THE TRIPLE HELIX

CREST COMMUNITY NEWSLETTER
TECHNOLOGY. APPLIED TO MARKET.

IN THIS ISSUE

CEO's Message

JAFFRI IBRAHIM

As we enter into a new year, it is only befitting that we look back at the previous year to take stock of how far we have come. The volatility of 2020 was unimaginable - many businesses and industries were heavily impacted.

Great crises test our resolve, but they also provide us with opportunities to reshape our future. On this note, I encourage you to read an article in this newsletter, titled "Building back better: A sustainable, resilient recovery for Malaysia's E&E industry". The article was published by regional technology publication, Digital News Asia and several of our members contributed their thoughts on how 2020 shaped out for them, their outlook for this year and a post-pandemic future they envision.

In this issue of the Triple Helix, we tuned our focus on our research and development capabilities by featuring two researchers who have made tremendous impact on the ecosystem.

We also shine a spotlight on two successfully completed collaborative R&D projects, conducted in partnership with the industry to bring about innovative solutions for the automotive and healthcare industries.

Get to know our community members and their business in our "News from the Community" section and read about the "2020 TGL Grand Design Challenge Finale", an annual initiative run by our talent development team. Also, find out more about CREST's recent appointment as the neutral entity for i-Connect health and wellness sector, whereby we will steer a consortium of 15 founding members, to catalyze innovation, nurture talent and increase Malaysia's competitiveness in developing health and wellness solutions for local and global markets.

As we continue to operate in unprecedented times with the economic, social and political impact of Covid-19, allow me to take this opportunity to extend our support as you continue your efforts to build back stronger. Collectively, as a community we can revitalize and rebuild towards a sustainable future for us all.

Collaborative Innovations

RFID: The technology making industries smarter

RFID, technology of the future

Radio Frequency Identification (RFID) is a new technology that leverages electromagnetic waves to track and identify objects automatically. The technology has received rapid development in recent years, due to its broad applications in fields such as transportation logistics, traffic control, asset management and healthcare and with the growing popularity in IOT concepts, various sensing devices, including RFIDs, have been incorporated into engineering designs such as Cyber-Physical systems and Internet of Things.

A simple RFID system can consist of a reader and a tag where the latter contains information for a particular object. A powerful RFID reader system can read a few hundred tags within milliseconds. Different from the conventional barcode technology, the RFID sensing mechanism does not require line-of-sight alignment, therefore tags can be easily tracked even when they are several feet away and not within visibility range of the reader antenna.

However, it is often challenging to design a tag antenna that can be used for different objects as its read performance is affected by the antenna structure itself. Designing a tag involves working with a complex multi-variable optimization process that involves many variables that are interrelated. The design process is tedious, time-consuming and may take weeks, even for an experienced RFID engineer to optimize a tag antenna.
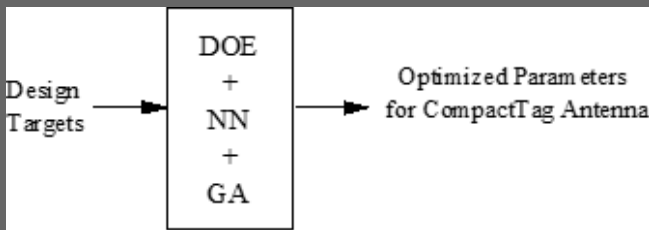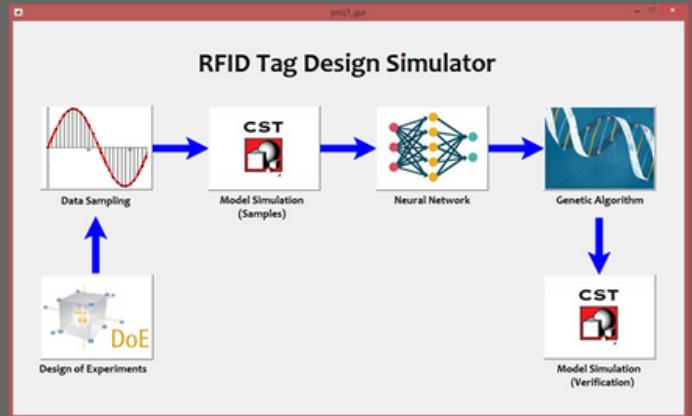

Fig 2: Implementation of the simulator using the MATLAB GUI

Advancing RFID technology

For the first time, in this project, we applied the artificial intelligent (AI) techniques to ease the RFID tag design process. Here, the Design-of-Experiment has been successfully incorporated with the Neural Network and Genetic Algorithm for designing an easy-to-use simulator, as shown in Fig. 1. The design method is innovative as it uses machine learning algorithms to learn the complex electromagnetic properties of the tag antenna and provides the final optimized design parameters to the designer. Having been adequately trained, the simulator can work as a competent RFID designer. And to make it user-friendly (as shown in Fig. 2), the simulator is implemented using a MATLAB GUI so that design targets can be easily fed.

As there is no access-wait time for post-processing, the simulator can provide the most optimum design parameters within a tenth of a millisecond when there are new changes in the design targets. The newly developed AI-assisted system is easy to use and does not require the user to have any professional qualifications. It is therefore effective and can reduce the design cycle time and costs of up to ~80%.

Fig 1: Simulator that has incorporated the DOE, NN, and GA into one

For this project, the simulator had been applied to design tag antennas, and prototypes were fabricated to verify their read performances. Experimental results have shown that the proposed simulator can be trained to design and optimize any types of tag antennas. One of our designed tags is shown in Fig. 3. The success of this project has enabled us to file a Malaysia patent and we have published eight technical papers in various top international journals, including having two of our sponsored PhD students (Dr. Lee Yong Hong and Dr. Ng Wai Hau) graduate from the program.

Funding support and achievements

With funding from CREST, we have successfully built up a strong research group actively involved in the research and development of RFID, sensors, and wireless power transfer. Our team consists of an associate professor, an assistant professor, a postdoctoral fellow, seven PhD students, and four Masters students. In the last three years, the group has published more than 20 papers in the IEEE Transactions on Antennas and Propagation, one of the best journals in Electromagnetism internationally and I have been acknowledged as the only Malaysian who has published the most papers in this prestigious journal.

With CREST's support, the project is now entering into its commercialization stage. A new company has been set up under the umbrella of MDT Innovations Sdn. Bhd. MDT is fully committed to the project and designed all the reader systems during the implementation phase. To kick off the business, the team has been working towards providing turnkey R&D services to design RFID readers and tag antennas for our customers.
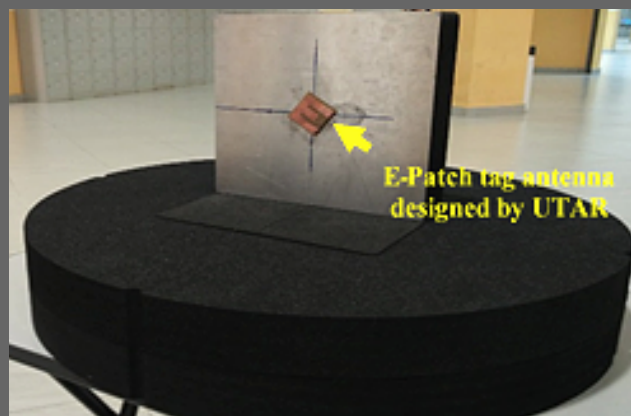

Fig 3: Our designed tag (Size: 30 x 30 x 3.0 mm3, Max. Read Distance: ~14.5 m)

Moving forward

With high penetration of RFID into various industries and services, the market for this technology is experiencing high growth. It was valued at USD 16.95 Billion in 2016 and is expected to grow at a CAGR of 7.7% between 2017 and 2023.

We want to tap into the growth of the RFID market and our ultimate goal is to become the top one-stop service provider from design to fabrication. CREST has been the catalyst for the E&E industry in Malaysia and their support has been invaluable to the success of our mission. Recently, we applied for IPs to design various types of high-frequency antennas and electronic systems, and will continue to work towards creating more success stories and to put Malaysia on the global map of RFID technology. We believe that we can do it!

About Prof Dr Lim Eng Hock

Prof. Lim is the chairperson of the UTAR Research Centre for Communication Systems and Network.

The center has 15 active members and under his leadership, has published 114 refereed journal papers and secured 53 research grants amounting more than 10 million ringgit. He is also the founding chapter chair of the IEEE Radio Frequency Identification Council Malaysia Chapter, which consists of 43 members, both from academia and industry Prof Lim has been instrumental in bridging the gap between academia and industries in Malaysia and has been actively promoting and working on R&D capabilities for the RFID industries in Malaysia. The success of this CREST project is definitely an important milestone in his life!

