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MBOT
LEMBAGA TEKNOLOGIS MALAYSIA
MALAYSIA BOARD OF TECHNOLOGISTS

TECHIES

TRANSPORTATION IN THE 4TH INDUSTRIAL REVOLUTION

POLYTECHNIC: CARVING A NICHE IN THE RAIL INDUSTRY

MALAYSIAN SELF-DRIVING CAR: CHASING GLOBAL TECHNOLOGY

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EDITOR'S NOTES

Datin Paduka
Ts. Dr. Siti Hamisah Tapsir
Editorial Adviser / Board Members

Welcome to TECHIES second quarter (April – June issue of 2017) edition. Following our previous publication, we have worked hard to bring out the best of our bulletin so that it truly caters the needs of the public as whole. We are hoping that what we have chosen to highlight will be able to carve the interest of the public on technological issues.

The selected theme for this issue is Transportation. We feature articles on the 4th industrial revolution and transportation. The development of the National Rail Industry Roadmap and the whole scenario of high speed rail were discussed.

To acknowledge the talent of our technologists, our exclusive column highlighted the success of four young talents in designing a driverless car system which may be the future of our transportation.

We also feature a couple of past events in this issue. One event is the official launching of MBOT's new headquarters in Cyberjaya by Datuk Seri Panglima Wilfred Madius Tangau, Minister of Science, Technology and Innovation, and the other is on The 9th National Engineering and Technology Convention (NETC2017) organized by the Malaysian Society for Engineering and Technology (MySET) where Tan Sri Dato' Academician (Dr.) Ts. Hj. Ahmad Zaidee bin Laidin FASc was one of the distinguished guests.

We hope this edition will inspire everyone to read, write and contribute to TECHIES. Happy Reading!

What's Inside...

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MBOT would like to thank all those who have contributed in one way or another towards the successful publication of this bulletin.

PRESIDENT'S NOTES

Tan Sri Dato' Academician
(Dr.) Ts. Ahmad Zaidee Laidin FASc

Technologists and technicians are the pillars of strength who will determine the success of the forth industrial revolution (Industry 4.0) and the National Transformation 2050 (TN50). TN50 is an effort by government of Malaysia to shape the future of the country for the period 2020 to 2050. We should aim to be among the top nations in the world with regard to domestic economy, prosperity and innovation.

In Industry 4.0, the value of technology is highly emphasised. Industry sectors such as electrical/electronics, automotive, aerospace, transportation and telecommunication are natural adopters of cutting edge technologies. This is the only way they can remain relevant and competitive.

In 2020, 60% of 1.5 million jobs would require skilled workers. Needless to say, for Malaysia to achieve its goals, skilled human resource is vital. Considering this, the government, through Budget 2017, has allocated a total of RM4.6bil to focus on TVET institutions. RM270 million is allocated to upgrade educational equipment in TVET institutions, while RM360 million has been earmarked for the Skills Development Fund Corporation.

MBOT plays an important role to support the government's agenda in ensuring the availability of skilled workforce to meet the industry's needs. As such, the boundary of the technologist/technician profession is enlarged so that a more diverse and wide-ranging talent pool can be nurtured and supported within the MBOT umbrella. Agro-based technology, transportation and logistics technology, material science technology, and biotechnology are some examples of disciplines that are well-matched with the fields that are conventionally associated with MBOT.

As part of the effort to strengthen MBOT, we continuously look at similar organisations in other countries to give us the benchmarks that we go for. In Canada, for example, the occupational category of technologist was established in the 1960s, in conjunction with the then emerging system of community colleges and technical institutes. It was designed to effectively bridge the gap between the increasingly theoretical nature of engineering degrees and the predominantly practical approach of technician and trades-based programmes. Canada established its own board, namely, the Canadian Council of Technicians & Technologists (CCTT). The board advocates for the profession of technicians and technologists, as well as certifies technology and technical educational programmes. CCTT is also signatory to both the Sydney and Dublin accords.

Similarly, MBOT will be signatory to both these accords. This, and many more features will be attended to in order for MBOT to soar high in the wake of the Industry 4.0 and the TN50.

ABOUT MBOT

LEMBAGA TEKNOLOGIS MALAYSIA
MALAYSIA BOARD OF TECHNOLOGISTS

- **The Parliament of Malaysia has enacted the Technologists and Technicians Act 2015 (Act 768), an act to provide for the establishment of Malaysia Board of Technologists (MBOT), in line with other professional bodies in Malaysia.**
- **MBOT is responsible for the registration of graduate technologists and qualified technicians as well as to recognise professional technologists and certified technicians.**
- **MBOT promotes education and professional training in related technology and technical fields.**
- **MBOT recognises technological careers and empowering technical and vocational education and training (TVET).**
- **MBOT will strive to be a signatory to international accords in the field of technology and technical to ensure the technologists and technicians produced in the country meet the international standards and ability to compete globally.**

01 VISION

To be a world class professional body for technologists and technicians

02 MISSION

To elevate the standing, visibility and recognition of technologists and technicians

03 OBJECTIVES

- To elevate the standing and recognition of technologists and technicians
- To increase the pool of skilled workforce required to attain a high income economy
- To protect public safety and health

WHO SHOULD REGISTER ?

PROFESSIONAL TECHNOLOGIST

Graduate Technologist with practical experience as stipulated by the Board

GRADUATE TECHNOLOGIST

Holds a bachelor's degree recognised by the Board

CERTIFIED TECHNICIAN

Qualified Technician with practical experience as stipulated by the Board

QUALIFIED TECHNICIAN

Holds a certified qualification recognised by the Board

YBhg. Tan Sri Dato' Academician (Dr.) Ts. Ahmad Zaidee bin Laidin FASc. signed the agreement on behalf of MBOT, while Touch 'N Go Sdn Bhd was represented by their Chief Executive Officer. The exchange was witnessed by YB Datuk Sari Panglima Wilfred Madius Tangau.

OPENING OF MBOT'S PREMISE IN PUTRAJAYA

PUTRAJAYA, 13 APRIL 2017- YB Datuk Seri Panglima Wilfred Madius Tangau made an official site visit to Malaysia Board of Technologists (MBOT) and later proceeded to officiate the opening of MBOT's new office premises at Ayer@8, Presinct 8, Putrajaya, Wilayah Persekutuan.

During the launch of MBOT's new premises, a working agreement was signed with Touch 'N Go Sdn Bhd. Touch 'N Go would supply MBOT's membership cards that has built-in Touch 'N Go features to 250,000 potential MBOT members.

Current holders of Undergraduate degrees, diplomas and certificates in technological and technical fields are eligible to apply and be registered as graduate technologists and qualified technicians under MBOT. This would be the first step leading to official certification status by MBOT towards being Professional Technologist and Certified Technicians.

Further information and registration details for membership applications can be found at www.mbot.org.my or any enquiries can be sent by email to info@mbot.org.my

SEMINAR THAT IGNITES INTERESTS IN STEM

By M Hazri B A Shahpin & Adz Jamros Bin Jamali

SERI ISKANDAR, 3-4 APRIL 2017 - Realising the importance of science, technology, engineering and mathematics (STEM), Universiti Teknologi PETRONAS (UTP) Laboratory Facilities and Service Department took the initiative to organise the Technology, Engineering & Scientific Seminar (TESS) 2017.

Held in conjunction with the university's 20th anniversary celebration, the event saw the participation from Universiti Sains Malaysia (USM), Universiti Kuala Lumpur Malaysian Institute of Marine Engineering Technology (UniKL MIMET), Universiti Malaysia Kelantan (UMK), Politeknik Ungku Omar (PUO) and UTP.

The topics discussed included automotive engineering, instrumentation and control, cloud computing, civil engineering, electrical and electronics engineering, material engineering and health, safety and environment.

This biannual event was held to bring together technicians and technologists from all over the country to exchange and share their ideas and experience on STEM. In addition, it is also a platform to share their knowledge on their involvement on research and development works.

TESS 2017 also helped bring the community of practice to network with other institutions and industry. For this purpose, a meet and greet session was held with two National Technologist Award recipients from UTP. They were Adz Jamros Jamali and Shaiful Hisham Samsudin who won the award in 2015 and 2016 respectively. The session was beneficial to the audience as it gave insight on the importance of adapting new trends and models in in their profession.

Musa B M Yusuf from UTP explaining on Self Managed Queing System for Exam Hall (SemQS) function.

The seminar also acknowledged Rosedi Che Ros from PUO as the Best Presenter for his talk entitled "Alat Canting Batik Elektronik". Meanwhile, Ade Wahyu Ramadhani from UTP won the Best Presentation award for his talk entitled "Optimised High Performance Cloud Computing Platform"

Both received a trophy and a certificate of achievement from UTP Dean for Faculty of Engineering, Professor Dr Hilmi Mukhtar.

UTP hopes that the seminar will be a stepping stone to give recognition to all technicians and technologists for their skills and expertise as well as their dedication and commitment in achieving their career goals and support UTP's vision to become a globally prominent institution.

Speaker, Participant and committee of TESS2017 doing the "Soaring Upward".

MySET's 9th NATIONAL ENGINEERING & TECHNOLOGY CONVENTION 2017

By Assoc. Prof. Dr. Suraya Abdul Rashid

From the left: Emeritus Professor Dato' Ir Abang Abdullah Abang Ali, President of the Malaysian Society for Engineering and Technology (MySET), YBhg. Dato' Sri Ir. Dr. Roslan Md Taha, President of the Board of Engineers Malaysia (BEM), and YBhg. Tan Sri Dato' Academician (Dr.) Ts. Ahmad Zaidee Laidin FASc, President of the Malaysia Board of Technologists (MBOT).

BANDAR BARU BANGI, 8 APRIL 2017 - The National Engineering and Technology Convention 2017 (NETC2017) was successfully held at the Bangi-Putrajaya Hotel in Bandar Baru Bangi. NETC is an annual event organised by the Malaysian Society for Engineering and Technology (MySET) and this year's convention is the 9th event in its series.

The objective of the convention is to provide a platform for the presentation and exchange of ideas and experiences amongst engineering and technology professionals. Subsequent to the theme of NETC2016, which was "The Malaysian Engineering Team", the theme for NETC2017 was "Professional Qualification", which is a very important topic amongst the local engineering fraternity and is considered the next step in the progression of the professional engineering team.

