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Investigating evidence of mobile phone usage by drivers in road traffic accidents

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A B S T R A C T

The United Kingdom is witnessing some of the highest volumes of motor vehicle traffic on its roads. In addition, a large number of motor vehicle traffic accidents are reported annually, of which it is estimated that a quarter involve the illegal use of a hand-held mobile device by the driver. Establishing whether mobile phone usage was a causal factor for an accident involves carrying out a forensic analysis of a mobile handset to ascertain a timeline of activity on the device, focussing on whether the handset was used immediately prior to, or during, an incident. Previously, this involved identifying whether SMS messages have been sent or received on the handset alongside an examination of the call logs. However, with advancements in smartphone and application design, there are now a number of ways a driver can interact with their mobile device resulting in less obvious forms of evidence which can be termed as 'passive activity'. This article provides an analysis of iPhone's `CurrentPowerlog.powerlogsystem` file and Android device 'buffer logs', along with their associated residual data, both of which can potentially be used to establish mobile phone usage at the time of, or leading up to, a motor vehicle accident.

Introduction

Within the United Kingdom (UK) in 2013, 183,670 road traffic casualties were reported, 8% of which were children, whilst approximately 2% of crashes resulted in fatalities (Department of Transport, 2014). Further, trends highlighted by the World Health Organisation (2011) suggest road traffic injuries will rise to constitute the fifth largest global cause of death by 2030. In light of these statistics, with around 35 million licensed vehicles in operation on UK roads (Department of Transport, 2013), there seems to be an increasing need for investigation into causal factors that put drivers at risk of road traffic accidents.

It is vital to consider all possible factors when assessing events leading up to and during motor vehicle incidents, in order to establish the nature and order of events and importantly, whether a particular party is at fault. Although statistics identifying specific use of mobile phones during road traffic accidents in the UK is sparse, it is estimated that in the United States, drivers were using mobile phones in almost a quarter of all reported incidents (Pless and Pless, 2014; National Safety Council, 2014; Northern Ireland Statistics and Research Agency, 2013). These figures prove concerning, since the ability of a driver to operate their vehicle proficiently is significantly decreased whilst using a mobile device, thereby increasing the chances of an incident or accident occurring on the road (Horberry et al., 2006). Further, the driver's attention is diverted from the main goal of ensuring their safety and that of others through effective driving, towards a secondary activity, termed as 'driver distraction' (Hosking et al., 2009).

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Issues facing a driver arising from mobile device usage include, but are not limited to, the following:

- Restriction of sight; limiting the driver's ability to survey the road, potential obstacles or changes in traffic flow, since their line of vision is focused on the handset (Nasar and Troyer, 2013).
- Reduction of concentration levels and situational awareness (Nasar and Troyer, 2013).
- Slower reactions times during adverse events (The Royal Society for the Prevention of Accidents, 2012), which could result in as much as a 50% reduction in response rates (Think!, 2014).
- Failure to maintain a high standard of driving etiquette, resulting in acts such as tailgating or improper road position (The Royal Society for the Prevention of Accidents, 2012).

RAC (2014) surveys indicate that 75% of motorists have observed other drivers talking on their mobile phones whilst driving, however, only 8% admit to doing so themselves. In turn, surveys undertaken outside of the UK (yet still in jurisdictions where mobile phone usage when driving is illegal) by White et al. (2010) indicate that over 60% of participants professed to interacting with their mobile phone whilst driving without the use of a hands-free kit. Similarly, there are a growing number of younger drivers with an increased dependency on mobile devices resulting in them frequently being used whilst driving to access social media (Weller et al., 2013).

Due to the size of these devices it is likely that many cases remain unreported due to successful concealment of usage of the device whilst driving. The challenge surrounding mobile phone-related vehicle accident investigations lies with proving a device was used leading up to or during an accident, thereby ultimately becoming a causal factor and an element with which to potentially help establish blame. To achieve this requires the forensic analysis of the mobile handset and its residual data.

This article provides an analysis of UK law governing mobile phone usage whilst driving, followed by the discussion of the role of a mobile phone forensic analyst in road traffic accident investigations. An examination of iPhone's `CurrentPowerlog.powerlog` system file and Android device buffer logs will be presented and their relevance for detecting user activity on mobile handsets outlined.

UK law and mobile phone forensics

Since December 2003, the act of using a hand-held mobile device whilst driving has been prohibited within the UK. Amendments to the Road Vehicles (Construction and Use) Regulations 1986 (RVR86) via the Road Vehicles (Construction and Use) (Amendment) (No. 4) Regulations 2003 have now introduced the following regulation under 110(1) RVR86:

> "*No person shall drive a motor vehicle on a road if he is using (a) a hand-held mobile telephone*"

It is important to note that interaction with a mobile device via a hands-free device is legal provided its usage could be proven. Further, government guidance states that hands-free phones, two-way radios and satellite navigation devices can be legally used whilst driving, but if police believe the driver is being distracted and failing to sufficiently control their vehicle, prosecution may still occur (Gov.uk, 2014). Justice Lloyd Jones in *R v Curtis* (Regina v Phillipa Curtis [2009] EWCA Crim 1003) stated that driving requires 100% of the driver's concentration, and in the recent case of *R v Jaswinder Arora* (*Regina v Jaswinder Arora* [2014] EWCA Crim 104), it was highlighted that even drivers using hands-free kits are still up to four times more likely to be distracted and cause an accident. In addition, RVR86 regulation 110(6) (a) defines a device as being hand-held given the following:

> "*A mobile telephone or other device is to be treated as hand-held if it is, or must be, held at some point during the course of making or receiving a call or performing any other interactive communication function*".

On initial inspection, the term '*interactive communication function*' appears ambiguous given the array of features and functionalities of the modern mobile device/smart phone and associated applications. Therefore, it is useful to explore what this means in more depth.

What constitutes 'interactive communication function'?

RVR86 regulation 110(6)(c) provides guidance for identifying features and functionalities that may be involved:

> ""*Interactive communication function" includes the following*:
>
> *(i) Sending or receiving oral or written messages;*
>
> *(ii) Sending or receiving facsimile documents;*
>
> *(iii) Sending or receiving still or moving images; and*
>
> *(iv) Providing access to the internet.*"

Upon interpretation of RVR86 regulation 110(6)(c), and particularly the wide scope of regulation 110(6)(c)(iv), it would appear that almost all interaction with the device whilst driving is prohibited. Given that most smart phones now maintain fairly constant communication with data networks in order to update applications automatically (unless disabled by the user), even the act of waking a handset from a sleep state to view push notification alerts on the handset's display (see Section 'Interacting with the screen lock' below) could be deemed an interactive communication function. However, proving that these subtle interactions have taken place on the device whilst driving may be difficult.

Categorisation of offences

The offence of using a mobile device whilst driving also overlaps with offences of greater severity laid out in the Road Traffic Act 1988, notably the offence of causing death by dangerous driving under Section 1 and causing death by