Automated Vehicles

The Future is Near

Jason Wagner
Transportation Researcher
The Future is Near

- Are we all going to have a fully automated vehicle next year?
The Future is Near

- Maybe not, but automation is already saving lives today
  - Driver warning systems
    - Proximity warning
    - Blind spot warning
    - Forward crash warning
    - Lane departure warning
    - Pedestrian warning
    - Curve speed warning
    - Back-up warning
The Future is Near

- Advanced Driver Assistance Systems (ADAS)
  - Electronic stability control (ESC)
  - Adaptive cruise control (ACC)
  - Crash imminent braking (CIB)
  - Lane keeping assist
  - Lane departure prevention
  - Traffic jam assist

- The systems of today serve as underpinnings of the AVs of tomorrow
Defining Terms

- **Autonomous**
  - “existing or acting separately from other things or people”
  - “undertaken or carried on without outside control”

- **Automated**
  - “to run or operate by using machines, computers, etc., instead of people to do the work”

*Source: Merriam-Webster Online*
How Do AVs Work?

- Gather and integrate info from various sensors to understand the world
  - Radar
  - Lidar
  - GPS
  - Camera
  - Ultrasonic
  - DSRC
How Do AVs Work?
# Classifying AVs

<table>
<thead>
<tr>
<th>NHTSA Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero</td>
<td>No Automation</td>
</tr>
<tr>
<td>One</td>
<td>Function-Specific</td>
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Classifying AVs

According to OEMs, when will AVs be available?

<table>
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<tr>
<th>NHTSA Level</th>
<th>Availability?</th>
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Why Do We Care?

- **Safety benefits**
  - 95% of crashes partially attributable to human error (NHTSA)

- **Mobility and congestion reduction**
  - AVs and CVs could increase throughput through platooning, tighter lane spacing

- **Quality of life**
  - Comfort, convenience, productivity
Connected Vehicles

- Vehicles talk to each other, the infrastructure, and other modes through DSRC, Wi-Fi, and Cellular

- AKA: V2V, V2I, V2X

- Focus on safety; also provides environmental and mobility benefits
Where to From Here?

- Uncertainty in Abundance
  - Estimates based on models and assumptions; limited empirical evidence
  - Current infrastructure is designed for human drivers
    - Funding?
  - Establishing legal and regulatory environment
  - How will motorists respond when the direct and indirect costs of driving decrease?
Thank You!

Questions?

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