

NTSB Shares Investigation Findings and Recommendations Regarding March 2018 Uber ATG Fatality

The National Transportation and Safety Board (NTSB) held a board meeting yesterday to discuss its investigation of the March 18, 2018, fatal car accident in Tempe, Arizona, involving an automated test vehicle, a 2017 Volvo XC90, modified and operated by the Advanced Technologies Group of Uber Technologies, Inc. (Uber ATG). A more detailed summary of the full report will be posted once it is released, however an abstract, summarizing the NTSB's findings, probable cause and recommendations, was published on the NTSB's website following the conclusion of the meeting. All findings, probable cause and recommendations were adopted by the NTSB without amendment.

Summary of Accident

The SUV was completing the second loop on an established test route when it approached the collision site in the right lane at a speed of 45 mph. About that time, a pedestrian began walking across the roadway where there was no crosswalk. The ADS detected the pedestrian and continued to track the pedestrian until the crash, however it never accurately classified her as a pedestrian or predicted her path. By the time the ADS determined that a collision was imminent, the situation exceeded the response specifications of the ADS braking system. Video from the SUV's inward-facing camera shows that the operator of the test vehicle was glancing away from the road for an extended period while the vehicle was approaching the pedestrian. The operator redirected her gaze to the road ahead about one second before impact. The pedestrian died in the crash. The vehicle operator was not injured.

Findings

NTSB provided 19 findings as a result of the investigation. Significantly, the NTSB found:

- Uber ATG did not adequately manage the anticipated safety risk of its automated driving system's functional limitations.
- The safety risks associated with testing automated driving systems on public roads were increased by:
 - the aspect of the automated driving system's design that precluded braking in emergency situations only when a crash was unavoidable;
 - the removal of the second vehicle operator; and
 - the deactivation of the Volvo forward collision warning and automatic emergency braking systems.
- Had the vehicle operator been attentive, she would likely have had sufficient time to detect and react to the crossing pedestrian to avoid the crash or mitigate the impact.
- Uber ATG did not adequately recognize the risk of automation complacency and develop effective countermeasures to control the risk of vehicle operator disengagement contributed to the crash.

- Uber ATG's inadequate safety culture created conditions that contributed to the circumstances of the crash and specifically to the vehicle operator's extended distraction during the crash trip.
- Mandatory submission of safety self-assessment reports—which are currently voluntary—and their evaluation by the National Highway Traffic Safety Administration (NHTSA) would provide a uniform, minimal level of assessment that could aid states with legislation pertaining to the testing of automated vehicles.
- Arizona's lack of a safety-focused application-approval process for ADS testing at the time of the crash, and its inaction in developing such a process since the crash, demonstrate the state's shortcomings in improving the safety of ADS testing and safeguarding the public.
- Considering the lack of federal safety standards and assessment protocols for automated driving systems, as well as the National Highway Traffic Safety Administration's inadequate safety self-assessment process, states that have no, or only minimal, requirements related to automated vehicle testing can improve the safety of such testing by implementing a thorough application and review process before granting testing permits.

Probable Causes of Accident

NTSB determined that probable cause of the accident was the failure of the vehicle operator to monitor the driving environment and the operation of the automated driving system because she was visually distracted throughout the trip by her personal cell phone. It was also found that Uber ATG's inadequate safety culture, including (1) inadequate safety risk assessment procedures, (2) ineffective oversight of vehicle operators, and (3) lack of adequate mechanisms for addressing operators' automation complacency, was a contributing cause to the accident. Finally, other contributing factors to the accident included the impaired pedestrian's crossing of roadway outside a crosswalk, and Arizona's Department of Transportation's insufficient oversight of automated vehicle testing.

Recommendations

The NTSB made six recommendations: two to NHTSA, two to the State of Arizona, one to the American Association of Motor Vehicle Administrators and one to Uber ATG.

To NHTSA

- Require safety self-assessment reports (which are currently voluntary) to be submitted to NHTSA by entities who are testing or who intend to test a developmental automated driving system on public roads.
- Establish a process for the ongoing evaluation of the safety self-assessment reports and determine whether the plans include appropriate safeguards for testing a developmental automated driving system on public roads, including adequate monitoring of vehicle operator engagement, if applicable.
- To State of Arizona
- Require applications for testing ADS equipped vehicles that, at a minimum, details a plan to manage the risk associated with crashes and operator inattentiveness and establishes countermeasures to prevent crashes or mitigate crash severity within the ADS testing parameters.
- Establish a task group of experts to evaluate applications for testing vehicles equipped with ADS before granting a testing permit.

To the American Association of Motor Vehicle Administrators

- Inform states about the circumstances of the Tempe crash, encouraging states to (1) require an application for testing ADS equipped vehicles that, at a minimum, details a plan to manage the risks associated with crashes and operator inattentiveness and establishes countermeasures to prevent crashes or mitigate crash severity within the ADS testing parameters, and (2) establish a task group of experts to evaluate the application before granting a testing permit.

To Uber ATG

- Complete the implementation of a Safety Management System for ADS testing that, at a minimum, includes safety policy, safety risk management, safety assurance, and safety promotion.

Copies of presentations discussed at the meeting can be found [here](#).

NTSB Chair Robert L. Sumwalt will be testifying about this meeting at today's [hearing](#) of the U.S. Senate's Committee on Commerce, Science and Transportation will hold a hearing on highly automated vehicles, titled "Highly Automated Vehicles: Federal Perspectives on the Deployment of Safety Technology." The hearing will examine the U.S. Department of Transportation and the NTSB's perspectives on the safe testing and deployment of highly automated vehicles, otherwise referred to as autonomous vehicles (AVs), self-driving vehicles, or driverless vehicles.