Collaborative Innovations

A novel approach for prioritization of product quality improvement in a complex manufacturing environment.

A conversation with Prof Dr. Low Heng Chin, Professor of Statistics at the School of Mathematical Sciences, Universiti Sains Malaysia reveals how her team of researchers is helping businesses prioritize product quality improvement through the use of statistics and AI techniques.

Fifth from left: Prof. Dr Low with the Industry-Academia project team and Dr NorAzmi Alias from CREST (fourth from left)

Can you give us a brief background of the project?
Product quality is critical for business organisations due to a highly competitive, customer driven market. Robust products and reliable services play a key role in ensuring long-term customer loyalty. The aim of our project is to design an information system that will assist in prioritizing product quality improvement based on available data.

On the onset of our project, we began looking at our study from a high-level systemic view. We then took a data modelling approach to narrow down to potential focus areas for quality improvement. Further analysis was carried out to prioritise critical factors affecting specific product quality issues and subsequent actions were taken on the selected factors. Results were later monitored and impacts validated.

The project was divided into four major phases. For phase one, we conducted a study on the product life cycle so as to define the entire scope of our study. In phase two, statistical or AI techniques were used to perform data analyses and in phase three, a prototype was created to manage and prioritize product quality improvement. Finally, in phase four, the impacts of the developed information system were assessed, and results were disseminated.

The achievements of this project include a Decision Support System to prioritize the critical parameters at the test stations to allow for early intervention using historical product testing data. A machine learning approach was then implemented, using historical data to support the decision-making process in parameter prioritisation based on data consistency. The prioritized parameters enable users to make intelligent decisions to identify failures to that can be solved at an early stage.
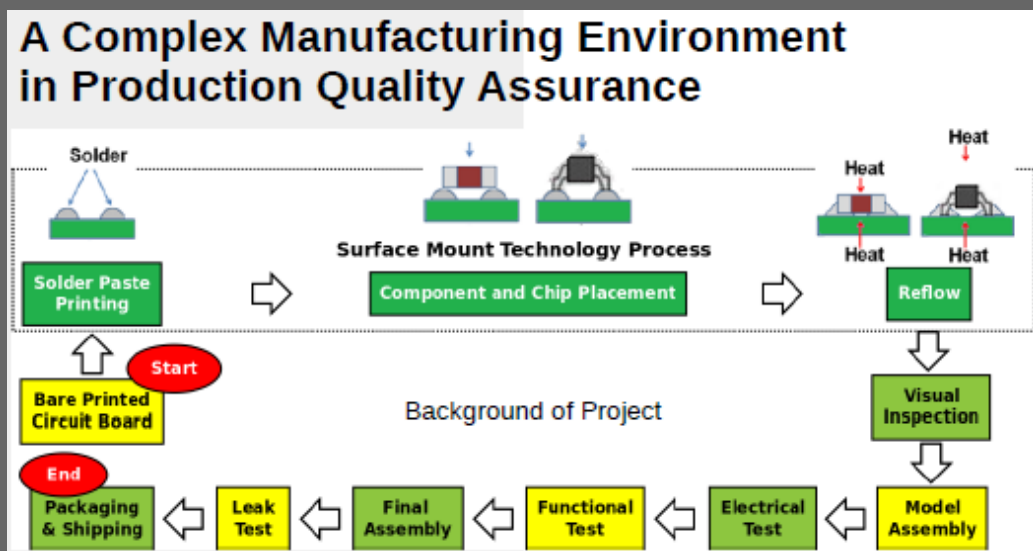
Who was involved in this project?

Our multidisciplinary project team:
1. Prof. Dr. Low Heng Chin (Project Leader, Statistics background, School of Mathematical Sciences, USM)
2. Mr. Amir Hamzah (Director of Quality, Engineering background, Sanmina)
3. Dr. Teoh Ping Chow (Mechanical Engineering background, Wawasan Open University)
4. Dr. Tan Choo Jun (Computer Science and Economics background, Wawasan Open University)
5. Dr. Teh Sin Yin (Statistics and Operation Management background, School of Management, Universiti Sains Malaysia)
6. Mr. Koay Fong Thai (PhD student, EE Engineering background, School of Mathematical Sciences, Universiti Sains Malaysia)
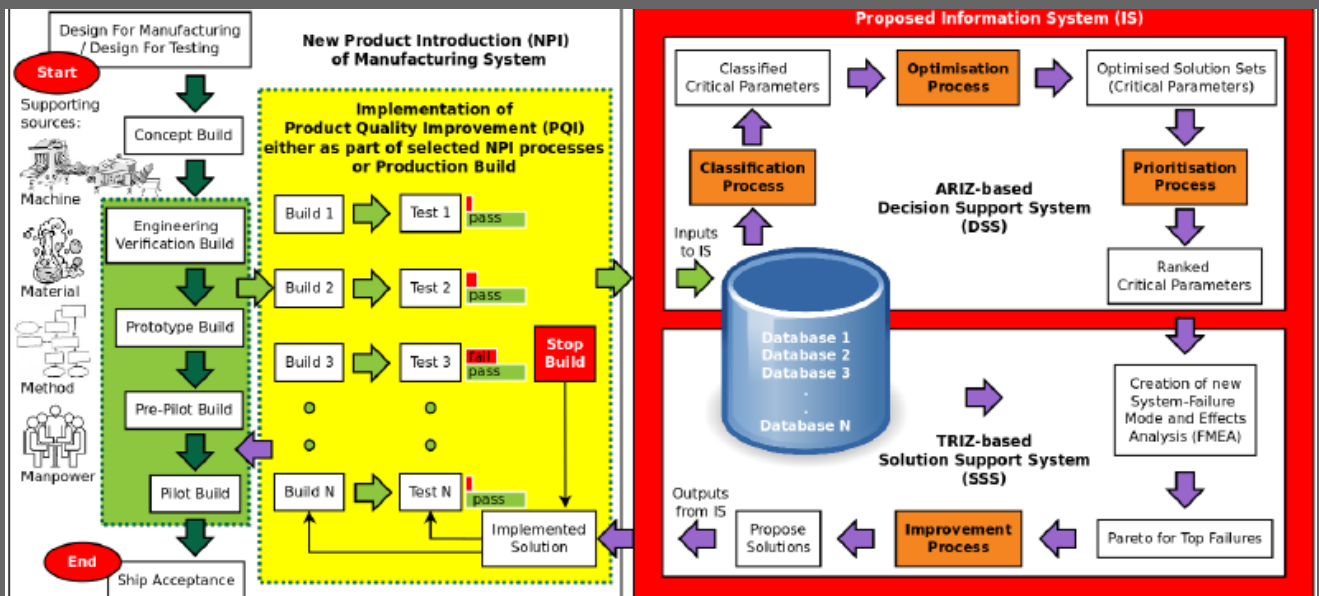7. Mr. Ng Wei Chien (Master student, Finance background, School of Management, Universiti Sains Malaysia)

How was it like collaborating with CREST throughout the project?

We are grateful to CREST for their thorough reviews throughout the duration of the project. In addition, we are appreciative of the opportunities which CREST has given the team members, particularly the students who were allowed to showcase their project accomplishments at various CREST events.

About Prof Dr Low Heng Chin

Professor Dr Low graduated from the University of Liverpool with a PhD in Mathematical Statistics and joined Universiti Sains Malaysia's (USM) Medical Faculty in 1984. She taught Statistics and researched and published in the medical field from 1984 to 1991.

In 1992 she returned from the USM School of Medical Sciences in Kubang Kerian to the main campus in Penang. From 1992 to her retirement in 2020, she linked up with the industries and collaborated with multinational corporations in Penang, among which are Motorola (later Sanmina), Intel, Hewlett-Packard, Robert Bosch, Broadcom, ASE and Infineon, and with SMEs including QDOS, Pensonic and Pentamaster. Her areas of collaboration include quality improvement through the use of statistical and AI techniques.

Product Quality Improvement Flow using ARIZ based Decision Support System & TRIZ based Solution Support System

Tomorrow's Talent

– TGL Grand Design Challenge –

in 2020, CREST organised the 2020 TheGreatLab (TGL) Grand Design Challenge Finale, a design competition involving High School and University students. The program produced top 3 winners based on 2 levels of evaluation - Regional and Finale Evaluation. 13 university and 15 high school teams competed to vie for the top 3 innovative project award.

