VIRGINIA TECH
TRANSPORTATION INSTITUTE

Connected and Automated Vehicle Projects

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VTTI FACTS

ADVANCING TRANSPORTATION THROUGH INNOVATION

5 VTTI faculty are among the top **10** sponsored research awardees at VT

Infrastructure worth more than **$150M**

Historically, on average, employs close to **500** faculty, staff, and students

- Top three transportation institute globally
- Largest group of driving safety researchers worldwide
- 300 active projects and collaborations with more than 100 sponsors across the private and public sectors
- Approaching $50M in annual externally-sponsored awards
- Research has positively influenced public policies for driver, passenger, and pedestrian safety
- Advanced safety of infrastructure, vehicles and reduced environmental impacts

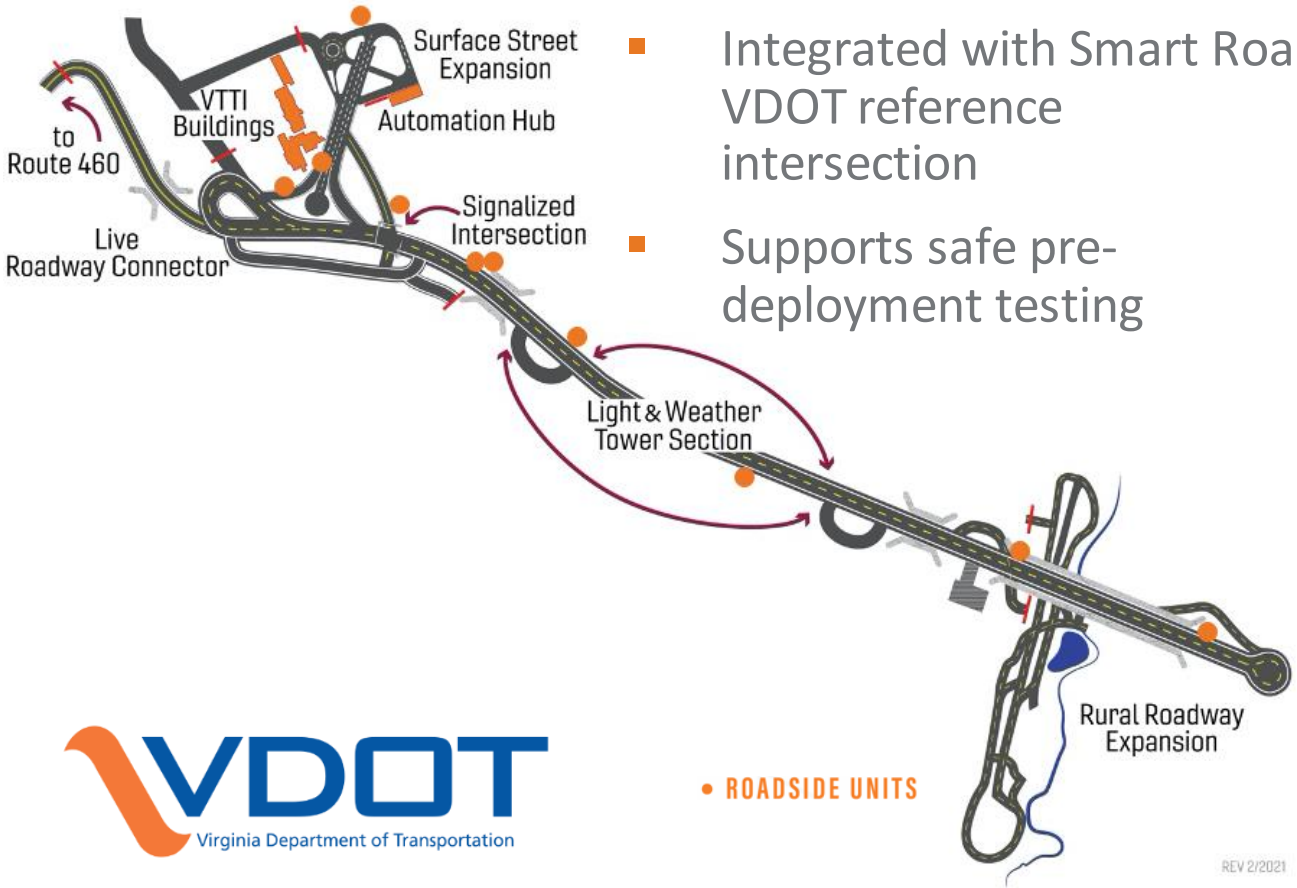
VTTI's Virginia Connected Corridor Living Lab

