Are Cities Ready for Autonomous Vehicles?

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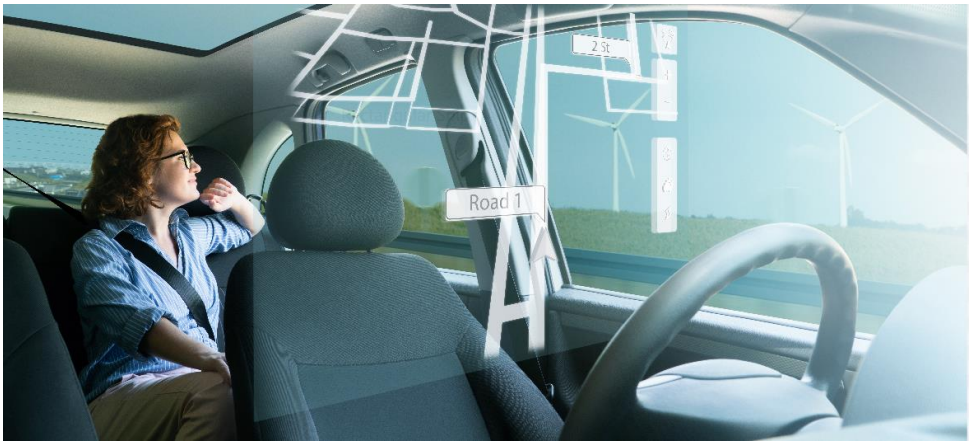
Autonomous transportation is not new. Depending on how it is defined, the autonomous spectrum can range from driver-enabled, partially automated to fully driverless. The latest airplanes already enable full autopilot from take-off to landing, although industry norms continue to require two pilots to be in the cockpit. While autonomous technology is already deployed with partial levels of automation in the air, are people ready to embrace autonomous vehicles (AVs) on the road?

Not quite, though some may say it is possible a few years down the road. Even with the growing potential of AVs to improve road safety, reduce congestion and provide a greener means of transport, concerns about regulation, safety and efficiency are holding some back.

Autonomous technologies with limited automation have been in development since the 1960s. Besides the autopilot mode on planes, vehicles have also been outfitted with Advanced Driver-Assistance Systems (ADAS) such as self-parking function and built-in lane-keep assist features to ensure vehicles stay within road lanes.

On the whole, AVs are slowly gaining public acceptance. In fact, a 2018 Ipsos' study[1] of over 21,500 global respondents from 28 countries revealed that interest in autonomous cars is high, with nine in 10 people generally interested in autonomous cars – but with a caveat.

Among the majority who were open or in favour of AVs, two thirds remained unsure due to various reasons.



How Safe Are AVs?

Computers have consistently been shown to make fewer errors than humans when driving. So you can be certain that while autonomous cars may not be perfect, they are less flawed than human drivers, who are prone to poor judgement and driving behaviours.

Driverless vehicles are powered by autonomous software and algorithms designed for human-like driving – without the errors. ST Engineering's autonomous mobility solutions, for instance, are equipped with multiple fail-safe features to ensure high road awareness and that no hazards on the roads go unnoticed.

Designed with an array of sensors, cameras, radar and LIDAR, AVs are able to make sense of the complex and dynamic driving environment to navigate safely from point to point.

Besides deploying advanced sensing devices and technologies, AVs leverage artificial intelligence (AI), data and video analytics, and high-speed connectivity to ensure safe driving even under challenging driving conditions.

AV systems rely heavily on AI to process a vast amount of data efficiently to train the autonomous driving systems. It needs to recognise every object and environmental variable the AVs can encounter in real-world scenarios and respond safely to all situations on the road. The massive amount of data collected from every scenario is then used to generate valuable collective insights to ensure continued improvement of the safety and performance of driverless vehicles.

Around the world, extensive testing in various environments are driven by collaborations among industry partners and the public sectors. These have helped to validate AV systems and designs, as well as develop new standards and regulatory frameworks to keep up with the safety requirements in the fast-evolving AV industry.