High School Category

The 1st place winner from the High School category was the team from Penang Chinese Girls' High School with their project titled 'Medispress', represented by Wong Wan Yin (Form 3), Phi Yi Xian (Form 3), Erica Khoo Yu Xuen (Form 3) and Wong Chjann Hann (Form 2) and supervised by Ms Tan Eng Keng.

The project falls under the innovative solution for digital healthcare applications category and its focus is on drug delivery system. To create the system, the team chose a drone as the method of transportation that would be accessible to different locations and is user-friendly. The drone was integrated with apps, designed to allow doctors to prescribe medicine to their patients through their mobile devices and have the medicine delivered to the patient's home in a timely manner.
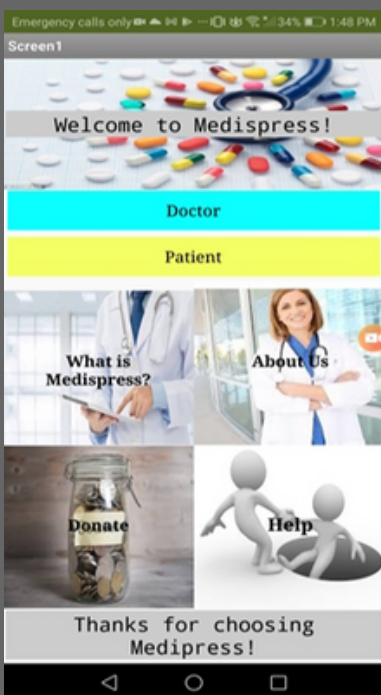

Left: Screenshot of the Medipress App

The second winning team are a group of students from SMK Kota Masai 2 with their Science based project entitled 'Wonder Bin'. The team comprised of Aina Batrisyia Bt Sahrin (Form 5), Fatin Nur Najwa binti Salleh (Form 5), Nur Fatin Najiha binti Ibrahim (Form 5), Muhamad Hadif Ilham bin Kamalrudin (Form 5) and Mohamad Ismail Syah bin Esa (Form 4), supervised by their teachers Rahayu binti Abdul Rahman, Mohamad Rosman Bin Aini and Siti salbiah binti Salleh.

Food waste has become a major concern, particularly in developing countries such as Malaysia and its negative impact on the economy and environment has led the team to invent The Wonder Bin. A method that helps to compost food waste into fertilizer effectively and is user friendly. It is equipped with a grinder, PH & temperature sensor, water sprinkler, coconut coir as a natural odour filter, and regulator. These processes produces two types of fertilizers; liquid and solid compost which can be used to nourish the plantation.

"As students, we are rarely exposed to innovation projects, so we were excited to join the Youth Industry Bootcamp. We learnt that we could serve the community by creating a product that impacted the environment positively for the next generation."
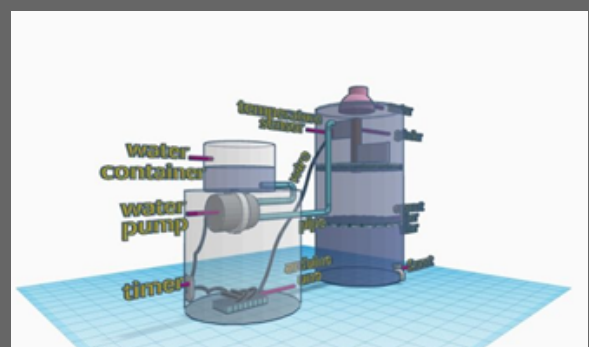
Top: 3D Design of the Wonder Bin

In third place is the team from SMS Tun Syed Sheh Shahabudin with their project titled 'Smart Aquaponics'. The team is represented by Muhammad Amiruddin Afif Bin Mohd Roshanaffi (Form 4), Muhammad Alauddin Arfan Bin Mohd Roshanaffi (Form 4), Ahmad Zariff Afdhal Bin Zulkhairi (Form 3) and Mohamad Afiq Adha Bin Md. Azri (Form 3) and were supervised by their teacher Bahariah Binti Abd Halim.

The team developed a smart agriculture IoT solution which helps improve aquaponics through the detection of environment conditions such as flow rate, amount of pollutants, dissolved salt as well as the amount of Nitrates, present in the system. It is a monitoring system that is able to send notifications to the farmer to troubleshoot issues on the farm.
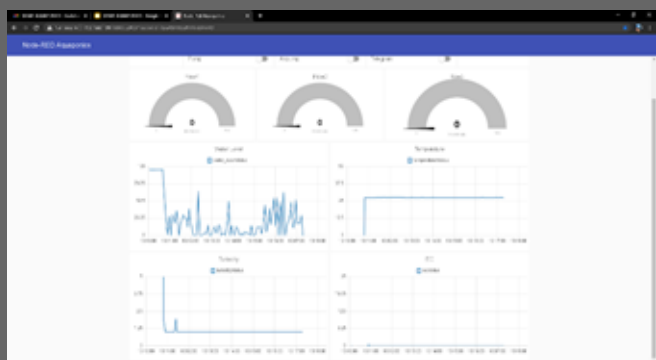
Top: Screenshot of the system interface

University category

The 1st place winner was the team from UTM with the project titled 'Pillit'. The team comprised of Omar Khaled Elhossiny Mohamed Abouelmagd (4th-year Mechatronics Engineering), Lim Wei Sheng (4th-year Mechatronics Engineering), Syed Abdul Quddus Al-Khered (4th-year Software Engineering), Lai Xiao Tong (4th-year bioinformatic Engineering) and Luqman Al-Hakim Ghani (3rd-year Software Engineering). The team was supervised by Assoc. Prof. Dr Yeong Che Fai from the Faculty of Engineering. Aside from securing 1st place, the team also won the James Dyson Special Award.

Their project aims to care for patients above 60 years old who are unable to understand prescriptions provided by doctors due to complexities and at times, forgetting to take the medicine at specific times which could lead to Medication Non-Adherence.

The solution? A device that can arrange the dosage for the patient, release on a timely manner, monitor the patient's adherence and report to family members or the doctor in case a dose is missed. This device can assure that elders consume the right medicine at the right time.

This project began in March 2020 when the team joined Malaya Makerthon 2020 aiming to improve the lives of elders. The team emerged as champions and subsequently raised RM6k in funding through the Make It Challenge 2020 organized by Sunway iLabs, in collaboration with MaGIC, where they also emerged winners at the competition. Finally, the team joined TGL 2020, having fine-tuned their prototype and produced a completely different design and approach to solve the problem.

The team opines that the CREST platform encourages students to utliize their knowledge and apply it to solve real life problems. This is done through competitions that involve problem statements from the industry in addition to mentoring sessions, workshops and judges from the industry as well. Linking students with industry partners provides them with exposure to business aspects which is fundamental to their growth.
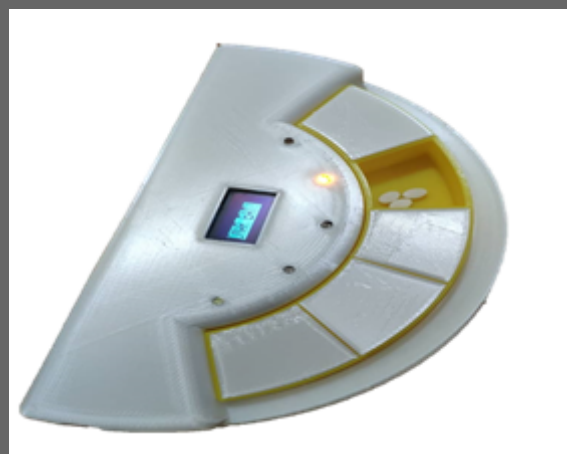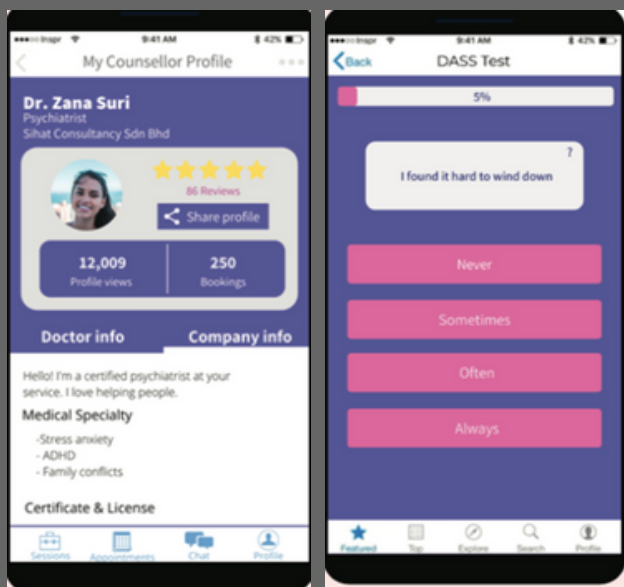

Bottom: Portable version of Pilit

The 2nd place team were 3rd year Biomedical Engineering students from University of Malaya (UM),, namely Siti Hajar Binti Juhari, Rama Amjad Mohd Alawawdah, and Ameera Husna Binti Helmy Zamin supervised by Dr Juliana Bt Usman.

