

Why driverless cars still need driving tests

July 25 2016, by George Filip



The finalized prototype of Google self-driving car. Credit: Google

Joshua Brown was reportedly [watching a Harry Potter film](#) when the "autopilot" function of his Tesla Model S drove the car into a truck, instantly killing him. This incident, the first time someone died from an accident involving self-driving car technology, doesn't prove autonomous vehicles are inherently unsafe. But it does serve as a reminder that the technology isn't yet at the stage where we can take our eyes off the road.

Prior to Tesla's crash a few weeks ago, I interviewed 12 experts from

across the driverless car world as part of my [PhD research project](#) looking at issues of trust in automated vehicles. The experts included academics and industry professionals, all with vast experience in automated [vehicle technology](#) and design. They said, as research suggests, that until the autopilot can fully take over, we need to treat self-driving cars with a certain amount of distrust, otherwise we could be putting ourselves in serious danger. The issue was so serious that drivers shouldn't be allowed to use this technology without specific training.

Moving up the gears

Although it's on the horizon, a future where humans have no interaction with a car's driving system (known as level 5 automation) is still far away. To get there, we need to get through [several transitional stages of technology](#) (levels 2, 3 and 4) that can take increasing but not complete control of a vehicle. Tesla's autopilot, for example, is typically seen as level 2 to 3 automation because it can take control of at least two functions such as steering and acceleration, but still needs the driver to monitor the car and its environment.

These levels of transition actually pose many of the biggest challenges for the technology. More and more vehicles come out of the production lines with combined automated features, bringing them to levels 2 and 3 of automation. Most of the car manufacturers are offering either as a standard or as a premium functionalities such as [parking assist](#), [Adaptive Cruise Control](#), [Autonomous Emergency Braking systems](#), and so on – automated features that added and combined year-after-year create an incremental path towards driverless vehicles.

Self-driving cars require a suite of technologies such as radar, LIDAR (like radar but works with light waves instead of radio waves), video cameras, GPS and inertial navigation systems, among others, which build awareness of the car's surroundings. Drivers need to be able to trust that

these systems can reliably work together in the potentially dangerous or unpredictable situations created by driving. Otherwise, they won't use them properly and miss out on the benefits they can provide.

Trust your car – but not too much

Despite some [public fears](#) about the safety of self-driving cars, a survey we conducted with 239 [respondents last year](#) found that people may actually be more willing to trust an automated system than other drivers. This is because humans are more unpredictable and susceptible to emotions. A [self-driving car](#) would never be guilty of road rage, aggressive driving or day dreaming.

But there's also a danger that people are already putting too much trust in self-driving technologies. The recent crash aside, the apparent reliability of Tesla's autopilot and similar systems could lead people to believe they can stop paying attention to the road and let the car drive itself – leaving them to do other things. But these technologies are not designed to take full control of the car and the driver is supposed to be ready to take over at any time.

As one of the experts we spoke to put it:

People will start trusting it, things will start going wrong, the drivers will not be able to resume control because they will have jumped into a false sense of security.

When a driver has even partly been relying on an autonomous system, they lose their awareness of what is going on on the road around them. To safely take back full control of the vehicle in a potentially dangerous situation, they need to regain their situational awareness and this takes time. For example, research using a driving simulator test [has shown](#) that it takes drivers using [level 3 driving automation](#) (where the car controls

steering and acceleration and monitors the environment) around 15 seconds to resume control of the car.

According to another robotics expert we spoke to, the loss of situational awareness is made worse the longer the driver has been using the automated technology. They suggested that using a basic [adaptive cruise control](#) function, which simply adjusts the car's speed to keep a safe distance from other vehicles, for an hour or more would effectively lower the driver's awareness as much as if they were using a fully self-driving car.

Read the manual, take the test

So how can we make sure drivers don't overtrust partially automated vehicle technology in a way that puts themselves and others in danger? For one thing, it's well-known that people [rarely read instruction manuals](#) or the information screens that feature in new software.

Most of the experts we spoke to thought drivers should be given specific training before using these systems. This could involve changing the current standard test for new drivers, retraining classes, obliging manufacturers to provide demonstrations of new technologies before they sell them, or even the use of driving simulators. These could be provided in either dedicated centres or even [car](#) dealerships.

As automated vehicle technologies become more popular, it is vital that people learn when it is safe to trust them and when it is not. If they don't, we could imagine a situation where a spate of accidents could make people lose faith in the safety of these systems and force the industry to take a step backwards.

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