Official Bulletin 11th Edition - KDN: PQ1780/J/187

LEMBAGA TEKNOLOGIS MALAYSIA
MALAYSIA BOARD OF TECHNOLOGISTS

TECHIES

ISSN 0128-1313

9 770128 131009

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CHIEF EDITOR'S NOTE

Welcome to the 11th Edition of TECHIES.

I would like to wish everyone a Happy 2021 New Year, the beginning of a new decade. Perhaps it is also a good time to review our activities and performance briefly. TECHIES was started as a voice of MBOT, disseminating MBOT's efforts to introduce and communicate technology to the masses. It was created to provide a platform for the technology community to share their thoughts and ideas. TECHIES is not an academic journal per se. It is more of a publication to introduce technology to readers. Contributors need not be academics only. We are anticipating to see more businessmen, entrepreneurs, students, industries, educators and the public to contribute to TECHIES. Let us make it a more interesting publication. Thank you.

Happy writing and happy reading!

MBOT REGISTRATION

(As of February 2021)

Graduate Technologists	Qualified Technicians	Professional Technologists	Certified Technicians
20,142	3,639	8,498	830

PHOTON REVOLUTION: A BOLD PREDICTION ON WHAT TO FOLLOW AFTER INDUSTRY 4.0

By Ts. Dr. Tiu Zian Cheak
Head, Faculty of Engineering and IT, SEGi College Subang Jaya

Since Europe experienced the first industrial revolution in the 1760s, mankind has officially entered the industrial age from an agricultural society. Driven by the steam engine and steel mould technology, the manufacturing industry broke away from its dependence on traditional manpower and entered a mechanized production line. Until the 1870s, the confrontation between direct current and alternating current brought the industrial revolution into the era of electrification (industry 2.0). During the same period, the popularization of railways and telegraphs gave birth to the concept of globalization.

After the World War II, human technology had made great strides. During the World War II, the major powers invested in technology research and development regardless of cost and hoping to dominate the outcome of the war. Come to the end of World War II, the products derived from war have become technology that benefits mankind. These included computers (originally a military decoder) and global positioning systems (originally dedicated to air force navigation). Incorporated with the development of the Internet, mankind has entered digitalization, which is so-called Industry 3.0.

In 2010, Germany first proposed the concept of Industry 4.0. The main axis of Industry 4.0 is the combination of cyber and physical industry, to realize a highly intelligent industrial and commercial sectors. Malaysia started to follow up the development of Industry 4.0 in year 2018. In the same year, the Ministry of International Trade and Industry published the National Policy on Industry 4.0. The National Policy on Industry 4.0, also called as Industry 4WRD, highlighted 7 Transformation Drivers to cope with Industry 4.0, which are:

1. Global Economic Order
2. Technology Advancement
3. Knowledge & Skills
4. Global Supply Chain
5. Competitiveness
6. Regulations
7. Customer Behaviour

In the new global economic order, the rise of China, Japan and Korea economies have realigned the flow of hot money from Europe and US to come to Asia. This is crucial for our nation to jump on the bandwagon and to recover from the strike of Covid-19 Pandemic. Continuous technology advancement in manufacturing industries are playing an important role to attract foreign direct investment. Besides the technology advancement, the capability of our national education system to produce future workforce who equipped with IR 4.0 knowledge & skills will also determine the success of the IR 4.0 transformation.

The blooming of online trading platforms (such as Alibaba, Amazon and Shopee) are increasing the complexity in the supply chain networks as manufacturing firms are managing partners in borderless world, and not bounded by geographical location. As a result, the competition among the nations and manufacturers are getting more intense. It is important for our nation to uphold the competitiveness; defend the domestic markets, while tapping into new oversea market segments for long-term growth. Therefore, it is important to understand

the changes of customer behaviour. Nowadays, people are influenced by values, demand in personalization and customization. Manufacturing industries must reassess their manufacturing system, focus on the emergence of new products and services attributes to cater the new customer behaviour. Lastly, the up-to-date rules, regulations and standards are important for local manufacturing industries to meet the international standards and increase the interconnection with other continentals.

The core of Industry 4.0 is a set of rapidly evolving and converging technologies. There are 11 Enabling Technologies which have been highlighted in Industry 4WRD, including:

1. Big Data Analytics
2. Artificial Intelligence (AI)
3. Augmented Reality
4. Cyber Security
5. Simulation
6. Advanced materials
7. Additive Manufacturing
8. Autonomous Robots
9. Internet of Things (IoT)
10. Cloud Computing
11. System Integration

These technologies allow the manufacturing industries to hop to a new industrial dimension. For instance, additive manufacturing which focus in the use of advance materials in 3D printing, enable the growth of product customization; The system integration between cyber and physical systems enable the remote factory; The application of AI in manufacturing industry enable the production line to self-configuration, failure prediction and adaptable to changes. Of course, above examples are just a part of wonders that can be achieve in IR 4.0.

So here comes the interesting question, after Industry 4.0, what's next?

Author boldly predicts that Industry 5.0 will be the Photon Revolution. Based on solid-state physics, electrons and photons can be converted into each other through the excitation and recombination processes. Compared with electrons, photons have a faster transmission speed and resist to the interference by electromagnetic waves in the surrounding environment. Common photon technology products are including Light-emitting Diode (LED) fluorescent light, LASER, barcode scanner and so on.

In today's technology, most of the technological equipment is driven by electron, including electrical appliances and computers, mobile phone, and so on. However, photonic technology has slowly stepped into the mainstream of technology. In the field of information transmission, photonic technology has replaced electronic technology to achieve high speed wired signal transmission, which is the so-called optical fiber network. In energy transmission, electrical power transmission requires expensive high-voltage towers and cables to carry electricity. In fact, as early as ten years ago, the European Aeronautic Defence and Space Company (EADS) has completed the wireless energy transmission technology prototype using photon as energy carrier. In this work, the solar energy collected at the space station is converted into a high-intensity laser light source, and transmission back to the earth surface as a pollution-free renewable energy source. On the other hand, in the supercomputer development, the core of quantum computing is driven by photons to achieve high speed and high stability computing technology. Furthermore, photonics technologies had been widely used in modern manufacturing system, including laser cutting machine, optical sensors, 3D imaging, medical equipment etc.

In most of the sci-fi movies that describe future world, cities are filled with all kinds of dazzling lights. This may be a herald of the Photon Revolution. In year 2019, Malaysia government has approved National Fiberisation and Connectivity Plan (NFCP) that worth of RM 21.6 billion. On the other hand, there are many photonics relevant manufacturing companies are established in Malaysia, including Lumileds Malaysia, Finisar Malaysia, SilTerra etc. However, in Malaysia higher education system, there is no Photonics Engineering program offered by any local or private university (to the best of author knowledge). Photonics related knowledge is only offered as 2 or 3 courses in Electrical & Electronics Engineering programs. Do we have enough talents and workforce to support photonics engineering sector? Are we ready to face the upcoming Photonics Revolution?

Speaking of 4G communication in Malaysia, it is not yet fully covering the entire country, but 5G communication is already knocking on the doorstep. Similarly, the foundation of Industry 4.0 in Malaysia has not yet been laid steadily, and will the Industry 5.0 flood our country like a giant tidal wave?

Author

Ts. Dr. Tiu is currently working in SEGi College Subang Jaya as Head, Faculty of Engineering and IT. He has been recognized as Professional Technologist in Electrical and Electronics Technology field. He has been working in tertiary education for more than 13 years, which covering vocational education, undergraduate and postgraduate level. Besides, he is an active researcher who involving in cutting edge research in Malaysia, with more than 60 ISI indexed publications in past 5 years. Visit segisj.edu.my for more publications by Dr. Tiu.

FUTUREPROOFING GRADUATES FOR THE DIGITAL ECONOMY VIA DESIGN THINKING

By Professor Ts. Dr. Murali Raman
Deputy Vice Chancellor, INTI International University

INTI International University Design Thinking lecturer Menaga Vesudevan guiding students from a past Design Challenge session

With the advent of COVID-19, it has become even more apparent that we are truly living in Industrial Revolution 4.0.

On a global scale, corporations are facing massive challenges, but also opportunities for digital disruption.

Corporate strategies need to be transformed. Employees need to keep themselves relevant or face the consequences of being replaced by either more competent staff or artificial intelligence, which has now expanded its capabilities across numerous tasks.

Failure to track and closely monitor technological changes (amid other changes in a Vulnerable, Uncertain, Complex and Ambiguous world) could lead to the demise of even highly successful enterprises.

The Global Center for Digital Business Transformation offers a powerful way of examining industries affected by digital disruption. The researchers used the analogy of a vortex to describe industries affected by digital disruption.

A vortex is essentially a force akin to a whirlpool that can suck elements into its core (dictionary.com). This definition implies that industries close to the core of the vortex are at the greatest risk of being disrupted.

