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Is Malaysia Ready to Adopt Autonomous Vehicles?

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Malaysia is a rapidly developing country with the potential for growth of future technologies. Autonomous Vehicle (AV) is one of these new technologies which evokes both excitement and apprehension among the general public. This paper shall discuss Malaysia's preparedness to accept AV on its roads. Finally, this paper will also explain the possible steps to facilitate efforts to have AVs on Malaysia's roads in the imminent future.

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Most people are intrigued by the impending possibility of their car automatically steering and accelerating on its own. In today's age of Artificial Intelligence, several automobile manufacturers as well as start-up companies are vying to develop such an advanced technology, which shall pave the way for the fully autonomous vehicle to be mass produced. Some of these companies include automobile manufacturers with the likes of Ford, Audi, and Volvo (Paultan.org, 2015; Huawei, 2018; The Star Online, 2018). In addition, several tech companies including Google, Huawei, and Intel have also emerged as major players in fine tuning the technology for the introduction of Autonomous Vehicles (AVs) (Business Insider Malaysia, 2017; Business Insider Malaysia, 2018; Huawei, 2018).

All around the world, test runs have been conducted. In some countries, these tests have gone as far as becoming part of a ride sharing service, which means that there shall be automated taxis with no drivers in the future. The e-hailing services which aim to fully take advantage of AVs include Uber, Lyft, and DiDi Chuxing (CB Insights, 2018).

Autonomous Vehicles in Malaysia

Over in the local scene, similar efforts have been seen in the development of AVs. Most recently, it was revealed that Universiti Teknologi MARA (UiTM) has produced an AV dubbed the AVII. The purpose of the AVII is to conduct research work, with further improvements planned for the system. The AVII was unveiled at an international auto show KLIMS 2018 (Paultan.org, 2018). Another public research-intensive university – Universiti Teknologi Malaysia or UTM – through its partnership with a Singapore tech company MooVita Pte. Ltd., has equipped a Proton Exora with sensors and cameras. These modifications have transformed the car into a fully functioning AV, which was recently spotted doing test runs in the Malaysia Global Innovation & Creativity Centre (MaGIC) in Cyberjaya (UTM, 2018).

Further, efforts to produce the AV have also been actively carried out by a start-up company called REKA Studios. Its team comprising of 20 people have equipped the Proton Wira and the Proton Perdana cars with off-the-shelf sensors and cameras. The components were rigged together with a central processor dubbed the RIG (REKA Innovation Gear) to control the actions of the car. The REKA team would normally turn up at local auto events to showcase their invention and they have even uploaded YouTube videos of their endeavour (Paultan.org, 2017).

Autonomous Vehicle Readiness Index (AVRI)

Professional service company and one of the Big Four auditors, KPMG through its international branch has conducted annual studies and made strides in collecting data and analysing countries in their efforts to present AVs to the public. The aim of the study is to gauge how open and how ready these countries are to embrace this new emerging technology (KPMG International, 2018). KPMG has identified four major factors in evaluating a country' readiness to adopt AVs which are shown in Figure 1.

For this paper, a background search was conducted to obtain a comprehensive review of the local scene in terms of what has been accomplished in the academia. The search was done using Google Scholar and by filling in keywords such as "autonomous vehicle", "driverless car" and "Malaysia".

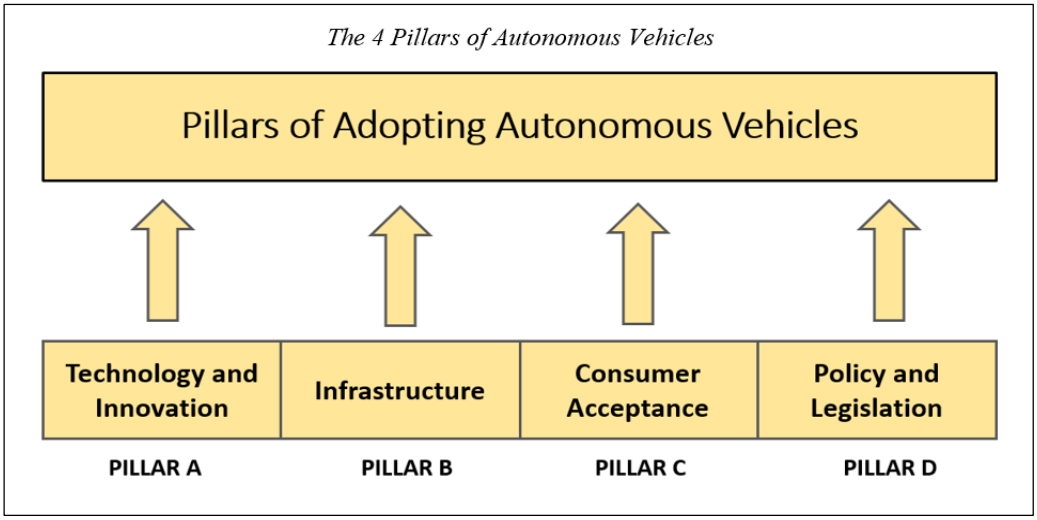

Figure 1: The four factors in consideration for implementing AVs in a country (KPMG International, 2018)

