ATSE

House of Representatives Standing Committee on Industry, Innovation, Science and Resources Inquiry into the Social Issues Relating to Land-based Driverless Vehicles in Australia

SUBMISSION TO THE STANDING COMMITTEE ON INDUSTRY, INNOVATION, SCIENCE AND RESOURCES

Inquiry into the social issues relating to land-based driverless vehicles in Australia

The Australian Academy of Technology and Engineering (ATSE)[1] welcomes the opportunity to provide input to the Inquiry into the social issues relating to land-based driverless vehicles in Australia. ATSE argues that there are compelling benefits to full automation[2] of Australia's road system. These include benefits to the nation's health, infrastructure, economy and improving equity and access.

Opportunities

Health and safety

The advancement and uptake of fully autonomous vehicles in Australia will generate significant improvements to road safety and significant community benefits through reduced crashes. The US National Highway Traffic Safety Administration (NHTSA) showed that human error was the cause of 94 per cent of road accidents in the US between 2005 and 2007[3]. In Australia, there were 1,300 road fatalities during 2016[4] and 35,059 road-related hospitalised injuries during 2013[5]. Hence, a fully autonomous road system would likely avoid a large majority of these deaths and injuries.

Infrastructure

Autonomous vehicles will have a major impact on Australia's infrastructure, including through urban development, public and private transport and mobility. The greatest benefits of autonomous vehicles will be gained when they are integrated into a sharing economy. Changing the model of car ownership to a focus on shared ownership will enable autonomous on-demand-mobility services, provide greater transport options and improve mobility of disadvantaged or vulnerable people, as well as children and elderly people.

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1 ATSE advocates for a future in which technological sciences, engineering and innovation contribute significantly to Australia's social, economic and environmental wellbeing. The Academy is empowered in its mission by some 800 Fellows drawn from industry, academia, research institutes and government, who represent the brightest and the best in technological sciences and engineering in Australia. The Academy provides robust, independent and trusted evidence-based advice on technological issues of national importance. ATSE fosters national and international collaboration and encourages technology transfer for economic, social and environmental benefit. www.atse.org.au

2 https://www.sae.org/misc/pdfs/automated_driving.pdf

3 https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812115

4 https://bitre.gov.au/statistics/safety/

5 SAE level 5: https://bitre.gov.au/publications/ongoing/hospitalised-injury.aspx

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Furthermore, there are significant opportunities for reducing traffic congestion, by reducing the number of vehicles on the road and by improving traffic flow. A case study on Lisbon, Portugal by OECD's International Transport Forum[6] showed that full autonomy, car sharing and mass transit could reduce road requirements by two-thirds. The Lisbon case study also found that the use of shared autonomous vehicles could reduce the requirement for parking, and potentially result in the reallocation of almost 20 per cent of the kerb-to-kerb street area in Lisbon.

Thus, autonomous vehicles used in a sharing economy have the potential to free up much-needed land in Australia's growing suburbs and cities, which could be transformed into housing and public spaces. In anticipation of the reduced need for car spaces, local councils as well as federal and state governments must develop transitional urban planning rules, whereby the requirements for developer to include parking spaces in new developments will need to be reduced.

Capital gains

Australia will gain significant capital if it properly invests in the implementation of driverless vehicles. According to the RAC Foundation, the average car in the UK spends 80 per cent of the time parked at home, parked elsewhere about 16 per cent of the time and thus a car on average is only being utilised 3–4 per cent of the time[7]. The OECD predicts that driverless vehicles could remove 9 out of 10 cars in a mid-sized European city. In Australia, total capital value of private cars is about $250 billion, thereby freeing up about $200 billion of capital. In addition to this, it has been estimated that autonomous vehicles have the potential to free up almost 50 billion hours each year for US drivers, which roughly could translate to US $99 billion worth of time savings per year[8].

