Field Study of Light Vehicle Advanced Driving Assistance System (ADAS)

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04.05.2019
Outline

• Project Background & Objectives
• Methodology for Data Collection
• Definition of Automatic Emergency Braking (AEB) Events
• Overview of Results
• Q & A
Project Background & Objectives

• Rapid proliferation of ADAS technologies

• Evaluate emerging ADAS technologies in real world driving
  • Focus on AEB system performance

• Performed by University of Michigan Transportation Research Institution (UMTRI)
  • In collaboration with General Motors (GM)
Methodology for Data Collection

- Utilized vehicle telematics
- Across 46 States
- Drivers opted in
  - Used own vehicles
  - No experimenter interaction
- Event data sent to OnStar Center
- GM provided de-identified AEB data to UMTRI for analysis
  - Vehicle safety performance
  - Drivers’ adaption
Definition of AEB

- **Collision Imminent Braking (CIB)**
  - Imminent front-end collision detected
  - Driver has not applied brakes
  - System automatically applies brakes

- **Dynamic Braking Support (DBS)**
  - Imminent front-end collision detected
  - Driver brakes hard
  - DBS provides boost to driver braking

- **Both CIB & DBS**
  - CIB initiated
  - Driver intervened/override CIB
  - DBS provides a boost to the driver

- **AEB – Either CIB or DBS or Both**
# Basic Statistics on AEB Events

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Vehicles</td>
<td>1,021</td>
</tr>
<tr>
<td>Total Trips</td>
<td>1,106,210</td>
</tr>
<tr>
<td>Total Miles of Driving</td>
<td>11,891,341</td>
</tr>
<tr>
<td># CIB Events</td>
<td>258</td>
</tr>
<tr>
<td># DBS Events</td>
<td>962</td>
</tr>
<tr>
<td># CIB with DBS Events</td>
<td>17</td>
</tr>
<tr>
<td>Total All Events</td>
<td>1,237</td>
</tr>
</tbody>
</table>
# Drivers’ Setting Choices

<table>
<thead>
<tr>
<th>Front Auto Braking</th>
<th>Percent of Driving Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>1.7</td>
</tr>
<tr>
<td>Alert Only</td>
<td>1.9</td>
</tr>
<tr>
<td>Alert + Brake</td>
<td>96.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Forward Collision Alert/Adaptive Cruise Control</th>
<th>Percent of Driving Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting</td>
<td></td>
</tr>
<tr>
<td>Near</td>
<td>27.4</td>
</tr>
<tr>
<td>Medium</td>
<td>27.5</td>
</tr>
<tr>
<td>Far</td>
<td>45.1</td>
</tr>
</tbody>
</table>

- Majority of drivers employed AEB/default setting
- About half of driving time ‘Far’/default setting selected

Far Setting = maximum following distance
AEB & DBS Events Distribution

Vehicle Speed and Event Duration

1237 events

- 659 ≤10 mph
- 578 >10 mph

- 403 >0.08 s
- 175 ≤0.08 s

- 277 CIB
- 116 DBS
- 10 AEB
Study Crash Statistics

- 8 Automatic Collision Notification (ACN) events collected
  - 3 side impacts (no CIB/DBS)
  - 3 rear impacts (no CIB/DBS)
  - 2 frontal impacts (CIB/DBS unknown)
Conclusion

1. Onboard data collection from production vehicles is a viable study approach
   ✓ Can successfully produce large-scale data acquisition and analysis of ADAS system performance and driver behavior

2. Public-Private Partnerships are of high value for real-world vehicle safety studies
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