The invited Keynote Speaker was YBhg. Dato' Sri Ir. Dr. Roslan Md Taha, President, Board of Engineers Malaysia (BEM). Two other VIPs who also came to support the event were YBhg. Tan Sri Dato' Academician (Dr.) Ts. Ahmad Zaidee Laidin FASc, the President of the Malaysia Board of Technologists (MBOT) and YBhg. Dato' Prof. Ir. Dr. Hassan Basri from BEM.

The event started with a welcoming speech from the President of MySET, Emeritus Professor Dato' Ts. Abang Abdullah Abang Ali, who is also a council member of MBOT. This was followed by the Keynote Speech given by Dato' Sri Roslan entitled "Professional Qualification – The Engineering Team". Dato' Sri Roslan began his talk with an overview of engineering history in Malaysia. He then elaborated on the various categories of professionals who can register under the Board of Engineers Malaysia, covering Inspector of Works, Engineering Technologists, Graduate Engineers, Professional Engineers with Practicing Certificate, Accredited Checker and Technicians. He concluded his talk by urging the setting up of strategic collaborations between BEM and other professional bodies in Malaysia such as MySET and MBOT. Next on the agenda was the Student Award Giving Ceremony, followed by a Round Table Discussion. The session was chaired by Dato' Ir. Abang Abdullah, with the expert panels being Tan Sri Ahmad Zaidee and Dato' Prof Hassan.

Some MySET council members with YBhg. Dato' Sri Ir. Dr. Roslan Md Taha, and YBhg. Tan Sri Dato' Academician (Dr.) Ts. Ahmad Zaidee Laidin FASc

Tan Sri Ahmad Zaidee started the discussion by congratulating MySET on its 10th Anniversary. Tan Sri gave an overview on MBOT and stressed that MBOT's role does not duplicate the role of BEM, but rather, it complements the role. He talked about the history of MBOT formation and reported all the various activities that MBOT had been involved with to-date. Then Dato' Prof. Hassan gave a short introductory talk where he reconfirmed that graduates could register with either BEM or both BEM and MBOT. The chairperson then invited views from the floor to generate good ideas which could be presented to the relevant authorities. Topics that were raised from the floor

Photo session of MySET council members with YBhg. Dato' Sri Ir. Dr. Roslan bin Md. Taha and YBhg. Tan Sri Dato' Academician (Dr.) Ts. Ahmad Zaidee Laidin FASc.

revolved around how we should be prepared for the technology of the future and how to avoid from current technology becoming redundant or irrelevant, the importance of having the right attitude, and the knowledge and skills needed to face the challenges in our respective fields of expertise.

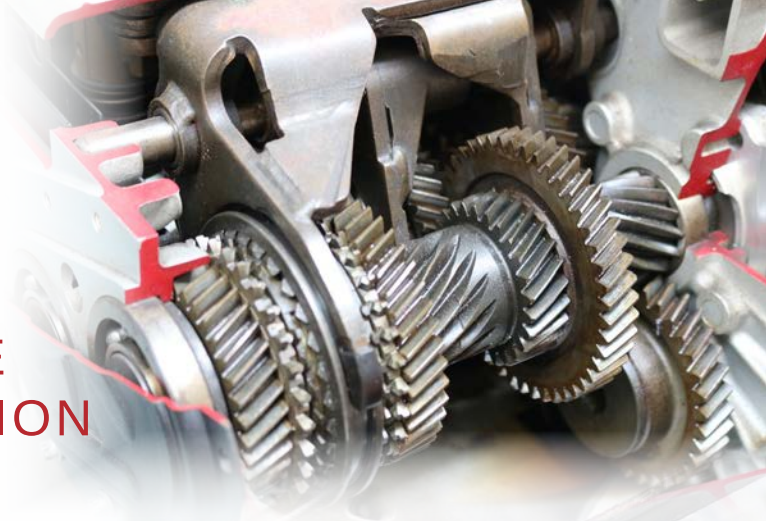
Mr. Sazalinsyah Ghazali, a technologist from UTeM, Melaka, was particularly pleased to hear updates from Tan Sri Ahmad Zaidee about developments and progress being made in MBOT, such as benchmark visits to Canada and Germany. News such as these are not readily accessible. He also commented that it was not very clear how computer science and technology graduates could register through the MBOT website as there were no options for people coming from areas such as ICT, data science and big data. Hopefully these suggestions for improvements would be looked into.

The first response to the issues raised was given by Dato' Hassan Basri. Regarding future scenario, he agreed that the world is facing extremely fast and radical changes. It is hence important to prepare students for the future. Benchmarking against the 12 graduate attributes spelled out by the International Engineering Alliance (IEA), it is found that only 5 are technical in nature. These five attributes would become very relevant for curriculum development and it is hoped that with experience from performing graduate attribute assessments, we would relate our practices with the future demands of the industry.

In Tan Sri Ahmad Zaidee's response to the floor, he stated that the ability to look into the future is not without specific techniques. A leader must have the x-factor as well as skills in technology forecasting. He stressed that in order to keep abreast of the future, one needs foresight. In Malaysia, several bodies are practicing foresight, such as the Malaysia Industry-Government Group for High Technology (MIGHT) and the Academy of Sciences Malaysia (ASM).

Dato' Abang wrapped up the Round Table Discussion by saying that we could conclude with a good feeling and intention that the spirit should be for us to work together and complement each other. Graduates can register with either body - BEM and/or MBOT. It does not matter which, because at the end of the day, there is still so much to be done for the nation by all allied professionals. At the same time, he also highlighted that we should be aware that all our efforts are being observed by other countries so we should be prepared to assist the ummah at both the national and international levels.

Dato' Prof. Ir. Dr. Hassan bin Basri (left) and YBhg. Tan Sri Dato' Academician (Dr.) Ts. Ahmad Zaidee Laidin FASc (middle) as panelists of the Round Table Discussion chaired by Emeritus Prof. Dato' Ts. Abang Abdullah Abang Ali (right).



TRANSPORTATION IN THE 4th INDUSTRIAL REVOLUTION

By Dr. Mohamad Asmidzam Ahamat

In today's transportation system, which is put together to ensure connectivity between air, land and water, the use of environmental-friendly vehicles is given top-most priority. To facilitate the passenger's journey, contact points for air, land and water are built in a way that makes for a convenient passage. However, in the current state, the overall scheme of the transportation coordination is still very limited. A delay in bus arrival at an airport may cause a passenger to miss his/her flight. In future, this may not happen if the bus, flight and passenger schedules are interconnected through the Internet of Things, which is a network that joins physical and cyber technologies. The integration of physical and cyber schemes is one of the expected characteristics of the Fourth Industrial Revolution (or Industry 4.0), together with the use of more environmentally-friendly transportation systems.

Future of transportation

Unmanned vehicles do not require humans to manoeuvre them. Instead, they rely on actuators that react based on the input provided by artificial intelligence systems that receive data from various sensors embedded in the vehicles. The ability of the artificial intelligence system to learn new things is tremendous. It can learn from its own experience, as well as from other vehicles through their interconnection in the internet. Any information on road conditions, weather data, and other relevant statistics would be disseminated in a fraction of a second. Global positioning system (GPS), with the accuracy of a few centimetres, could determine the position, speed and direction of a vehicle, which is essential to avoid collisions. This cyber-physical system reduces traffic congestion by making certain that vehicles are kept on their own respective lanes. To reach its destination, a vehicle would travel at optimum speed and with better fuel efficiency since its routes are optimized according to its current traffic state. In general, this strategy may also be applied to other modes of transportation.

The current technology in superconductor allows magnetic levitation to occur only at low temperatures. Invention of room temperature superconductor will allow the development of magnetic levitation vehicles that need to overcome air resistance only. If such a vehicle is operated inside an evacuated tunnel, scientists estimate that up to 4000 miles per hour of speed is achievable.