Technological advancement

With substantial investment into driverless vehicle technology, the potential economic gains for Australia are significant. For instance, a key driver for the future of autonomous vehicles is artificial intelligence (AI). AI will enable driverless vehicles to gather information and conduct in-depth learning, thereby making them more reliable and safe. A further example is Lidar (Light detection and ranging), which is a remote sensing method used to create high-resolution maps of a driverless vehicle's surroundings. Roughly 10 years ago, a Lidar cost about $80,000. The price has dropped by 90 per cent since the start of 2017[9] and will likely fall to the $100 level in the near future. Developments such as these not only enable the implementation of autonomous capabilities in new vehicles at a low marginal extra cost, but also make it affordable to retrofit existing vehicles, thereby overcoming the need to wait the long period for existing vehicles to diffuse out of the economy before implementing a fully autonomous road system. With its profound impact on business and society, Australia must take the lead for this disruptive technology.

Challenges

Job shifts and losses

Perhaps the greatest social concern is the effect that driverless vehicles will have on jobs. The World Economic Forum estimates that a confluence of technological, socioeconomic and demographic drivers will displace 5.1 million jobs across 15 major economies by 2020[10]. Modelling by CEDA

6 http://www.itf-oecd.org/sites/default/files/docs/15cpb_self-drivingcars.pdf

7 http://www.racfoundation.org/assets/rac_foundation/content/downloadables/spaced_out-bates_leibling-jul12.pdf

8 https://www.forbes.com/sites/modeledbehavior/2014/11/08/the-massive-economic-benefits-of-self-driving-cars/#4877e6083273

9 https://www.businessinsider.com.au/googles-waymo-reduces-lidar-cost-90-in-effort-to-scale-self-driving-cars-2017-1?r=US&IR=T

15 https://www.ussc.edu.au/analysis/how-digital-infrastructure-can-substitute-for-physical-infrastructure

10 http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf

suggests that in Australia, almost five million jobs face a high probability of being replaced in the next decade or two while a further 18.4 per cent of the workforce has a medium probability of having their roles eliminated[11].

Clearly, only a small proportion of these job shifts or losses will be directly as a result of driverless vehicles, but they will certainly be part of the total. By ATSE's estimates, 28 per cent of jobs in Australia for 2012 involved driving a vehicle[12]. Therefore, it is clear that a fully autonomous road system would have a substantial impact on employment, with consequent social impacts.

Public acceptance

Another major social roadblock to the transition of driverless vehicles is public acceptance. While many people are excited by the prospect and potential of driverless vehicles, there are many others who fear the technology, owing to concerns such as safety, security, privacy and job losses[13]. Consumer confidence in the technology must be improved through advocacy and education. There may also be challenges in shifting public behaviour and attitudes towards ownership of a car. Nevertheless, the rapid and growing widespread acceptance of sharing services such Uber and GoGet show that communities are willing and eager to try new technologies and services if the benefits are effectively demonstrated.

Insurance and regulation

A further issue for driverless vehicles is the challenge of insurance. There is debate as to where the responsibility lies if there is an accident and who will pay for the insurance – car owner or manufacturer. In an attempt to reduce legal hurdles in launching driverless vehicles, Volvo announced that it will accept full liability whenever one of its cars is operating in autonomous mode[14]. ATSE recommends that any regulatory and insurance changes should be aligned with overseas examples, and where possible, draw on best practice from around the globe.

The views of ATSE on regulation and insurance of automated vehicles align with the Academy's international counterparts, including The Royal Academy of Engineering (UK), the National Academy of Engineering (US) and the National Academy of Science and Engineering (acatech, Germany). Acatech released a Position Paper[15] in 2014 on autonomous vehicles and argued that regulatory frameworks must be developed at the national and international level and that these frameworks must be able to evolve alongside the technology. The Royal Academy of Engineering discussed regulatory issues of autonomous vehicles in a 2009[16] report and argued that public engagement on the issue is

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11 http://adminpanel.ceda.com.au/FOLDERS/Service/Files/Documents/26792~Futureworkforce_June2015.pdf

12 Calculated as follows:

% Employees that use a vehicle: 28 per cent = (3,266,521+10,000+11,900)/11,541,500