Northern Virginia Testbed

- 38 DSRC and 11 C-V2X / 5G RSUs
- RTK Base Station – RTCM Messages
- Live operational environment
- Integrated into 30 intersection controllers
- On-road application testing and evaluation

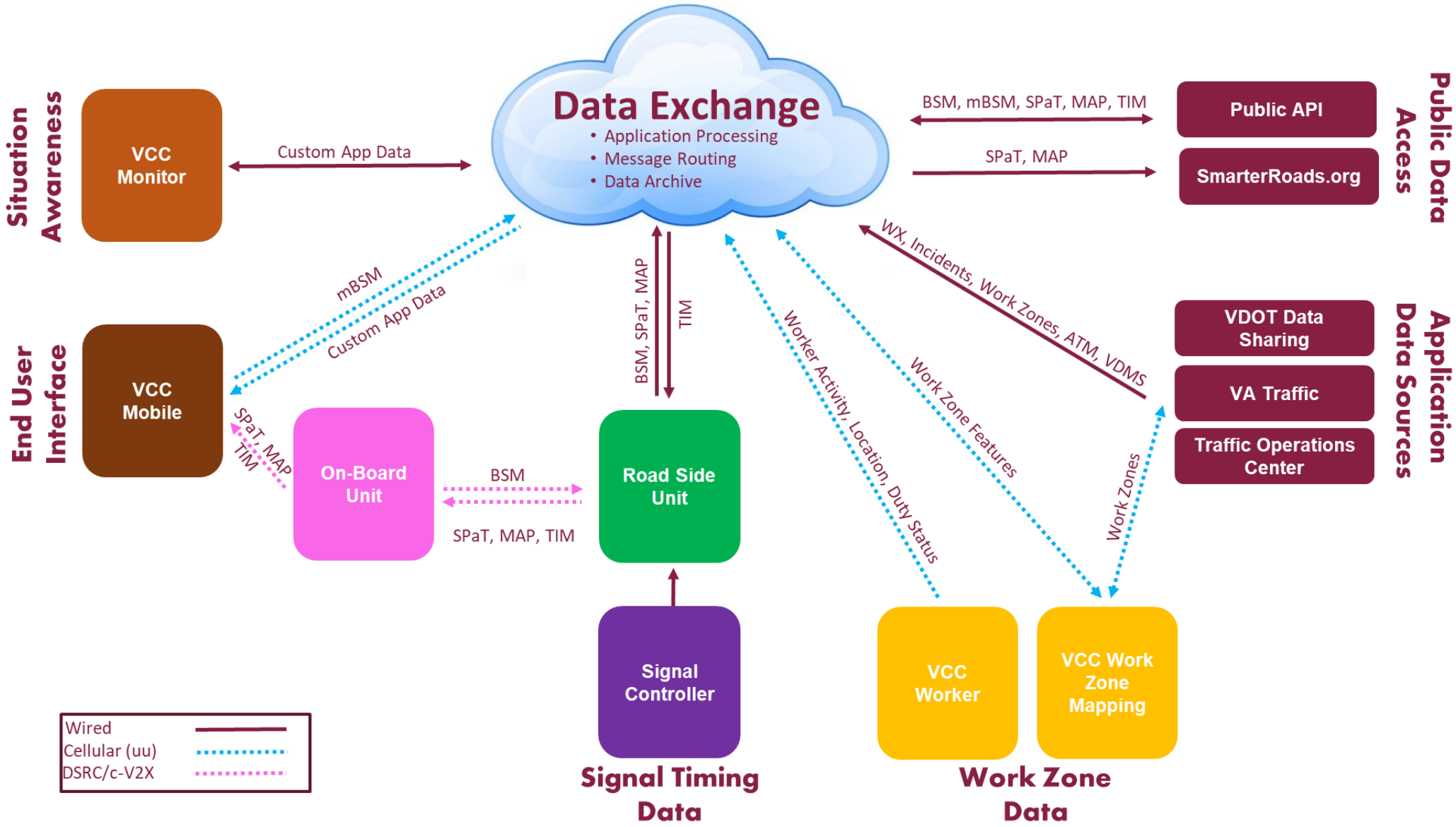
Virginia Smart Roads

- 8 DSRC and 4 C-V2X / 5G RSUs
- Integrated with VCC data exchange
- Integrated with Smart Road VDOT reference intersection
- Supports safe pre-deployment testing