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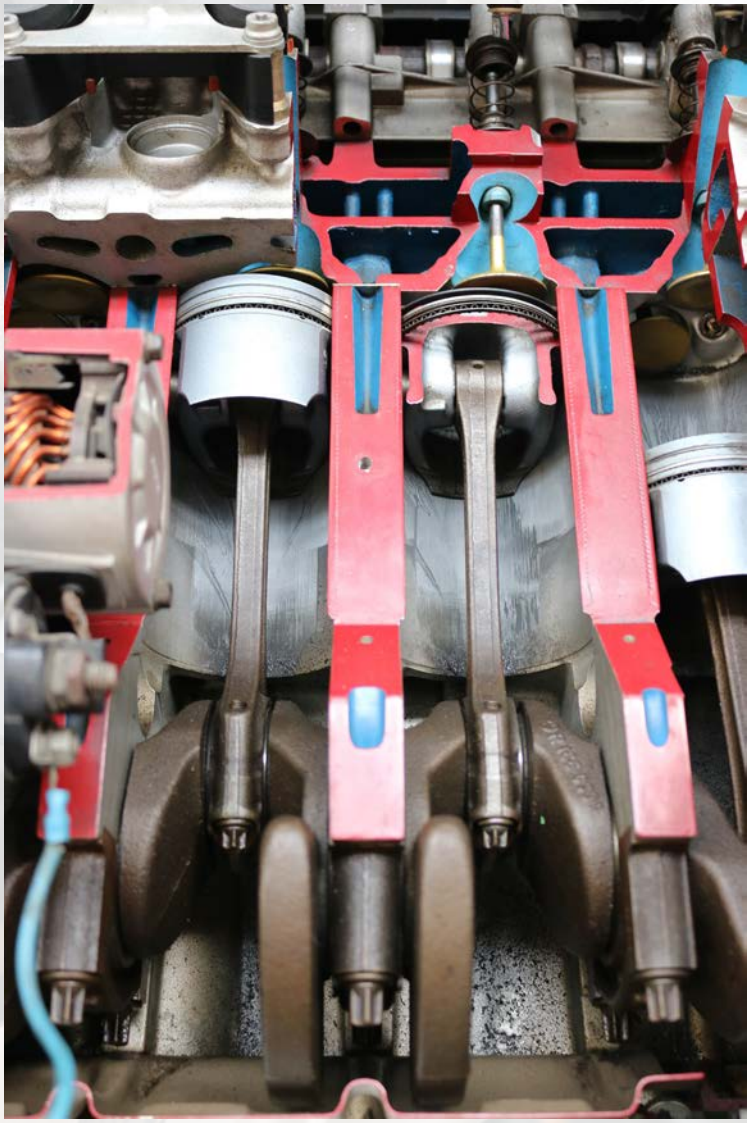
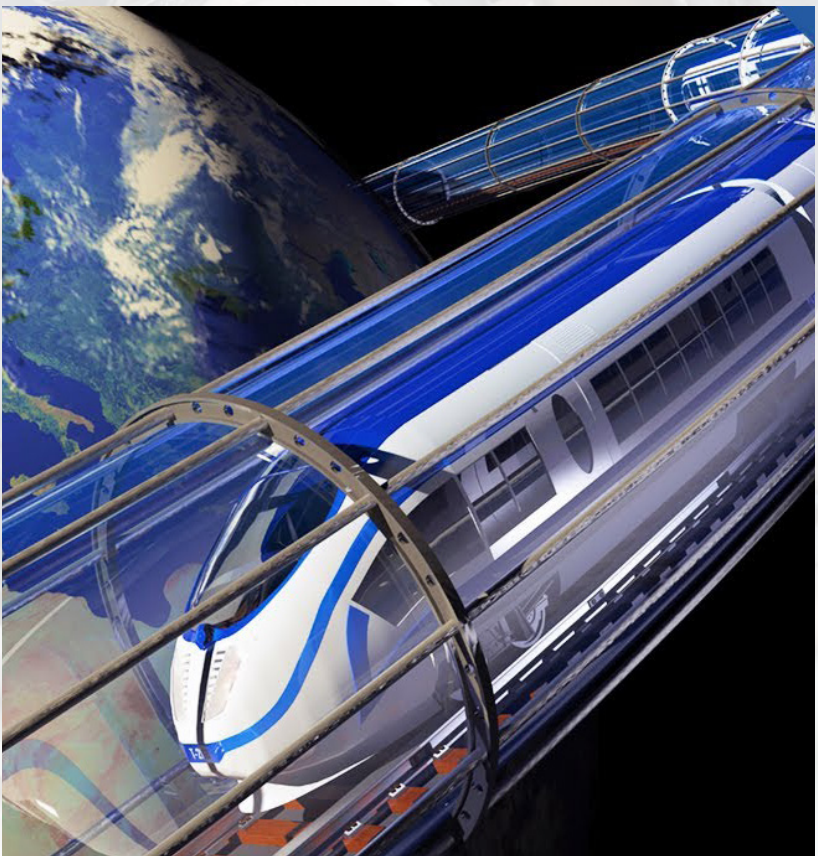
Future fuels and engines in transportation



Transportation requires a substantial amount of energy. Oil, which is a form of fossil fuel, is widely used in cars, aircrafts, ships and other vehicles equipped with internal combustion engines. Other than the bad reputation of fossil fuel in polluting the environment, depleting natural resources make humans very keen to look for alternative sources of energy, preferably one that is the least harmful to the earth. Bio-fuel and liquid fuel derived from coals are examples that may offer cleaner sources of energy.

Increasing the efficiency of engines and using renewable energy are other options being explored. For instance, to reduce the emission of pollutants, hybrid cars that use a combination of internal combustion engine and electric motor have been introduced. Electric cars use electricity stored in batteries. This makes for a significant leap if the battery technology is considerably improved. A more compact battery that has short recharge time and unlimited charge cycle is desirable. One of the main drawbacks of the battery is its mass, which does not significantly reduce even when almost all of its stored energy has been drained - a characteristic that is not possessed by petrol fuel. Grid-connected electric vehicles do not warrant the necessity to carry any battery. However, researchers must ensure that the technology is economical enough to be implemented.

Another type of technology that can be used in transportation is the fuel cell. In a fuel cell, hydrogen and oxygen are combined to produce energy and water. Hydrogen acts as energy carrier, which has density that is less than petrol. The process of hydrogen production could be powered by renewable energy resources, in line with the sustainability goals of the future.



Space tourism

Space tourism is expected to become common in 2070 and beyond. Several methods have been proposed to enable humans to reach the outer space. Space shuttles have now been successfully operated for trips between the earth and outer space. In the future, it is expected that the public could visit outer space for vacation. Space shuttles may become the transporter for space tourists soon. Rigorous development in space elevators would provide another means of transportation for the space tourist. Wouldn't it be a fascinating experience to visit the outer space at the touch of a button, similar to travelling in a lift to reach a certain floor in high rise buildings?

RAIL TRANSPORT TECHNOLOGY IN MALAYSIA

By Assoc. Prof. Dr. Muhammad Fahmi Bin Miskon

Rail Transport Scenario in Malaysia

Malaysia's public transportation has improved aggressively in recent years. In the latest development, MMC Gamuda KVMRT (PDP) Sdn Bhd has successfully completed and launched the first phase of the new Sungai Buloh - Kajang Mass Rapid Transit (MRT) service on 15th December 2016. The service covers 12 stations between Sungai Buloh and Semantan in Phase 1. It will continue to Kajang in Phase 2, which is scheduled to complete in late 2017. MRT is owned by Mass Rapid Transit Corporation Sdn. Bhd. and operated by Prasana Rapid Rail Sdn. Bhd. The train could reach a maximum speed of 100kph. With an average speed of 70kph, it takes only 30 minutes to travel 23 km from Sungai Buloh to Semantan. There are four cars in each train, carrying 300 passengers per car. The service has a frequency of 2.5 minutes during peak hours and runs from 6 am to midnight daily. Such capacity can certainly solve some of the urban congestion issues faced by greater Kuala Lumpur. Figure 1 shows some quick facts on the new MRT service from Sungai Buloh to Kajang.

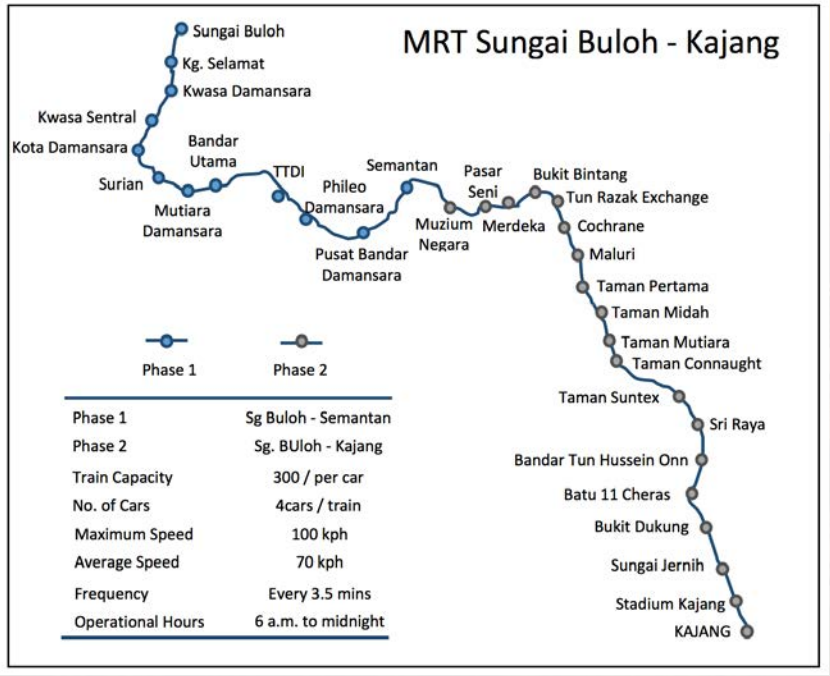


Figure 1: MRT Sungai Buloh – Kajang line.

Figure 2 depicts travel time comparison between different modes of transport from Kuala Lumpur to Singapore.

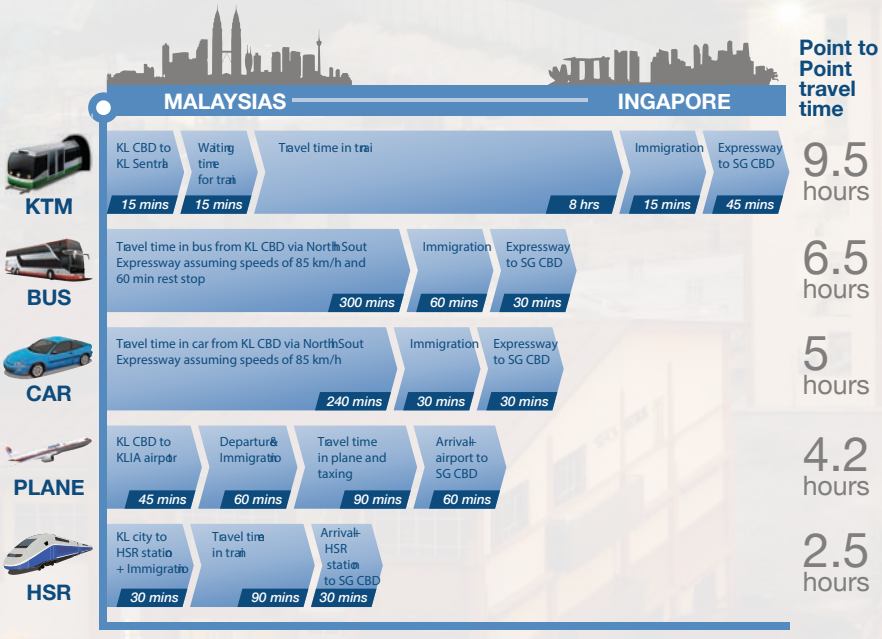


Figure 2: Estimated travel time between Kuala Lumpur and Singapore using various mode of transport. (Source: SPAD, 2013)

Another exciting development in the Malaysian public transportation landscape is the future development of high speed rail (HSR) to be led by MyHSR Corporation Sdn. Bhd., which is wholly owned by the Ministry of Finance. The project is expected to be completed in 2026. According to Suruhanjaya Pengangkutan Awam Darat (SPAD) in 2013, the high speed rail (HSR) is estimated to reduce travel time between two capital cities, i.e. Kuala Lumpur and Singapore, by at least two hours compared to the fastest current alternative. When compared to aircraft transport, travelling using HSR saves the hassle of departure and immigration processes. This convenience will allow the two big cities to access larger markets, investment opportunities, and talent pools. In cities along the HSR route, seven priority economic growth areas have been identified - digital economy, bio-economy, advanced manufacturing, healthcare, tourism, furniture, and textile. The cities concerned are Bandar Malaysia, Putrajaya, Seremban, Melaka, Muar, Batu Pahat and Iskandar Putri.

