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INSIGHT

Automated Vehicles: Safety Implications of Computers on Wheels

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On August 13, 2021, the National Highway Traffic Safety Administration (NHTSA) announced an investigation of crashes involving "Autopilot" systems in Tesla electric vehicles. The investigation shows that technologies that seek to automate tasks traditionally performed by drivers are becoming an increasing part of NHTSA's safety oversight.

Traditional vehicles powered by gasoline and diesel engines with human drivers have been regulated by NHTSA for over 50 years. During that time, many types of vehicle defects have been addressed and millions of vehicles have been recalled for safety-related modifications at the manufacturers' expense. In 2020 alone, nearly 900 recalls of vehicles and parts were issued, affecting nearly 55 million vehicles.

Because of the widespread use of computers, sensors, and other automated technologies in vehicles, cars are increasingly referred to as "computers on wheels." The current shortage of semiconductors highlights the dependence of motor vehicles on electronics, which are used in a wide variety of applications, including airbags, emission sensors, engines, and media displays. By forcing vehicle and parts manufacturers to scale back production, the semiconductor shortage has reduced the availability of cars in dealers' lots and driven up prices: the average new vehicle transaction price is nearly $42,000—a $6,000 increase from August 2020 prices for comparable vehicles.

In light of the computerization of motor vehicles, NHTSA will increasingly be faced with the need to evaluate the safety impact of electronics-based technologies. The recently announced Tesla investigation is to evaluate its Autopilot—an advanced driver assistance system (ADAS) that is thought to have been involved in 11 crashes in nine states. Seventeen injuries and one death resulted from these incidents. The inquiry could ultimately affect more than 700,000 Tesla electric vehicles, including Models 3, S, X, and Y.

Autopilot is Tesla's name for a technology that maintains a vehicle's speed through cruise control, ensures lane centering, and enables self-parking, along with other features. Other automakers have similar systems. Despite the name Tesla has applied to its ADAS, its vehicles do not operate autonomously; they must still be monitored and ultimately controlled by the driver, who must intervene when necessary to identify obstacles in the road ahead or change the drive path based on actions taken by nearby vehicles. It appears, however, that some Tesla drivers believe their vehicles can drive themselves with little or no human involvement. NHTSA's preliminary investigation is to "assess the technologies and methods used

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to monitor, assist, and enforce the driver's engagement" with Autopilot and also is to examine circumstances surrounding each of the 11 designated crashes, each of which involved a first responder vehicle.

Tesla's vehicles fall into the Level 2 category of automation, under a classification system developed by SAE International (formerly the Society of Automotive Engineers). The SAE system, which has been adopted by NHTSA and other safety regulators, categorizes vehicle automation based on the amount of driver intervention and attention required to safely drive the vehicle: Level 0 requires full driver control of the vehicle; Level 5, which has not been achieved by any highway vehicle in commercial production, would require no human intervention at all. Newer vehicles on the roads today are generally categorized as Level 2, with partial automation for steering and acceleration, but with a human driver executing most driving functions. An August 2021 NHTSA statement confirmed the current state of vehicle automation: "NHTSA reminds the public that no commercially available motor vehicles today are capable of driving themselves. Every available vehicle requires a human driver to be in control at all times, and all State laws hold human drivers responsible for operation of their vehicles."

The National Transportation Safety Board (NTSB), an independent agency that investigates transportation accidents and recommends steps to avoid similar incidents, has issued reports on several fatal Tesla crashes, including those in Mountain View, CA, in 2018 and Delray Beach, FL, in 2019. Regarding the California crash, NTSB's final report noted that "contributing to the crash was the operational design of Tesla's partial automation system ... and the company's failure to limit the use of the system to the conditions for which it was designed." NTSB reached a similar conclusion with regard to the Florida fatality, in which the driver's "overreliance" on Autopilot and its design "have led to tragic consequences."

To prevent similar crashes, NTSB recommended in February 2020 that automakers deploying Level 2 driving systems should (1) add safeguards to limit the use of automated vehicle control systems such as Autopilot to those conditions for which they were designed, and (2) develop applications to alert drivers when they are not paying attention to the road during use of ADAS. According to NTSB, several automakers have confirmed their intention to undertake these steps, but not Tesla. The board also recommended that NHTSA develop appropriate standards and verify that manufacturers of vehicles equipped with Level 2 systems incorporate safeguards that limit their use to conditions for which they were designed. In March 2020, NTSB went further and recommended NHTSA specifically evaluate Tesla's Autopilot.

While this is not the first time NHTSA has investigated a Tesla crash—it investigated a 2016 Tesla crash involving a tractor-trailer in Florida—the current investigation of 11 vehicle crashes may be an indicator that automated vehicle issues are rising in regulatory importance as the technologies become more widely deployed. Congress may seek further information from NHTSA on the safety implications of ADAS and examine why the agency has not issued relevant regulations. In addition, Congress may evaluate whether NHTSA has appropriate resources to deal with these emerging technologies and promulgate effective standards to ensure their safety.

Author Information

Bill Canis
Specialist in Industrial Organization and Business

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