For the purpose of this review, unrelated topics were excluded to obtain only the ones relevant to the large-scale passenger vehicle. A screening phase was also carried out up to the results of the first 190 publications. A total of 78 publications were deemed appropriate for the topic of this review. The resulting exclusion and grouping generated is shown in Table 1.

Table 1: Background search on Google Scholar – observation of local research patterns

Pillar A TECHNOLOGY & INNOVATION		**Pillar B** INFRASTRUCTURE		**Pillar C** PUBLIC ACCEPTANCE		**Pillar D** POLICY	
TOPIC	N	**TOPIC**	N	**TOPIC**	N	**TOPIC**	N
CAMERA (A1)	22	TRAFFIC SIGN (B1)	4	DRIVER STYLES (C1)	1	IMPLEMENTATION (D1)	1
GPS (A2)	7	DRIVING ENVIRONMENT (B2)	1	ETHICS (C2)	1		
STEERING (A3)	12	SIMULATION (B3)	2	USER INTERFACE (C3)	1		
SENSORS (A4)	11						
CONTROL (A5)	10						
MULTI SENSING (A6)	1						
OTHERS (A7)	4						
Total	**67**	**Total**	**7**	**Total**	**3**	**Total**	**1**

A recurring pattern among the academia in Malaysia regarding published works on the topic AVs is that some of the papers did not even discuss the full-size passenger vehicle that is driven on the road. In addition, plenty of the papers focused on Unmanned Aerial Vehicle (UAV), and Autonomous Underwater Vehicle (AUV). An observation was thus made. All the publications identified and were grouped according to four factors essential for a country to adopt AVs. After some observation, it was clear that there was plenty of AV technology research work carried out by Malaysians to develop AV. However, most of the efforts were on small scale models of miniature robots. Another observation was that most local research and

development work have been highly concentrated on the technological side of AV. Albeit a good sign; it also showed a lack of effort in other fields of research for Malaysia to properly adopt AVs in the near future.

Future Direction of Autonomous Vehicle in Malaysia

The direction for Malaysia to adopt AV very much depends on several factors to be discussed here, namely Technology and Innovation, Infrastructure, Public Acceptance as well as Policy and Legislation.

(i) Technology and Innovation

Currently, there are plenty of research and development efforts in Malaysia to improve AVs. As stated earlier, there are a lot of studies focusing on the improvements of AV technologies such as the camera detection mechanism (Hasan et al., 2009), sensors, controlling systems, and GPS navigation (Zakaria et al., 2013). These are steps in the right direction. However, for AV to move further forward, there must be more investments and efforts to test the technologies with larger passenger vehicles. The technology will eventually obtain maturity through making multiple iterations, continuous testing and implementing further improvements. This will require time and funding for the AV to be safely deployed for public consumption.

(ii) Infrastructure

Clearly, Malaysian road infrastructure lacks the technology for AVs to properly operate. For a country to be ready to implement AVs, proper infrastructure is required for AVs' safe deployment. Since the technology is still at its infancy, a controlled environment is required for a safe test run to be conducted. A suggested plan of action is to allocate an already established road to become a testing ground for researchers. The test roads must include a large variety of possible scenarios for the AV to react to, for example, a narrow road, a congested road with traffic, and during rainy weather. Density of EV charging stations is also a factor in improving the infrastructure for the new technology. The presence of EV charging stations will reflect the commitment of a country to update their road environment with new technologies.

(iii) Public Acceptance

Most Malaysians are uncertain of the prospect of the AV technology due to its scarcity. In several countries, one way of negating the scepticism is by letting the public participate in the testing phases of the AV. This includes providing ride sharing services, and inviting them to participate in the test runs which will also help build trust in the technology. A study in France has shown that AV test runs which included participation from the public helps in garnering trust towards the technology and system (Piao et al., 2016).

(iv) Policy and Legislation

The Government of Malaysia's policies that address AVs are obviously lacking. Policymakers shoulder the responsibilities in ensuring safe deployment of the AV. Their decision to allow new technologies should benefit both the technology developers and the public. One of the ways to handle this situation is by introducing clear policies on AVs. Without adequate focus

on this emerging technology, its development shall be stunted. Policymakers should thus actively work alongside the industry to ensure its growth.

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