

Forum: Economic and Social Council

Issue: Innovation and Regulation of Autonomous Vehicles

Name: Lucy Row

Position: Deputy Chair, Economic and Social Council

Introduction:

Autonomous Vehicles (**AVs**) have enormous potential. The benefits of AVs are many and notable, but regardless, they are still yet to arrive in many nations, mostly due to a lack of government and citizen support. Progress still remains to be made surrounding their regulation but because transportation is such an essential aspect of everyday life, AVs have the power to change the everyday commute of millions of people.

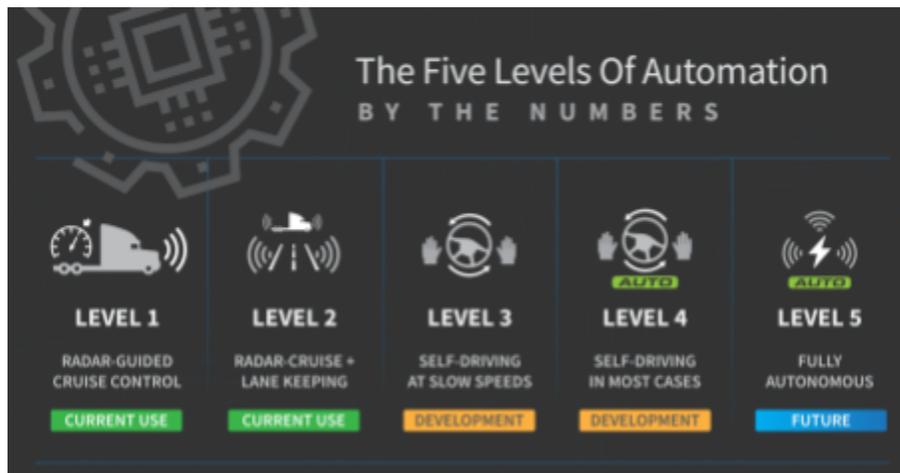
However with change comes fear, and throughout history, society has always been cautious and apprehensive, if not fearful, of life-altering developments. This proves the need for regulations regarding AVs. By creating systems that regard and encourage security regarding this technology, humanity can advance and innovate the way they travel without the restrictions of social apprehension. The implementation of AVs in everyday life is a paradigm shift in the industry, and regulating them well is something many nations have recognized as vital. AVs have the potential to drive humanity to the future, and regulating and innovating them can ensure the destination is one worth travelling to.

Definition of Key Terms:

1. **Autonomous vehicle** - a vehicle capable of operating itself without input or instructions from a human driver.
2. **Automated lane-keeping systems (ALKS)** - the first AV technology permitted on the roads in the United Kingdom, which controls the speed and position of a

car in a single lane, limited to 60km/h.

3. **Levels of Autonomous Driving** - an industry-standard scale from zero to five, detailing the degree of human control or autonomous system control. Some levels overlap, however they differ in regards to control systems. These levels are defined below.



A short summary of the five levels of automation. Sources to <https://www.freightwaves.com/news/infographic/the-five-levels-of-automation>

4. **Level 0 (zero): No Automation** - complete human control of the vehicle, usually regarding tasks like steering, braking, accelerating or slowing down. Backup cameras, blind spot warnings and collision warnings, are regularly found in Level 0 vehicles. Note the aggressive braking in the event of an imminent collision (known as automatic emergency braking), is classified as Level 0, due to the fact that it does not act over a sustained period of time.
5. **Level 1 (one): Driver Assistance** - human control of the vehicle, however, automation is beginning to take over. In Level 1, the driver can rely on automated control in situations where it can control acceleration and braking, typically in situations such as adaptive cruise control on a highway.
6. **Level 2 (two): Partial Automation** - the vehicle has gained a better understanding of its surroundings, and automation can perform more complex

tasks. The human is now controlling the vehicle less, as automation is now able to pair steering with acceleration or braking.

7. **Level 2+ (two plus): Advanced Partial Automation** - Level 2+ represents a significant category, in which the automated systems are almost entirely driving, but human control is still required to monitor and step in to control the vehicle if needed. Level 2+ is not widely recognized as a legitimate level of automation, however, it does bridge the gap between Levels 2 and 3.
8. **Level 3: Conditional Automation** - human control is now required less, and the driver can focus on other tasks. This level is considered the first step into full automated driving. The driver will have to take control in specific situations, especially conditions such as varying road types, weather conditions and speed limits.
9. **Level 4: High Automation** - the vehicle's automation system is now completely able to monitor its environment and control driving functions in regular routes and appropriate conditions ("appropriate" means the conditions determined by the design of the vehicle). The vehicle may alert the driver if necessary.
10. **Level 5: Full Automation** - no human driver is needed. The vehicle is fully automated and fully capable of transporting from one destination to another without human intervention Level 5 vehicles may not even need a steering wheel or gas pedals.

