

# Driver monitoring could combat abuse of automation

Freddie Holmes speaks to Seeing Machines to find out what can be done to ensure partially automated systems are used responsibly

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Driver monitoring has long been a subject of interest in the automotive industry, primarily due to a need to improve the safety of vehicles being driven for commercial purposes. With long, often tedious hours behind the wheel, fatigue and distraction can soon settle in—and with grave risks.

The introduction of partially automated driving features in ordinary road-going vehicles has added further fuel to the fire, with many drivers taking advantage of the comfort and convenience provided by highway pilot systems such as Autopilot. It could be argued this is less a case of distraction, and more about intentional carelessness. Either way, driver-monitoring systems could well remedy the situation.

## A watchful eye

Canberra, Australia-based Seeing Machines develops a number of driver monitoring technologies for use in the automotive, aviation and rail sectors. At CES 2020, the supplier announced it would integrate its driver monitoring technology into the BMW i Interaction EASE concept, a prototype luxury cockpit. The driver monitoring system is based on Seeing Machines' FOVIO chip, which enables advanced computer vision software to observe where drivers are looking. It is accurate enough to

analyse head pose, eye gaze and eyelid movements—even through sunglasses.



*Many drivers are abusing the freedom provided by a Level 2 system*

Seeing Machines currently sees business from six global automakers, but the company is perhaps best known for its role in Cadillac’s Super Cruise highway pilot. Often compared to Tesla’s Autopilot, this Level 2 system enables hands-free driving in defined scenarios on the highway. Systems like these are prime candidates for driver monitoring systems, says Nick DiFiore, Senior Vice President & General Manager, Automotive at Seeing Machines.

“Our job is to monitor the driver and make sure he or she stays attentive enough to the task,” he told *Automotive World*. “These Level 2 cars only are so capable and you don’t want the driver deciding to climb in the back seat and take a nap. It’s fine for the driver to have his hands off the wheel, but the driver has to remain attentive because the car isn’t capable of handling any situation that might arise, even in the modality it’s designed for, like driving on a freeway.”

## More automation, more monitoring

Demand for driver monitoring in Level 2 systems is growing rapidly, he says. There is also growing interest in deploying the technology in vehicles with higher levels of automation. Here, the vehicle may be advanced enough to allow the driver to briefly concentrate on something other than driving. In order for that to work, the vehicle needs to judge whether the driver is ready to take back control of the wheel. What better way than with a camera?

“The feedback we’re getting now from automakers is that driver monitoring will be integral to those systems. If the car is operating autonomously, it needs to know the state of the driver in order to actually hand control back,” affirmed DiFiore. For example, a vehicle may be travelling 60mph (97kph) on a highway, but the driver is allowed a certain level of inattentiveness—perhaps able to check an email or text message without the system interjecting. As it approaches the necessary exit, the vehicle will need to ensure the driver is fully attentive.



*Seeing Machines' driver monitoring technology will provide an understanding of the driver's state in real-time*

Maybe the driver is even allowed to take a short nap, and as a result will lose all situational awareness. This is where things become really tricky. “If you’ve just woken up, the car needs to ensure you’re fully attentive 20 minutes before the freeway exit,” explained DiFiore. “If you’re fully attentive, maybe it only needs to warn you two miles ahead.”

## **Legal issues?**

While there are clear uses for driver monitoring in future, there are also benefits to deploying today. For example, these computer vision-based systems can help to create a better picture of the events prior to a crash.

In March 2018, an Apple engineer in California died after his Tesla Model X collided with a concrete barrier. In May 2016, a Model S was involved in a fatal collision with a

truck whilst Autopilot was engaged. The National Highway Traffic Safety Administration (NHTSA) later found that in the latter, the driver had not been paying attention, and over-relied on the system's capabilities. However, much back and forth was initially had as to whether it was the automaker or the driver at fault.

Other similar crashes have prompted calls for driver monitoring systems to be included as standard as part of an ADAS package. Automakers are understandably wary to give access to that data or integrate systems that might frustrate consumers. "Automakers are being quite cautious about privacy. In fact, what we're seeing at this point is a complete avoidance of any kind of video recording of the driver," said DiFiore. "But there are videos of people asleep at the wheel with their hands on the wheel, which proves that 'hands on wheel' is a wholly insufficient measure of the attentiveness of the driver."



*Eye and face tracking software can detect driver distraction, and provide context in the event that a collision cannot be avoided*

By comparison, it's virtually impossible to defeat or abuse a camera-based system. "Someone might try to trick the system, but we've evolved our technology and have anti-spoofing features to be able to differentiate between a human, a 2D image or even a mannequin," he added.

Commercial fleet operators would have greater control over the footage collected by a driver monitoring system. Various companies in long-haul trucking have already touted the fact that such [businesses are saving money in legal fees](#) by exonerating drivers from blame. "At the discretion of the fleet owner, we have helped in a lot of cases where collisions couldn't be avoided," said DiFiore.

Ultimately, driver-monitoring systems would appear to be a no-brainer for any automaker looking to make good on its bid to improve road safety. Many consumers will argue that mounting a camera in the cockpit is an invasion of privacy, or an overly cautious measure for something that has, so far, never failed them. But with many drivers finding loopholes in the built-in safety measures of an autonomous driving feature, it could be argued that driver monitoring cannot just be an optional extra moving forward.