VDOT
Virginia Department of Transportation

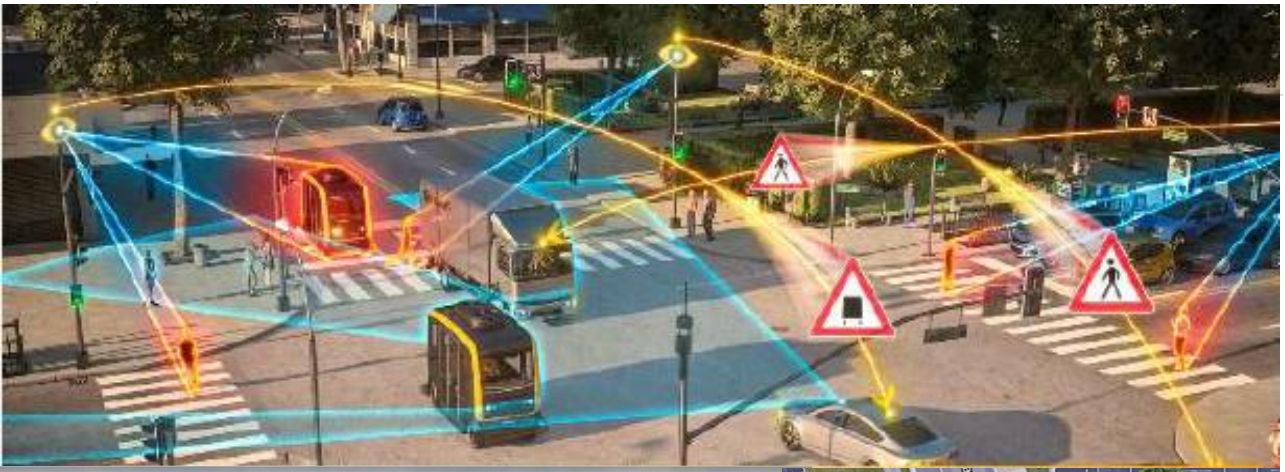
VCC Data Flow Architecture

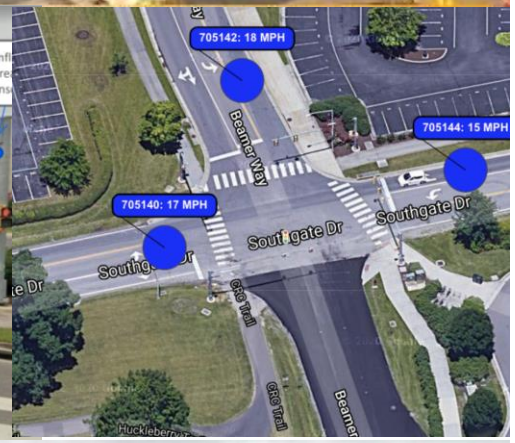


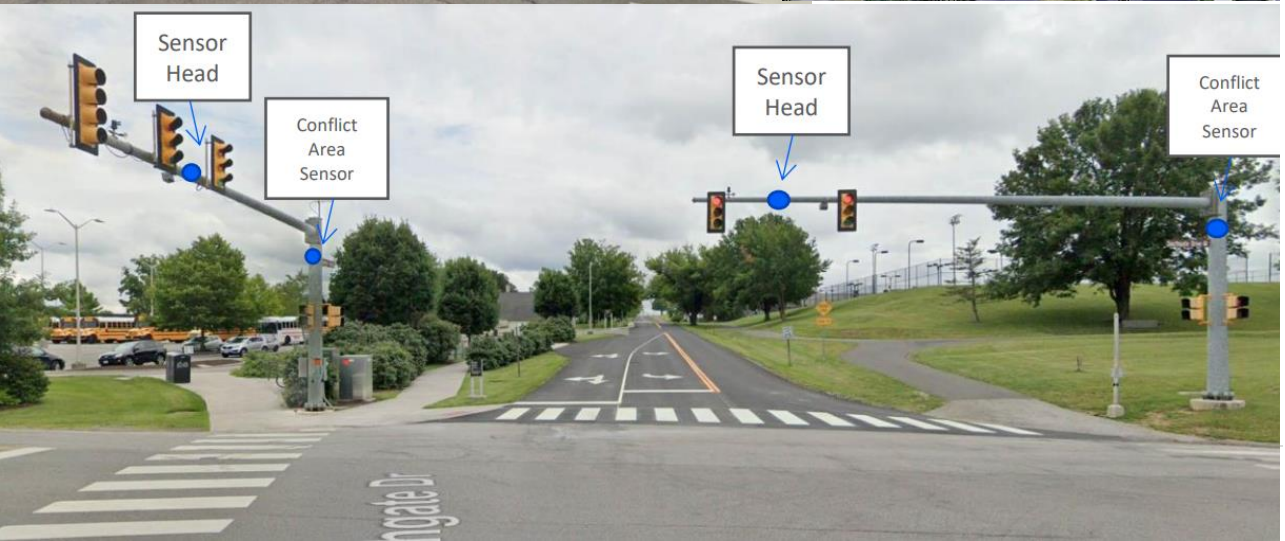
C-V2X Use Case Demos

Sponsor: Audi, Qualcomm, American Tower, VDOT

- VTTI teamed with partners to develop connected vehicle application use cases that demonstrate the features of C-V2X
- Provide drivers with advisories about work zones including location, lane configuration changes, reduced speeds, and worker hazards
- Provide drivers with information about the traffic control status to support Red Light Violation Warning (RLVW) and Green Light Optimized Speed Approach (GLOSA) applications
- One of the first C-V2X deployments on operational infrastructure (US50)
- CAMP, LLC Connected Intersection Guidance







