSTITUTE

Facilities

Virginia Tech Transportation Institute

Virginia Smart Roads

The Virginia Smart Roads are state-of-the-art closed test-bed research facilities managed by VTTI in cooperation with the Virginia Department of Transportation (VDOT). The roads include over 12 lane miles of paved roadbed with weather-making, lighting capabilities, advanced sensors, traffic intersections, and varying pavement types. The Smart Roads support vehicle evaluations and driver safety testing for VTTI's partners in a secure location.

- 2.2 mile controlled-access test track built to Federal Highway Administration standards
- 2 paved lanes & 3 bridges
- 75 weather-making towers
- Optical fiber network, including gig ethernet switches
- Signalized intersection

- Highly reconfigurable: portable buildings, infrastructure, roundabout, pavement markings, signalized intersection
- Multiple actor scenarios (vehicles, pedestrians, & cyclists)
- Optical fiber network, connectivity to backend computational networks including cell & DSRC modes

- Designed to recreate the challenges of rural roads
- 2.5 miles of paved roads & 4.5 miles of unimproved roads
- Includes: hills, flat winding sections, short site distances, small bridges, narrow soft shoulders & intersections

- Controllers schedule, oversee, & monitor all on-site research
- Researchers can observe traffic & driver performance via video monitors
- Engineers can manipulate highway lighting & oversee weather operation from the Control Room

Virginia Connected Corridors

Virginia Connected Corridors is a developer-friendly environment enhanced by 56 roadside units installed on freeways and arterials on Interstates 66 and 495 in Northern Virginia and on the Virginia Smart Roads.

- Cloud computing supports development & deployment of third-party applications, data exchange services, application program interfaces, & reference applications
- Supports migration of applications from Smart Roads to public roadways
- Post-deployment safety assessment systems

Partners VDOT VTRC Virginia Transportation Research Council VIRGINIA TECH TRANSPORTATION INSTITUTE

Virginia International Raceway

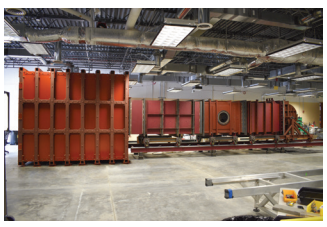
VTTI's collaboration with Virginia International Raceway in Alton, Va., allows the institute to conduct projects in a multi-use testing environment that includes both closed-course and open traffic conditions.

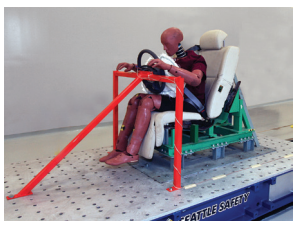
- Configurable to five different courses ranging from 1.1 miles to 4.2 miles, with hairpin curves & blind passes
- Home to the Virginia Motorsports Technology Park and the VTTI-affiliated Global Center for Automotive Performance Simulation (GCAPS)
- GCAPS has the world's premier force-and-moment tire testing machine, as well as tire modeling & parameterization & vehicle simulation capabilities

VTTI Crash Sled Lab

The VTTI Crash Sled Lab houses an impact laboratory and a high-speed biplane X-ray suite

- 1.4-meganewton ServoSled System with high-rate impact testing & imaging capabilities to study transportation-related trauma
- Advances understanding of injury mechanisms & develops mitigation schemes and protection systems for occupants of consumer & military vehicles as well as for users of recreational sports equipment





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Weather Features & Capabilities

Virginia Tech Transportation Institute

VTTI Smart Outdoor Lighting Lab

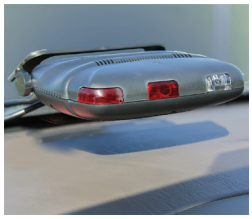
VTTI's SOLL includes test sites around Virginia Tech's campus with adjustable lighting systems based on real-world conditions

- Test sites on the Virginia Smart Roads focus on lighting & transportation safety
- Parking lots & parking garages utilized for lighting & control systems testing
- Roadway Lighting Mobile Measurement System collects in situ data for roadway lighting performance & participant response
- Robot-based system for assessing the lighting of paths & sidewalks

Laboratories & Data Acquisition Systems

Laboratories & VTTI-developed data acquisition systems collect and store large amounts of continuous naturalistic data from the driving environment

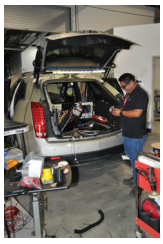
- Facilities for driver interface development, data reduction, lighting research, accident analysis, pavement research, & traffic simulation
- Video, vehicle network information, & additional sensor information that can include radar, GPS, and acceleration
- Engineering labs to rapidly prototype novel technologies for tests and evaluation



Garages & Vehicles

Garages & Vehicles – machine shops, welding shops, electronics laboratories, and garage facilities support the customization of research hardware and software

- Large & varied fleet of instrumented vehicles outfitted with instrumentation packages that can be quickly tailored to the specifications of each project
- Passenger vehicles, heavy vehicles, bicycles, & motorcycles maintained on-site through a full-service vehicle maintenance operation



High Performance Computing & Data Warehouse

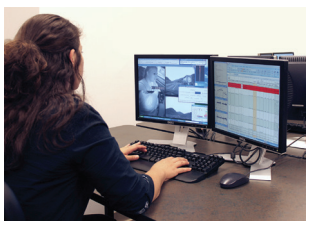
Our high-performance computing and data warehousing capabilities allow us to unleash the potential of data analytics using cutting edge data processing pipelines

- Large, complex, & continually evolving data center infrastructure to support the Institute's mission & research objectives
- The petabytes of Naturalistic Driving Data provide the foundation for many of VTTI's data-intensive scientific research programs
- Tools include MATLAB, R, SAS, & other statistical packages
- VTTI's Information Technology team, Virginia Tech's central IT organization, & other large-scale Virginia Tech research institutes collaborate using strategic university research computing & archival resource investments

Data Annotation

Data Annotation – processes and reduces raw data collected in VTTI studies

- Data annotationists undergo a rigorous training & evaluation process
- Testing protocols in place for all studies to ensure data reduction is consistent both between annotationists & from a single annotationists over time



Virginia Tech Transportation Institute
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Blacksburg, VA 24061

For 35 years, VTTI has been conducting research to save lives, time, and money and protect the environment. In our world-class facilities, we investigate, invent, design, develop, refine and test transportation systems of the future. As one of seven premier research institutes created by Virginia Tech to answer national challenges, VTTI is continually advancing transportation through innovation and has affected public policy on national and international levels.

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Advancing Transportation Through Innovation