Preparing for Automated Vehicles: Traffic Safety Issues for States

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In the next 10 minutes

- What’s an AV?
- AV status and projections
- AV safety issues
- Recommendations for states
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PREPARING FOR AUTOMATED VEHICLES:
TRAFFIC SAFETY ISSUES FOR STATES

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GHSA
Governors Highway Safety Association
The States' Voice on Highway Safety
What’s an AV?

• **Level 0:** no automation, driver in complete control
• **Level 1:** driver assistance
  - Cruise control or lane position, driver monitors at all times
• **Level 2:** occasional self-driving
  - Control both speed and lane position in limited situations, like Interstates; driver monitors at all times

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• **Level 3:** limited self-driving in some situations, like Interstates
  - Vehicle in full control, informs when driver must take control
• **Level 4:** full self-driving under certain conditions
  - Vehicle in full control for entire trip, such as urban ride-sharing
• **Level 5:** full self-driving at all times
## What’s an AV?

### Automated Vehicle Terminology and Levels

<table>
<thead>
<tr>
<th>Automated Driving Systems (ADS)</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 (conditional automation)</td>
<td>Full self-driving under certain conditions (high automation)</td>
<td>Full self-driving under all conditions (full automation)</td>
</tr>
</tbody>
</table>

**Vehicle**
- No automation.
- Can assist driver in some situations.
- Can take control of speed and lane position in certain conditions.
- Can be in full control in certain conditions and will inform the driver to take control.
- Can be in full control for the entire trip in these conditions and can operate without a driver.
- Can operate without a human driver and need not have human occupants.

**Driver**
- In complete control at all times.
- Must monitor, engage controls, and be ready to take over control quickly at any moment.
- Must monitor and be ready to take over control quickly at any moment.
- Must be ready to take control quickly when informed.
- Not needed.
- Not needed.
AV status 2018

• Level 1 available for many years
  ▪ Adaptive cruise control, lane-keeping assistance

• Level 2 available now
  ▪ BMW, GM, Mercedes, Tesla, VW, ...

• Levels 3-5 coming soon
  ▪ Waymo (Google) test fleet: 7 million miles as of June 2018
  ▪ 54 companies with AV testing permits in CA as of June 2018
  ▪ By 2020: available (perhaps) from Audi, BMW, Ford, GM, Mercedes, Tesla, Toyota, Volvo, VW; Delphi, FCA, JLR, Lyft, NuTonomy, Uber, Waymo, ...
AV projections

**FIGURE 5: PREDICTIONS OF SALES, VEHICLES ON THE ROAD, AND TRAVEL FOR LEVEL 4 AND 5 VEHICLES**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Decade</th>
<th>Vehicle Sales</th>
<th>Vehicle Fleet</th>
<th>Vehicle Travel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large price premium</td>
<td>2020s</td>
<td>2.5%</td>
<td>1.2%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Moderate price premium</td>
<td>2030s</td>
<td>20-40%</td>
<td>10-20%</td>
<td>10-30%</td>
</tr>
<tr>
<td>Minimal price premium</td>
<td>2040s</td>
<td>40-60%</td>
<td>20-40%</td>
<td>30-50%</td>
</tr>
<tr>
<td>Standard feature on most new vehicles</td>
<td>2050s</td>
<td>80-100%</td>
<td>40-60%</td>
<td>50-80%</td>
</tr>
<tr>
<td>Saturation (everybody who wants it has it)</td>
<td>2060s</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Required for all vehicles on road</td>
<td>???</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Littman (2018)
AV projections

Autonomous Vehicle Fleet Projections
(as a percentage of all vehicles on the road)

- **2020’s:** Large Price Premiums (01%-02%)
- **2030’s:** Moderate Price Premiums (10%-20%)
- **2040’s:** Minimal Price Premiums (20%-40%)
- **2050’s:** Standard on Most New Vehicles (40%-60%)

Source: GHSA
The big takeaway

- AVs and DVs (driver-controlled vehicles) will share the road for a long time – perhaps forever
State AV activities

• February 2018 survey of SHSOs; 35 responses
• AV development and testing
  – 17 actively encouraging; 10 with testing underway
  – 6 observing
  – 12 no involvement
• 21 with an AV task force
  – 13 with SHSO involvement
• 11 with law enforcement involvement in testing or task force
FIGURE 7
Laws and Legislation relating to AVs
AS OF JUNE 2018

- 13 states authorized a study
- 5 states regulate truck platooning
- 6 states authorize testing with a human operator
- 2 states authorize testing without a human operator
- 1 state and D.C. authorize full deployment with a human operator
- 10 states authorize full deployment without a human operator
• **AV operational issues**
  - Compliance with traffic laws
  - Local customs
  - Decision rules

• **AV driver issues**
  - Level 2
  - Level 3
  - Level 4
  - AV drivers switching to manual operation

• **Other road user issues**
  - Understanding AV operations
  - Communicating with AVs
AV safety issues

• Law enforcement issues
  ▪ Identifying AVs
  ▪ Communicating with AVs
  ▪ Crash response

• Data issues
  ▪ Identifying AVs in vehicle title, registration, crash data systems
  ▪ Access and use of data produced by AVs

• Crash liability issues
  ▪ Who’s responsible: occupant, owner, vehicle manufacturer, software developer, all of the above?
AV recommendations for states

• **Management**
  - Lead agency
  - AV task force
  - AV testing and deployment plan

• **Traffic laws to consider**
  - Authorize driverless Level 4 and 5 AVs
  - Distracted driving for Level 3 AV drivers
  - Following too closely
AV recommendations for states

• **AV testing**
  - Requirements for organizations conducting AV testing
  - Traffic law changes or exemptions
  - Law enforcement coordination
  - Information for public and media
  - Oversight and reporting

• **AV deployment**
  - Licensing and registration procedures
  - Education for AV owners and other road users
  - State data systems
  - Access to data produced by AVs
  - AV vehicle insurance
  - Law enforcement policies and procedures
For more information

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Download the report: www.GHSA.org