Smart Intersection Technology Evaluation

Sponsor: Virginia DOT

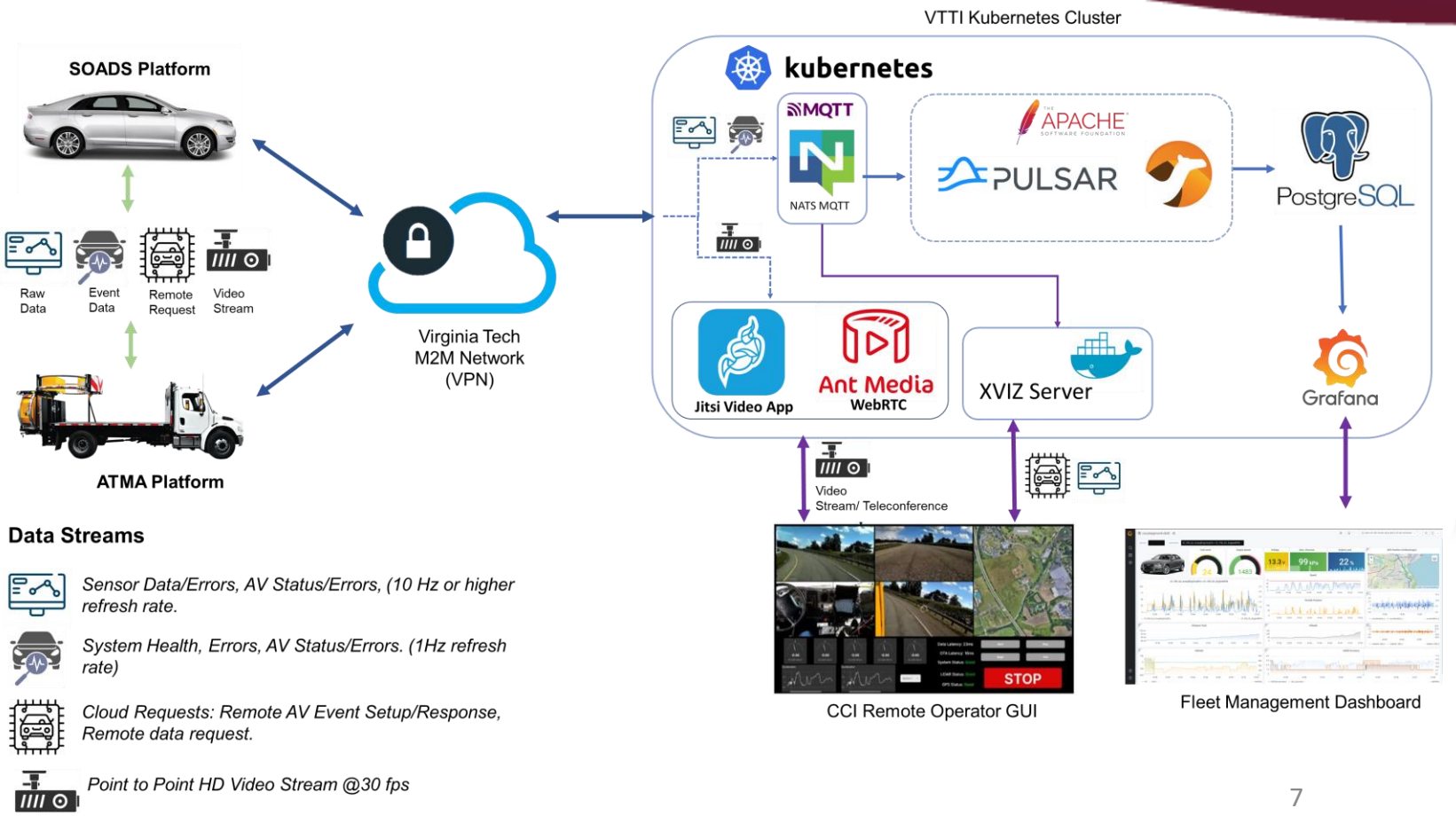
Focus: Technology Evaluation

- Deploy 4 smart intersection technologies (Derq, Miovision, Iteris/Continental, Blue City) on both test track and in live operations
- Camera and radar with edge processing for object detection, classification, and localization
- Evaluate data quality, reliability, accuracy, and latency
- Assess application requirements and align to available solutions
- Make recommendations to VDOT for future deployments
- Accelerate value recognition in early CV equipped vehicles
- Planned SAE J3224 Implementation

Remote Operator & Fleet Management Concept

Remote Operator & Fleet Management

- 4G/5G Multi-SIM modem comms system
- Real-time data Telemetry to VTTI Kubernetes Cluster
  - Sensor Data
  - Automation Status/Errors
  - Public Safety Interaction
  - Vehicle Control Functions
- Multiple ADS platform support
- Live Video Streaming