On the flip side, these industries also end up leading digital disruptions. The industries closest to the epicenter of the vortex are from the technology sector, such as Facebook, Amazon, Apple, and Google.

These companies either provide the relevant tools and technologies for digital disruptions, that is, they enable disruption for others, or they themselves constantly generate new value propositions in the economy and lead the disruption.

The education industry is not spared from digital disruption. Continuous changes in teaching and learning activities coupled with emerging digital platforms that provide self-learning tools and technologies make this sector ripe for disruption.

Although in the case of emerging economies such as Malaysia, digital disruption in the education sector is contingent upon strong regulatory conditions, which could prevent an immediate "sucked into the vortex" syndrome.

Nevertheless, academic institutions should constantly track and monitor technological changes that can impact this sector, particularly in making sure that our local graduates remain relevant in the digital economy and IR 4.0 space.

Emerging competencies for graduates

The Future of Jobs report 2020 (World Economic Forum), states that the top 5 skills that are highly demanded by industries in Malaysia are: emotional intelligence, creativity, analytical thinking and innovation, technology design and programming, and complex problem solving.

This report also suggests that employers are focusing on similar skillsets as part of their corporate retraining and upskilling initiatives. As such, to ensure they remain relevant, both academic and training institutions alike need to offer programs and courses that address these emerging skills that are required for the future.

To this end, we are witnessing the use and application of Design Thinking (DT henceforth) as an approach to harness such skills.

Design Thinking Essentials

The inherent ideas and ideals behind DT are not necessarily new. However, DT presents a systematic way of injecting creativity and innovative thinking into any company.

DT offers highly specific tools and techniques in a simplified manner. These tools are then used to derive the magical, inspirational values of DT.

DT is defined as a user-centric collaborative approach in problem solving. The design school (dSchool) at Stanford University prescribes a five-step DT process. This five-step process and what each process means are summarized as follows:

DT Phase	Brief explanation
Empathy	The first step and arguably the most vital one in DT. Empathy focuses on having a deep understanding of customer pain points and emotional attachment to a given problem or challenge (called design challenge) in DT. Findings from empathy feed naturally and lead to the second step, namely, "define."
Define	Focuses on getting deep into the problem from the viewpoint of the customer. During this stage, design thinkers spend time coming up with specific perspectives and try to offer game-changing propositions to the problem based on insights or hunches.
Ideate	The stage when design thinkers try and generate as many ideas to address the problem defined. Ideate is akin to a brainstorming session where ideas are seamlessly generated.
Prototype	Focuses on translating the idea(s) into tangible manifestations. A prototype is not confined to having a tangible product but also refers to simulations, mockups, or even campaigns depending on the challenge.
Test	The final step stresses on the importance of pitching the idea to indemnified target groups; feedback is gathered by teams. The solution is then either launched or reworked accordingly until deemed fit for market launch.

A student presents the problem statement and proposed prototype during INTI's Design Thinking Presentation Day 2019

DT focuses on collaborative work—squashing the traditional silo mentality and mindset of working in departmentalized isolation. DT projects often provide a conducive field for cross-fertilization of ideas and solutions from various experts in an organization.

When executed well, DT can produce breakthrough ideas. In the context of the Malaysian higher education system, DT can harness creativity, innovation and problem solving skills amongst students, as they work on projects in a given classroom/event setting.

DT allows us to celebrate failure—the prototyping and testing stages of DT are highly iterative, moving back and forth between both steps, where ideas are continuously refined based on feedback from the end-users/customers.

In our local education scene, this implies that the competencies associated to innovative, creative and deep-rooted problem solving can be derived from a well-crafted DT curriculum.

DT stresses on the importance of listening. With empathy at the core of every DT project, one outcome of successful DT projects is their ability to promote a culture that provides everyone a chance to express themselves freely and listen effectively.

To this end, DT can be used to shape and guide the emotional intelligence amongst our students.

Design Thinking the INTI way

Given its potential to address the future job skills required, INTI's Design Thinking module has been exclusively developed by INTI's Teaching & Learning department for our students.

Offered as an institution wide programme for all undergraduate students, INTI's bachelors students will train in the five step process over the course of their studies.

Our DT module is developed based on the United Nations' Sustainable Development Goals – while students learn the skill of design thinking they are also exposed to current global challenges and taught to think of solutions with a higher purpose.

Students are mentored by industry and also present their ideas to industry leaders during their final presentation and during other events such as INTI's Design Thinking Day. They receive feedback from businesses and organisations on what is needed in the present market, adding to their employable skills and workplace exposure.

Even during the pandemic, this module was fully delivered online, ensuring students did not miss out on developing their ideas and skills, as well as completing their required module for the year.

Students also gain other skills such as collaboration and presentation skills, as the program requires them to work together as a group and gather and communicate their ideas to deliver a meaningful solution. This fosters the much needed competencies and skills they need to thrive in the 21st century workplace, and future proofs them for the digital economy.

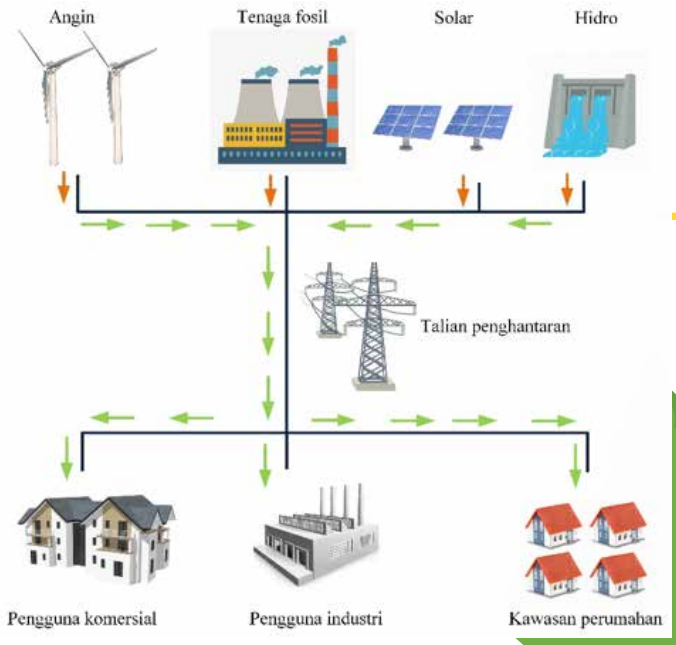
Industry partners and INTI leaders pose for a group photo during INTI's Design Thinking Presentation Day 2019

MIKROGRID PINTAR: MASA DEPAN BAGI SISTEM PENGAGIHAN TENAGA

Oleh Ir. Ts. Dr. Mohammed Reyasudin Basir Khan, CEng
Pensyarah Kanan
School of Engineering, Manipal International University

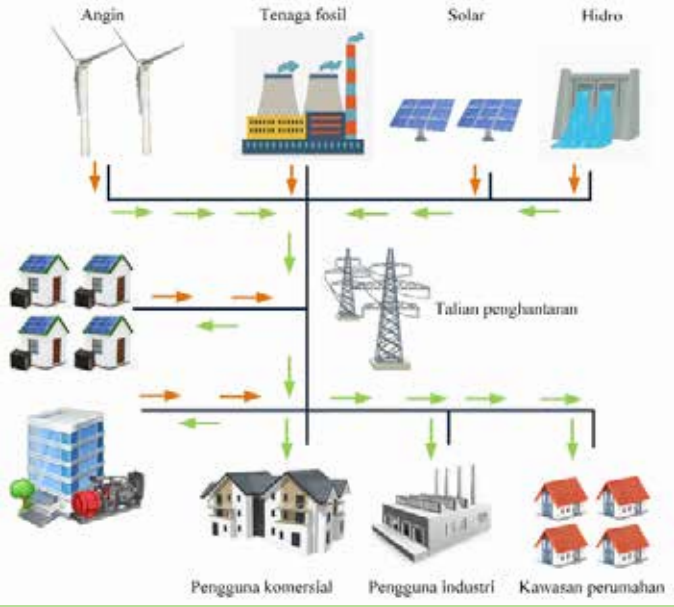
'Blackout' atau gangguan bekalan elektrik berlaku setiap masa dan disebabkan oleh pelbagai perkara. Cuaca adalah salah satu sebab utama berlakunya gangguan elektrik dan ia akan menjadi lebih teruk disebabkan oleh perubahan iklim di masa akan datang. Pada waktu ini, cara kita mengagihkan kuasa elektrik adalah rapuh, tetapi ada cara yang boleh diadaptasi supaya ia lebih berdaya tahan.

Pada masa kini, sistem tenaga bergantung kepada loji janakuasa yang mendapat tenaga daripada pelbagai sumber seperti bahan api fosil, matahari (solar), angin dan air (hidro). Kemudian, tenaga elektrik diagihkan kepada beribu atau berjuta pelanggan melalui sistem grid kuasa. Oleh itu, ia adalah satu sistem berpusat yang besar. Tenaga elektrik diagihkan kepada ramai pelanggan melalui beberapa talian penghantaran yang terdedah kepada sebarang kerosakan akibat daripada ribut atau pokok yang tumbang. Ini bukan sahaja satu kesulitan, bahkan akan menjejaskan kehidupan beribu orang. Rajah 1 menunjukkan contoh sebuah sistem pengagihan tenaga berpusat.