Background Information

The History of Vehicles and Automation

In 1925, the first radio-controlled car was sent driving down the streets of Broadway and Manhattan. It was led by a person in another car, who sent out radio feeds that instructed the small electric motors of the vehicle. In 1953, a miniature version of a car was instructed by wires spread out on the floor of RCA Laboratories in Nebraska, USA, which inspired a full-sized system to be tested in 1957, on a 400ft path

of a public highway. Throughout the 1950s and 1960s, General Motors released a series of experiments, regarding test vehicles with electronic guidance systems, telling them what to do. In the 1980s, a Mercedes-Benz robotic van managed to reach 63km/h on traffic-less streets. In 1991, the United States Department of Transportation (USDOT) passed the ISTEA Transportation Authorization bill, which aimed to have an “automated vehicle and transportation system” demonstrated by 1997. Extensive engineering work was led and shared by FHWA and General Motors, with Caltrans, Delco, Parsons Brinkerhoff, Bechtel, UC-Berkeley, Carnegie Mellon University, and Lockheed Martin, but USDOT budget cuts lead to the project being cancelled in the late 1990s. Since then, the United States has funded three unmanned army ground vehicles to navigate difficult terrain, with each vehicle having an autonomously controlled throttle, steering and braking. AVs have been used in mining and introduced to more urban environments and Google began developing self-driving cars. General Motors, Ford, Mercedes Benz, Volkswagen, Audi, Nissan, Toyota, BMW, and Volvo, all major manufacturers of automobiles, are in the process of testing driverless car systems.

Though AVs and smart transportation systems have developed tremendously since the 1920s, there is far more potential for innovation.

The Benefits of Autonomous Vehicles

Autonomous travel systems have been truly recognised as possible in the past 100 years, but they are still yet to be fully developed and implemented in all nations. The potential of this technology is notable, and there are many benefits yet to be mentioned. AVs are more sustainable, they minimise human-fault accidents and are safer as a whole. They make transport easier for the elderly, disabled, or those who are unable to drive and allow for more opportunities for productivity or rest, as people don't have to keep their consciousness on the road. As is to be expected with any major development, many nation's communities don't trust and are sceptical about implementing AVs as a part of their everyday commute, which we will explain why in the

next section, but by innovating and regulating these technologies, the way humanity travels will be changed forever.

Drawbacks of Autonomous Vehicles

There are some drawbacks to the widespread usage of AVs. Firstly, AVs may be vulnerable to hacking. As hackers become more sophisticated, compromised security systems could not only be costly but deadly. Similarly, machine errors will be equally fatal. The economic cost may be high, both for the initial cost of innovation and for the workers they would replace (see figure).

Occupation	Number of Workers
Transportation	3,628,000
Retail salespersons	3,286,000
First line supervisors	3,132,000
Cashiers	3,109,000
Secretaries	3,082,000
Managers, all other	2,898,000
Sales representatives	2,865,000
Registered nurses	2,843,000
Elementary school teachers	2,813,000

Over 3.6 million of US workers work in Transportation.

Current Situation

As of 2021, only a few countries have begun implementing government regulations regarding AVs. Australia, Canada, China, Germany, New Zealand, Singapore, the United Kingdom and the United States have all taken steps to regulate AVs as a part of everyday life, although self-driving cars are still not widely deployed in any nation. The need for regulation is a major concern regarding implementing AVs in everyday life and is the main reason they are yet to be fully implemented in all nations.



Major Parties Involved and Their Views

The Netherlands

The Netherlands is a strong advocate for the use and development of the technology of AVs. The Netherlands has expressed the clear benefits of AVs and is taking steps to make these technologies more accessible. They have already been established as a ground for testing AVs (and Intelligent Transport Systems, ITS), and the nation wishes to become a viable “breeding ground” for this technology while encouraging other nations to invest and develop intelligent transportation systems as well.