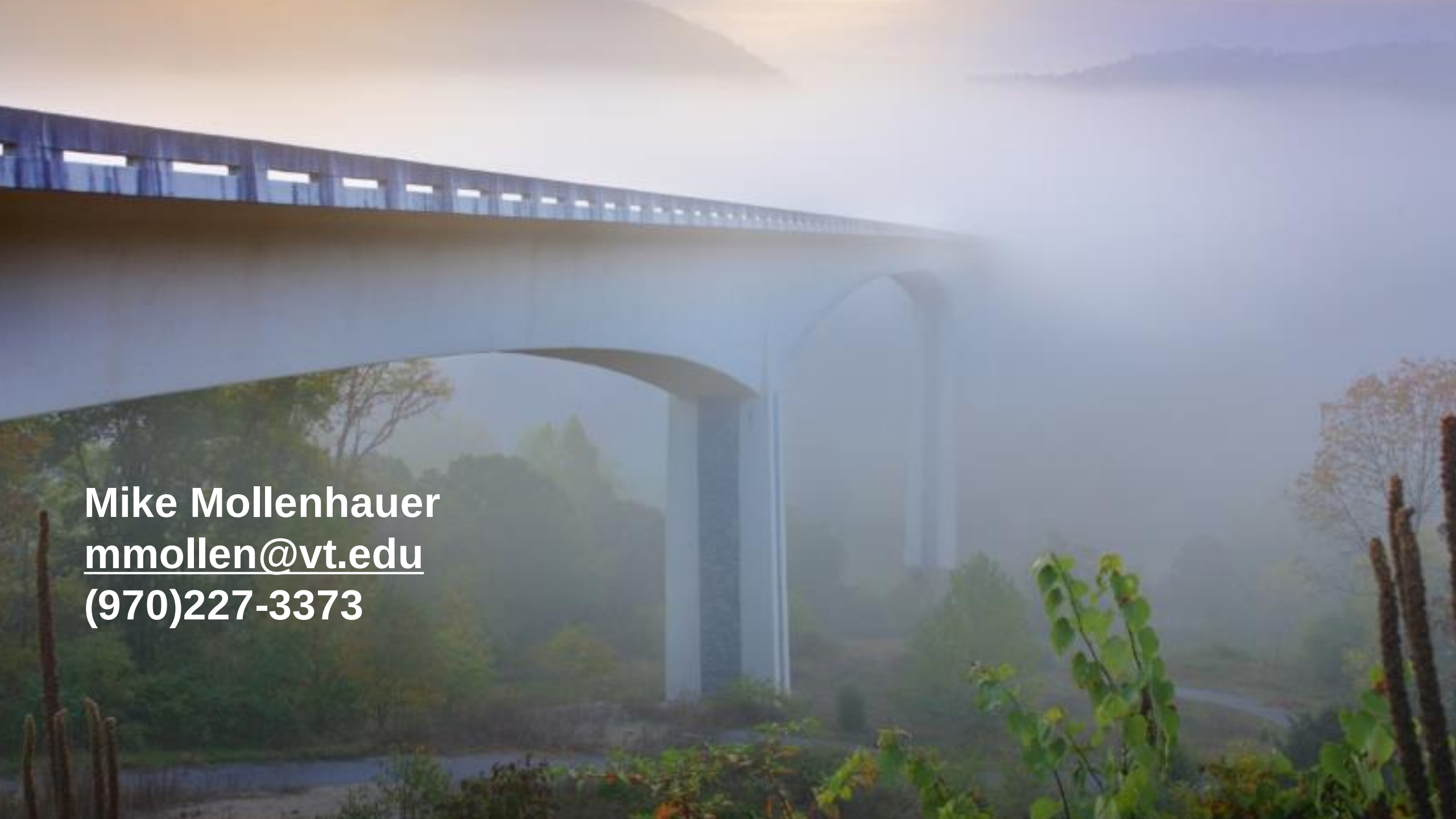


Safety Monitoring of the Relay Low-Speed Automated Vehicle Deployment

Sponsor: VTRC / Fairfax County

Impact: Safety monitoring of low-speed automated shuttle in Fairfax County, VA

- Provided SPaT and MAP to shuttle to support safe intersection operations
- Operations in mixed traffic on an urban circulator route (most complex route to date)
- 360-degree video with near real time evaluation
- First of its kind data reduction protocol to assess impact on direct and indirect traffic conflicts
- Facilitated NHTSA disengagement reporting requirements



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