Rajah 1: Sistem pengagihan tenaga berpusat

Ada beberapa cara untuk mengelakkan perkara ini daripada berlaku. Sesetengah rumah mempunyai pemasangan tenaga solar dan ada sesetengah tempat mempunyai janakuasa kecil yang tersendiri. Kawasan-kawasan ini mampu untuk menjana tenaga sendiri apabila berlakunya gangguan elektrik akibat cuaca buruk. Ini adalah dikatakan mikrogrid dimana sistem tidak berpusat dapat mengekalkan tenaga sendiri waktu diperlukan. Mikrogrid bukanlah satu teknologi atau idea yang baru. Ia adalah sebuah rangkaian pengguna elektrik yang mempunyai akses kepada tenaga secara lokal. Sudah berdekad teknologi ini digunakan di kawasan pedalaman bagi untuk penjanaaan tenaga elektrik disebabkan terlalu jauh daripada rangkaian grid utama. Manakala hospital dan fasiliti-fasiliti kritikal bergantung kepada tenaga yang dijana secara lokal sebagai sandaran ('backup') pada ketika kecemasan. Majoriti tenaga ini dijana melalui sumber diesel, propane atau bahan api yang lain. Secara dasarnya, sesebuah kawasan perumahan yang menggunakan penjana diesel ketika berlakunya gangguan elektrik boleh dikatakan sebagai mikrogrid. Contoh sistem pengagihan tenaga dengan mikrogrid ditunjukkan di Rajah 2.



Rajah 2: Sistem pengagihan tenaga dengan mikrogrid

Apa yang baru ialah mikrogrid kini dijana melalui tenaga lestari seperti solar dan angin. Ini dapat dicapai kerana pengurangan harga pemasangan yang jauh lebih murah jika dibandingkan daripada sedekad yang lalu. Selain daripada itu, pengenalan akta dan polisi dan pengawalan yang memudahkan adaptasi tenaga lestari ini juga menyumbang kepada peningkatan pemasangan. Contohnya, Polisi Tenaga Boleh Baharu Kebangsaan, Akta Tenaga Boleh Baharu 2011 dan Akta Pihak Berkuasa Pembangunan Tenaga Lestari 2011 [1].

Pembekal utiliti seperti Tenaga Nasional Berhad (TNB) juga berminat dengan teknologi mikrogrid dan telah membuat pelaburan bagi pemasangan kuasa di kawasan pedalaman dan kawasan-kawasan yang tidak mempunyai tenaga yang boleh diharap [2]. Salah satu lagi kawasan yang memerlukan mikrogrid adalah kawasan terpencil atau komuniti terasing yang terletak jauh daripada tenaga grid utama. Contohnya seperti kawasan komuniti orang asli dan pulau-pulau.

Mikrogrid adalah berguna terutamanya ketika kecemasan apabila berlakunya gangguan elektrik. Ia dapat mengstruktur semula sistem kuasa ketika ini. Kalau objectif utama adalah untuk pengurangan gas rumah hijau, tenaga fosil yang digunakan perlu dikurangkan, manakala tenaga lestari seperti solar dan angin perlu dimaksimumkan. Tenaga-tenaga ini menghasilkan tenaga yang berbeza-beza sepanjang hari bergantung kepada sumber yang ada. Contohnya, sistem solar bergantung kepada ketersediaan cahaya matahari. Manakala, tenaga angin hanya dapat di gunakan ketika adanya sumber angin. Jadi, kita seharusnya mengubah laluan tenaga daripada kawasan yang mempunyai sumber solar dan angin yang tinggi ke tempat yang lebih memerlukan. Oleh sebab itulah mikrogrid diperlukan. Mikrogrid dapat menghasilkan tenaga melalui sumber hijau seperti solar dan angin dan dapat menyimpan tenaga melalui sistem simpanan bateri, tidak seperti loji janakuasa. Apabila kawasan itu tidak cerah atau berangin, mikrogrid dapat berkongsi tenaga yang disimpan kepada grid utama.

Persoalan yang timbul apabila banyak mikrogrid dengan tenaga lestari dipasang adalah: Bagaimana cara untuk memastikan setiap mikrogrid dengan tenaga lestari dapat bekerjasama dan berkongsi antara satu sama lain secara efektif?

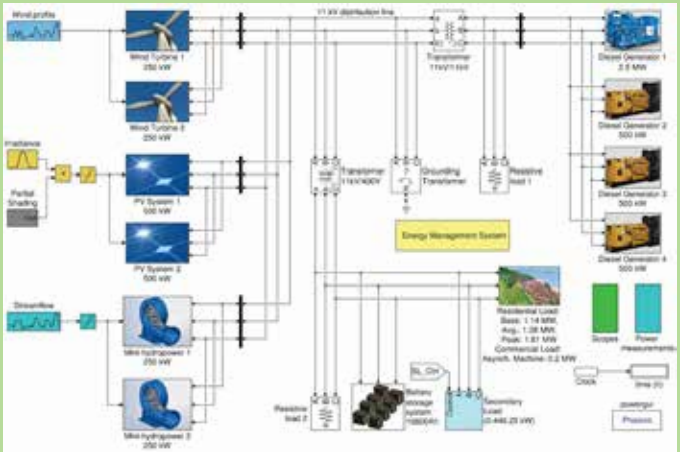
Pengawalan dan pengoptimuman sistem pembekalan tenaga tradisional dicapai melalui kawalan dan koordinasi secara berpusat. Sistem ini mengoptimumkan penjanaan, pengeluaran dan aliran tenaga daripada loji janakuasa kepada talian penghantaran dengan sewajarnya.

Di masa akan datang, lebih ramai orang disesuatu wilayah yang membeli kereta elektrik dan megguna pakai tenaga lestari, bateri dan pekakas pintar yang menggunakan tenaga secara berubah-ubah sepanjang hari. Ia akan mengakibatkan jumlah tenaga yang dipakai dan disumbang menjadi amat tinggi. Oleh itu, tenaga yang tersebar ('Distributed Energy Resources') menjadi satu masalah data besar yang mustahil untuk dikawal dan diselaraskan secara berpusat. Solusinya? Agihkan sumber pengkomputeran ditambah dengan algoritma pintar.

Penulis (M. Reyasudin Basir Khan) daripada Manipal International University dengan kerjasama rakan sekerja daripada Universiti Tenaga Nasional telah membangunkan sistem pengurusan tenaga yang tidak berpusat bagi mikrogrid [3]–[6]. Sistem ini dapat mengawal tenaga

daripada beberapa sumber secara pintar tanpa kawalan berpusat. Sistem ini tidak fokus kepada kemampuan pengkomputeran bagi mengendalikan berjuta-juta pemboleh ubah. Tetapi, lebih kepada bagaimana untuk memecahnya menjadi bahagian yang boleh dikendalikan, kemudian menyelaraskan komunikasi antara mereka. Tenaga yang tersebar ini dipastikan berinteraksi dengan grid tanpa sebarang kerosakan akibat beban berlebihan secara tidak sengaja.

Kajian ini telah diuji di mikrogrid pulau Tioman. Dimana, sebuah model komputer mikrogrid beserta sistem kawalan tenaga tersebar telah dibangunkan. Kebanyakan pulau dan kawasan pedalaman di Malaysia bergantung sepenuhnya kepada sumber diesel untuk tenaga elektrik. Walaupunbegitu, semakin banyak pulau telah megadaptasi tenaga hijau dengan pemasangan sistem solar secara mandiri ('standalone') atau disambungkan kepada grid. Contohnya, sumber elektrik utama mikrogrid di Pulau Tioman ialah janakuasa diesel dan baki tenaga dijana oleh sistem hidro kecil dan solar. Terdapat juga beberapa janakuasa diesel kecil mudah alih yang dipasang di beberapa kawasan di pulau ini. Ia digunakan untuk durasi beberapa jam terutamanya ketika musim puncak pelancongan. Model mikrogrid Pulau Tioman yang mempunyai sumber daripada diesel, solar dan hidro beserta sistem kawalan tidak berpusat telah berjaya disimulasi. Sistem ini dilengkapi dengan algoritma pintar seperti 'game-theory' bagi koordinasi sistem kawalan yang tersebar. Kajian ini menunjukkan bahawa sistem kawalan ini dapat menggantikan sistem kawalan pusat bagi mengoptimumkan pegagihan tenaga di sesebuah mikrogrid. Rajah 3 menunjukkan model komputer mikrogrid di Pulau Tioman yang mempunyai kawalan tenaga pintar.



Rajah 3: Model komputer bagi mikrogrid dengan sistem kawalan pintar.