The team came up with the project idea for the DASSist app, which is a combination of words, DASS test and assist which involved planning and designing a mobile app capable of providing mental health services such as an effective mental health assessment - the DASS test, a convenient therapy booking platform, and a practical mood journaling feature.

Throughout the pandemic, the team used online applications to collaboratively plan and design the application features including its user interface, pseudocodes, and user flowcharts and relied on online surveys for market research.

'"What started as an initiative by enthusiastic engineering students trying to gain more knowledge before the upcoming semester turned out to be a path that yielded changes in our personal development", a team member said.
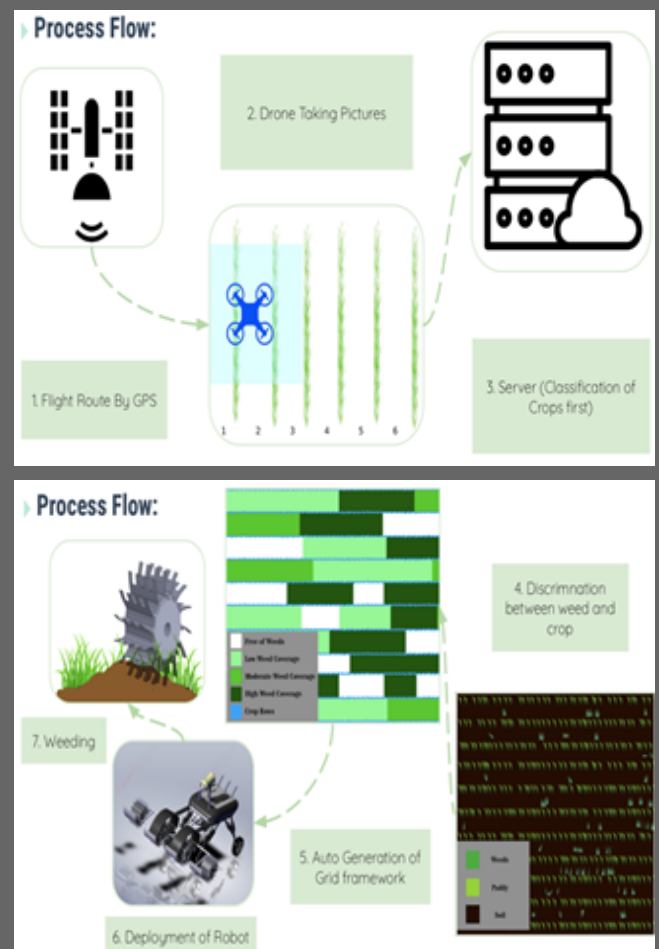
In 3rd place was team Falcon-Tech, comprising members from UTM and UM - Belal Yahya Hussein Al-Tam (2nd year – Degree in Biomedical Engineering, UTM), Ebrahim Hassan Abdelfattah Ahmed (2nd year – Degree in Mechanical Engineering, UTM), Hashed Moqbel Abdullah Farea Al-Naeem (2nd year – Degree in Mechanical Engineering, UTM) and Yousef Gamal Abdulmajeed Ahmed (3rd year – Degree in Mechanical Engineering, UM). The team was supervised by Dr Mohamad Shukri Bin Zainal Abidin and Dr Mohd Saiful Azimi bin Mahmud.

The team took it upon themselves to resolve weed issues faced by farmers which affects soil and paddy yield. The Falcon-Tech system is designed to manage the problem caused by weeds by removing it via a simple method - through the use of weeder robots.

The robot is recharged with batteries that are eco-friendly. It is also user friendly and can be controlled using a basic method whereby it identifies the weeds using a camera installed within a drone which flies above the field and capture a stream of pictures to be analysed in real-time using a dedicated server.

Top: Digitised DASS test

To find out more about the TGL Program and participants, visit thegreatlab.my

Top: Process Flow of Falcon Tech

Humanising R&D

Placing robotics at the heart of stroke patient rehabilitation

CREST funded researcher, Dr Yeong Che Fai is combining the worlds of robotics to create rehabilitation devices that are accessible, affordable and effective for stroke patient recovery.

THE SPARK OF AN IDEA

It was in 2010 that Dr Yeong, a researcher cum senior lecturer from Universiti Teknologi Malaysia and serial entrepreneur had the idea to place robotics at the center of patient rehabilitation devices. Dr Yeong was in the midst of completing his PhD at the Imperial College in London and was involved in the development of a rehabilitation robot for stroke patients. He was impressed by the effectiveness of the robot in facilitating recovery whilst at the same time, affording new ways for medical professionals to evaluate patients' progress, whilst at home.

"The value of research and innovation lies in solving real-life problems. I witnessed first hand the positive effects of embedding robotics as part of a healthcare solution and it inspired me to further my research and develop my own therapeutic robot for the Malaysian market." Dr Yeong said.

He added that stroke is a major public health concern in Malaysia with statistics indicating that ever year, one out of every six Malaysians suffer from the disease. "Conventional methods with physiotherapists can be labour-intensive, costly, and inconsistent so I thought, why not create a solution to address the issues of cost, accessibility and effectiveness?" Dr Yeong said.

Fuelled by immense passion for robotics and a goal to create a Malaysian success story in this field, Dr Yeong dove into his research upon returning back to Malaysia.

From left: Dr Yeong, Dr Khor Kang Xiang and a team member from the CR2 Haptic project

"The value of research & innovation lies in solving real-life problems." - Dr Yeong

TRACING THE JOURNEY

The journey towards the development of CR2-Haptic was marked by challenges as Dr Yeong faced numerous obstacles at every stage of his journey. "The biggest hurdle I encountered during the initial stages of the project was in maneuvering the intricacies of the local healthcare industry and conveying my research to the right people. Healthcare practitioners in Malaysia lack the mindset and appetite for research; the culture of innovation and research isn't one that is immediately understood or practiced here. Research and development is often deemed as time consuming and costly and ranks low in priority within our local healthcare industry."

For two years, Dr Yeong approached multiple stakeholders, in hope of getting his idea to the right audience. At the same time, he faced cash flow problems and almost gave up on his project when a chance meeting with Universiti Teknologi Malaysia student, Khor Kang Xiang, changed everything.

Khor was a former student of Dr Yeong and what is interesting is that he too, had the intention of building a robot for stroke patients rehabilitation. It was Khor who informed Dr Yeong about CREST and his intention to bring his idea to Dr Nor Azmi Alias, whom he had met at a previous engagement. Through Khor, a meeting with Dr Nor Azmi and the CREST team was set and thus began the journey for Dr Yeong and Khor as researchers and technopreneurs.

SYNERGY & COLLABORATION

"The CREST team saw the potential in CR2-Haptic and funded our project. We received a RM500,000 grant from CREST, over a period of three years, which allowed us to dive deeper into our research. CREST facilitated linkages with the government by connecting us with key stakeholders within the Ministry of Health, medical device authorities, industry players and funders."

"The organization has been invaluable in giving us a platform to connect with other stakeholders who we can learn much from in growing our business. I especially like that CREST understands researchers and also industry. Because many of the CREST team members have worked in industry previously, they know the different 'languages' people speak and that is the lynchpin that connects us all." shares Dr Yeong.

CR2 Haptic - compact robot design that provides a wide range of modular units to train for vaious functional movement

"CREST has been invaluable in giving us a platform to connect with other stakeholders who we can learn from. I especially like that CREST understands researchers and also industry." – Dr Yeong

POISED FOR A BRIGHT FUTURE

By marrying research, technology and innovation into healthcare, Dr Yeong and Khor have been able to develop a compact, portable and affordable rehabilitation robot named CR2-Haptic. The robot which focuses on hand exercises, through playing of games, enables the device to test a patient's hand dexterity through specific functional movements and sends assessment reports on a cloud-based platform to a medical practitioner to chart their progress.

The product which has been in the market for over two years now is making waves overseas. "We are happy with how CR2-Haptic is performing in the market - we enjoy a solid market share locally and a global audience. From the research done on CR2, we were able to create two new products, the first being a bot that helps stroke patients regain balance and the second, an IoT system built specifically for badminton players, with the purpose of allowing them to master their stroke and perfect their game." Dr Yeong said.

