The testing and evaluation of a vision based automatic detection system for illegal phone use by drivers in Australia

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Abstract

Naturalistic driving original studies have shown a range of crash risks associated with hand-held mobile phone use. One study found that mobile phone use during or shortly before a casualty crash increased the risk of the crash occurring by four times. Hand held phone use is illegal in Australia but until now enforcement options have been limited to direct intervention by a police officer observing illegal mobile phone use. In 2018, Transport for NSW (TfNSW) embarked on a project to find a camera technology detection solution for this road safety issue.

Background

Naturalistic driving studies have shown a range of crash risks associated with illegal, hand-held mobile phone use depending on the type of use. Case study research of mobile phone use during or shortly before a crash found the risk of having a casualty crash was four times higher than where a person was not using a phone (McEvoy et al., 2005).

The NSW Government released the Road Safety Plan 2021 in February 2018 which included a commitment to implement legislative changes to enable camera-based technology to enforce mobile phone offences. The Road Transport Legislation Amendment (Road Safety) Act 2018 came into effect from 1 July 2018, making NSW the first jurisdiction to introduce such legislation in Australia.

A Registration of Interest process was announced in April 2018 to identify potential technology for a vision-based system that would automatically detect mobile phone offences on NSW roads. Following a tendering process, three proponents were selected to demonstrate and test their solutions. This process helped identify a preferred provider to support a two-phase non-enforcing pilot which ran between January and June 2019.

Method

A test facility on a bridge over the M4 motorway in Western Sydney was used to validate the claims of the shortlisted three companies. Each was allocated a lane to monitor on the 100 km/h stretch of road.

During the four-week test proponents were expected to meet technical and management requirements including: capturing illegal mobile phone use by drivers passing under the test site and provision of clear photographic evidence within 24 hours of detection. To assist the evaluation, TfNSW deployed a high definition video camera and radar unit to independently validate the data provided by the proponents.

Based on outcomes from the testing, a non-enforcing pilot of the best performing solution provided the opportunity to gain further insights. A thirteen-week phase ran at two fixed locations (M4 and Anzac Parade), covering all lanes in one direction. A shorter six-week phase piloted a transportable version of the system at six locations across Greater Sydney, with the technology being moved from one site to the next every few days.

Results

During the four-week test period 1.7 million vehicles were detected by the TfNSW verification system. Vendors' vehicle detection rates varied from 19% to 103% when compared to the TfNSW system. Proponents provided two offence detection counts: Detection rate identified through artificial intelligence and detection rate following human verification. The proportion of verified offences based on the verification count ranged from 0.02% (lane2) to 1.3% (lane1).

Table 1. Technology Testing Phase – vehicle count accuracy and automatic / verified offence detection, by motorway lane / proponent

	Lane1	Lane2	Lane3
Vendor vehicle count accuracy	**103%**	**61%**	**19%**
Automatically detected possible offences	8,591	419	2,277
Human verified offences	7,571	156	2,155
Vendor detection rate	**88%**	**37%**	**95%**

The non-enforcing pilot generated more extensive data and insights from fixed and transportable deployments of the technology. Over 8.5 million vehicles were detected, almost 104,000 instances of illegal mobile phone use were identified, and non-compliance was found to be 1.2%.

Table 2. Technology Pilot Phases – summary of detection and offence data from both fixed and the transportable technology deployments

	M4	Anzac Parade	Transportable
Vehicle detections	5,603,793	2,462,499	446,367
Automatically detected possible offences	672,601	311,020	119,473
Human verified offences	66,621	28,884	8,438
Mobile phone offence detection rate	**1.19%**	**1.17%**	**1.89%**

Downtime for the fixed solution was 0.8% and 1.2% for the transportable solution (mainly arising from the relocation between sites).

Conclusions

The testing and piloting of new technology to automatically detect illegal phone use by drivers has shown there is a technology solution for this road safety problem. A selected provider has demonstrated a reliable system in all light and whether conditions, and for both fixed and transportable deployment models.

References

McEvoy S P, Stevenson M R, McCartt A T, Woodward M, Haworth C, Palamara P et al. (July 2005). Role of mobile phones in motor vehicle crashes resulting in hospital attendance: a case-crossover study. British Medical Journal doi:10.1136/bmj.38537.397512.55