Salah satu kelebihan mikrogrid di masa akan datang yang merupakan satu keinginan semua adalah perkongsian tenaga secara lokal. Pada waktu ini, jiran tidak dapat menjual tenaga sesama mereka. Jika terdapat gangguan bekalan elektrik, seseorang jiran yang mempunyai pemasangan solar di bumbung tidak dapat berkongsi tenaga dengan jiran yang tiada pemasangan. Perkongsian tenaga adalah bermasalah samada dari segi teknikal atau peraturan, malah tidak selamat tanpa peralatan yang bersesuaian. Namun begitu, ini adalah salah satu langkah yang perlu diambil bagi menaik taraf grid dan ketahanannya. Apabila perkongsian tenaga boleh dilaksanakan, sesebuah kawasan kejiranan boleh berkhidmat sebagai rizab tenaga untuk grid utama. Ini dinamakan sebagai loji janakuasa maya ("Virtual Power Plant").

Kesimpulannya, masa depan grid tenaga perlu berkembang menjadi sesuatu yang hibrid antara teknologi baru dan lama. Sistem janakuasa lokal adalah sama penting seperti tenaga solar dan angin tersebar yang kini mempunyai harga yang berpatutan. Tetapi, adalah penting dan praktikal bagi setiap komponen dalam grid berupaya untuk putus dan berfungsi secara bebas. Yang penting, landskap pengagihan tenaga kuasa akan lebih mempunyai integrasi daripada tenaga lestari dan mikrogrid dengan adanya teknologi kawalan pintar yang mampu meyelesaikan masalah kordinasi dan kawalan antara sumber tenaga.

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A NEW CHAPTER: ROAD SAFETY IN MALAYSIA

On the 26th January 2021, Ts. Ir. Dr. Khairil Anwar bin Abu Kassim, the Director-General of Malaysian Institute of Road Safety Research (MIROS) has joined the Malaysia Board of Technologists (MBOT) in an interview touching on his involvement in MIROS prior and current, past work experiences, his thoughts on the importance of safety in the automotive industry, challenges faced, his take on leadership attributes, MBOT recognition pursue as well as his future hope for young technologists in Malaysia.

In 1996, Dr. Khairil Anwar undertook his degree of Mechanical Engineering in The Land of the Rising Sun, Japan and further stayed to pursue his first job as a Design Engineer there for two years. Dr. Khairil Anwar then moved back to Malaysia in 2001 and was then offered a position in Ingress Precision Sdn Bhd, a local Proton and Perodua vendor. Moving forward, Dr. Khairil then grabbed a position in Autoliv Hirotako Sdn. Bhd, a worldwide restrain company producing seatbelts, airbags and many other safety products. His 5 years in Autoliv Hirotako Sdn Bhd has instigated MIROS's interest in him, which eventually lead to him to being offered a position in MIROS.

Proton X50 frontal offset crash test

Speaking on local vehicle safety and regulatory stances during his early years in Autoliv Hirotako Sdn Bhd, Dr. Khairil commented that during year 2000, there were only 20% vehicles with airbags and 70% without airbags in Proton vehicles due to lacking in regulation empowerment. The government at that moment did not enforce regulation while comparing safety airbags to leather seats seemingly more to a cosmetic need. With that being said, Dr. Khairil began to pressure emphasis that airbags should be a compulsory safety item in local

vehicles and instigated enforcement for airbags to be a compulsory item. In his interview with the first MIROS Director-General, Allahyarham Professor Radin back in 2008, Dr. Khairil was asked about his capability to prove the airbag safety theory right in which he confidently committed. This came to an established regulation in 2012, regulation number 94, which states that airbags are compulsory in vehicles. Dr. Khairil successfully proved that airbags can save lives by running frontal collision dummy tests. Thirteen years of ups and downs, Dr. Khairil Ahmad is now the MIROS Director-General.

Dr. Khairil then explained his day-to-day responsibilities as the Director-General of MIROS which in the beginning went through the hardship of finding ground in forming a road safety institution. Road safety was still too new to the country during that time, however, the then MIROS Director-General, Allahyarham Professor Radin and the current Chairman of MIROS, Dato' Suret set up MIROS towards being the one-stop think tank for the Ministry of Transport along with other ministries and agencies on safety and road safety issues. The main target is to reduce the number of fatality and through research and development, Dr. Khairil holds a responsibility to ensure technology practice is embedded in vehicles.

Dr. Khairil was then asked about challenging projects he was involved in during his past years and stated that the biggest challenge faced is being involved in developing the first crash lab. The lab which is the first in Southeast Asia made of 3 acres of land named Provisional CRASE Crash Centre (PC3) which is now used as ASEAN NCAP in developing star ratings for vehicles and car crash tests. The beginning of development includes visitation to many other crash labs around the world, studying engine functionality as well as benchmarking or better known as reverse engineering. The lab is a turnkey solution turned

Adjung Professor Ir. Ts. Dr. Khairil Anwar Abu Kassim as ASEAN Secretary-General NCAP with Prince Michael of Kent while receiving prestigious "Prince Michael International Road Safety Awards 2019" at The Savoy, London.

success which started during his start in MIROS and officiated in the year 2012.

Upon asking Dr. Khairil about the time length in developing the crash test programme, he stated that due to budget constraint, the programme took a 2-year development time frame.

"We built the crash lab for RM5 million from our Operational Expenses (OE). It takes about 2 years to be developed."

Dr. Khairil was then asked on consumer awareness regarding safety and he foregrounded the fundamental importance of educating the consumer on safety. Since social media is the new norm for the century, not taking advantage of such technology would be wasteful.

"Educating the consumer is very important. We have our social media and YouTube with the highest number of views at about 750,000 from the whole of Asia. YouTube displays crash test for viewing."

A subliminal approach in embedding customer automotive safety awareness is by providing automotive safety choices indicated through the star ratings given by MIROS and consist of 2 types which are the active and passive measures.

"A passive safety feature is a system that does not do any work until it is called to action. Active safety, which is the ABS itself, the lock braking system is prevention from the crash itself."

Dr. Khairil possess great leadership during his tenure in MIROS. He was asked regarding his stake in disagreement handling and ways to overcome disagreements, Dr. Khairil touches first on his leadership practice which focuses on being practical, disciplined, tactical, fair and considerate.

Dr. Khairil emphasizes on being a great leader stems from being a great follower when asked about being an inspiration to others as a leader. He believes in personalization when working, such as giving special tasks and holding one-to-one sessions with his team in order to have a better understanding of each person he works with.

"I give a special task to every research officer in MIROS, to see how they develop and get through the job well."

A question on taking up the Professional Technologist title from MBOT, Dr. Khairil mentioned that his take on the recognition was to add prestige in automotive safety technology. He further commented that the Technologist Professional by MBOT adds a more relatable yet recognized title aligned with the Industrial Revolution 4.0. The autonomous vehicle industry is relatively moving at a slow pace therefore through a well-known recognition title such as MBOT Technologist Professional, it provides a level of recognition when pursuing development in the automotive industry.

"I think the recognition would be sufficient and I may see the advantages of it."

In the last few minutes of the interview, a question on Dr. Khairil's thoughts with regards to the younger generation aspiring to pursue the automotive field was asked. He commented that automotive safety is a large canvas of possibilities that has yet to be filled.

"In University, safety is not a well-known field and was not there from day one. It is an opportunity because it has great potential to expand."

The opportunity window towards new career, development and research is up for takes therefore automotive safety is a great idea to look into as Dr. Khairil further commented.

Toyota Corolla Altis BSD assessment

OSMOTIC POWER AS NEW EMERGING GREEN AND CLEAN ENERGY FOR FUTURE

By Zhen-Shen Liew [1,2], Thiam-Leng Chew[3], Boo-Kean Khoo[4], Norhayama Ramli[5] and Yeek-Chia Ho [1,2]

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1.0 INTRODUCTION

Clean and renewable energy is critical to overcome the threats of using fossil fuels such as diminishing supplies and the climate change issue. The renewable energy proposed here is through interaction of two separate salinities to produce electricity, also known as osmotic power (Nijmeijer & Metz, 2010). The global potential for electricity production using this approach was estimated at 1600 TWh per annum as suggested by Gerstandt, Peinemann, Skilhagen, Thorsen, and Holt (2008).

Currently the available power generation techniques from osmotic pressure gradient energy use membrane-based technologies such as pressure retarded osmosis (PRO) and reverse electrodialysis (RED) (S. Loeb, 1975; Pattle, 1954; Yip & Elimelech, 2014). In contrast, PRO shows

higher efficiency and higher power density and is ideally suited for extracting power from high salinity gradient (Yip & Elimelech, 2014).

In a typical PRO process, water spontaneously permeates through the semi-permeable membrane from the low salinity feed solution (fresh water) to the pressurized high-salinity draw solution (salt water). Consequently, the volume and hydraulic pressure of the diluted salt water are increased which allows power generation by depressurizing the solution through a hydro-turbine (Sidney Loeb, 2002).