Rail Technology

The existing and newly developed rail transportation system needs strong support from a complete rail ecosystem. As depicted in Figure 3, the ecosystem of rail-related activities in Malaysia can be grouped into seven major components: Policy/Regulatory, Asset Management, Rail Operation, Design, Manufacturing & Assembly, Maintenance, Repair & Overhaul, Support Services, and Education & Training. In 2014, the Malaysian Industry-Government Group for High Technology (MIGHT) published the Malaysian Rail Supporting Industry Roadmap 2030 to chart the way forward for the country's rail industrial development until 2030. The industry is divided into several sub-sectors, namely design, manufacturing & assembly of rail-related products, infrastructure, and maintenance, repair & overhaul (MRO).

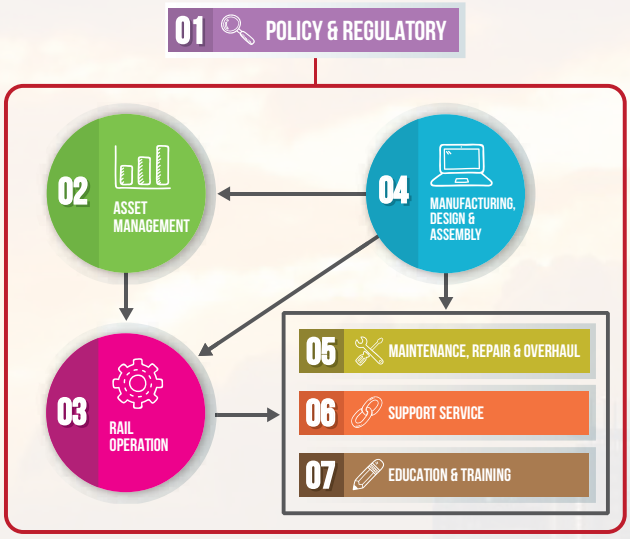


Figure 3: The structure of rail industry in Malaysia.

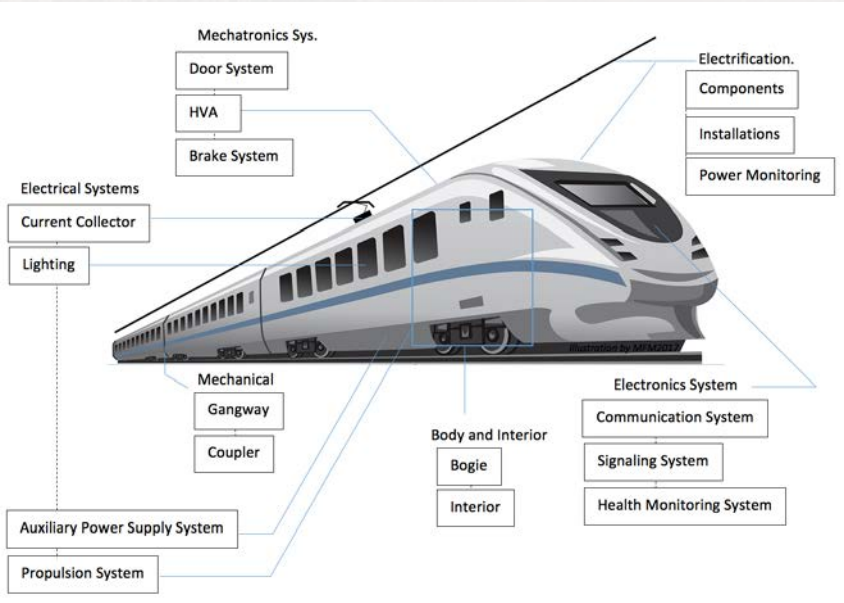


Figure 4: Some of the main rail transport sub-systems and components.

Within these industrial sub-sectors, there are many specialized technologies involved, including rolling stocks & electrification, signaling, and communication & train control. To add, there are also the building and maintaining of rail tracks and infrastructure. Unfortunately, Malaysia is still dependent on foreign products, and it has insufficient skilled and knowledgeable human capital in some rail-related activities. Figure 4 illustrates some of the main rail transport sub-systems and components in rolling stocks & electrification, signaling, as well as in communication & train control. The main sub-systems and their components highlighted in Figure 4 are electrical systems, mechanical systems, electronics systems, mechatronics systems, body & interior, and electrification.

Trains will not be able to move without rail tracks and infrastructure to support. The main activities for rail tracks and infrastructure include track works, electrification, track maintenance vehicles, and civil works & systems.

Opportunities for Malaysia

One of the drivers needed to shape the future of the Malaysian rail industry is technology and human capital development. Malaysia should take advantage of the expanding rail industry by increasing its know-how base to support existing and future assets, as well as by uncovering new rail technologies through research and development. With the ongoing rail projects as well as future projects announced by the government, the rail industry will need some 30,000 professional and skilled technicians and engineers to meet the industry's demand by 2030.

Malaysia should also take advantage of the new paradigm of short and long distance commute. As the network of rail and other modes of public transport expand, plus the advancement of new technologies, travelling within cities and inter-cities become more convenient, faster and cheaper. The rail transport system, particularly the new HSR, will improve the Malaysian economy and lifestyle by providing easy access to cities along its route. This opens up countless opportunities for a variety of services and goods. That is why integrating development planning with HSR is vital right from the beginning, as it ensures that each city and the people are ready to take up whatever prospects on offer.

The future of rail transport is already here in Malaysia. In the long run, rail transport will expand, positioning Malaysia to become one of the leaders in the rail industry in the ASEAN region and even the world.

POLYTECHNIC : CARVING A NICHE IN THE RAIL INDUSTRY

By Dr. Naimah Binti Md Khalil

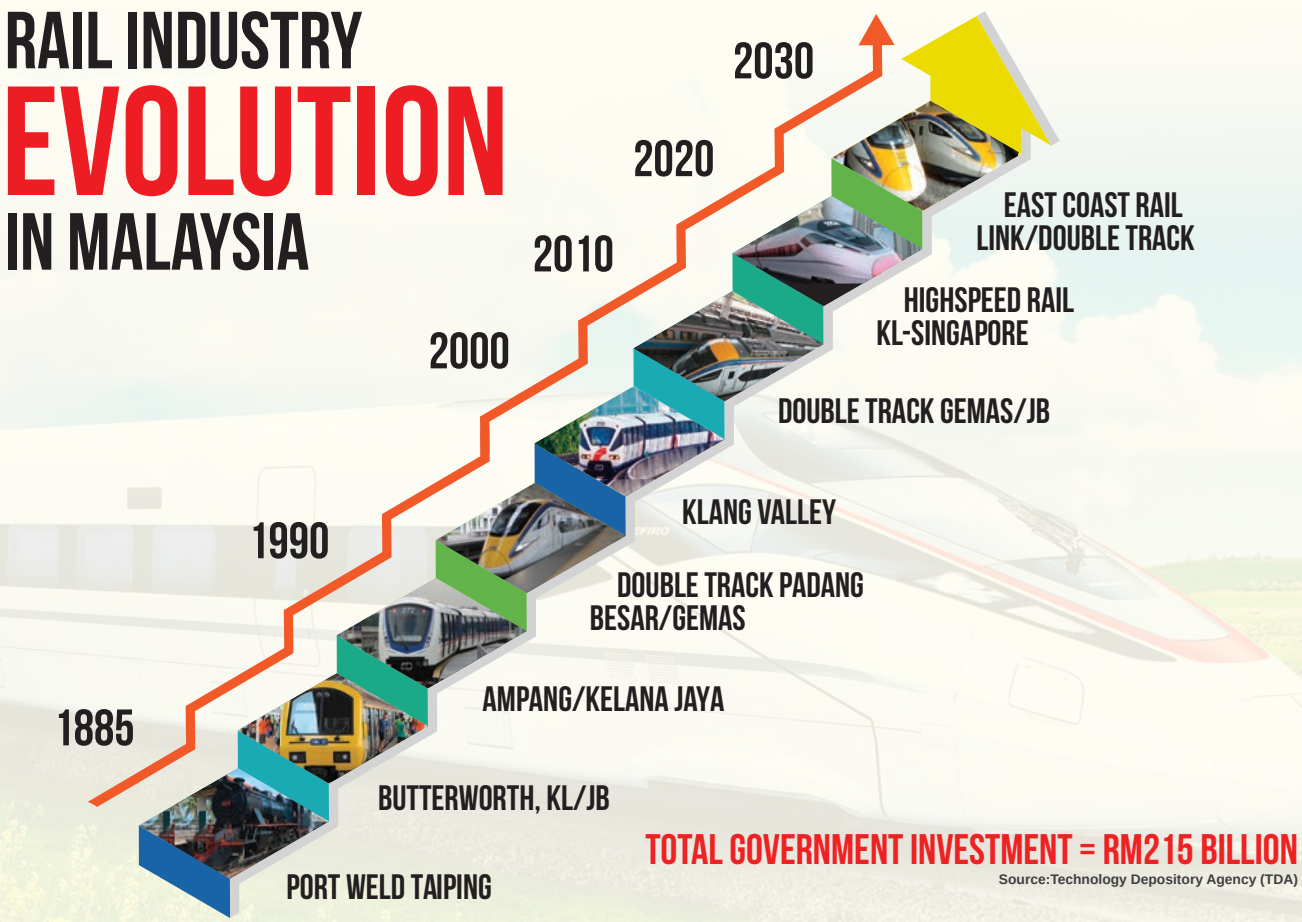
INTRODUCTION

According to the National Rail Industry Roadmap, by 2030 Malaysia's rail industry will be a strong and sustainable business, capable of satisfying the demands of the national rail transportation, and a competitive global player that optimises the use of indigenous resources and technologies. This means, migrating from 'integrator and exporter of monorails' to 'integrator and exporter of light / heavy rails' with speed less than 200 km/h. The government is estimated to invest about RM 160 billion for future rail projects until 2020. Based on the huge business opportunities, the Government is supporting the industry's aspiration to advance to the next level.

The characteristics of the industry as envisaged by Vision 2030 shall be attained by means of having a conducive rail industry eco-system, high localisation of rail products and services and being a competitive regional & global player. Hence one of the important strategies to achieve this vision is by populating the industry with capable workforce and thereby developing capability in targeted technology areas.