The Global Medical Robotics Market is expected to surpass US$ 16 Billion by 2025. The major drivers for the market growth are growing geriatric population globally, rising preference for medical robotics for surgery and patient recovery. Rehabilitation robots are expected to witness the highest Compound Annual Growth Rate in the forecast period and we want to ensure that we're ready and plugged into the market to reap the rewards when the time comes!" Dr Yeong said.

Humanising R&D

CREST connects industry with academia to create solutions for the automotive sector

The article traces the journey from research to outcome, through the lens of Associate Professor Dr. Muhammad Nasiruddin Mahyuddin, USM and Encik Noor Hafizi Hanafi, Senior Staff Engineer, from Continental and illustrates the synergies between the two, resulting in the development of 'Vehicle Instrument Cluster Testing based On Real-Time Inspection' (VICTORi), an automated test system for automotive instrument panel, aimed at increasing productivity, efficiency and accuracy in automotive testing.

Collaborations between academia and the industry is one of the best ways for the industry to direct academic research outcomes to solve problems faced by their respective sectors. The second of our humanizing R&D stories takes a look at how Continental Automotive Components Malaysia and Universiti Sains Malaysia (USM), via CREST as the catalyst has made it possible for both parties to collaborate and jointly create solutions for the automotive sector.

WHAT ARE THE PAIN POINTS WHICH VICTORi AIMS TO SOLVE?

Automotive vehicles are equipped with a panel called a cluster assembly or a dashboard which displays vital information to the driver. This includes displaying the driver status, information of the vehicle system and driving conditions. As an integral component in a vehicle, the cluster assembly undergoes vigorous testing to ensure reliability and effectiveness, before the vehicle is deemed safe.

"We were challenged to look beyond the obstacles and imagine possibilities (however wild) that can bring about solutions to the problem" – Dr Nasiruddin

Manual testing is a popular method used to test the reliability of the dashboard. This is no doubt time consuming and often hampered by human limitations, such as exhaustion, thus resulting in judgment errors, during the testing process. In addition, consistency and integrity of the test data is dependent on skill, therefore requiring the product to be further developed from time to time.

To address these issues, Continental collaborated with USM, to develop solutions which will reduce testing and manpower hours, minimize human error, whilst simultaneously increase productivity throughout the entire process.

VICTORi's VALUE PROPOSITION

VICTORi features a custom built product designed and developed to solve Continental's problem in automating its instrument cluster test at an R&D level. The solution was built with ease of use in mind. At a click of a button, VICTORi enables test engineers to write a simple code that enables them to run tests in the most efficient manner. The product is easy to use, customizable and allows for future functionality upgrades.

Dr Nasiruddin (5th from left) and the VICTORi Collaborative R&D Project Team from USM and Continental.

WHAT WERE SOME OF THE KEY CHALLENGES
DURING THE COURSE OF YOUR RESEARCH AND
HOW DID YOU OVERCOME THEM?

Dr. Nasiruddin: After a bumpy start of negotiating the
requirements and 'must-haves' for the project, USM
was able to fully understand the requirements of
Continental, therefore leading to a more fruitful
collaboration. It was during this phase, that USM also
learnt a golden lesson which is that researchers ought
to pay greater attention to the demand and wants of
industry. We were also challenged to look beyond the
obstacles and imagine possibilities (however wild)
that can bring about solutions to the problem that is
before us.

Another memorable challenge which USM faced was
the agreement on some of the procurement clauses
which arose at the start of the project. This was
resolved amicably by all parties and the project
research agreement was then signed to mark the start
of the project.

TELL US ABOUT THE COLLABORATION BETWEEN USM
AND CONTINENTAL? HOW DID THIS COME ABOUT?

Noor Hafizi Hanafi: Our partnership started in 2016,
where Continental was looking for support from USM
to look into the issues regarding our test system. Our
corporate offices in Germany and Romania had
already developed and launched this project but what
was missing was to have someone on board to
innovate and create a workaround solution for our
cluster assembly. To develop such a technology on a
global scale would be an expensive process, therefore
we were on the lookout for an alternative to develop
this in Malaysia, instead.

We submitted a proposal to USM, having spoken to
them in previous occasions and the rest is history.

RESEARCH JOURNEY VIA CREST

Noor Hafizi Hanafi: CREST played a key role in
helping us fund the initiative, we were given a
small budget to run the project, therefore their
financial aid made it possible for us to get the
project off the ground.

Dr. Nasiruddin: I learnt a lot during my time
developing VICTORi - As a grant recipient, CREST
mandates that a review be conducted on a
quarterly basis for a period of two years. Each
review produced fruitful results as the session was
conducted together with the presence of our
industrial counterparts, therefore ensuring that
each project milestone is in accordance with the
expectations of the industry. As part of the grant,
CREST imposed a quarterly review on the project,
which kept us disciplined in our pursuit of
developing solutions in an effective and timely
manner. The grant from CREST was also unique as
it emphasizes on human capital output as one of
the tangible outcomes. We, therefore received
constructive feedback and positive criticism from
the CREST panel which helped us in evaluating
our progress in addition to adhering to specific
stands and quality of our solutions.

VICTORi - Vehicle Instrument Cluster Test Operation in Real-time
Inspection

VICTORi's IMPACT ON THE AUTOMOTIVE SECTOR

Dr. Nasiruddin: As the instrument cluster will be autonomously tested by VICTORi, several obvious benefits are expected as a result of the automation process. Firstly, Continental will save up to 160 man-hours of manual testing. This translates to saving up to 800 man-hours in five years and if we are looking at a cost of RM100 per man-hour we will save up to RM80 000 in cost savings!

Aside from industrial impact, VICTORi has also contributed to an outstanding academic impact such as published papers and intellectual property. Patent under the project name 'Automated Test System, Automotive Instrument Cluster' has been submitted and the copyright under the product name of 'VICTORi' has been obtained. We have also published several journal articles on VICTORi and showcased our research at CREST Open Day 2017, ITEX 2018 (where VICTORi was awarded a Gold medal) and Industry4WRD Summit 2019.

VICTORi TODAY

Noor Hafizi Hanafi: VICTORi is currently being tested in Continental's R&D labs on various prototype instrument clusters to further evaluate its test automation effectiveness against manual testing and the latest semi-auto approach. To date, the product has been successful in automating numerous test sequences and is commended by the global Continental team for its efficiency and effectiveness in conducting various tests with next to zero error.

Final Production Demonstration to Continental Automotive

"To develop such a technology on a global scale would be an expensive process, so we looked to USM for support to look into the issues regarding our test system and develop an alternative solution locally." – Noor Hafizi
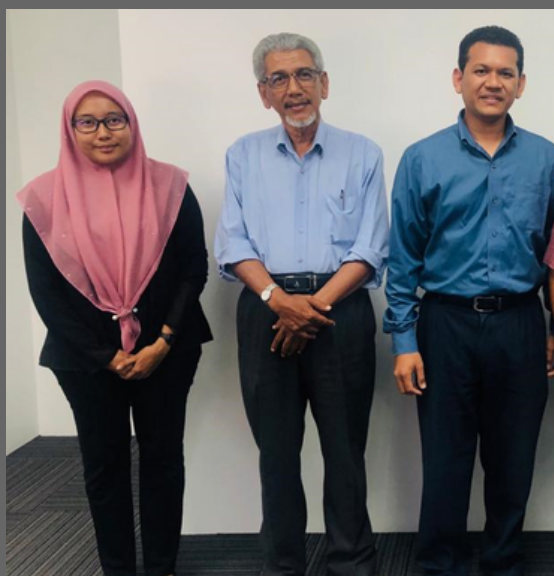
News from the Community

Advanced Binary Network provides end-to-end solutions to help SMEs and large corporations accelerate growth

ABOUT US

Over the last eight years, Advanced Binary Networks has provided ICT solutions to help organizations embed the use of technologies across all levels of their business. Our expertise lies in building web-based mobile, and desktop apps, software development, infrastructure services and total end-to-end solutions for SMEs and large corporations.

Our aim is to become Malaysia's leading digitalization driver, catalyzing enterprises with innovative ICT solutions and to be the bridge that connects Malaysians to digital technologies. We are a small team of experts who strive to meet each individual or organization's personalized objectives, by enabling them to enhance productivity and profitability, across their respective businesses. In delivering services to our clients, we are driven by three main principles: humility, respect, and trust. As such, we believe that excellent digital solutions result from understanding the unique challenges of our clients, practising close cooperation, building long-lasting collaborations, recognizing ideas, good planning, and treating everyone humanely.

