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> TRAVELSAFE
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Research Director
Travelsafe Committee
Parliament House
George Street
BRISBANE QLD 4000

Dear Sir

Re: Inquiry into Automatic Number Plate Recognition Technology

PB has a team of experts who are involved in the Intelligent Transport Systems (ITS) industry. Through our work in this area and specifically on electronic toll systems, we have gained working knowledge of ANPR technology. We offer the following information based on our professional experience within the industry.

ANPR in electronic tolling

In the past five years tolling systems have made a significant change from cash to cashless multilane free flow systems. This change has been brought about by the advances in technology to be able to correctly detect and identify vehicles in an open road environment and specifically to be able to enforce unpaid tolls by ANPR. More recently ANPR technology has been used to offer customers casual user products such as day passes, weekend passes and seven day passes. These products require a driver to pre-register details of the vehicle and number plate and provide payment details prior to travelling on the toll road. The driver's number plate is detected by ANPR technology when it uses the toll road so the required fee can be charged.

The performance and accuracy of these ANPR applications is critical to ensuring that toll payments can be processed quickly with minimal human intervention.

As identified in the scope of the inquiry, ANPR does not provide a solution on its own but must form part of an integrated business process integrated with other sources of information. For enforcement purposes the number plate generated by the ANPR technology will be compared against the DMR data base of registered vehicles. For payment of tolls this number plate will be compared against a database of customer provided number plate data. It is important that accuracy be considered at the output of the entire process.

The core question of accuracy is how often the number plate output from the ANPR system is correct. This is reported as a measure of the average accuracy of the system. A statistical likelihood of success is commonly reported by the ANPR system to give an indication of the "confidence" with which the system proposes the number plate. In practice, any one number plate output is either correct or incorrect.

In an operational system, consideration must be given to the incidence of 'false positive' readings. This is the situation where the number plate is reported from the ANPR with sufficiently high confidence to be considered correct without further analysis however is incorrect, and this incorrect number plate is associated with a valid 'account' or 'registration' as part of the overall process. Many incorrect number plates will 'fall-out' of the process because the number plate output does not reflect a 'real' number plate. However the issues involved in incidences where the number plate output is incorrect in fact, however now reference a different, valid, existing number plate need to be understood in the context of the application.

Toll operators continue to seek products that can improve on this performance threshold to minimise processing costs. One recent development is vehicle fingerprinting technology or pattern recognition. Trials are currently underway in Canada and the USA into how this technology in conjunction with ANPR can achieve a higher confidence level.

A vehicle fingerprinting system operates by identifying and capturing unique physical features of vehicles. Images of vehicles are captured, verified to ensure the number plate can be read and processed to create a unique digital "fingerprint" based on the vehicles characteristics. The vehicle "fingerprint" is kept in a data store along with a time and date stamp and used to cross match against subsequent images. This extra point of reference can be used to increase the overall performance of vehicle identification. This technology is under trial on roads including the ETR 407 in Canada.

One of the factors that continues to limit the overall performance of ANPR technology is the many variations in the number plates used across Australia. If registration plates were designed with ANPR technology in mind it is likely that the level of accuracy could be increased further. Issues paper No. 12 acknowledges the potential benefits of ANPR in the UK however; this is based on readings in an environment where there is only a single type of clear unambiguous number plate in use.

As discussed above a crucial part of an electronic tolling system is ANPR technology, therefore this will feature as part of the following planned toll projects in Queensland in addition to QML's existing toll roads:

- Gateway Bridge Upgrade
- North-South Bypass Tunnel
- Airport Link

These projects, once completed, will provide an initial ANPR network that could be adapted and used for road safety including measures such as:

Speed over distance

ANPR allows speed to be assessed over distance rather that at a specific point on the highway. This technology works by registering the number plate of a vehicle over a known distance and applying the logic of how fast the vehicle has covered the distance to assess if the vehicle, on average, was travelling within the speed limit for the road. This is perhaps a more effective method of speed enforcement as it enforces speed over much longer distances rather than at a single point. This method of enforcement has been used in the UK for a number of years to manage speeds, particularly at road works where staff are working adjacent to traffic travelling at potentially high speeds.

Advanced lane signs

As an extension to the suggestion above; ANPR could also be used as a trigger for advanced lane signs used to display mandatory speeds. ANPR could be used to assess the average speed of traffic flow and alter the mandatory speed to ensure the most efficient throughput and safe driving conditions.

Bus lane enforcement

Transport for London is successfully deploying ANPR technology on its bus lanes which has lead to the following recognized benefits:

- Passenger time savings, resulting from faster buses in bus lanes, worth £25 million per annum

- Buses travelling 12.6 per cent faster in bus lanes compared to between bus lanes

- Bicycle usage increasing by 80 per cent over five years of monitoring at a roadside camera site

Building on this success TfL has continued to deploy ANPR cameras (Roadside and Bus mounted) across its bus network. Further information on this initiative is available at http://www.tfl.gov.uk/assets/downloads/TE-digital-age.pdf

Network Data

ANPR data would also be useful to support the modelling of future road network requirements by providing origin and destination data.

We trust that the information provided is able to assist you in your inquiry into ANPR technology. Please contact Mr Dan West (02 9272 5343) dwest@pb.com.au if there are any further details related to the above which may be of assistance in progressing your work.

PB

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In Australia our people have been working on infrastructure and environmental projects for more than 40 years. Our multidisciplinary team of over 1,400 professionals throughout Australia and New Zealand offers a comprehensive range of services, and provides total project delivery on projects of any scale.

PB's Intelligent Transport Systems Team has extensive experience; providing clients with technical advice and full design and project management services for the delivery of ITS systems. Our experience in tolling systems includes: Eastlink, Melbourne, Lane Cove Tunnel, Sydney, M5 West, Sydney, Logan and Gateway Bridge, Queensland, Sydney Airport, RTA E-Way, Sydney.

Yours faithfully

Dan West
Team Manager – Intelligent Transport Systems
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