This is where the challenge begins because although the National Rail Industry has been around for the past 130 years, the size of the rail industry remains small. Major rail related engineering works are still dependent on foreign expertise. This means that workforce requirements have not been addressed holistically thus local industry players are not equipped with world class rail industry capabilities, infrastructures and certifications. There is also no focal point as a centre of reference to ensure the development of the local rail industry.

The Forecast set by PEMANDU is to have 48,700 jobs by 2020 in the rail industry. However it does not take into account the attrition rate of 3%-5%, Inter-sectoral movement and potential upsurge of manpower leaving for rail related jobs within ASEAN & Middle East. Based on the size of the rail sector development, there are needs to support industry's sustainability via Human Capital Development and Knowledge Transfer programs. The Technology Depository Agency (TDA) is currently driving the Rail Center of Excellence (RCOE) agenda in order to enhance the Human Capital Development in the rail industry.



POLYTECHNIC'S ROLE

As a TVET institution that has been around since 1969, it is only befitting that Polytechnic rise to the challenge of providing training in the relevant areas needed and identified by TDA. A joint venture between TDA and Department of Polytechnic Education (DPE) on RCOE was meted out in early 2016 where DPE will collaborate in the preparation of the training modules and enhancement of the curriculum provided by Original Equipment Manufacturer (OEM). Towards this end and in conjuction with TDA, 3 polytechnic lecturers have been sent for training in Signalling and Communication in Thales, Portugal and another one to CRRC, China for training in Rolling Stock in 2016. These efforts will also help towards the establishment of a Rail Centre of Excellence (RCOE) in the polytechnic.

However, Polytechnic needs to play a more effective role in ensuring that the nation's needs and requirements in the rail industry are met. Hence a meeting with the main rail industry players was called in May 2017 to solicit input in order to position Polytechnic on how to best meet the national rail industry manpower needs. The input from this meeting is very important in helping to identify the relevant areas and measures to be taken by Polytechnic in order to achieve not only the outcome of providing the required manpower but also to address other areas of growth as a result of the development in the rail industry not least on the supply chain area.

A strategic plan for Polytechnic to address the challenges brought about by the rail industry needs to be drafted. Although there are already four (4) trained lecturers in the rail related areas, they will also be involved in TDA's Rail Industry development plan. As such, the number of lecturers who have knowledge and competencies in the rail industry in the polytechnics need to be increased in order to have the critical mass required to roll out the programmes related to rail in the polytechnics. Thus Training of Trainers (TOT) programmes will have to be put in place as well as measures like industrial attachment or secondment to the rail industry either in the form of industrial attachment or cross fertilisation, and also reskilling programmes for the lecturers.

Module development for the rail courses is also a priority where the focus of these courses can be for the three year polytechnic diploma programmes or for reskilling/upskilling courses for existing rail workers. To ensure that these programmes are recognised by industry, the curriculum must adhere to the National Competency Standards as well as the National Rail Standards which is currently being developed. The programme must also be designed to provide for industry or professional certification which will ensure its credibility. Being an institution under the Ministry of Higher Education, the polytechnic diploma programme must certainly be accredited by the Malaysian Qualifications Agency. Of course, aligned to the Polygreen Blueprint (2015), the curriculum will embed Green Technology, moreso since rail related programmes are most closely related to the environment.

Although it would be ideal to have a Rail Centre of Excellence in the polytechnic, efforts towards this end could begin by enhancing the existing Centres of Technology in the polytechnics to incorporate aspects of the rail industry for example the Centre for Air Conditioning and Refrigeration at Politeknik Ungku Omar, Ipoh could also look into research for air conditioning in the rail industry as well.

Of course, there are a number of institutions that are also offering rail related courses. It would be more strategic if there is collaboration between Polytechnic and these institutions. This would help to ensure the dynamism and expansion of the National Rail Industry.

In order to have the required workforce, efforts need to begin from those who are still at school. Hence promotion is indeed an important tool to create interest and awareness among the young so that there are feeders for the planned programmes. To date, Polytechnic has worked closely with TDA in the Rail Awareness Programme held in three zones - Northern, Central and the Southern Zone. The programme will be continued to include the East Coast and Borneo region in the near future.

It is hoped that these efforts by Polytechnic will contribute to the healthy growth of the National Rail Industry. However these measures are not free, Polytechnic needs to seek funding not only from the Ministry of Higher Education but also from other parties eg TDA. Collaboration with the operators in the rail industry is also a key point in ensuring the relevancy, delivery and sustainability of these rail related programmes.

PREPARING FOR SUFFICIENT HUMAN POWER FOR MALAYSIA'S RAIL INDUSTRY

By Assoc. Prof. Dr. Kushsairy Abdul Kadir & Ir. Azman Senin

Public rail transportation is key in Malaysia's Economic Transformation Plan. In the Kuala Lumpur and the Klang Valley areas alone, there are currently nine train lines servicing the vicinity. The lines intersect in a transport hub called Kuala Lumpur Sentral (KL Sentral). From KL Sentral, there are two commuter rail services linking Kuala Lumpur to the Kuala Lumpur International Airport.

PRASARANA - KL Sentral

PRASARANA - LRT Station

The Government, under its RMK-11 Master Plan, has come up with a massive MRT project, which when completed, is expected to increase connectivity for an estimated 1.2 million residents. This project has created many opportunities to local rail industry services, such as in design manufacturing & assembly, infrastructure & system, maintenance & overhaul (MRO) and several others. Nevertheless, the opportunity does not come without issues and challenges. The issues and challenges, which are hampering the smooth progress of the local rail industry, include (as per diagram besides)

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Universities play an important role in terms of research on the critical technology used in the works. The issue of sufficient human power for the rail industry is also prevalent.

Recognising this opportunity, Universiti Kuala Lumpur, under its We4Asia initiative, has established the Asia Rail Institute, which is the first institute in Malaysia that concentrates on railway technology. Established in March 2016, Asia Rail Institute's mission is to produce competent human capital in railway systems for Malaysia and Asia in the next five years. The mission is in line with the Government's initiatives via the Economic Planning Unit (EPU) framework under Pillar No. 3 (Teras 3) – Pembangunan Modal Insan (PMI).

To jumpstart the initiative, EPU has injected a sum of money for capital expenditure under the 11th Malaysia Plan. The aim is to create a highly-skilled workforce and entrepreneurs from targeted groups such as SPM leavers (especially from rural areas), diploma students and degree students from the bottom 40% initiative (B40).

The Ministry of Transport recognises Asia Rail Institute as a centre of excellence for human capital development for our nation and Asia utilising the National Blue Ocean Strategy (NBOS) approach via collaboration between Universiti Kuala Lumpur and Rapid Rail Academy. In the first phase, Universiti Kuala Lumpur Asia Rail offers railway professional courses, licence programmes and customised courses to cater for the immediate demands of the railway project. In future, the programmes will be expanded to cater for new and more complicated demands of the railway industry.

The current programmes offered to the masses as well as the railway community are Professional Certification for Rolling Stock Maintenance, Signalling and Communication Level 1, Signalling and Communication Level 2, Signalling and Communication Level 3, Railway Professional Program – Asset Management, and Railway Professional Program – Operation Management and Railway Executive program.

International Railways Forum 2017, organised by Universiti Kuala Lumpur on 14 April. Officiated by YB Datuk Aziz Karpawi, Deputy Minister of Transport

MCBC HONOURS PRASARANA AS PROVIDER OF WORLD CLASS PUBLIC TRANSPORT

Prasarana Malaysia Berhad (Prasarana) – the driver in Malaysia's transformation of the urban public transport service – continues to draw worldwide recognition and support for its contribution to the nation when it was accorded a special award from Malaysia Canada Business Council (MCBC).

Prasarana, which operates the Rapid KL urban rail and bus services in the Kuala Lumpur and Selangor, was accorded MCBC's Business Excellence Award for World-Class Mass Public Transport Provider at the council's 25th anniversary dinner, which honoured 28 other distinguished personalities and companies from various industries in the country.

Dato' Ir Zohari Sulaiman holding proud the MCBC award. He was flanked by other members of Prasarana Senior Leadership team

Held at Mandarin Oriental Kuala Lumpur on May 23, Prasarana was represented by Dato' Ir Zohari Sulaiman, who is the Chief Executive Officer of Rapid Rail Sdn Bhd, which is the Group's subsidiary in operating its rail services that included three LRT lines, a monorail service and the new MRT Sungai Buloh – Kajang Line.

The award was presented by the Deputy Minister of International Trade and Industry Datuk Chua Tee Yong, who accompanied by Her Excellency Judith St George, the Canadian Ambassador to Malaysia.

Commenting on the award, Zohari said Prasarana was honoured to be recognised with such a distinguished establishment and a prestigious award to be a world class public transport provider in Malaysia.

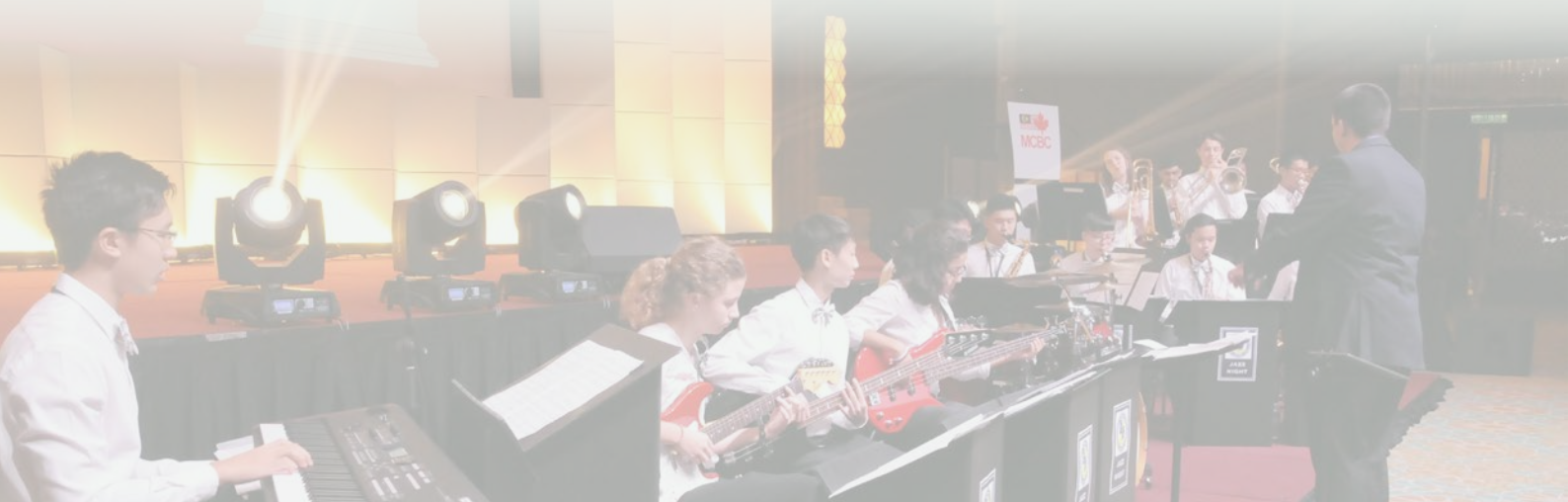
"It is the clearly written in our vision to be the preferred provider of world class mass public transport Malaysia. Like the MCBC, Prasarana has gone a long way in our works for the transformation of the country's urban public transport system and in line with the government's National Transformation Programme.".