Today the most commonly researched combination of salinity gradients is the mixture of seawater with river water that can be applied in coastal estuaries (Thorsen & Holt, 2009; Yip & Elimelech, 2014). Another potential combination is brines from desalination plant (high salinity) and treated wastewater (low salinity) that utilises by-products for power generation. The low environmental impact and abundant supply of power generating material make osmotic power an effective renewable energy source worth exploiting (Evans, Strezov, & Evans, 2009).

2.0 PROBLEM STATEMENT

Pressure retarded osmosis (PRO) is a promising source of renewable energy when using solutions with high saline concentrations as draw solution (DS). However, the implication of PRO as a reliable energy source is still limited due to several detrimental effects that limits the productivity of a pressure retarded osmosis power generation.

There are a few complications, which includes external concentration polarization (ECP), internal concentration polarization (ICP), and reverse draw salt flux. Firstly, the main factor that limits PRO performance at high densities is ECP. This effect can be reduced by enhancing hydrodynamic flow condition in the feed solution (FS). However, this leads to higher operating cost and hydraulic pressure loss (Yip & Elimelech, 2011). Secondly, ICP mainly occurs in the porous support layer of the membrane. ICP limits PRO performance because it contributes to the decrease in water flux flowing from FS to DS. However, without the support layer, most membrane could not resist the high hydraulic pressure exerted on the DS side of the membrane, and the membrane will eventually fail (McCutcheon & Elimelech, 2006). Last but not least, reverse salt flux will impact water flux and power density by limiting osmotic driving force and causes less solvent to move through membrane, because more solute accumulates in the FS over time (Xia et al., 2018).

3.0 METHODOLOGY

Firstly, shown in figure 1 is an open loop PRO system that uses low salinity water as the feed solution. The feed solution is then constantly pumped to the semipermeable membrane in low hydraulic pressure. While a draw solution, commonly brine or seawater, is pumped in the other side of the membrane in high hydraulic pressure. The salinity difference of both solution will produce an osmotic pressure as the driving force. However, as illustrated in figure 2 the hydraulic pressure (ΔP) cannot be higher than the osmotic pressure difference (Δπ), to prevent reverse solute flux to occur.

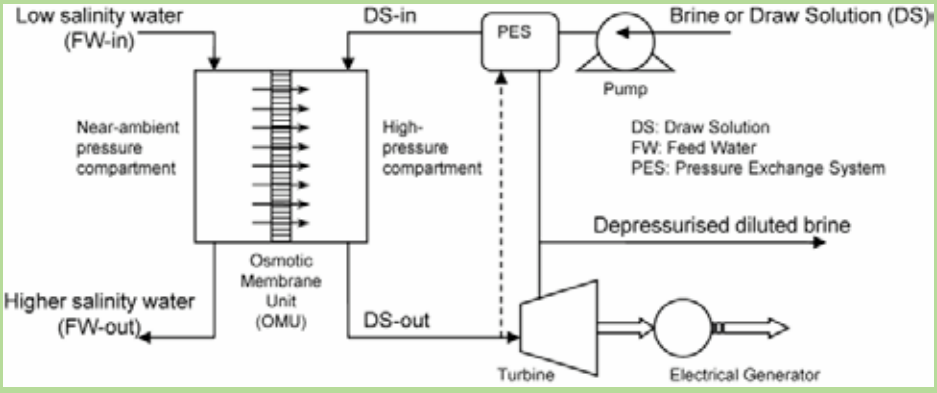


Figure 1: Schematic diagram of an open loop PRO power plant. Diagram adopted from Sharif, Merdaw, Aryafar, and Nicoll (2014)

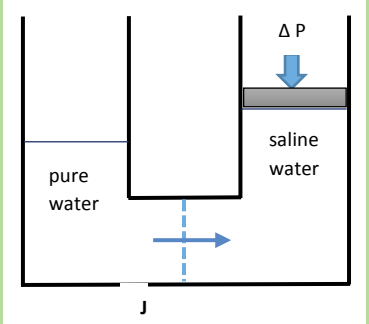


Figure 2: Schematic diagram of pressure retarded osmosis.

Consequently, the draw solution will then be depressurised and the diluted draw solution will turn the hydro turbine to generate electricity. To make maximum use of the energy, a more efficient method can be accomplished by recycling part of the pressurized drawing solution, leaving the membrane unit to support the pumping of the new drawing solution to the membrane unit by using a pressure exchange system demonstrated in figure 1.

4.0 COMMERCIALIZATION POTENTIAL

Osmotic energy is produced when water with different salinity meets. In nature, the perfect source for feed solution and draw solution can be easily found in estuaries, where rivers enter the ocean. Approximately 0.61 kWh of energy is generated when 1 m3 of river water flows into the ocean, and the estimated global flow is 1,200,000 m3/s. From that it is estimated that the global energy potential is 2 TW (La Mantia, Pasta, Deshazer, Logan, & Cui, 2011).

The osmotic power is a reliable source when compared to other renewable energy source that is heavily dependent on weather. As it is able to generate constant power for 333 days/year (Skilhagen, 2010). Furthermore, osmotic power is a carbon dioxide free power production, as it does not require a combustion unit that is commonly found in many power generation method (Touati & Tadeo, 2017). To better understand osmotic power's performance financially, Table 1 compares the estimated energy cost of osmotic power with the other main renewable and non-renewable energy.

Energy Sources	Estimated Energy Cost (€/MWh)
Osmotic Power	50-100
Nuclear Power	45
Run of River Power	48
Pulverised Coal Combustion	80
Combined Cycle Gas Turbine	85
Hydro Dam	85
Biomass	88
Wind Onshore	90
Wind Offshore	115
Petroleum-fired Power	125
Solar	160

Table 1: The Estimated Cost of Different Energy Sources. Data reference from (Sharif et al., 2014)

The estimation are based on existing hydro power plants, general reverse osmosis desalination information and the targeted membrane (Sharif et al., 2014; Skilhagen, 2010). When comparing the estimated cost of osmotic power to other energy sources, it shows high competitiveness with the mainstream renewable energy source such as wind, solar and biomass energy. Moreover it is comparable with the main energy sources used nowadays, for example the hydro dam, pulverised coal combustion and petroleum-fired power. Thus, Table 1 shows a bright future potential for osmotic power.

5.0 CONCLUSION

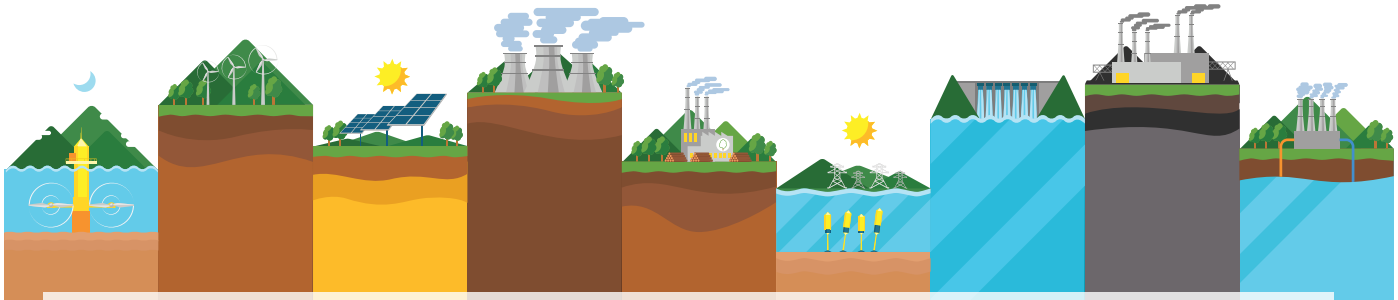
There is substantial potential for PRO to counter water and energy shortage as a renewable bioenergy alternative. To make PRO a reliable energy source, technological advances and in depth research are therefore required to improve its feasibility and cost efficiency. In order to outperform other renewable energy sources, high-salinity draw solutions should be investigated as higher salinity difference will contribute directly to power density. Previously, the implication of PRO as a reliable energy source is still limited due to several detrimental effects such as external concentration polarization (ECP), internal concentration polarization (ICP), and reverse draw salt flux that limits the productivity of a PRO power generation. "However, with recent advanced developments in membrane technology, many of this negative effects can be limited. For example, utilise grafted high flux membrane to provide adequate structural strength that can withstand high hydraulic pressure and at the same time show high water flux permeability to maximise power generation."

ACKNOWLEDGEMENT

This research was funded by PETRONAS through YUTP grant (015LC0-169).

