ODOT Connected Vehicle Applications

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Vehicle to Infrastructure Connectivity

Source: US DOT
Connected Automation for Greatest Benefits

**Autonomous Vehicle**
Operates in isolation from other vehicles using internal sensors

**Connected Vehicle**
Communicates with nearby vehicles and infrastructure

**Connected Automated Vehicle**
Leverages autonomous and connected vehicle capabilities
Industry Status: DSRC Adoption

Toyota, Lexus to launch 'talking' vehicles in 2021
It wants V2X tech on most of its lineup by the mid-2020s.

BY ANDREW KROK / APRIL 16, 2018 1:01 PM PDT
THE LARGEST 4G LTE Wi-Fi® VEHICLE LINEUP
Make Your Strongest Connections On The Road
Share of New Cars with Internet Connectivity

Source: Statista.com
AASHTO SPaT Challenge
Traffic Signal Connected Vehicle Strategy

ATC Controller
- MaxTime
- MaxTime cv
- DSRC Radio
- SAEJ2735

Central
- MaxView
- MaxView cv Server
- NTCIP

CV Data Portal
- Reverse Proxy Website
- HTTP JSON
- HTTP/WS

Third Party

Third Party

Website

HTTP

Third Party

HTTP

HTTP/WS
Connected Vehicle Pilot Project-Central: Mission St, Salem Oregon
Mission Street Pilot
• Active August 24th 2018
• Test Environment
• Production Environment
Hardware Requirements: ATC Controllers
MAXVIEW Configuration Tool

(10002) 25th @ Mission St

Intersection

Number
10002

Name
25th @ Mission St

Type
Intellight MAXTIME 2.0

Host

Longitude
-123.01074713303004

Latitude
44.92281456763432

Actions
Add Detectors...
Add Lanes...
Delete Intersection...
Basemap Data

Mobile LiDAR data can be used to create MAP data
Can use ODOT LiDAR for new signalized intersections not in Google Map, Bing, etc.
## CV Status

### MAXVIEW cv - connected

<table>
<thead>
<tr>
<th>Location</th>
<th>Status</th>
<th>Time Remaining</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mission St @ 22nd St</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17th @ Mission St</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25th @ Mission St</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Airport Rd @ Missions St</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hawthorne @ Mission St.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signal Group</th>
<th>Status</th>
<th>Time Remaining</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>RED</td>
<td>Tue Oct 09 2018 10:30:12 GMT-0700</td>
</tr>
<tr>
<td>4</td>
<td>GREEN</td>
<td>Tue Oct 09 2018 10:30:07 GMT-0700</td>
</tr>
<tr>
<td>5</td>
<td>RED</td>
<td>Tue Oct 09 2018 10:30:12 GMT-0700</td>
</tr>
<tr>
<td>6</td>
<td>RED</td>
<td>Tue Oct 09 2018 10:30:37 GMT-0700</td>
</tr>
</tbody>
</table>

### Hawthorne @ Mission St

- Advised Speed: 35 MPH
- Speed Limit: 45 MPH
- Follow/Aerial

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**Google Maps Visualization**

- Map showing locations and traffic signals.
- Marker locations are indicated on the map.
- Street names and landmarks are visible.

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**Content Description**

- The page is dedicated to CV Status, indicating connected devices like MAXVIEW cv.
- A table lists various locations along with signal status and time remaining.
- A detailed section highlights Hawthorne @ Mission St with traffic speed information.
- Google Maps visualization provides a graphical representation of the area.
In Car Scenarios
Local Connected Vehicle (DSRC)

- DSRC Radios have been purchased
- Installation scheduled for summer 2019
Roadside Unit (RSU)

- Raspberry Pi Computer
- ATC 1C CPU
5G Cellular Vehicle to Everything (C-V2X)

• **Device to device**
  – V2V and V2I, direct communication without relying on the cellular network provider.

• **Device to cell tower**
  – Another V2I communication link which enables network resources and scheduling and utilizes existing operator infrastructure.

• **Device to network**
  – V2N solution using traditional cellular links to enable cloud services to be part and parcel of the end to end solution.
Next Steps

• Scalability
• Future CV Projects (ATCMTD Grant)
QUESTIONS?