"Like all the previous awards and recognition accorded to us, the MCBC Business Excellence Award will spur us at Prasarana to strive harder in taking our rail and bus services to higher levels as we help push the Government's aspiration of increasing the public transport modal share to 40 percent by 2030," he added.

Some of the awards that had been previously accorded to Prasarana's include innovation works by staff of Rapid Rail that is largely aimed at increasing efficiency and enhancing productivity in the rail operations.

While the urban rail services are managed and operated by Rapid Rail Sdn Bhd, the Rapid KL stage bus service is operated by Rapid Bus Sdn Bhd, which also runs Rapid Penang, Rapid Kuantan dan Rapid Kamunting bus services.

Rapid Bus operates with modern buses, which are equipped with universal access features and supported by state-of-the-art bus control centre, which has the capability to monitor the movement of the buses via GPS.



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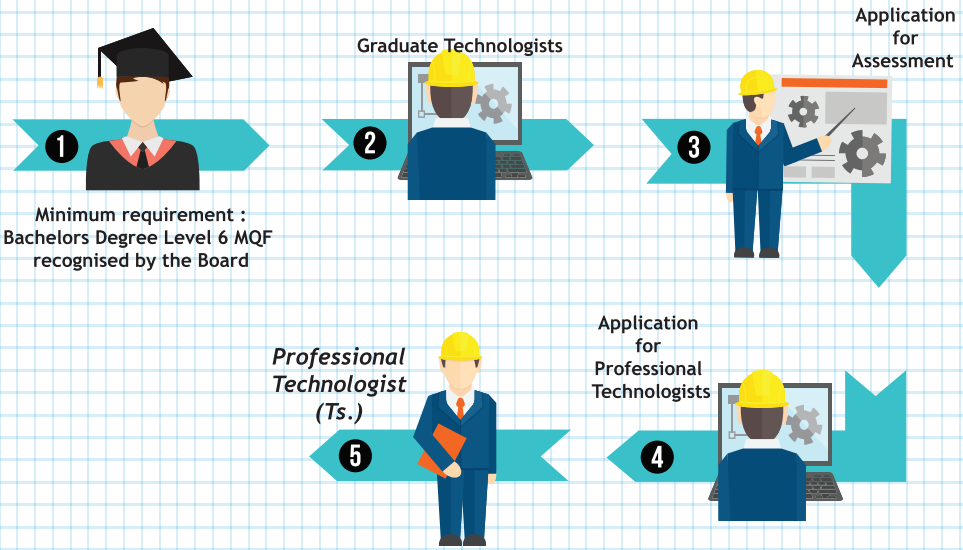
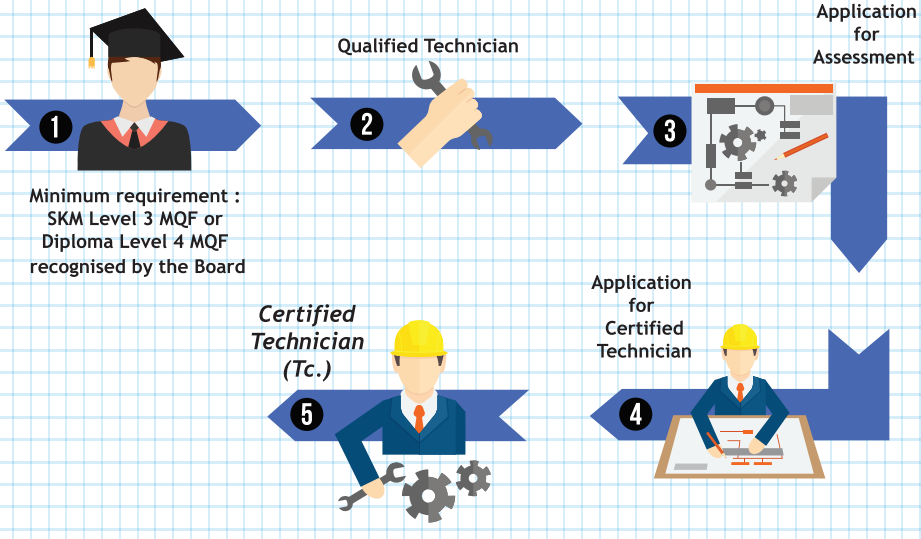
Graduate Technologist : RM 50.00
Qualified Technician : RM 30.00

Who should register?

Graduate Technologists



Qualified Technicians



INDUSTRY 4.0 AND THE MALAYSIAN HIGHER EDUCATION (ABRIDGED VERSION)

By Assoc. Prof. Marlia Puteh

Industry 4.0 leverages on disruptive technologies which touch upon many fields – Internet of Things (IoT), cyber security, big data, cloud, mobile internet, advanced robotics, and next-generation genomics, among others. The big question is, how ready is the Malaysian higher education in embracing Industry 4.0?

Here are the opinions of three Malaysian scholars regarding the matter. Professor Datin Dr. Rubiyah believes that some technologies for Industry 4.0 are already embedded in university programmes, although much more is warranted. She strongly feels that Universities need to produce more experts in the fields required for Industry 4.0 especially at the postgraduate level. The undergraduate level will take longer to take off due to requirements stipulated by the Engineering Accreditation Council.

Similarly, Professor Dr. Mohammad Hamiruce feels that local universities are fast in adapting to changes and are currently moving from producing industry-ready graduates to future-proof graduates who have creativity, innovative and entrepreneurial mindsets.

In contrast, Professor Ir. Dr. Noor Azuan reflects the opposite. He thinks that universities are only partially ready to face Industry 4.0, and envisages big investment in people and infrastructure for preparation towards Industry 4.0. He also predicts that the curriculum content and pedagogical delivery will require some kind of transformation where collaborations and insights from the industry will be needed.

Industry 4.0 is not only about advances in technology. Advancement in learning analytics is also called for, hence the introduction of Integrated Cumulative Grade Point Average (iCGPA), which highlights the Ministry's provision of university students' experience towards Industry 4.0. Through iCGPA, future employers will be able to assess students' academic credentials and their social engagement and personality traits. By the same token, students will be acclimatized to attain suitable workplace skills and mindset at the beginning of their academic years.

Malaysian universities are also ready for Industry 4.0 by way of course offerings. Programs such as Bachelor of Computer Science (Artificial Intelligence), Bachelor of Electrical Engineering Technology (Automation and Robotic Technology), and a host others are already on offer. There are also Centres of Excellence (CoEs) that are intended to spur competitiveness in various fields of research and development. The CoEs include the Virtual Reality Centre

(UM), the UTM Big Data Centre, and the Institute of Microengineering and Nanoelectronics (UKM), to name a few. These CoEs predominantly thrive on translational research, another initiative by the Ministry in driving local universities to seek solutions to the problems faced by the industry, academics, government and community.

In strengthening our human capital base, initiatives such as the UNI-Industry collaboration or UNIC, blurs the lines between the university and industry in our effort to ensure that our graduates have the skills and mindset to be employable by emphasizing on their individual talent and personal development.

Regarding academic-industry collaboration, the Ministry of Higher Education (MOE) ought to provide various platforms to link the two. Under the Ministry's 2017 'redesigning higher education' agenda, various initiatives that will bring our education offerings up to speed with Industry 4.0 are introduced. Two such examples are the 2u2i and the CEO@Faculty programmes.

In short, Industry 4.0 is already here and Malaysia is at the onset of adopting newer innovative technologies into its higher education ecosystem. Our achievements in global rankings such as the Times Higher Education World University Rankings are exemplary to our effort in globalizing and escalating Malaysia as a regional education hub. Still, we should do more at a greater speed in these challenging times so as to leverage whatever opportunity that comes our way. We need to ensure that our graduates are fully prepared for 21st century challenges.

Indeed, Industry 4.0 may have the potential to "robotize" humanity. Nonetheless, we need to shape a future that works for all of us by putting people first and empowering them because everything comes down to people and values. At the end of the day, creativity is innately human and individual touch and caring work cannot be replaced by intelligent machines.

THE NEW MASS RAPID TRANSIT (MRT) SUNGAI BULOH-KAJANG (SBK) LINE

Source: https://www.myrapid.com.my/traveling-with-us/how-to-travel-with-us/rapid-kl/mrt

MRT SBK Line Connectivity

The line connects you to Sungai Buloh (northwest of KL) and Kajang (southeast of KL) through its 51 km route. It comprises of a 41.5 km elevated guideway with 24 stations and 9.5 km tunnel segment with 7 underground stations. The MRT SBK Line also integrates 7 locations / stations with existing rail lines and 16 stations equipped with park & ride facilities.

Fully Automatic Operations

Similar to the Kelana Jaya Line, the operations of the MRT SBK Line trains are fully automatic and operated remotely from the Operations Control Centre (OCC) in Sungai Buloh Depot and a Backup Control Centre (BCC) in Kajang Depot.