REFUEL WITH BIOFUELS: FUELLING PROMISES

By Nawwar Z. Mamat
Msc. in Applied Science
from Auckland University of
Technology, New Zealand



Biofuel is one of the alternative energy resources that could reduce consumption of fossil fuels. The first-generation of biofuel is mainly produced from edible plant such as oilseeds, grains, sugar beet or maize. To avoid unnecessary discussion on the use of edible plants to produce biofuel, the second-generation biofuel is extracted from non-edible plant parts such as woods, agricultural waste, and organic waste. The first and second-generation biofuels raised concerns over the increase in food prices and land utilization. Thus, the third-generation biofuels are produced by photosynthetic microorganisms such as microalgae, yeasts, and bacteria.

Microalgae are plant-like microscopic organisms, typically found in oceans and waterways. They are largely abundant in the well-lit surface area of oceans, seas, rivers, streams, and lakes. There are many autotrophic microalgae that have been found to accumulate oil such as Chlorella vulgaris and Botryococcus braunii. The growth of microalgae is dependent upon the presence of resources required for photosynthesis. Those resources are light, water, carbon dioxide (CO2) and inorganic nutrients (i.e., nitrate, phosphate and sulphur). Due to its growth characteristics, microalgae can be cultivated on non-arable land, which attracts attention of biofuels' producers. Microalgae are capable to efficiently convert light energy into biomass at a high rate. Their storage capacity of lipids is enormous, up to 80% of its dry biomass.

Technological advances in production and extraction of bio-products have become the major foci of research on microalgal biofuels. One of the interesting topics is the synergistic integration of microalgae and bacteria to enhance productivity in algal cultivations. Maintaining single species(axenic) culture of microalgae is usually difficult especially in open culture systems such as ponds or tanks. Hence, symbiotic existence of bacteria and algae can be manipulated to improve algal biomass production and enrichment with valuable compounds. It is understood that algal-bacterial interactions occur in natural environment, but the extent of their relationship requires future research explorations. For instance, several studies have pointed out that microalgae are dependent on bacteria for source of vitamin B 12. A study has shown that bacterial community promoted the growth of a diatom alga, Thalassiosira rodula, with a relatively higher cell number than an axenic culture.

The use of bioreactor such as photobioreactors have been widely agreed as the primary option to microalgal culturing methods. A photobioreactor is a closed system comprising vessels with controlled illumination to optimise biomass production. The system, under truly sterile conditions, maintains monoaxenic algal species which is fully isolated from contaminants. Uses of photobioreactors are an effective way to cultivate microalgae for biofuel purposes due to consistent quality of microalgae under controlled conditions. The constrain of this culturing method is its cost and scalability. More studies are required to investigate possibilities of using inexpensive materials to build photobioreactors and flexibility to scale-up the production of microalgae using this culturing method.

There are various methods to harvest microalgae. Cells harvesting from large volumes of water is a key challenge in production of microalgal biofuels. It is essential to adopt a method that can concentrate algal cells with high efficiency at minimum cost. Centrifugation, flotation, flocculation, sedimentation, filtration, and any combinations of these methods are the conventional methods of harvesting. Centrifugation is a mechanical process that relies on the action of centrifugal force to separate particles in a solid-liquid mixture to two distinct phases. Obtaining cells by means of centrifugation is feasible only for small-scale cultures. For large scale cultures, development of alternatives to existing harvesting methods with higher production capacity is necessary. Flotation involves a gravity separation process in which fine air bubbles are continuously generated in the culture medium of microalgae and cause the cells to rise to the surface and concentrate. Flocculation seems a reliable and cost-effective since flocculants can be applied to large quantity of microalgae. This harvesting method uses a process which cell particles are concentrated to form large units for settling. However, recovery and recycling of flocculants, especially of chemical types such as ferric chloride and lime may cause some ecological problems.

It is also important to point out that the quality of biofuels derived from lipid extraction from microalgae must comply with standard specifications. For instance, the United States and European Union have established specific biodiesel standards based on several significant properties including flash point, water and sediment content, distillation temperature, viscosity, density, ester content and oxidation stability. The comparisons of global biodiesel standards are outlined in Table 1.

Table 1: International quality standards for biodiesel.

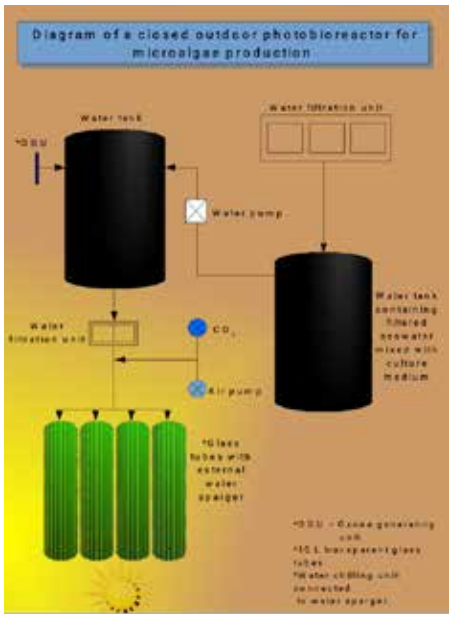
Parameters	United States *ASTM	Austria *ON	Germany *DIN	Italy *UNI	Malaysia
Flash point (°C)	130	100	110	100	182
Water and sediment (mg/kg)	500 max	-	-	-	-
Distillation temperature (°C)	360	-	-	-	-
Viscosity at 40 mm^2/s	1.9 – 6.0	3.5 – 5.0	3.5 – 5.0	3.5 – 5.0	4.415
Density at 15°C (g/cm^3)	-	0.85 – 0.89	0.875 – 0.89	0.86 – 0.90	0.8783
Ester content (mass %)	-	-	-	≥98	98.5
Oxidation stability at 110°C (h)	3 min	-	-	-	-
Cetane number	≥47	≥49	≥49	-	56
Methanol/ethanol (mass %)	-	≤0.2	≤0.3	≤0.2	<0.2

*ASTM: American Society for Testing and Materials
*ON: ÖNORM
*DIN: German Institute for Standardization
*UNI: Ente Nazionale Italiano di Unificazione

Although biofuels derived from microalgae have been regarded as highly promising and attractive to substitute petroleum-based fuels, it is important to note that attempts to commercialise biofuels from microalgae has not yet successful. Several obstacles to commercialisation are strain selection, improvement of percentage of lipid content, designs and construction of cultivation system, and methods for microalgal harvesting. The first critical step to microalgal biofuels is the selection of strains or species that can produce high lipid content. A higher lipid content is another hurdle for efficient production of microalgal biofuels. Nitrogen limitation has been considered as an efficient method to increase lipid content in microalgae. Nutrient deficiency may limit the growth rates and subsequently the biomass production.

The future of microalgal-derived biofuels is deemed realistic since microalgae can be generally cultivated in areas or devices without concerns over competing factors with land crops. Sustainability of microalgae as

biofuel producers demands the application of practical innovations to increase the quantity and quality of microalgae. In addition to this, large scale production of biofuels is dependent upon convenience and suitability of an algal species to accumulate optimum amount of lipid. Lipid enhancement with external supplementation or enrichment may improve oil accumulation in microalgae. Integrating engineering and biological components might serve as a possible solution to optimise the processes involved in cultivation, harvesting and post-harvest stages of biofuel production. Finally, the promise of microalgal biofuels comes with a responsibility to a greener oil production specifically to reduce the ecological impacts of the existing use of fossil fuels.



About the author

Nawwar Z. Mamat received her M.Sc. in Applied Science from the Auckland University of Technology in New Zealand. Her M.Sc. thesis discusses the importance of microalgae in feeding and reproduction of a clam species. In addition, she has experience with designing and setting up an outdoor bioreactor system for microalgae, and has worked on the optimization of the dilution rate for a semi-continuous culture.

