Infrastructure to Support CAV – MDOT Perspective

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Infrastructure Support of Automated Vehicles

- **Digital Infrastructure**
  - Surveying / Digital Mapping
  - Vehicle-to-Infrastructure Connection
    - SPaT
    - Traveler Info
    - V2I Applications

- **Physical Infrastructure**
  - Pavement Markings
  - Roadway Signage
  - Geometric Design

- **Regulatory Frameworks**
  - Senate Bills/Public Acts
MDOT’s CAV Program connects the entire state’s mobility. Expansion of our deployments covers urban and rural areas.
V2I Applications

Initial Pilot Applications

- Red Light Violation Warning
- Work Zone Warning/Management
- Road Weather Management
- Pavement Condition
V2I Applications

Red Light Violation Warning

- Vehicle approaching intersection too fast, signal is turning red
- Approaching vehicle receives SPaT message, identifies threat
- Driver Vehicle Interface (DVI) alerts driver to brake
- Smart signal broadcasting Signal Phase and Timing (SPaT)
Updating Standards - Connected Signals Policy

- All new or upgraded traffic signals on the MDOT system will be CV-enabled going forward.
- Coordinated effort with Signals Division to update traffic signal controller specification standards.
- Streamline the management of all 3,100+ MDOT traffic signals to improve safety, enhance reliability, and reduce congestion through active and remote management by implementing a central signal control software.
V2I Applications

Work Zone Warning/Management

Vehicle is approaching work zone too fast

Approaching vehicle receives message from RSU with work zone information

Driver Vehicle Interface (DVI) provides warning of lane closure

Portable RSU sends work zone info to vehicle
YOUR CONNECTED WORK ZONE
- Improve work zone data collection
- Replaced End of Life System
- Developed in TFM (DUAP) System
- Newly developed system to support:
  - Data Collection
  - Data Management
  - Data Distribution
    - Mi Drive Website
    - 3rd Party Traveler Info Providers
    - Connected Vehicle (CV) Messages
V2I Applications

Road Weather Management

Vehicle is approaching hazardous weather conditions area
Approaching vehicle receives message of road ice in area from RSU and/or cellular network
Driver Vehicle Interface (DVI) example
Driver reduces speed in response to warning

Portable Road Side Unit (RSU) sends weather warning to vehicle

Road weather station detects icing conditions, reports conditions to weather office
Operations - Weather

- ESS continue to be deployed with an enhanced consideration for alternative technologies
- Outlined in 2017 RWIS Strategic Plan
V2I Applications

Pavement Condition Monitoring

Vehicle drives over pothole in pavement

Sensors in vehicle detect sharp acceleration at that location from the pothole strike, stores data

Vehicle broadcasts data via cellular network, and sends message to nearby roadside radio as it drives past

MDOT receives data from that vehicle (and lots of others), dispatches maintenance crew

Maintenance crews respond to fix pothole

Roadside unit sends pothole data to operations center

Heat map of pavement conditions
Operations – Pavement Analysis
Updated Pavement Marking Policy

- Increasing width of lane lines on freeways from 4 – 6 inches
  - To support increasing use of lane departure warning and lane keeping technologies

- On and off ramp dotted line extensions included in the annual contract
  - Guide both vehicles and drivers to stay in their lane with traversing the freeway

- Both changes will be included in 2021 construction program
Partnerships

American Center for Mobility (ACM)
The $8M Michigan Mobility Challenge

• $8 million to fund multiple innovative pilot transportation projects of varying sizes that can solve mobility gaps for seniors, persons with disabilities and veterans in urban, rural and suburban communities throughout the state of Michigan.

• A collaborative effort that includes the Michigan Department of Transportation (MDOT), PlanetM/MEDC, the Michigan Department of Health and Human Services, the Michigan Veterans Affairs Agency, The Bureau of Services for Blind Persons, and the Michigan Department of Civil Rights – Division on Deaf, Deafblind, and Hard of Hearing.
$8 Million Challenge

Requirements

• Innovative
• Coordinated
  • Mobility Companies
  • Public transportation agencies in or near to the service area
  • Transportation planning agencies in the service region
  • Social service agencies that provide services to seniors, persons with disabilities and/or veterans in the service area
  • Advocacy groups that have knowledge of the needs of seniors, persons with disabilities or veterans

• Supplemental
• Sustainable
NAIAS 2020 Michigan Mobility Challenge

• Calls upon industry innovators to propose new and dynamic technology deployments that embody how autonomous, connected and electric vehicle technology can transform how we live, work and play.

• Demonstrate innovative solutions and cutting-edge technologies that can showcase autonomous vehicle capabilities

• Provide innovative, dynamic AV technology deployments, further solidifying the NAIAS and the Motor City as the preeminent environment for new transportation solutions.

• Operational during 2020 North American International Auto Show – June 2020
WHAT IS PLANETM?

In spring 2016, the PlanetM brand was born to represent collective mobility efforts and assets across the state.

*Michigan. Where big ideas in mobility are born.*

A year later, the State built on the early success of PlanetM by growing beyond its awareness-focused advertising campaign into a full-service statewide business development program.

*Michigan. Leading the transportation revolution.*
By the end of 2019, PlanetM will be involved in over 50 pilots.

We have an opportunity and responsibility to advance our state’s automotive and technology landscape in a way that also improves the quality of life for all Michigan residents.
Technology Activation Grants

50 activations in the counties below have been facilitated through MEDC/PlanetM and MDOT.

Ann Arbor: Bus driver alerts for predicting vulnerable actions

Grand Rapids: First-ever digital alerts between fire, police, EMS

Detroit: Road condition evaluation & early crack detection

Detroit: Intersection safety in front of RenCen, City Hall using AI

Detroit: AV paratransit shuttle at DMC Hospital Campus

Dearborn: Automated RX delivery inside hospital

Battle Creek: Secure RX delivery in rural area with under-utilized vans

Rochester Hills: AV shuttle at Oakland University, as part of STEM program

SE Michigan: Safe carpool app for schools, teams and families

Ypsilanti (ACM): Self-driving car company without pre-mapping

SW Michigan: Electric school bus deployment in multiple school districts

Ortonville: Automated power line inspections in rural communities
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