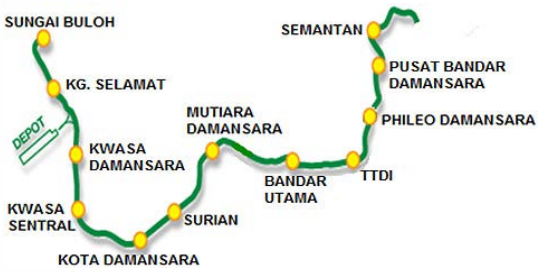
Ready for Service

The entire stretch of the MRT SBK Line line will be fully completed and ready for passengers by July 2017. Starting from 15 December 2016, Phase 1 of the MRT SBK Line will be ready to take you from Sungai Buloh (station 1) to Semantan (station 12), at a total estimated travel time of approximately 30 minutes. All trains will turn back to Sungai Buloh at the north portal near Semantan station.

Phase 2 of the line is estimated to commence by July 2017, taking you from Sungai Buloh (station 1) to Kajang (station 31). Estimated traveling time is 86.3 minutes.

All trains will be operating at a frequency of 3.3 minutes during peak hours.

Phase 1 Operations
(starting 16 December 2016)



Phase 2 Operations
(July 2017)

Facilities at Stations

Universal Access	Provided
Ramps for wheelchair users and passengers with walking difficulty	No
Accessible entrances and exits	Yes
Handrails at the entrance/exit ramps	No
Accessible lift for wheelchair users, pregnant woman, elderly and person with disabilities	Yes
Tactile tiles on the edge of platforms	Yes
An obstacle-free route – An unobstructed route across a station concourse	Yes
Accompanying stairs handrails, higher and lower, to facilitate people of different heights, including children and people with walking difficulty	Yes
Accessible tickets counters with ticketing facilities and customer assistance: lowered ticket counter for wheelchairs users	Yes
Priority Lane Wide gate for wheelchairs users, blind person, passengers with big luggage, family with baby stroller completed with directional tactile	No
Accessible toilets	Yes
Accessible lift with tactile (embossed and Braille) signs at All Station lift buttons	Yes
Lift control buttons with braille markings	Yes
Chairlift at a level where it is inappropriate for a lift to be installed	Not available
Accessible Help Points at platform	No
Well-lit platforms to give passengers a feeling of comfort and security	Yes
Slip Resistance Floor	Yes
Passenger Automatic Gate	Yes
Station signage to identify services, facilities, direction to platforms, entry, exit etc	Yes
Passenger Information Panel (PIS)	Yes
Parking for Disabled (wheelchair users)	Yes
Disabled persons' parking spaces, showing compliant parking space markings	No
Train doors are equipped with visual prominent flashing red 'Door Closing' lights to warn passengers	Yes
Priority Seating: Seating located nearest to the train car entrance is designed and designated to provide easy access for people with disabilities, wheelchairs parking space inside train compartment	Yes

Train Information

Item	Info
Number of Trains (sets)	58
Overall width	3.1m
Primary Power	750 DC
Passenger seating capacity (without wheelchair / standees + seated)	Motorised car = 45 seats Train car = 43 seats
Overall Length (in mm)	89,560 mm
Height (in mm)	3,700 mm (top of rail)
Design Speed	100km/h
Revenue Service	December 2016 (Phase 1)
Peripheral seating attached to sidewalls	Yes
Fibre Reinforced Place (FRP) seats	Yes

PETA TRANSIT BERINTEGRASI LEMBAH KLANG

KLANG VALLEY INTEGRATED TRANSIT MAP

Source: https://www.myrapid.com.my/clients/Myrapid_Prasarana_37CB56E7-2301-4302-9B98-DFC127DD17E9/contentms/img/20170504_Transit_Map

NOTA :

Sila ikut langkah berikut apabila menggunakan stesen sambungan Rapid KL :

- **Dang Wangi dan Bukit Nanas**
  Beli token untuk perjalanan hingga stesen Dang Wangi (jika dari LRT Laluan Kelana Jaya) dan stesen Bukit Nanas (jika dari Laluan Monorel KL.). Keluar dari stesen destinasi tersebut dan beli token perjalanan baharu untuk memasuki stesen sambungan.
- **Sultan Ismail dan Medan Tuanku**
  Beli token untuk perjalanan hingga stesen Sultan Ismail (jika dari Laluan LRT Sri Petaling) dan stesen Medan Tuanku (jika dari Laluan Monorel KL). Keluar dari stesen destinasi tersebut dan beli token perjalanan baharu untuk memasuki stesen sambungan.
- **KL Sentral (LRT Laluan Kelana Jaya) dan KL Sentral (Laluan Monorel KL)**
  Beli token untuk perjalanan hingga stesen KL Sentral (di laluan di mana anda berada).
  Keluar dari stesen destinasi tersebut dan beli token perjalanan baharu untuk memasuki stesen sambungan.

Bagi pengguna kad MyRapid dan Touch 'n Go, tambang akan ditolak berdasarkan perjalanan anda.

NOTE:

Please observe the following steps for journey between Rapid KL connecting stations :

- ***Dang Wangi and Bukit Nanas***
  Purchase tokens up to Dang Wangi (if from LRT Kelana Jaya Line) and Bukit Nanas (if from KL Monorail Line).
  Exit station upon arrival and purchase another new token to enter connecting station.
- ***Sultan Ismail and Medan Tuanku***
  Purchase tokens up to Sultan Ismail (if from LRT Sri Petaling Line) and Medan Tuanku (if from KL Monorail Line).
  Exit station upon arrival and purchase another new token to enter connecting station.
- ***KL Sentral (LRT Kelana Jaya Line) and KL Sentral (KL Monorel Line)***
  Purchase tokens up to KL Sentral (on the current line you are on).
  Exit station upon arrival and purchase another new token to enter connecting station.

For MyRapid and Touch 'n Go card users, fare will be deducted accordingly as you travel.

rapidKL

SPAD SURUHANJAYA PENGANGKUTAN AWAM DARAT LAND PUBLIC TRANSPORT COMMISSION

MALAYSIAN SELF-DRIVING CAR: CHASING GLOBAL TECHNOLOGY

By Syahril Anuar Idris, Muhammad Haziq Faris Hasnol & Khairul Muzzammil Saipullah

Introduction

REKA's self-driving car made an appearance for the first time around November 2016 and made headlines in a lot of media. REKA's Self Driving Car was highlighted in various events and the event that started it all was during Kuala Lumpur Engineering & Science Fair (KLESF) in 2016. KLESF started our journey in realising the dreams of Malaysians owning cars and to experience first-hand a global technology that is built locally.

Who or What is REKA? REKA is an abbreviation for "Rediscovering Knowledge and Arts" which we believe through technology, design and innovation we can help communities to ease the burden of life. REKA is an R&D company that specializes in multiple disciplines under Artificial Intelligence with the mission to create and invent technology that will lead to a sustainable life.

Developing a self-driving car, used to be a topic in which only big automotive companies such as Tesla, Toyota, and Nissan invest billions of dollars to make possible. Yet REKA, a small R&D company from Malaysia that consists of less than twenty employees takes a step inside this game. Introducing different approaches on a self-driving car system, REKA developed CRETA - an apparatus retrofitting on a human driven vehicle to achieve level 4 autonomous vehicle.

REKA's self-driving car project is still under development and looking for pledges to support the innovation. However, the system itself has already been tested on the road and proof of concept is verified. The journey of REKA self-driving car project can be viewed on our Youtube channel - REKA Studios (HQ) or can be Googled with the keywords "REKA Self Driving Car".

Self-Driving Car Journal

It was around March of 2016 that our CEO, Haziq, came to the Malacca Branch of REKA and briefed our Chief Research Officer, Khairul Muzzammil, of an event that would take place in November 2016, the Kuala Lumpur Engineering and Science Fair (KLESF). It was a good opportunity to introduce to the Malaysian makers about REKA Innovation Gear (RIG), REKA's very own development board that we have been planning to build since January. Everyone was excited with the notion but the question that everyone was thinking of was "How are we to stand out against Arduino and Raspberry Pi?". The answer uttered next by our CEO was about to put REKA on a journey in chasing the impossible, "Why don't we build Malaysia's First Self Driving Car?"

Then over the following months, we were faced with a task never been done before within REKA or in fact, Malaysia. A lot of brainstorming had been done to decide on how we were going to carry out the project but the development came to a halt. On May 2016, REKA launched an initiative called F.uT.U.Re. Program (Fun with Technology Untuk Remaja), a program to spread awareness in digital and green technology amongst high school students around Malacca. Our whole team was involved and we were swamped with the program, such that our Self Driving Car Project did not leave the drawing board in our lab.

Around June we were already finished with developing our first version of RIG which we called RIG Lite and was looking to mass producing it, all the while still sketching our Self Driving Car. We were sourcing for good manufacturers in Malaysia and also in China. During the time, we were busy with a few on going R&D projects with several companies and did not have the opportunity to actually get started on our Self Driving Car. Then September came and we are pressured by our COO at the time, Syurahbil, to get started on the Self Driving Car project which after consideration was given the name project CRETA. In late September, our team gathered most of the materials needed to build CRETA but something was missing, a motor for the steering wheel and a few mechanical parts.

Early October we had improved on the design for our Self Driving Car and also most importantly had gained the trust of one our engineer's parents to loan their Proton Waja as a test subject. We had decided to go with a retrofitting style of system, where we the system could be installed or uninstalled without tempering or major modification on manufacturer warranty. One of the factors why we went for a retrofitting style is because of the limitations we had for modifications or changes that can be made to the car. We did not want to permanently modify the car or to void the warranty. Obviously, this was a tough challenge. From there we had divided the system into three milestones, the mechanical design to control the steering wheel and pedals, the image processing and artificial intelligence to recognize the obstacles around the vehicle and the electronic control unit, to give commands and make decisions for the movement of the vehicle.

In mid October, REKA sent a team to Shenzhen to source for motors and various electronic components that we could not find in Malaysia. There we met various manufacturers and took advices to better improve our design. By the time we came back from our China trip, we were only a week away from KLESF and we were faced with another roadblock. The mechanical design that we initially designed had problems supporting the motor to turn the steering wheel in a continuous cycle. The pressure was on. We needed to find a better way of doing it. The original design was sufficient for KLESF as we were not

allowed to do a live demo of the car and even during the event we were still working on the mechanical design.

Then Selangor Makers and Innovation Carnival (SMIC) came mid November. By this time, we had already totally changed the mechanical design from a pulley system that goes all the way to the floor to a gear system fitted behind the steering wheel. The whole time the only mechanical design that worked from the original design was the servos that controlled the pedals.