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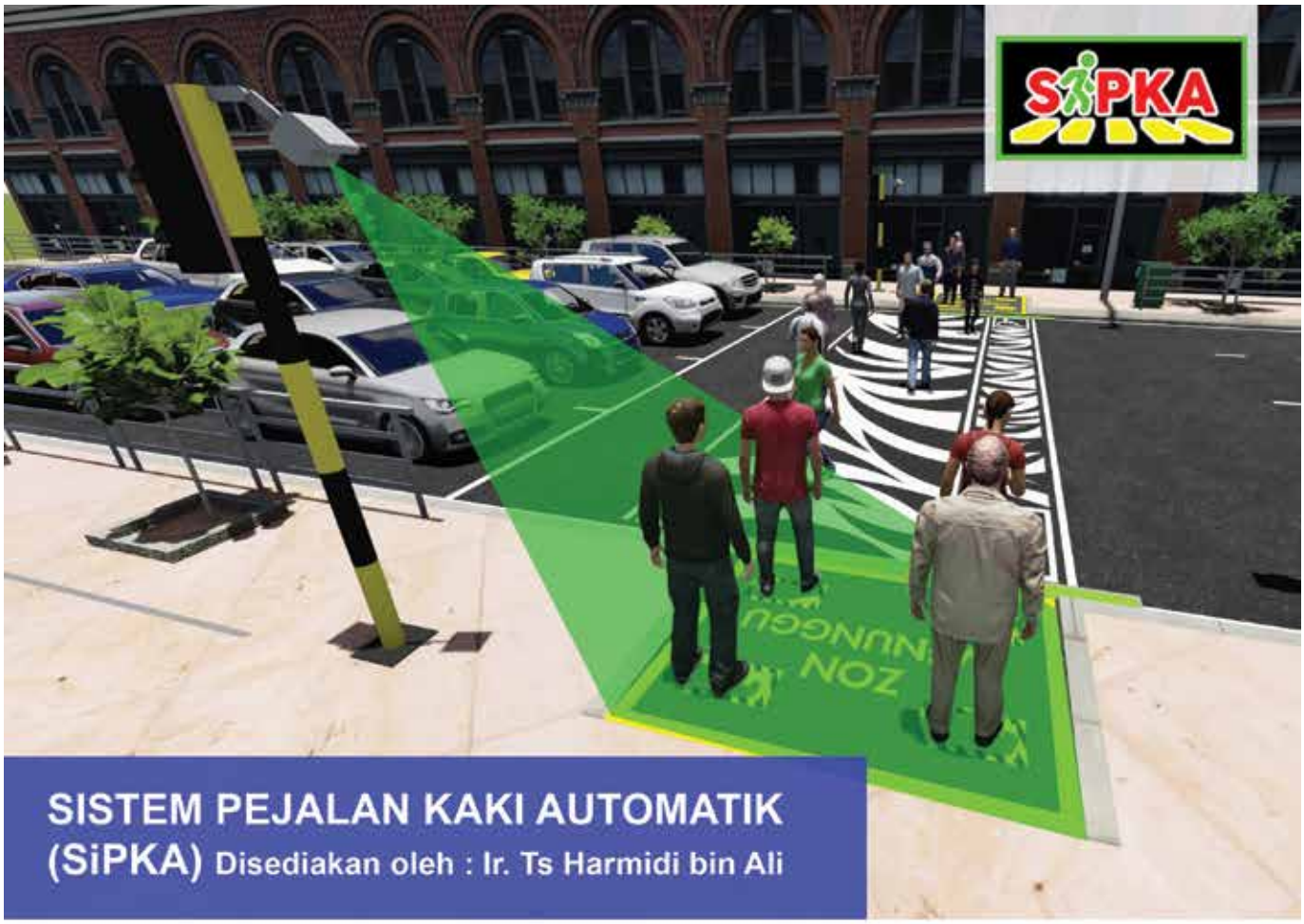


SISTEM PEJALAN KAKI AUTOMATIK (SiPKA) Disediakan oleh : Ir. Ts Harmidi bin Ali

Sistem Pejalan Kaki Automatik, menyediakan cara untuk mengesan kehadiran pejalan kaki ketika mereka menghampiri jalan iaitu sebelum melintasi jalan. Sistem ini menyediakan petunjuk pejalan kaki yang lebih tepat dan memastikan pejalan kaki mempunyai masa yang cukup untuk menyeberang dengan selamat.

CIRI-CIRI UTAMA SiPKA

- Menggunakan Teknologi Wireless Pedestrian Detection (infrared) untuk mengesan pejalan kaki
- WPD berfungsi dengan memanggil isyarat "WALK" apabila seseorang memasuki zon pengesanan
- Saiz dan bentuk zon pengesanan boleh di ubah mengikut saiz dan kesesuaian tempat
- Apabila pejalan kaki dikesan di zon pengesanan, Isyarat "WALK" akan diaktifkan
- Tahan lasak, mudah diselenggara dengan kos yang minimum untuk jangka masa panjang

KELEBIHAN SiPKA

WPD DIGUNAKAN SEBAGAI ALAT PENGESAN

- Menggunakan teknologi inframerah (IR)

TIDAK PERLU MENEKAN BUTANG UNTUK MELINTAS

- Perlu berada di zon pengesanan untuk dikesan menggunakan pengesan yang diaktifkan

MESRA PENGGUNA

- Pejalan kaki yang tidak boleh melihat boleh menggunakan sistem ini untuk membantu mereka melintas dengan selamat

PERBEZAAN SiPKA & PUSH BUTTON

	Push Button	Wireless Pedestrian Detection
Pemasangan	Rumit	Mudah dipasang
Penyelenggaraan	Setiap 2/3 bulan	Tidak perlu
Ciri-ciri	Mudah rosak	Kedudukan yang tinggi menyukarkan dari berlaku kerosakan yang berpunca dari perbuatan manusia

Majlis Bandaraya Melaka Bersejarah, Graha Makmur, No.1 Jalan Tun Abdul Razak - Ayer Keroh, Hang Tuah Jaya 75450 Melaka, Malaysia
Telefon Untuk Dihubungi : 012-6949521 (Ir. Ts. HARMIDI) Emel : harmidi.mbmb@gmail.com

KEBERHASILAN PROJEK

a) Menggunakan alat pengesan tanpa wayar yang berteknologi tinggi dan terkini iaitu infrared untuk mengesan kehadiran pejalan kaki. Ia dihasilkan menggunakan Artificial Interlligence yang dapat membezakan antara manusia dengan yang lain.

b) Pejalan kaki tidak perlu menekan butang sebelum melintas sebaliknya hanya perlu berada di Zon pengesan untuk dikesan oleh sistem ini.

c) Sistem ini menggunakan teknologi IR iaitu IP 65 yang sesuai digunakan di kawasan terbuka yang terdedah kepada cuaca seperti tahan panas dan hujan. Selain itu sistem ini mempunyai jangka hayat 10 tahun (jaminan 5 tahun).

d) Kerosakan pada infrared dapat dikesan melalui aplikasi telefon dan dapat dibaiki dengan kadar segera.

e) Sistem ini mesra pengguna kerana ia dapat digunakan oleh semua lapisan masyarakat termasuk golongan OKU.

f) Sistem ini dapat membantu mengelakkan kesesakan lalulintas di Kawasan tersebut melalui penyuraian trafik yang dibuat.

BUKTI FIZIKAL

i) Penjimatan Kos Penyelenggaraan

Melalui Wireless Pedestrian Detection (WPD) yang digunakan, kos penyelenggaraan berkala dapat dikurangkan. Ini adalah kerana kurang berlakunya Vandalisme pada Wireless Pedestrian Detection (WPD) yang diletakkan pada ketinggian 3.5meter hingga ke 5meter semasa pemasangan dibuat supaya sukar diakses oleh orang awam berbanding butang penekan yang sering rosak kerana terdedah kepada vandalisme dan sistem sediada yang selalu breakdown.

ii) Peningkatan Hasil

Dengan menggunakan Wireless Pedestrian Detection (WPD) sebagai alat pengesan, kos penyelenggaraan tahunan juga dapat dikurangkan kerana jangka hayat Wireless Pedestrian Detection (WPD) adalah selama 10 tahun dan jaminan selama 5 tahun. Sistem ini juga menggunakan teknologi IR iaitu IP 65 yang sesuai digunakan di kawasan terbuka yang terdedah kepada cuaca seperti panas dan hujan.

Rajah 1 di bawah menunjukkan harga alatan yang digunakan untuk lintasan pejalan kaki dan kos penyelenggaraan yang diambil dalam tempoh tiga bulan. Ini menunjukkan kos pembaikan bagi butang penekan adalah lebih tinggi berbanding dengan alat pengesan WPD walaupun kos pembelian butang penekan adalah rendah.

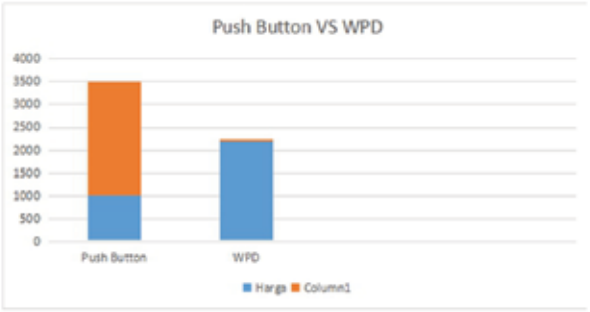
iii) Peningkatan Kepada Produktiviti

Hasil daripada bancian Passenger Car Unit (PCU) yang telah dijalankan pada waktu puncak antara jam 12:00 tengahari sehingga ke jam 1:00 petang dan antara jam 9:00 malam sehingga ke jam 10:00 malam, di dapati pejalan kaki sentiasa menggunakan Sistem Pejalan Kaki Automatik (SiPKA) ketika meyeberangi jalan tersebut berbanding sistem sediada kerana perlu menekan butang. Rujuk rajah 2

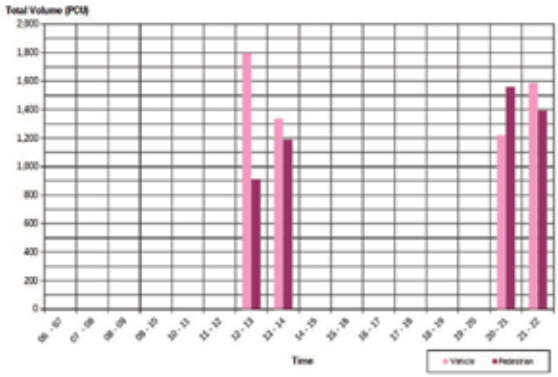
iv) Peningkatan Imej Terhadap Komuniti Bandaraya

Hasil kecekapan dan kekesanan Sistem Pejalan Kaki Automatik (SiPKA), projek ini telah memberikan kesejahteraan dan menjamin keselamatan pengguna jalanraya terutamanya pejalan kaki di kawasan bandaraya. Selain itu, taraf kehidupan dan juga imej Bandaraya dapat dipertingkatkan kerana menggunakan teknologi terkini yang diaplikasi pada kehidupan harian.

