

# Road safety factsheet:

## Infotainment systems

December 2023

Over the last ten years, there has been a huge increase in the digital technology available to motorists, allowing them to perform tasks that are unrelated to driving while they are behind the wheel. One of the biggest developments in this period has been the rise of infotainment systems.

### What is an infotainment system?

In-vehicle infotainment refers to vehicle systems that combine entertainment and information delivery for drivers and passengers. These systems typically use audio and video interfaces, touchscreens and keypads<sup>1</sup>. Most new cars sold will now have a form of infotainment system fitted as standard.

Systems utilising either bluetooth or connected smartphones can be controlled by users through buttons on the steering wheel, touchscreens, or voice commands. These systems enable diverse tasks, from listening to music and making hands-free calls, vehicle voice commands and other types of interactive audio or video. Some systems also incorporate features such as: satellite navigation, reverse camera display, ability to listen to incoming and outgoing text messages and access internet or smartphone enabled content such as traffic conditions, sports results and weather forecasts<sup>2</sup>.

To perform tasks, users may use a combination of buttons, voice commands, and touchscreens. For example, to select a music option, a driver might push a button on their steering wheel, issue a voice-based command, or view the options presented on a screen and select an option via touch using the touch-screen display.

### Infotainment systems as a driver distraction

In 2022, there were 2,616 road collisions in Britain in which distraction in the vehicle was deemed a contributory factor. This included 777 collisions in which someone was fatally or seriously injured<sup>3</sup>.

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<sup>1</sup> Techopedia (undated) 'In-Vehicle Infotainment (IVI)' URL: <https://www.techopedia.com/definition/27778/in-vehicle-infotainment-ivi>: Accessed December 2023

<sup>2</sup> Webopedia (undated) 'In-Vehicle Infotainment (IVI)' URL: <https://www.webopedia.com/TERM/I/in-vehicle-infotainment-ivi.html> Accessed December 2023

<sup>3</sup> DfT (2023) 'Table RAS0701: Contributory factors: Collisions, casualties and road user types': <https://www.gov.uk/government/statistical-data-sets/reported-road-accidents-vehicles-and-casualties-tables-for-great-britain#factors-contributing-to-collisions-and-casualties-ras07>: December 2023

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In modern vehicles there has been a rise in larger information screens and multifunctional features, such as satellite use and smartphone connectivity. This can contribute to driver distraction in three ways: visual processing (when the driver takes their eyes off the road), manual interference (when the driver takes their hands off the steering wheel) and cognitive (when attention is drawn away from information processing necessary to operate the vehicle safely)<sup>4</sup>.

A perceived advantage of voice inputs compared with manual inputs is that they eliminate the competition for visual and manual resources between the secondary activity (operating the infotainment system) and the primary task of driving. Therefore, voice interfaces have often been seen as an appealing way of offering drivers access to a range of entertainment and connectivity options while minimising the potential impact on driving performance and safety<sup>5</sup>.

Research carried out in 2020 by TRL and commissioned by IAM RoadSmart,<sup>6</sup> investigated the effects of the latest in-vehicle infotainment systems Apple CarPlay and Android Auto, to determine how their use affects driving performance. The study involved 40 participants carrying out an experimental trial for each of these infotainment systems (20 participants for each system), with each trial consisting of several journeys carried out in a driving simulator under different experimental conditions.

Each participant, driving in a simulator with their designated infotainment system, carried out three drives, all following the same route. The first drive was a control drive, meaning the participant did not interact with the infotainment system at all for the duration of the journey. The second drive involved the participant interacting with the system using their voice, and the third drive involved them interacting with the system using its touchscreen. Participants were required to interact with the infotainment system in the second and third drive whilst also carrying out specific driving tasks, such as following a vehicle in front and navigating traffic. To further test reaction times, participants were required to react to a red bar appearing on their screen (at the same time as they used the infotainment system) by flashing their lights.

The critical finding was that the infotainment systems had a significant adverse effect on driving performance. When the participants interacted with either infotainment system, lane positioning, maintaining a constant distance and reaction to external stimuli were all significantly affected. The negative effects were less when using voice control, but the majority of participants stated that they use touch control during their day-to-day driving more than they use voice control. The study concluded that “for both touch and voice control with both systems, reaction times were greater than established benchmarks of the effect of alcohol consumption (at the legal limit) and cannabis use on reaction time when driving.”

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<sup>4</sup> Zurich Insider (2014) ‘The sobering reality of in-vehicle infotainment’ URL: <https://insider.zurich.co.uk/industry-spotlight/sobering-reality-vehicle-infotainment/> Date Accessed: 23/05/2018; page unavailable December 2023

<sup>5</sup> Mehler et al (2016) ‘Multi-modal assessment of on-road demand of voice and manual phone calling and voice navigation entry across two embedded vehicle systems’, *Ergonomics*. 59(3): 344-367.

<sup>6</sup> Ramnath, R. et al. (2020) ‘Interacting with Android Auto and Apple CarPlay when driving: The effect on driver performance’ URL: [https://iamwebsite.blob.core.windows.net/media/docs/default-source/default-document-library/iam-roadsmart-trl-simulator-study\\_infotainment.pdf?sfvrsn=d873495c\\_2](https://iamwebsite.blob.core.windows.net/media/docs/default-source/default-document-library/iam-roadsmart-trl-simulator-study_infotainment.pdf?sfvrsn=d873495c_2): Accessed December 2023

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The level of distraction is associated with how long a task takes. Research found that tasks such as text messaging and navigation tasks were more difficult for drivers to perform. Texting took an average of 30 seconds and entering a destination into the navigation system 40 seconds. Clearly, this distraction is too long. At 25mph, drivers using the infotainment system to enter a destination would travel just under 1,500 feet, and in several of the vehicles used in the study, entering a destination took significantly longer than 40 seconds<sup>4</sup>. More concerning is that drivers may well not believe that tasks such as programming music and entering a destination into their navigation system vary much in terms of visual and cognitive demand, despite the navigation system taking typically twice as long to set up as playing music.

The workload experienced by drivers vary as a function of different tasks, modes of interaction and vehicles. However, some features could be too distracting for drivers when the vehicle is in motion. This could be an issue as many motorists could assume that because features are enabled while driving, they are safe and easy to use. Therefore, it needs to be considered what interactions should be available to a driver while they are operating a vehicle rather than what could be available<sup>4</sup>.

### RoSPA's position

RoSPA recognises that while using these systems, drivers may take their eyes off the road for a sustained period of time to look at the screen and select which icons they should touch, devoting significant mental resources to this task, when screens are often well below the driver's eye-level. Drivers may also become distracted by interacting with the system vocally or manually.

Therefore, RoSPA believes that the law and the Highway Code, governing in-vehicle driver distraction, should be reviewed and updated. The first step to this is to conduct a research programme to assess the type and level of driver distraction caused by new vehicle technology, such as infotainment systems, and to identify potential countermeasures to this distraction. This could include certain infotainment touchscreen functions being prevented from operating while the vehicle is in motion. Manufacturers should also be encouraged to install 'head-up' displays in new vehicles, which are currently an expensive option on selected new vehicles. Regulations limiting the screens that a driver can see while the vehicle is in motion could also mitigate some of these risks.

Finally, education is key to combating the risks of in-vehicle infotainment. The importance with all new technology is to understand and address unintended risks they pose and not be blinded by the benefits. If the implementation of in-car technology continues at a rapid pace, proper management of associated risks is essential to safeguarding individuals<sup>4</sup>.