- Employed Dec 2012: 11,541,500 http://www.abs.gov.au/ausstats/abs@.nsf/mf/6202.0
- Commercial Vehicles 2012 (excluding motorcycles): 3,266,521

http://www.abs.gov.au/ausstats/abs@.nsf/mf/9309.0

- 6,600 Australia Post motorcycle routes, thus estimate 10,000 commercial motorbikes

http://en.wikipedia.org/wiki/Australia_Post#Facts_and_statistics

- 11,900 train and tram drivers in 2011, 2 year growth rate at 8 per cent but falling, thus estimate 2012 level to be same as 2011

http://joboutlook.gov.au/pages/occupation.aspx?code=7313&search=&Tab=prospects

13 https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2747491

14 http://www.autoblog.com/2015/10/07/volvo-accept-liability-self-driving-car-crashes/

15 Acatech 2015, Position Paper: The Future World of Automated Road Traffic, http://www.acatech.de/fileadmin/user_upload/Baumstruktur_nach_Website/Acatech/root/de/Publikationen/Stellungnahmen/acatech_POSITION _PAPER_New_autoMobility_web.pdf

16 The Royal Academy of Engineering 2009, Autonomous Systems: Social, Legal and Ethical Issues, UK, http://www.raeng.org.uk/publications/reports/autonomous-systems-report

needed in order to ensure that a regulatory model is built that will be supported by the public. Sharing best practices globally and opening Australian roads to more international testing will provide the necessary knowledge base to produce productive, efficient, safe and fair regulation and insurance.

Overseas governments have already started incorporating policies and initiatives to facilitate the development and introduction of automated vehicle technologies on to roads. For instance, California has already licensed 27 companies to test driverless vehicles on public roads, potentially meaning that driverless vehicles could be on Californian city streets by the end of 2017[17]. In 2015 the UK Government published a Code of Practice for testing driverless cars and the Swedish Government launched a Strategic Innovation Program (Drive Sweden) to optimise the introduction of automated transport systems. Together, these examples illustrate that similar regulatory and insurance issues on autonomous vehicles are being faced throughout the world and Australia should ensure that it aligns with international best practice. Importantly Australia should not create Australian-specific standards unless there are genuine regulatory needs to do so. Besides adopting international best practice as it evolves over-regulation, which would stifle innovation, must be avoided.

Recommendations

1. It is vital that Australia's policies and infrastructure anticipate the exponential rate of technological advancement and uptake. Accordingly, ATSE recommends that Australian governments pursue a fully autonomous road system at the earliest feasible date

2. Given the impact that driverless vehicles will have on road capacity[15] and the long-term nature of road planning, ATSE recommends that government authorities immediately start factoring the future impact of driverless vehicles on future road planning.

3. While driverless vehicles will have considerably fewer accidents than human drivers, there will still be accidents especially during the early phases of introduction as the system is introduced. Thus, regulation needs to be put in place to ensure the safe and effective introduction of driverless vehicles in Australia. ATSE recommends that regulatory changes cover the following issues:
   - Forensic analysis of accidents so that the system can be reprogrammed to avoid future errors
   - Full telematics collection (via 'black box' and networks) to ensure forensic data is available
   - Specification of key measurements to be provided for analysing machine-learning decisions
   - Cyber-security protections specific to driverless vehicles

4. In addition to these changes, there must be adequate testing of road-worthiness done on driverless vehicles. Conditions that should be put in place include:
   - Minimum test harness
   - Retest frequency
   - Failsafe requirements (e.g. when the driverless vehicle systems fail what must the car do?)

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17 http://na.smartcitiescouncil.com/article/here-they-come-maybe-california-weighs-driverless-cars-public-roads

5. There must be a set level of minimum technology requirements in order for driverless vehicles to be registered. These should include:
   - Situational awareness technology requirements
     - Cameras: number, direction, resolution, spectral range
     - Radars: Number, direction, timing
     - Audio: Number, sensitivity, purpose (what are they detecting)
     - Lidars: Number, direction, coverage
   - V2X (Vehicle-to-everything)communications standards and minimum capability
   - Differential GPS
     - Coverage
     - Map standards
     - Map information supplier

6. A social license to operate must be in place, so that any community concerns and issues are being addressed and the full benefit of the technology can be realised in the fastest possible timeframe

The Academy would be pleased to assist the Committee in any way on the Inquiry, and the expertise of the Academy and its Fellows remain available to the Committee. Should you require any further assistance, the contact at ATSE is Dr Milla Mihailova, Research and Policy Officer (Milla.Mihailova@atse.org.au or (03) 9864 0920).