Singapore

The nation of Singapore is a model for development and futuristic living, and a strong developer and representative for AVs. With the burdens of an aging population and limits regarding land and manpower, the Government of Singapore has recognised the necessity for a change in the national systems of transportation. Singapore has already implemented testing routines in MRT lines and is in the process of making these technologies more widespread. Taking note of the benefits for sustainability, civilian safety, economic advancement and the innovative improvement of systems for national gain, Singapore is wholeheartedly committed to supporting these technologies, however prioritises the regulations and measures necessary for safety and effectiveness.

United States

The United States is devoted to improving transportation as a whole, and is in support of the use of AVs. The USDOT is in the process of implementing AVs in everyday life. USDOT has created the “Automated Vehicles Comprehensive Plan” as a way to pave the path to creating safe, effective and efficient means of transportation with AVs, however, a large setback the United States is facing regarding these

developments is citizen doubt. By creating strong regulations, and educating the wider public on the benefits of Autonomous Transportation, the United States could potentially inspire many other nations to take steps in the direction of this new advancement.

China

As one of the biggest names in technology development and production, China is in full support of the use of AVs, under the condition that these technologies are monitored and have strictly enforced regulations. China is already implementing these technologies and has plans to make them a bigger part of the everyday commute for millions of people, and strongly encourages the innovation of AVs, to maximise potential and add to the already impressive list of benefits. As is to be expected, China is in favour of creating regulations that protect these advancements, but only under the conditions that the national sovereignty of member states aren't infringed upon.

United Kingdom

After a request from the Centre for Connected and Autonomous Vehicles (**CCAV**), The Law Commission of England and Wales and the Scottish Law Commission have reevaluated their laws, making the United Kingdom the first country to allow AVs on the road. The government has determined that the first AV technology permitted on the roads will be automated lane-keeping systems (**ALKS**). It is important to note that officials have reviewed the government's definition of "self-driving" as limiting, as the driver still needs to be able to take the wheel at any given moment. The United Kingdom may be urged by member nations to alter their new regulations, as there is a probability they will be taken as a basis or inspiration for other legislature regarding these technologies. Regardless, the United Kingdom is an avid supporter of the development and use of AVs.

UN Involvement, Relevant Resolutions, Treaties and Events

As the World Forum for Harmonization of Vehicle Regulations, China, the European Union, Japan and the United States have created a framework to guide the United Nations in regulating this technology:

- Framework Document on Automated/Autonomous Vehicles, 3 September 2019 (ECE/TRANS/WP.29/2019/34/Rev.1)

This framework applies to all AVs capable of driving with partial or zero driver supervision (automation levels 3 - 5). The safety of AVs is highlighted in this framework, especially regarding the vehicles not causing any tolerable risk, and that when in practice, injury or death will be prevented at any cost. The framework mentions all automated driving functionalities must ensure road users' safety and compliance with road traffic regulations, and ensure AVs guarantee human security. The framework lists its priorities to be raised to the World Forum as being: "System safety, Failsafe response, Human-machine interface, Object Event Detection and Response (OEDR), Conditions under which the automated system will operate, Validation for system safety, Cyber-security, Software updates, Data storage and Event data recorder (EDR)". The draft also urges the creation of four technical groups, mandated with: "Functional requirements for automated vehicles, validation of the driving capability of automated vehicles, cybersecurity and software updates, data storage systems for automated driving and event data recorders".

Possible Solutions

1. Create a system where any advancements and discoveries can be shared with other professionals in the field. This may be rejected by a few member nations as it can infringe on sovereignty, but uniting developers of AVs is significant to the improvement of our travel systems.
2. Create a forum in which professionals from all fields of AVs can unite to speak to the public on advancements in technology, events and milestones in autonomous

technology, and create a system of recommended action in the event of emergencies.

3. Create a system of restrictions for this technology, with regular analysis of efficiency and safety checks on all aspects of AVs. These restrictions could also include licencing regulations and punishments for misuse of technology or use without licence.
4. Implement a transnational system for advised reaction (action to be taken by nations), in the event that there is an issue regarding the failure of technology or similar issues. Such a system will have to be specified as a recommendation (not a mandatory requirement) for courses of action regarding AVs, and the issues that may come with it.

Bibliography

Useful Links

1. [United Nations](#) - the original framework for AV regulations, as mentioned in the UN involvement chapter
2. [Self-driving vehicles | Mobility, public transport and road safety](#)
3. [History of self-driving cars](#) (there are many good websites and links to use here)
4. [UN publishes framework for autonomous vehicles with safety at core](#)
5. <https://www.transportation.gov/AV>
6. [The Simple Solution to Traffic](#)
7. [Humans Need Not Apply](#)

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