1. Current technology is developing autonomous road vehicles with onboard auto-drivers which will take over the driving tasks. However, as things currently stand, there is both a legal and technological requirement for drivers to monitor their auto-driver, and take manual control if the situation demands. Research which I and colleagues have carried out at the University of Southampton over many years suggest a number of significant concerns with this approach.

2. As vehicles become fully autonomous, even the most observant human driver’s attention will begin to wane. Their mind will wander, and they may start to mentally switch off from the job of driving. This is particularly true if they are engaging in other activities such as reading, answering emails, engaged in conversations with passengers, watching movies or surfing the internet.

3. Research at Southampton over the past 20 years demonstrates that drivers of automated vehicles are generally not as effective in emergencies as drivers of manual vehicles. In simulated emergencies, up to a third of drivers of automated vehicles did not recover the situation, whereas almost all drivers of manual vehicles in the same situation were able to recover the situation. This has been shown repeatedly in both driving simulators and test track studies. In particular, the research shows that drivers of automated vehicles take, on average, six times longer to respond to emergency braking of other vehicles compared to manual drivers.

4. Further studies show that continual monitoring of partial automation takes as much mental workload as manual driving, and that drivers cannot sustain this level of monitoring for long periods of time.

5. These issues have significant implications if the driver of an autonomous vehicle is still required to take back control in emergencies, and if s/he is still fully accountable for the safe operation of the vehicle, which are important policy issues for Government as the technology develops.

6. Current research at the University of Southampton suggests some ways forward. Firstly, we have evidence of human drivers and automated vehicles becoming unsynchronised, for example if the driver believes the vehicle has detected the presence of another vehicle when in fact it has not. Our research has shown that if we design the vehicle to provide continuous relevant feedback to the driver (a “chatty co-driver” rather than a silent auto-pilot), this error can be reduced substantially, as well as keeping higher levels of attention of human drivers during periods of automation.
7. Secondly, a graduated and gradual hand-over and hand-back of tasks between human drivers and automated vehicles allows drivers to slowly regain the full attention needed to drive safely, rather than moving immediately from not driving to driving.

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