Whirlwind Intro to UL 4600 Safety Standard for Autonomous Vehicles

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EDGE CASE RESEARCH
Self Driving Car safety case assessment

Underwriters Laboratories
- Non-profit Standards Development Organization
- Standards Technical Panel:
  Developers, suppliers, academia, government,
  insurance, assessors, international reps., …
- UL 4600 issued April 2020 for light vehicles
  - UL 4600 version 2  kickoff summer 2020
  - UL 4600-2 for trucks  kickoff summer 2020

Goal based approach:
- Works with other standards to avoid gaps in safety approaches
Standardizes Safety Case Assessment

- Safety claims
  - “What does safe mean?”

- Arguments
  - “Why do we think it’s safe?”

- Evidence
  - “Where’s the data?”

4600 helps ensure:
- Evidence ➔ Arguments ➔ Claims
- Seeded hazard lists: #DidYouThinkofThat?
- System level approach to safety
System Safety

Driving:
- Functional safety & SOTIF
- Software safety in general
- Machine learning and autonomy

There is no “Captain” in charge:
- Lifecycle: deployment, operation, incidents, maintenance, …
- Infrastructure: vehicle, roads, data networks, cloud computing, …
- Road users: pedestrians, light mobility, emergency responders, …
- Environment: Operational Design Domain (ODD) violations
- … and more …

Is it safe to drive now?
SPIs and Feedback Loops

- Post-deployment feedback is essential

- Safety Performance Indicators (SPIs)
  - Is the system’s behavior safe?
  - Are assumptions in the safety case true?
  - Does field data look like we expect it to?

- Feedback loops
  - Diagnose and fix root cause of SPI alerts:
    - Testing, operational, procedural, training data, …
  - Field feedback continually improves:
    vehicle design // safety case // risk evaluation
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