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**INNOVATION**  
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# **Taking the First Steps Towards Connected Vehicle Deployment – Virginia’s CV Research Program**

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# Why is Virginia Investing in Connected Vehicles?

- Virginia's urban areas have some of the worst congestion in the country
- Traffic crashes killed 775 people on Virginia roads in 2012, another 67,004 were injured
- Traditional countermeasures can no longer address the safety and mobility challenges



# So what will our investment get us?

- AASHTO Footprint Analysis presents several potential benefits:
  - Highway crashes will be dramatically reduced when vehicles can sense and communicate the events and hazards around them
  - Mobility will be improved when all users in all modes have access to substantially more up-to-date, accurate, and comprehensive information on travel conditions and options and system operators have actionable information and tools to affect performance
  - Environmental impacts of vehicles and travel can be reduced when travelers can make informed decisions about modes and routes



# That sounds great, but how will it work?

- Benefits will accrue through the deployment of applications – both V2V and V2I
- As a public agency, VDOT is focusing on V2I applications
- V2V applications are included in our research program through our university partnerships



# Potential V2I Safety Applications

- Red light violation warning
- Curve speed warning
- Stop sign gap assist
- Spot weather impact warning
- Reduced speed/Work zone warning



# Potential Mobility Applications

- Motorist advisories and warnings
- Real-time route specific weather information
- Advanced traveler information
- Freight real-time traveler information with performance monitoring
- Transit signal priority
- Emergency Vehicle preemption



# UTC Connected Vehicle Research Projects

- **V2I Applications**

- Adaptive Stop/Yield
- Adaptive Lighting
- Intersection Management Using Speed Adaptation
- Eco-Speed Control
- Awareness System for Roadway Workers
- Infrastructure Safety Assessment
- Smartphone DMS Application
- NextGen Transit Signal Priority with CVI
- Smartphone App Reducing Motorcycle and Bicycle Crashes

- **V2V Applications**

- Emergency V2V Communication
- Freeway Merge Management
- CV Freeway Speed Harmonization Systems
- Reducing School Bus Conflicts through CVI
- Connected Motorcycle Crash Warning
- Connected Motorcycle System Performance

- **Other**

- Safety and Congestion Issues Related to Public Transportation
- Willingness to Pay and User Acceptance





# VDOT CV Application Priorities

- Traffic signal applications
- Pedestrian safety
- Expanded DMS (or radio) messaging
  - Incident details
  - Vehicle size restrictions (height/weight)
  - Diversion/alternative routes
- Work zone safety
- Weather-related traffic advisories





# Automated Vehicle Systems

- **VTTI is actively working with NHTSA, OEMs, and suppliers on groundbreaking automated-vehicle studies**
- **VDOT/DMV/others looking at regulatory, policy, and liability issues**



**Research projects with numerous OEMs and suppliers**

**Developing Level 4 light and heavy vehicles**

**NHTSA automated driving human factors project and IDIQ**

**Can leverage current VT capabilities (e.g., Blind Driver) to create bigger research awards**



# Project Team and Partners

## Automated Research Vehicles

- **GM: Level 2 Automated Vehicle (multiple automated features)**
- **Google: Level 3 Automated Vehicle (“hands-off” driving)**

## Human Factors Industry Advisory Group to provide expert/peer review and guidance

- **Battelle**
- **Bishop Consulting**
- **BMW**
- **Continental**
- **GM**
- **Google**
- **Mercedes-Benz**
- **SwRI**
- **TORC Robotics**



# Our next steps

- Initiate final round of UTC research projects – focus on test bed
- Increase the number of equipped vehicles regularly traveling through the test bed corridor
- Establish and extend partnerships that will enhance our program



# Additional Information

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