OUR BUSINESS SCOPE

Advanced Binary Networks Sdn. Bhd. offers a comprehensive range of managed e-services which includes providing internet applications and internet infrastructure services. To date, we have assisted our clients to automate their business process by leveraging ICT, enabling them to be more efficient and productive.

In addition, we develop custom made software applications and computer systems, based on our deep understanding of our client's requirements. We believe that businesses of all sizes require software to optimally run their business, therefore, we work with our clients to develop the best software that cater to their respective needs.

A niche area that we focus on is the development of Android and IOS based mobile apps.. We combine Internet-of-things technologies in our apps to assist companies to ride the Industrial Revolution 4.0 wave.

OUR CLIENTS

Over years, we have served over 60 companies ranging from Small & Medium Enterprise (SMEs) to multi-billion corporations. Our software has been deployed all over the world and our clients such as Petronas, Proton, Perodua, CREST, Universiti Sains Malaysia, Universiti Malaya and Bernas, among others, speak volume of the work we have done for them.

Middle: Nazri Said, Company Director and team

Advanced Binary Networks Sdn Bhd

Block A, Sains@USM,
10 Persiaran Bukit Jambul
11900 Bayan Lepas,
Penang, Malaysia.

SME in Focus

The Vision Beyond Tomorrow

Ideal Vision Integration provides innovative machine vision, system integration and software solutions for various industry applications.

BRIEF PROFILE OF THE FOUNDER

Edmund Yuen is the founder of Ideal Vision Integration Sdn Bhd, a company based in Penang which provides machine vision, system integration, and software solutions to various industries. He graduated with a Bachelor's Degree in Aerospace Engineering from Universiti Sains Malaysia and has over a decade of working experience in the engineering sector, particularly in machine vision and semiconductor industries.

Edmund was exposed to machine vision technology during his internship, in a semiconductor multi-national company where he was inspired by the advanced vision technology that integrated in IC package sorter machines. Well equipped with machine vision knowledge and working experience in the industry, Edmund brought his strong networking skills into building partnerships at a business development level, by founding Ideal Vision Integration in 2013. He understood the rapid growth and demand for machine vision systems and the organization is now one of the major players of machine vision solutions in Malaysia.

Left: Edmund Yuen

OUR BUSINESS

Ideal Vision Integration was established with a vision of becoming the world leading machine vision solutions provider. We specialize in design and development of automated vision inspection (AOI) machines and provide system integration services as well as vision software solutions to various industries. Our core products include AOI machines for the inspection of wire bond, wafer, IC package and many more.

Ideal Vision serves customers from Original Equipment Manufacturers, Electronics Manufacturing Services providers to semiconductor Outsourced Assembly and Test. We have a proven track record of successfully delivering reliable solutions over the past decade, serving various clients across multiple industries such as semiconductor, electronics, medical and automotive.

With great vision and leadership, the company has been growing steadily for the past eight years. Today, our customer base has expanded and spanned across Malaysia, China, Philippines, Vietnam, Thailand, Singapore, Europe & the United States.

Ideal Vision's first launched Pro-V vision platform in 2014 was further enhanced into a highly flexible inspection platform, JÄGER® Vision in 2017. It had remarkably contributed five times increase in revenue in year 2018.

Due to high market demand, Ideal Vision has started the development of several AOI machines in 2019 with the aim to further strengthen our business portfolio. 3 standard AOI machines have been successfully launched in 2020 namely 3D wirebond AOI with patented HDCompoziteTM technology, intelligent wafer AOI machine and post seal vision inspection machine. Further increase in the number of sales and customer expansion are expected in coming 5 years.

Ideal Vision has received numerous awards and recognitions. Apart from being certified with ISO 9001:2015 and granted MSC Malaysia Status Award, Ideal Vision is proud to receive:

- Golden Bull Award 2019, Asia's penultimate award for successful and growing business;
- Best Innovation Award - Platinum from SOBA 2019;
- Most innovative SME Award -Technology Solution Provider from SEBA 2020;
- Young Entrepreneur (Edmund Yuen) - Technology Solution Provider from SEBA 2020

It is worth mentioning that CREST has been rewarding Ideal Vision in many ways since our first meeting in 2019. As CREST aims to continuously catalyze innovation while supporting entrepreneurs, they have benefited us tremendously through networking opportunities with the industries such as potential customers and business partners, collaboration with the university and opportunity in terms of R&D funding. The CREST teams are always ready to share valuable advice and market insights to help accelerate growth for our company.

Ideal Vision Integration Sdn Bhd

02-25, SETIA SPICE CANOPY,
Jln Tun Dr Awang,
11900 Bayan Lepas,
Penang.

The Ideal Vision Team

MOVING FORWARD

Through continuous R&D, we have kept ourselves in pace with the latest technology to continuously develop turnkey solutions to our customers. AI in composite models for advanced defects identification and classification, Infrared Optics technology in detecting inner wafer or IC package crack as well as Industrial 4.0 that integrates the IoT and machine-to-machine communication will be our R&D focus in the next five years.

We are expecting next level of sales growth with more adoption of our patented innovations. Ideal Vision will strongly emphasizes on new product commercialization and business growth strategies to remain competitive and stay a step ahead in the marketplace. We will be offering our prospective customers to experience the immediate performance and quality of our advanced AOI machines through on-site product demonstration as well as actively participate in related industrial exhibitions. Leveraging on the network of distributors through appointment of reputable distributors is our focus in 2021 to expand our market globally.

To continue as one of the market leaders, Ideal Vision will strive to be innovative in product development and aims to scale up to at least double of its original size in two years. An innovative and complete system requires the gathering of expertise from different sectors and parties, therefore, industry and academic collaborators in related fields as well as business partners are always welcome to collaborate with us.

Highlights

Launch of World Bank Report: Assessing the Effectiveness of Public Research Institutions in Fostering Knowledge Linkages and Transferring Technology in Malaysia, 19 November 2020

Over recent decades, Malaysia has steadily promoted the development of a more knowledge-based and innovation-led economy. In line with this policy direction, public spending on research and innovation has grown and policy efforts have been exerted to bolster investments in education, science, technology and innovation capabilities.

The new World Bank report titled "Assessing the Effectiveness of Public Research Institutions: Fostering Knowledge Linkages and Transferring Technology in Malaysia", was launched virtually, by YB Khairy Jamaluddin, Minister of the Ministry of Science, Technology & Innovation on 19 November, 2020. The report shines a spotlight on the public-private nexus in the research and innovation space and examines the role of institutions in driving innovation-led economic growth and the efficacy of public research institutions in bringing innovations from research laboratories to industry and end-user applications.

As part of the launch agenda, the World Bank Group organized a panel discussion on the topic of "The Role of Public Research in Supporting Innovation-led Growth in Malaysia – Challenges and Opportunities". The panelists for this session include Datuk Seri Wong Siew Hai, Chairman of the E&E Productivity Nexus, Ahmad Parveez, Director-General, Malaysian Palm Oil Berhad, Hazami Habib, CEO, Malaysian Academy of Sciences and Jaffri Ibrahim, CEO, CREST.

When asked about CREST's secret sauce to its success, Jaffri spoke of the organization's unique position as a neutral entity, enabling it to bridge the innovation chasm between government, researchers and industries and work towards a common goal. "The ability to transcend the barriers to innovation, enables us to synchronize planning, coordinate and monitor Malaysia's Science, Technology & Innovation (STI) efforts in a more efficient way. " he added.

Jaffri also highlighted CREST's success in funding 160 projects, valued at RM200 mil, in which 28% of these projects have been commercialized. "We achieved this through our involvement with 25 public and private universities, in which 360 academic research institutes have worked with 271 industry practitioners to create solutions for the ecosystem." Jaffri said.

Other topics that were discussed during the panel discussion include making research more industry relevant, methods to encourage industry players to come together to collaborate instead of competing in the space and ways to encourage multinational companies to be more open to collaboration.

A replay of the launch and panel discussion is available **HERE**.

Highlights

CREST co-organizes the 5th Meeting of Malaysia Nitrides Research Group 2020

The 5th Meeting of Malaysia Nitrides Research Group 2020 (MNRG 2020) was held on 1-2 December 2020. Jointly organized by the Malaysia Nitrides Research Group, Universiti Sains Malaysia, the Institute of Nano Optoelectronics Research and Technology and CREST, the fifth installment of the meeting spoke volume of its effectiveness as a platform for academicians, scientists and engineers to share their researching findings, exchange ideas and present ongoing research activities on all aspects of nitrides semiconductors. It has also proven itself to be successful, in forging partnerships and collaborations.

