Virginia Department of Transportation
Sixth Annual Richmond Region Transportation Forum

Think Big and Make No Little Plans

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Office of Strategic Innovation
Virginia Department of Transportation

November 29, 2018
Make no little plans; they have no magic to stir men's blood and probably themselves will not be realized. Make big plans; aim high in hope and work, remembering that a noble, logical diagram once recorded will never die, but long after we are gone will be a living thing, asserting itself with ever-growing insistency.

—Daniel Burnham
Overview

Testing Demos and Pilots in Virginia

Innovation and Technology Cycles

Virginia Connected Corridors

Next Steps
Quiz Time!

- Connected Vehicle Environment
- Autonomous Vehicle (Self-Driving)
- Automated Vehicles
Why Connect?
What Benefits Can We Expect?

National Timeline for Application Adoption and Associated Mobility Benefits

- Cooperative Adaptive Cruise Control
- Forward Collision Avoidance
- Adaptive Cruise Control
- Traffic Jam Assist
- Platooning
- Fully Automated Vehicles

(Source: USDOT, FHWA-JPO-16-229)
### Levels of Vehicle Autonomy

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Level 0</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Automation</td>
<td>Driver assistance</td>
<td>Partial automation</td>
<td>Limited self-driving</td>
<td>Full self-driving under certain conditions</td>
<td>Full self-driving under all conditions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(conditional automation)</td>
<td>(high automation)</td>
<td>(full automation)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>No automation</td>
<td>Can assist driver in some situations.</td>
<td>Can take control of speed and lane position in certain conditions.</td>
<td>Can be in full control in certain conditions and will inform the driver to take control.</td>
<td>Can be in full control for the entire trip in these conditions and can operate without a driver.</td>
<td>Can operate without a human driver and need not have human occupants.</td>
</tr>
</tbody>
</table>

### Driver

<table>
<thead>
<tr>
<th>Level 0</th>
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<th>Level 4</th>
<th>Level 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>In complete control at all times.</td>
<td>Must monitor, engage controls, and be ready to take over control quickly at any moment.</td>
<td>Must monitor and be ready to take control quickly at any moment.</td>
<td>Must be ready to take control quickly when informed.</td>
<td>Not needed</td>
<td>Not needed</td>
</tr>
</tbody>
</table>

Source: GHSA
Testing, Demos, and Pilots are Active in Virginia

Virginia Tech Transportation Institute
Fall 2017

More info at https://www.youtube.com/watch?v=EwujR1ARsog
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September 13-15, 2017

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Testing, Demos, and Pilots are Active in Virginia (cont.)

FHWA Connected Vehicle Testing on I-95 Express Lanes
June 2018

Source: USDOT

More info at https://www.youtube.com/watch?v=EwujR1ARsog
Testing, Demos, and Pilots are Active in Virginia (cont.)
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Next Steps
Soooo, what's really happening out there?
Sooooo, what's really happening out there?

Tesla Driver Gets Auto-Pilot Ticket Dismissed After 'Driving' With Feet Out Window

Self-driving Uber kills Arizona woman in first fatal crash involving pedestrian
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Next Steps
VDOT’s Vision for Connected and Automated Vehicles

VDOT envisions a future environment where Connected and Automated Vehicle applications provide connectivity between vehicles, roadside infrastructure and wireless devices. This interconnected environment is expected to meet the following objectives:

- Increased Safety
- Improved Mobility
- Reduced Infrastructure Investments
- Enhanced Traveler Information
Virginia’s Unique Strengths

- Diverse highway system with a good state of repair
- An “Open-for-business” regulatory environment for innovative transportation solutions
- Data driven commitment to innovation
- Trusted world-class research and testing capabilities
- Capable knowledge based work force, including a strong military presence.
Focus Areas of the Connected and Automated Vehicle Program

1. Outreach and Coordination
2. Leadership
3. Deployments
4. Planning
5. Policy
Virginia Connected Corridors Partnership

To facilitate the understanding of CV deployment, the Virginia Department of Transportation has partnered with the Virginia Tech Transportation Institute to create the Virginia Connected Corridors.
Virginia Connected Corridors

Mission: Provide an open connected vehicle environment where concepts can be developed, tested, deployed, and evaluated in real world operating environments.
Smart Roads at Virginia Tech Transportation Institute
Northern Virginia Challenges
The test beds include cellular communications to support cellular-based applications.
VCC Work Zone Components

VCC Cloud
Data and Processing Hub

VCC Monitor
Situation Awareness

VCC Worker
Dynamic Worker Location and Activity

VCC Vest

Work Zone Builder
Detailed Work Zone Definition

VCC Mobile
Driver Interface
Contact us for more information!

Please visit http://virginiadot.org/automated
National SPaT Challenge

What is the Challenge?
To challenge state and local public sector transportation IOOs to cooperate together to achieve deployment of DSRC infrastructure with SPaT broadcasts in at least one corridor or network (approximately 20 signalized intersections) in each state by January 2020.

What is SPaT?
A Signal Phase and Timing (SPaT) message defines the current intersection signal light phases. The current state of all lanes at intersection are provided, as well as any active pre-emption or priority. SPaT message defined by the SAE J2735 standard.
Virginia Connected Corridor’s SPaT Challenge Architecture
Overview

- Testing Demos and Pilots in Virginia
- Innovation and Technology Cycles
- Virginia Connected Corridors
- Next Steps
Next Steps

Automated Maintenance Vehicles
Work Zone Information
First and Last Mile Solutions
Work Force Development

Fleet Challenge
Industry Coordination
Data Management and Security
Leveraging Broadband
Get Involved!
Thank you!

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Use Open Data Sources To Find Transportation Solutions!

The Virginia Department of Transportation presents its third installment of the SmarterRoads Hackathon and Idea Jam series.

The two-day event will be held on Friday, August 17, through Saturday, August 18, 2018, at CoLab in the heart of Roanoke Village. CoLab is Roanoke’s premier co-working space that provides an infrastructure for Roanoke’s entrepreneurial ecosystem through programs, education, networking, mentorship and shared workspace.

We are seeking to attract a diverse group of developers, planners, futurists, big data lovers and problem solvers to help address Virginia’s greatest transportation issues through the use of open data sets, including VDOT’s SmarterRoads data portal. Your expertise is the key.

IMPORTANT: Register Early at https://invite.com/SmarterRoadsVA/a81e82

#SmarterRoadsVA
SmarterRoads Hackathon & Idea Jam Objectives

- Accelerate Technology Development and Implementation
- Promote Existing Open Data Products
- Develop and Strengthen Relationships

GOAL: Create and share a model to follow for future events
Talk DOT

This project enables users to consume traffic data and get insights through artificial intelligence and neuro-linguistic programming.

Inspiration

Availability of data sources in various places and different formats waiting to be consumed by users in an easy manner.

https://smarter-roads-hackathon-vb.devpost.com
FlexiRoute

A user oriented customizable route optimizer.

Suggestions
README.txt files or code snippets of APIs consuming the data would prove really useful in understanding how the data is intended to be understood.

https://smarterroads-hackathon-nova.devpost.com
EZ Speed

Android app designed to audibly tell the user the speed limit of the road they are on.

What We learned
We learned how to develop an Android app using Android Studio. We also both improved our skills in java and learned the basics of xml.
EEvacPlan
All-in-one dashboard/app for emergency evacuation.

Challenges we ran into
Summarizing the problem and solution in 5 minutes.
Accomplishments that we're proud of
Illustrate our ideas through conceptual maps and dashboard.

https://smarterroads-hackathon-fxbg.devpost.com