Are There Sufficient Regulations for AVs?

Without a regulatory framework to govern the safe use of AVs on public roads, autonomous cars might be treading uncharted territory.

According to the 2020 Autonomous Vehicles Readiness Index (AVRI) by KPMG[2], which looks into the level of preparedness of AVs across 30 countries and their jurisdictions, Singapore claims the top position in the index. It has taken a number of significant steps to encourage and accelerate the testing, development and adoption of AVs, and has led in the area of policy and legislation.

Singapore has published a set of provisional national standards, known as the “Technical Reference 68” (TR 68)[3], to guide the industry in the development and deployment of fully autonomous vehicles. This is an industry-led effort of representatives from the AV industry, research institutions, institutes of higher learning and government agencies, which come together to develop standards covering four key areas of AV deployment: vehicle behaviour, vehicle functional safety, cybersecurity and data formats.

Multiple AV testing areas have also been set aside to trial the new technology to pave the way for planned pilot deployment of AVs, and eventually to achieve widespread implementation across the country. In October 2019, Singapore expanded its testing area to cover the entire western part of the island, with more than 1,000 kilometres of public roads for AV companies to conduct on-road testing in a wider range of traffic scenarios and road conditions.

According to the AVRI, Australia received the highest score for its AV regulations. Its federal government takes the early step to reform driving laws to enable the use of AVs, and this work is continuing through the country’s National Transport Commission’s Automated Vehicle Program.

In 2018, The Netherlands made significant announcements including a legal framework for AVs. Finland is also among the top scorers in AV regulations.

Although more countries have started to put in place the necessary regulations and frameworks to ensure the strategic development and safe operations of AVs, more still needs to be done to constantly review and ensure these are up to date and relevant to changing technologies and the operating environment of the AVs.

Are We Ready for Secure Connected Vehicles?

Beyond safety and regulations, a phased approach is used by many cities to ensure AV deployment and the necessary connected infrastructure are rolled out progressively to integrate with the cities' transport ecosystem to benefit commuters.

As more AVs go on the road, Vehicle-to-Everything (V2X) technology is the future of autonomous driving. It is essential to enable AVs to communicate with each other and the infrastructure (e.g. traffic lights, street lights and other road fixtures) to enhance the AVs' environment awareness, making autonomous driving safer and more efficient.

Having a high-speed network such as 5G will also have a major influence on the development of AVs. Although 4G is deployed for AV pilots and operations in some cities, it may not be optimised to realise the full capabilities of the AVs.

As AVs use hundreds of sensors to make vehicles smarter, they generate a huge amount of data that requires fast processing and analysing capabilities. Fast data connectivity will enhance the capability of AVs to closely simulate human-like reflexes and ensure AVs are safer on the road.

When AVs are more intelligent and connected, sharing everything from sensitive location and environment data may make AV systems become targets for hacking. Other concerns such as data privacy will also need to be addressed. Countries will need to put in place good cybersecurity practices and countermeasures, as well as legal regulations to protect data access and usage.

Whether it is building the infrastructure, enhancing connectivity, advancing AV technology or securing the systems and data, all these require strong collaborations between private and public stakeholders to make AVs a widespread reality.

As more countries get their cities 'AV-ready' to capitalise on the benefits of autonomous vehicles, the push for AVs, especially for shared public transport and other logistics deployment to meet growing urban mobility needs, is expected to shift into high gear within the next 10 years.

A global technology, defence and engineering group, ST Engineering is a leading technology provider of autonomous shared transport, and smart rail and road solutions that improve infrastructure availability, optimise operational efficiency and enhance commuter experiences. In addition to playing a lead role in steering the advancement of the AV ecosystem in Singapore, ST Engineering is also an active participant in operationalising autonomous shared transport deployments in markets such as Australia, China, Israel and Japan.