CREST's interest and participation in MNRG stemmed from its Gallium Nitride on Gallium Nitride (GaN-on-GaN) program. "Over the last five years, we have funded the Gallium Nitride GaN-on-GaN program, with the intention of further accelerating the growth of the LED ecosystem in Malaysia. Recognizing the importance of GaN, we set an ambitious goal to capitalize on the global market for GaN Research which is slated to hit USD82 bil by 2024 and to position Malaysia as one of the top three LED solutions providers in the world." Jaffri Ibrahim said, during his welcome address.
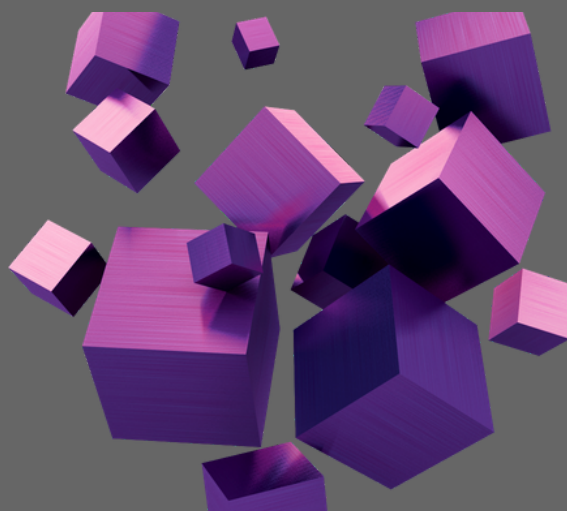
To date, CREST collaborates with Universiti Sains Malaysia, University of Malaya, Universiti Malaysia Perlis, Monash University Malaysia and University of California Santa Barbara to make this goal a reality. Our program has trained over 12 scientists and engineers on MOCVD and advanced LED fabrication techniques and has produced 70 GaN search experts and engineers. In addition, we are sponsoring three Malaysian PhD students who are in the midst of completing the research program.

"The opportunities that stem from GaN research are endless. With new application areas emerging, the E&E industry in Malaysia can now implement GaN technologies into the marketplace, placing us competitively with leaders of this technology." Jaffri added.

Due to the pandemic, MNRG 2020 was held virtually. Highlights from the two-day conference include keynote sessions from local and international universities, research finding presentations, scientific discussions and fireside chats with representation from academia and industry practitioners.

CREST in the News

Building back better: A sustainable, resilient recovery for Malaysia's E&E industry
Featured on Digital News Asia, 28 Dec 2020

The year 2020 has all the makings of a challenging year. The Covid-19 outbreak has sent global industries and economies into a tailspin, posted significant threats to the healthcare system, severely disrupted the supply chain and dampened consumer spending.

In Malaysia, the Movement Control Order (MCO) kicked off on 18th March, and curtailed economic activities severely. The Electrical & Electronics (E&E) industry was heavily impacted by the lockdown which caused manufacturing facilities to come to a grinding halt and brought about major disruptions to the supply chain.

Whilst these volatile times have put the industry through a stress test, the silver lining lies in the emergence of opportunities for new ways of thinking and doing things. This includes finding new strategies to revitalize, restructure and rebuild towards a sustainable future.

Amidst this crisis, we have seen captains of the industry formulate new strategies to adapt and overcome the uncertainties posed by the pandemic. These leaders have adjusted to the disruptive events with speed and agility and collaborated with trusted partners to find solutions that contribute to the recovery of their organizations, the industry and ecosystem.
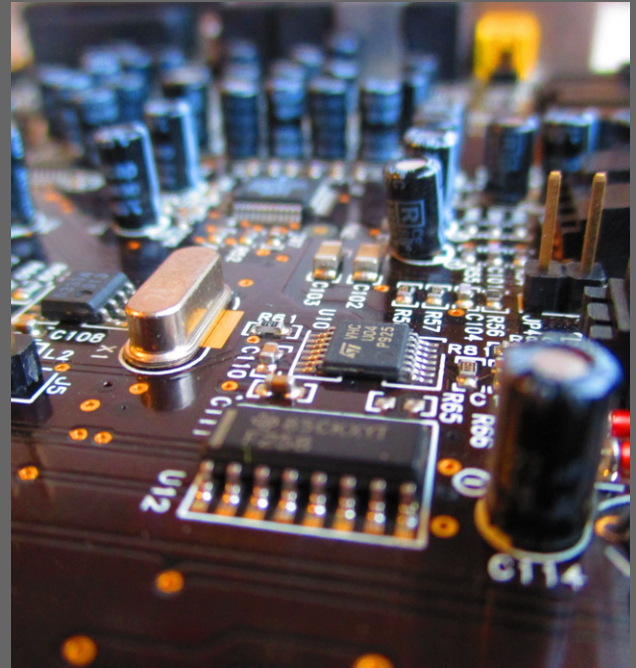
Voices from the Industry

Building a better post-pandemic world requires leaders to imagine the unthinkable. The following leaders expect far-reaching changes in the coming year, but critically see opportunities to shape the industry for the better. Below is a snapshot of how 2020 has shaped out for them and the post-pandemic future they envision.

Ang Hee Lai
Vice President & Managing Director,
Renesas Electronic (Penang) Sdn. Bhd.

2020 has been a challenging year for Renesas in many aspects - we have had to familiarize ourselves with new ways of working and operating our business. Through these challenges, we realized the importance of having a solid business continuity plan and a diverse source of supply chain partners to mitigate unforeseen circumstances such as shortage in supply or in the event where our manufacturing facilities have to be shut down. All in all, the pandemic has taught us what it's like to be more agile and resilient, as individuals and as an organization.

cont...

Voices from the Industry
cont...

Renesas's immediate priorities include building on our current platform that has kept us competitive in the marketplace. We will fortify our business continuity plan, optimize Work From Home (WFM) concepts, automate and build systems around WFH, including digitalization of activities using web and apps to increase productivity and efficiency.

Moving into 2021, Renesas believes that new technological innovations will continue to drive the E&E sector forward.

Firdaus Abdullah
CEO & Executive Director, SilTerra Malaysia Sdn. Bhd.

2020 was indeed a challenging year not only in Malaysia but globally. We were shocked when news of the MCO was announced but were relieved to hear almost immediately thereafter that semiconductor fabs were considered critical industries and therefore allowed to operate. Disruption to the supply chains hampered deliveries in and out of the country and as a result, affected delivery of our finished products, incoming spare parts, repairs and maintenance schedules.

Our lessons from the pandemic include the need for strong leadership, to maintain contact with what's happening on the ground and to provide our teams with necessary support for them to do their best. The pandemic has sharpened our focus on what we need to do to enable our factories to deal with unforeseen circumstances. Addressing the struggles of this year will ultimately put us in a better position for 2021.

The E&E sector is less impacted compared to sectors like F&B, tourism, consumer and retail. We need to recognise that Malaysia's E&E sector is probably one of the most resilient strongest in the world. Unfortunately, unlike Taiwan and Korea, we have not nurtured our locally developed products to international standards - this is not due to our capabilities, but rather our mindset. Therefore, more needs to be done to foster locally designed technologies to fulfil local demand which will in turn contribute to the advancement of Malaysia into the high-tech era. This will be SilTerra's focus, moving into 2021.

Eric Chan
VP & General Manager of IOTG Customer Engineering, Intel Corporation

The pandemic has caused tremendous disruptions on manufacturing operations which in turn impacted productivity in design and development of our products. However, on the upside, it has accelerated digital transformation which in turn spurred demand for semiconductor and electronics globally.

My takeaway from this experience is the need for better preparation particularly on business continuity and contingencies for future pandemic-related disruptions or other unprecedented events. In addition, there is a need to continuously ensure the safety of our employees, to look at redundancy in areas of supply chain, logistics and workforce and not forgetting the importance of partnerships with government and industry to overcome the pandemic. These are Intel's priorities moving into 2021, on top of establishing WFH efficiencies and application of innovations to solve pandemic-related challenges.

I'm of the opinion that the semiconductor and electronics sector will see positive growth in 2021. Having said that, we will continue to experience uncertainty around supply chain and logistics, including fallout from the US-China trade tensions and fragmentation of global trade.

Voices from the Industry
cont...

Sim Hon Wai
COO, MDT Innovations Sdn. Bhd.