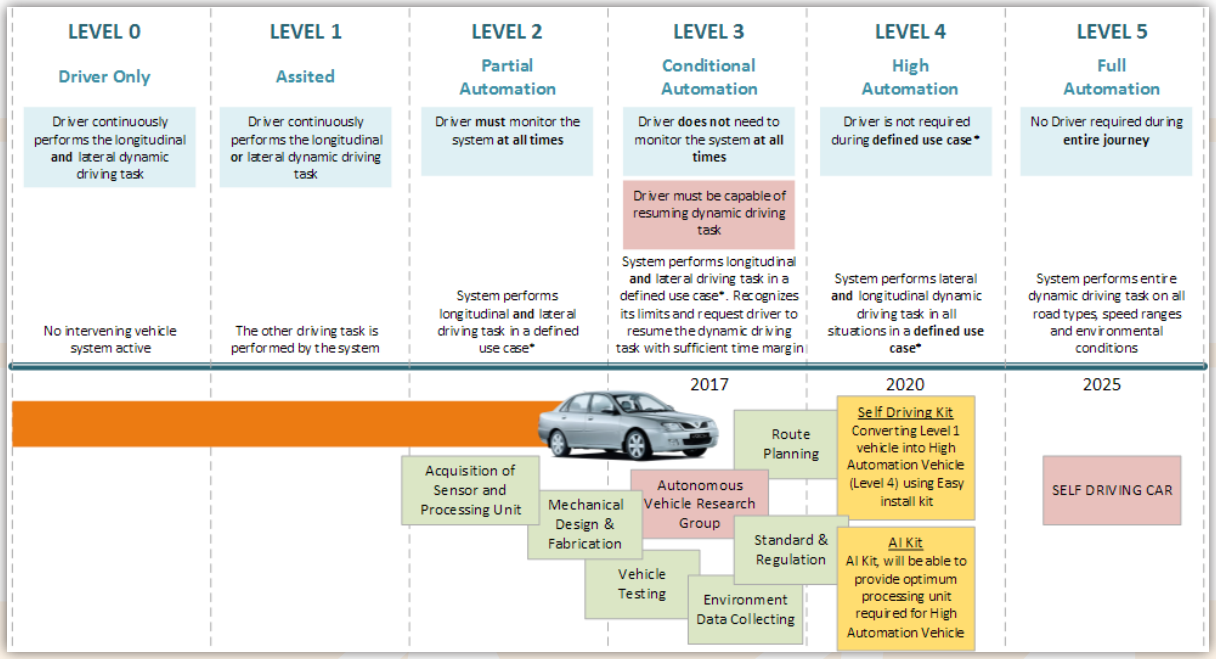
SMIC was our first public demonstration so we had to make a robust design for continuous driving capabilities. The event was less than two weeks and the system was not fully autonomous yet. We had changed from a pulley system to a gear system that fits in between the steering wheel and the car's boost kit. Luckily, we were able to find a solid foundation beneath the dashboard of the car to mount our system to. The motor that we used initially was a different motor that we procured from China but we changed it to a power window motor and mounted it between the steering wheel and the speedometer. It took another week for this to be installed and after initial tests, one of our engineers, Muhajir Mustapa, said the words all of us were waiting to hear, "Thank god, finally it works".

Finally, we moved on to the software part of the system. The mechanical system was in place and the electronics were done. Now we needed to make the image processing bit to recognize obstacles and objects while having an artificial intelligence decide on how the car should move. With Image processing being REKA's major specialties, especially for our Chief Research Officer, we finished calibrations in time for the event. It was our first public demonstration of the car going round and around a roundabout that was present at the venue of the event, which took place in The Strand Mall, Kota Damansara. It was a success. Malaysia's First Self Driving Car. Although we rejoiced with success but the event next to come would challenge us even further.

IDeX or known as Innovation & Design Expo, was organized by INTAN, Bukit Kiara. This event celebrates the latest in technology within Malaysia, and the theme for 2016 was on autonomous vehicle. At first when we were invited we thought that it would be an easy task but when we went for the briefing of the event, we soon found out that our assumptions were wrong. The organizer wanted us to carry the visitors of the event around INTAN which is very hard due to multiple factors such as non-standard road, too many trees which would affect lighting and also too many hill-like geography. As that wasn't hard enough, we had to carry actual passengers. We come to INTAN earlier than the event date to help CRETA learn the landscape and we drove for a few rounds before we went back to Melaka to do some calibrations. We adjusted and tweaked the Image Processing and Artificial Intelligence part very heavily knowing that lives could be at stake. After another week of no sleep coding,

we decided the best way to see if we were ready for INTAN was to drive to INTAN autonomously from Melaka to Kuala Lumpur which we did. Driving on it's own, CRETA drove an average of 60km/h and sometimes reaching 120 km/h on the PLUS highway. There were a few hiccups along the way when it decided to go into the R&R but overall it was fine.

We got a lot of reactions when on the highway such as when we drove through the toll booths and people were shocked by an empty driver seat. Also, we went to a few drive thru's before heading to INTAN. We recorded the people's reactions as part of our social research in determining how ready Malaysians are for an autonomous vehicle. We had a blast at INTAN. We impressed a lot of techies there, showing how a few Malaysians could build something on par with other countries with limited resources and time. We did a few rounds around INTAN carrying visitors and they enjoyed it although initially they were quite scared but we had an engineer present at all times to make sure everything ran smoothly. INTAN was the last event for 2016 and on that last event we showed the world how we built a functioning autonomous vehicle from scratch in less than two months in Malaysia.



REKA Self- driving car roadmap

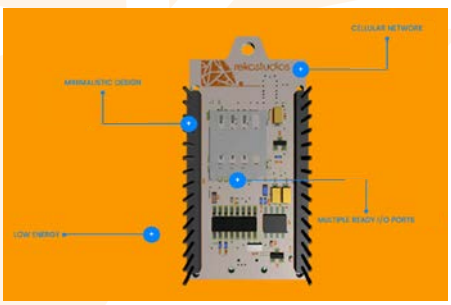
CRETA – The System Inside

CRETA is an abbreviation for Conscious REKA Transport Apparatus, which is what we namde our self-driving car. Our self-driving car focused on retrofitting an existing vehicle using an apparatus installed at the driver seat. With the objective to let everyone own and experience themselves a self-driving car, we built CRETA. The first car we tested CRETA on was on a PROTON WAJA. Using equipment and tools that can be obtained easily, we designed and developed a simple yet efficient method to automate a human driven car.

CRETA consists of three segments to make a human driven car become autonomous. The first one is the sensor unit that is used to sense the environment around the car. For CRETA's sensor unit, vision sensor is used to see what human drivers see when driving a car. Vision sensors use images captured by a camera to determine presence, orientation, and accuracy of subject detected. However, in order to recognize and identify properties of an image, image processing of acquired image is processed on a central processing unit.

Central Processing Unit or CPU is the second segment in CRETA. CPU equipped with multi-core gigahertz processor, to interpret data acquired from vision sensor in real-time processing. Using artificial intelligent algorithm to replace human driver fallibility, the system must be able to make a split-second decision and give quick command to the control unit.

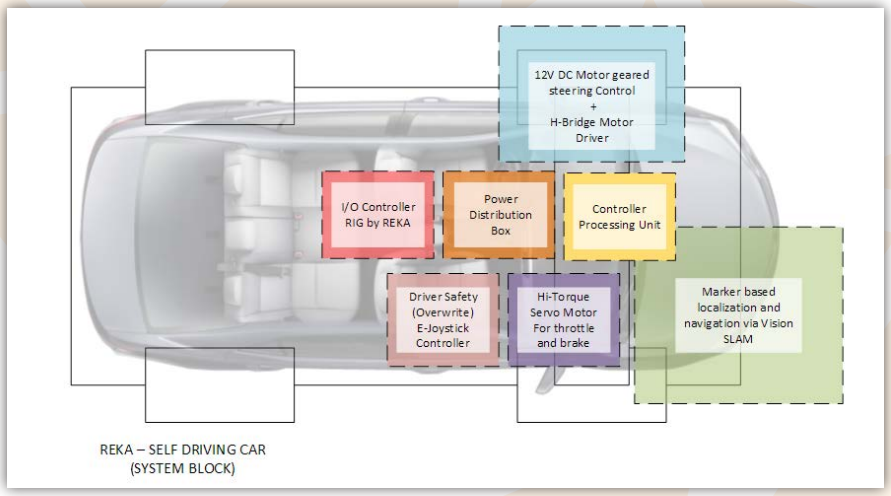
The third and last segment of CRETA is the control unit. The control unit



handles the acceleration, brake, and steering control of the vehicle itself. Coordination of controlling the control unit or module is obtained from the CPU. However, handling the actuator of the control unit is based on the REKA Innovation Gear, RIG. RIG translates the decision of CPU through the actuators connected with acceleration, brake and steering control in order to autonomous the vehicle.

REKA's self-driving car still has lot of room for improvements and modifications in order to be safely used on Malaysian roads. Communication unit such as Vehicle-to-everything (V2X) that include vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I), vehicle-to-pedestrian (V2P) and vehicle-to-network (V2N) wide area communication. It is essential in order to help vehicles 'talk' to one another and smart cities infrastructure to improve safety and vehicle security, reduce traffic congestion, save money and protect the environment. Therefore, REKA has developed Internet of Things (IoT) Microprocessor using Global System for Mobile Telecommunications (GSM) module as a method of communication on autonomous vehicle system. GSM describes the protocols for second-generation (2G) digital cellular networks used by mobile phones.

REKA Innovation Gear, RIG Cell Lite is a communication board in connecting the product to the internet, enable you to connect and control your product building your own IoT infrastructure. Using the GSM module, which has steady fast connection beyond urban area, RIG Cell Lite provides reliability and sustainability performance on machine to machine (M2M) connection. RIG Cell Lite is designed based on a minimalist concept, by stripping away all unnecessary elements and retaining important elements which directly relate to IoT functions. In addition, by stripping all the unnecessary elements, excess components and size can be reduced, thus cost of manufacture can also be reduced making the selling price cheaper from other competitors of IoT development board. More information on our RIG Cell Lite can be accessed at www.reka.com.my.



REKA Self driving car System Block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