Keynote Title

Deploying safe, robust and reliable CAV technologies: Now comes the hard part.

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Thursday, June 21
8:45 a.m.
Auditorium

Abstract

Everyone's goal is to deploy safe, robust and highly reliable (i.e., operate as intended, almost never fail and always fail safe) vehicle automation that achieves the promise of saving lives, improving mobility and reducing pollution. Deployment is inevitable but a number of hurdles still exist to realize that dream. These hurdles include:

1) Determining how safe is safe enough and reaching that goal throughout a long deployment cycle. Although human drivers are the primary causes of the vast majority of fatal and injury crashes, the average driver is actually very safe. The average driver is involved in a police reported crash about once every 18 years or 238,000 miles. "Good" drivers (who choose to generally drive alert, attentive and sober) are about 3 times as safe meaning that many will not be involved in an injury crash in a lifetime of driving. So does "safe enough" mean that an automated vehicle can never have an injury crash? Regardless, what is the right goal and how do we achieve it while protecting the public during development, testing, evaluation and deployment?
2) Coping with variability and uncertainty. Automated vehicles will be required to operate in a highly variable environment. This variability includes a wide variety of environmental and situational aspects in a wide variety of operating environments. However, in addition, automated vehicles need to operate in a "mixed manual/automated" environment for many years to come. Even within the automated fleet, vehicles will vary in capability, operational characteristics and intended operational domains. These multiple layers of variability add to the challenge of successfully deploying such systems at all stages, including the assessment of performance and safety.
3) The need to continue to develop a new strategy for performance and safety assessment. An innovative, multifaceted approach to assessment is needed to support continued, rapid advancement and innovation while protecting the public. Such a strategy will undoubtedly have more levels of evaluation than has been historically true for new technologies deployed in a manually-driven vehicle. Examples of practices that are evolving development approaches:
    - Collecting data from a production vehicle to use in simulation to evaluate the new technologies.
    - Running a ghost technology on deployed vehicles before actually deploying/releasing the technology.
    - Post-deployment monitoring and over-the-air up updates to continually improve the systems performance and limit untended consequences or failures.

Each of these hurdles will be presented and discussed in detail using recent data and examples.