Automated Driver Assistance Systems

HWY16FH018, Williston, Florida
May 7, 2016
Location and Pre-Impact Movement

Google Earth image 11/2016 (modified)
Post-Impact Movement
Highway - Westbound
Highway - Eastbound
Vehicles

Courtesy of Florida Highway Patrol
Safety Issues

- Operational design domains for vehicle automation
- Monitoring of driver engagement
- Event data recorders for automated vehicles
- Safety metrics and exposure data
- Vehicle-to-Vehicle communication requirements
User-Based Decision for ADAS

SR-24
- 2-lane roadway
- No central median divider
- Not limited access
Autopilot Operation During the Crash Trip

• Autopilot did not detect the truck
• Collision mitigation systems did not activate
• Autopilot maintained lane position, cruise speed, and following distance
• Autopilot functioned as designed, but it operated outside of the domain for which it was designed
The crash trip lasted 41 minutes; Autopilot was engaged for 37 minutes; driver’s hands on the steering wheel for 25 seconds.
Autopilot: Driver Engagement

- Driver is responsible for monitoring driving environment in Level 2 automation system
- ADAS monitors driver engagement through driver-applied changes to steering wheel torque
- System provides warnings after extended period of hands-free operation in Autopilot mode
Recovered Data

- Large dataset recorded by vehicle
- Automated Vehicles not subject to EDR regulation
- Need crash data to determine control responsibility
Metrics for Safety Assessments

• Data can improve our ability to evaluate safety benefits
• Needed by industry, manufacturers, operators, researchers, and regulators
• Standard system of reporting will facilitate data aggregation and comparison
Connected Vehicle Technology – V2V

• Use Dedicated Short-range Radio Communications
• Exchange basic safety messages (location, heading, speed) with other vehicles
• Radio spectrum allocated by Federal Communications Commission
• Supplement the capabilities of vehicle-resident sensors
Recommendations

• Operational design domains for vehicle automation
• Monitoring of driver engagement
• Event data recorders for automated vehicles
• Safety metrics and exposure data
• Vehicle-to-Vehicle communication requirements
Last slide with NTSB 50th Anniversary Commemorative Emblem - Making Transportation Safer Yesterday, Today, Tomorrow.
Collision Animation

**Truck Motion Scenarios**

**Car Speed Remained Constant**

- Scenario A
- Scenario B

**Approximate crest of hill**

**Car speed:** 74 mph  
**Time to Collision:** 10.4 sec  
**Distance to Collision:** 1128 ft