Teknologi ini merupakan salah satu daya tarikan kepada pelancong dari luar negara untuk datang ke Negeri Melaka. Secara tidak langsung, ekonomi Negeri Melaka boleh ditingkatkan dan boleh menjadi ikon kepada negeri-negeri lain.



Rajah 1



Rajah 2

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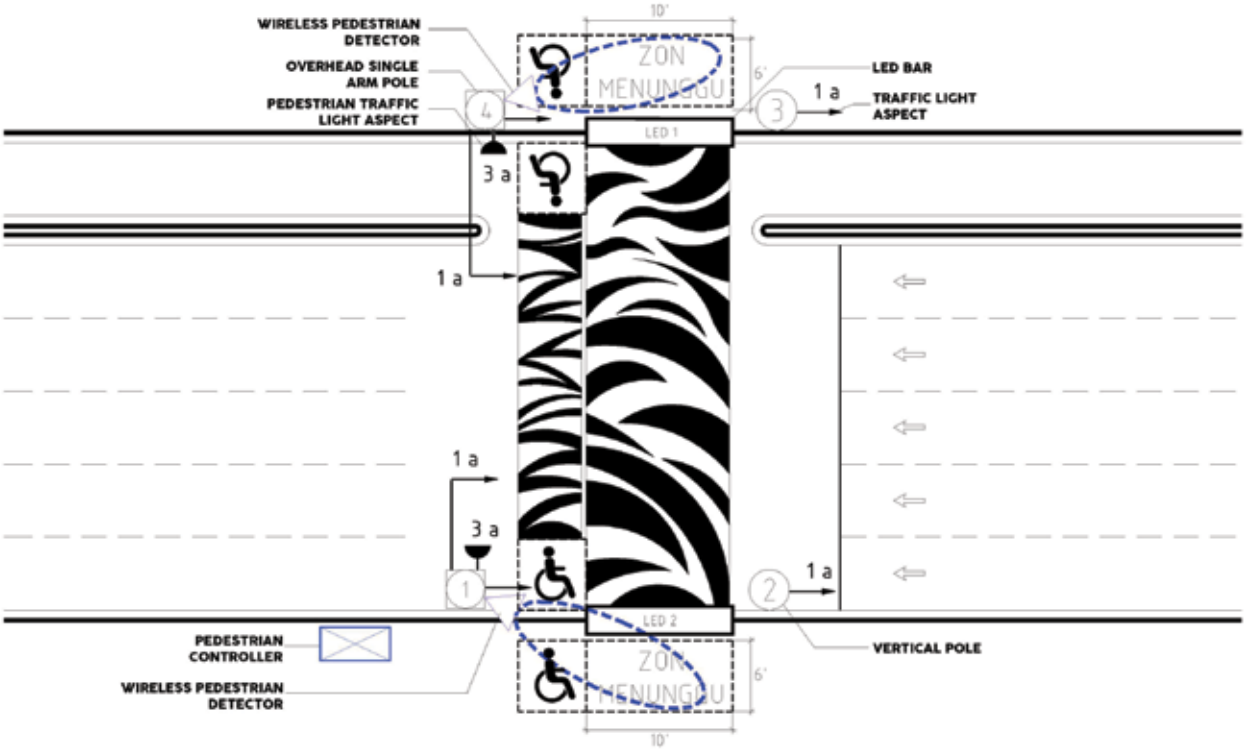
POTENSI

Melalui kerjasama antara pihak Majlis Bandaraya Melaka Bersejarah (MBMB) dan swasta pada 1 Ogos 2019 telah berjaya menghasilkan satu produk yang dikenali sebagai Sistem Pejalan Kaki Automatik (Wireless Pedestrian Detection (WPD) / infrared / traffic light / pelican crossing / LED Bar / stop line / Zon Pengesan) berteknologi tinggi dan dapat mengurangkan kos. Melalui SiPKA ianya dapat menarik minat semua penguasa jalan untuk memasang produk ini.

Melalui kerjasama strategik pihak MBMB telah mempromosikan produk SiPKA di pameran LS-1 oleh Jabatan Kerja Raya, Malaysia (Cawangan Letrik) di Perlis dan mendapat jemputan untuk menghasilkan artikel bagi penerbitan Lembaga Teknologist Malaysia (MBOT)



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RUMUSAN

Sistem Pejalan Kaki Automatik (SiPKA) merupakan salah satu projek inovatif dan kreativiti yang mengabungkan teknologi WPD (Wireless Pedestrian Detection) + Infrared + Traffic Light bagi menggantikan sistem push button. Dimana kehadiran pejalan kaki di kesan secara automatik tanpa menekan push button. Sipka juga dilengkapi dengan Pelican Crossing, Led Bar Pedestrian serta stop line. Project ini juga merupakan sebahagian dari RT MBMB 2035 di bawah teras infrastruktur dan Smart City di bawah teras Smart Living. Projek inovasi Sipka telah diujicuba selama lebih kurang 5 bulan mulai 01 Ogos 2019 dan siap dipasang di lapangan iaitu Jalan Merdeka , Banda Hilir pada 31 Januari 2020. Kos keseluruhan pelaksanaan projek SiPKA ini memakan belanja sebanyak RM 11856. Antara masalah yang dikenalpasti adalah masalah vandalism dengan memecahkan butang penekan, penggunaan yang kerap semasa menekan butang serta golongan orang kurang upaya (OKU) mungkin tidak dapat mencari tempat menekan butang manakala golongan berkerusi roda mungkin tidak sampai untuk menekan butang yang disediakan. Kerosakan Push Button sekaligus memberi impak negatif kepada pengguna jalan raya. Oleh yang demikian, SiPKA telah diwujudkan untuk mengatasi masalah yang berkaitan push button. Antara kelebihan SiPKA adalah pejalan kaki tidak perlu menekan butang sebelum melintas sebaliknya hanya perlu berada di zon pengesan untuk dikesan. Dengan menggunakan alat pengesan tanpa wayar tanpa wayar berteknologi tinggi iaitu infrared untuk mengesan kehadiran pejalan kaki yang dihasilkan menggunakan Artificial Intelligence (AI) yang dapat membezakan antara manusia dengan yang lain. Menggunakan IP65 yang sesuai digunakan dikawasan terbuka yang terdedah kepada cuaca seperti tahan panas dan hujan.

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LEMBAGA TEKNOLOGIS MALAYSIA
MALAYSIA BOARD OF TECHNOLOGISTS

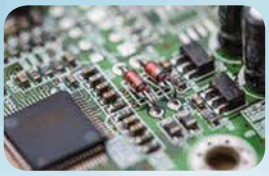
23 FIELDS OF TECHNOLOGY

What is MBOT's Recognized Technology Fields?

To-date, MBOT has recognized 23 Technology and Technical Fields. These technology fields are not permanent and will dynamically change based on the rapid growth of technology. Each Technology Fields has gone through rigorous verification and requirements study before it was being approved by the Board and recognised as MBOT Technology and Technical Fields.

Each Technology and Technical fields was defined by MBOT's Technology Expert Panel which consists of representative for the industry, relevant government agency and academia.

The Key Area for each Technology and Technical Fields was also defined properly to cover the wide angle of Technology Fields and its implementation in the industry.


Electrical and Electronic Technology (EE)


Information and Computing Technology (IT)


Chemical Technology (CM)


Telecommunication and Broadcasting Technology (TB)


Biotechnology (BT)


Building and Construction Technology (BC)


Resource Based, Survey and Geomatics Technology (RB)


Manufacturing and Industrial Technology (ME)


Agro-based Technology (AF)


Cyber Security Technology (CS)


Transportation and Logistic Technology (TL)


Material Technology (MT)


Marine Technology (MR)


Maritime Technology (MI)


Atmospheric Science and Environment Technology (AC)


Green Technology (GT)


Oil and Gas Technology (OG)


Automotive Technology (AT)


Aviation and Aerospace Technology (AV)


Food Technology (FT)


Nano Technology (NT)


Nuclear and Radiological Technology (NR)


Art Design and Creative Multimedia (AM)