2020 started well for us with our newly established factory ramping up production of RFID inlays and business expansions into Africa, Thailand and Indonesia. However, things took a u-turn when most countries globally experienced the lock down and hundreds of thousand dollars' worth of contracts had to be cancelled. Despite a grim outlook in Q2, MDT received new business opportunities related to Industrial Revolution (IR4.0) initiatives and many of our businesses are speeding up due to the adoption of new technologies to circumvent the impacts of Covid.

Our priority for 2021 is to focus on business sectors that are more vulnerable and to introduce digital solutions to add value to our business processes, products and services.

MDT foresees general market recovery in 2021 with growth in the tech sector, led by Internet of Things (IoT), resulting from uptake in businesses tapping into sub sectors of IoT to improve their day to day operations. The E&E sector is a key contributor to the nation's GDP. In 2019, the industry accounted for 6.3% of the country's GDP and has contributed approximately RM372.67 billion in export value, representing 44.7% of all manufactured goods exported.

Chu Jenn Weng
President & CEO, ViTrox Technologies Sdn Bhd

ViTrox achieved double digit growth in 2020 amidst the Covid-19 pandemic and the ongoing trade tension between US and China. We experienced supply chain disruptions on the onset of the MCO but managed to adjust our work arrangements quickly, to safeguard our people's health and safety, whilst simultaneously reacting swiftly to customers' needs.

At Vitrox, we believe in staying nimble and agile. Our philosophy was heavily tested this year but we were quick to adapt to change, remaining resilient in the face of uncertainty, which led to us rebounding quickly. Our priorities for 2021 include accelerating R&D on (IR4.0) and AI and to invest more on talent and infrastructures to enable seamless remote working.

The future outlook for the semiconductor and E&E industry in 2021 looks encouraging, with many short to long term opportunities abound for the technology equipment sectors, made possible through heavy adoption of automated manufacturing solutions regionally. In view of this, Malaysia needs to build a strong high tech equipment ecosystem to attract high value investments both locally and abroad, in addition to creating sustainable local high tech capabilities to support high growth local industries.

Building back better

The E&E industry in Malaysia has been identified as playing a critical role in the country's recovery and regrowth following the pandemic. The sector has shown signs of resilience to the economic turmoil and is expected to continue stabilizing in the coming months on account of demand for smart manufacturing capabilities, automation and technological innovations.

CREST believes that the E&E industry can rebound quicker, on the back of innovation and R&D efforts.

Towards an innovation-led recovery

The centrepiece to promote recovery and quality growth during hard times is to drive innovation. The need for innovation is greater than ever, driven by new challenges that are more disruptive. History has taught us that spending on innovation must be sustained through tough times in order to better compete when recovery resurfaces.

The pandemic is putting us through an innovation stress test - it is pushing organisations to work together in new ways, to create ecosystem-wide innovation. To meet these challenges, organisations will need to innovate, collaborate, invent and redefine themselves. The rules around innovation will never be the same - this means, as a nation, we need to prioritize cross-industry collaboration to help companies break through from innovative ideas to commercial success.

R&D, a catalyst for economic recovery

Industry leaders can make all the right moves to protect their business through the current economic shock, but their future competitive position depends largely on how they manage a single critical dimension: R&D. High-value R&D activity is critical for a faster economic recovery. Companies that are smart in R&D efforts now, can use this disruption to explore new ways of operating, improve products and gain a competitive advantage when the global economy recovers.

Year 2020 for CREST

2020 saw CREST play a key role in helping the industry re-engineer and rebound. In the early months of the pandemic, we collaborated with the government (MIDA and MITI), industry associations such as The Free Industrial Zone, Penang, Companies' Association (FREPENCA) and Kulim Industrial Tenants Association (KITA)) and with support from industry, assisted E&E companies to navigate the challenges posed by the MCO. Being the catalytic sector that cuts across many industries, particularly in producing parts and components for medical devices, enterprise storage, cloud computing and other technological innovations, it was critical that most companies were allowed to operate during the MCO.

Hence, as a catalyst that connects with different stakeholders to collaborate and jointly create solutions for the ecosystem, we spearheaded discussions with the government and industry and implemented procedures and protocols that led to the reopening of operations and continuity of the supply chain.

Our collective success from this experience underpins the importance of collaboration to safeguard the industry and the learnings from the E&E sector is a model for other industries to emulate.

Click here for the full article...

CREST in the News

CREST spearheads collaboration network in health, wellness
Featured on Digital News Asia, 5 March 2021

CREST has been appointed as the neutral entity for the i-Connect health and wellness sector, an initiative introduced by Academy of Sciences Malaysia (ASM), under the purview of the Ministry of Science Technology and Innovation (MOSTI).

This appointment will allow CREST to steer a consortium, consisting of 15 founding members which will represent the industry, academia, government and civil society, to catalyse innovation, nurture talent and increase Malaysia's competitiveness in developing health and wellness solutions for local and global markets.

"The appointment is a testament of the effectiveness of our collaborative model, which facilitates linkages between industry and academia, bringing them together to jointly create solutions for the ecosystem", said Jaffri Ibrahim, CEO of CREST.

The collaborative network in i-Connect is an alliance constituted by a variety of entities among the quadruple helix (industry, academia, government and civil society), coming together to work together to better achieve common or compatible goals. "Being a country that aims to become a developed and high-income nation by 2030, Malaysia has the potential to leverage on new economic opportunities and enter global markets through science, technology and innovation-based industries, collaboration and open innovation," said Hazami Habib, CEO of ASM.

Click here for full article...

The i-Connect Health and Wellness network is helmed by 15 founding members who represent the industry, academia, government and civil society. They will lend their expertise in suggesting best practices for the sector, in addition to determining research, development and commercialisation related to health and wellness in order to increase Malaysia's competitiveness locally and globally.
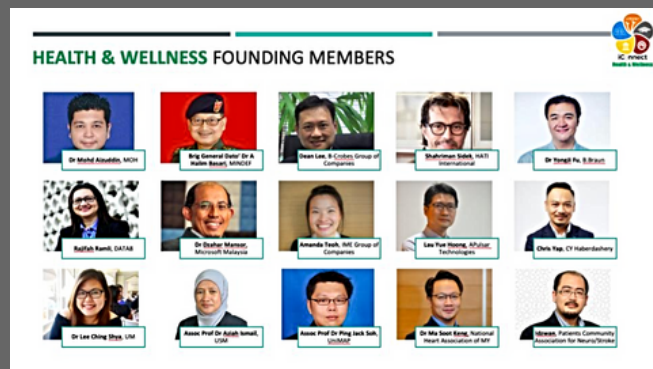
"Our founding members, who serve on a pro-bono basis, represent thought leaders and instrumental figures within their respective industries, actively championing technology and innovation in health and wellness," said Rajifah Ramli, chairperson and representative of the i-Connect Health and Wellness' founding members, and founder and CEO of DATA8.

CREST said through the use of digital technologies – Internet of Things (IoT), artificial intelligence, data analytics, blockchain and bioscience technology, the network aims to create solutions that address health and wellness challenges in areas such as:

- Epidemiology and surveillance for prevention and early detection of endemic;
- Environmental and community approaches to promote health, support healthy behaviours, including the promotion of healthy lifestyles; and
- Intervention to reduce barriers to care and improves the effective use of clinical and preventive services for patients and caregivers.

CREST is invites the research community to apply for the i-Connect Health & Wellness Technological Development Grant to fund their projects focused on development and deployment phases, namely, technology readiness level 4 and above.

Further information can be obtained here:
i-Connect Health & Wellness Community Platform on LinkedIn.

Collaborate with Us Today

For more details on our programs and initiatives, feel free to contact our team below:

INITIATIVES	EMAIL
OPEN & TARGETED R&D GRANT	**Lim Poi Hong** **phlim@crest.my**

THE GREATLAB (TGL) PROGRAM
  - TGL YOUTH INDUSTRY BOOTCAMP
  - GRADUATE INNOVATION PROGRAM
  - INDUSTRY LEADERSHIP PROGRAM
	Haziati Abdul Hamid
	haziati@crest.my

GALLIUM NITRIDE GAN RESEARCH PROGRAM	**Lim Hoo Kooi** **hklim@crest.my**
DIGITAL HEALTHCARE CLUSTER	**Aida Basri** **aida@crest.my**
INTELLIGENT & INNOVATIVE CITY CLUSTER	**Michelle Woo** **khwoo@crest.my**
SMART MANUFACTURING PRECISION AGRICULTURE NEW PRODUCT DEVELOPMENT & INNOVATION	**Fouzun Nasser** **fouzun@crest.my**
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