MONASH University

MALAYSIA

Innovation Profile 2024

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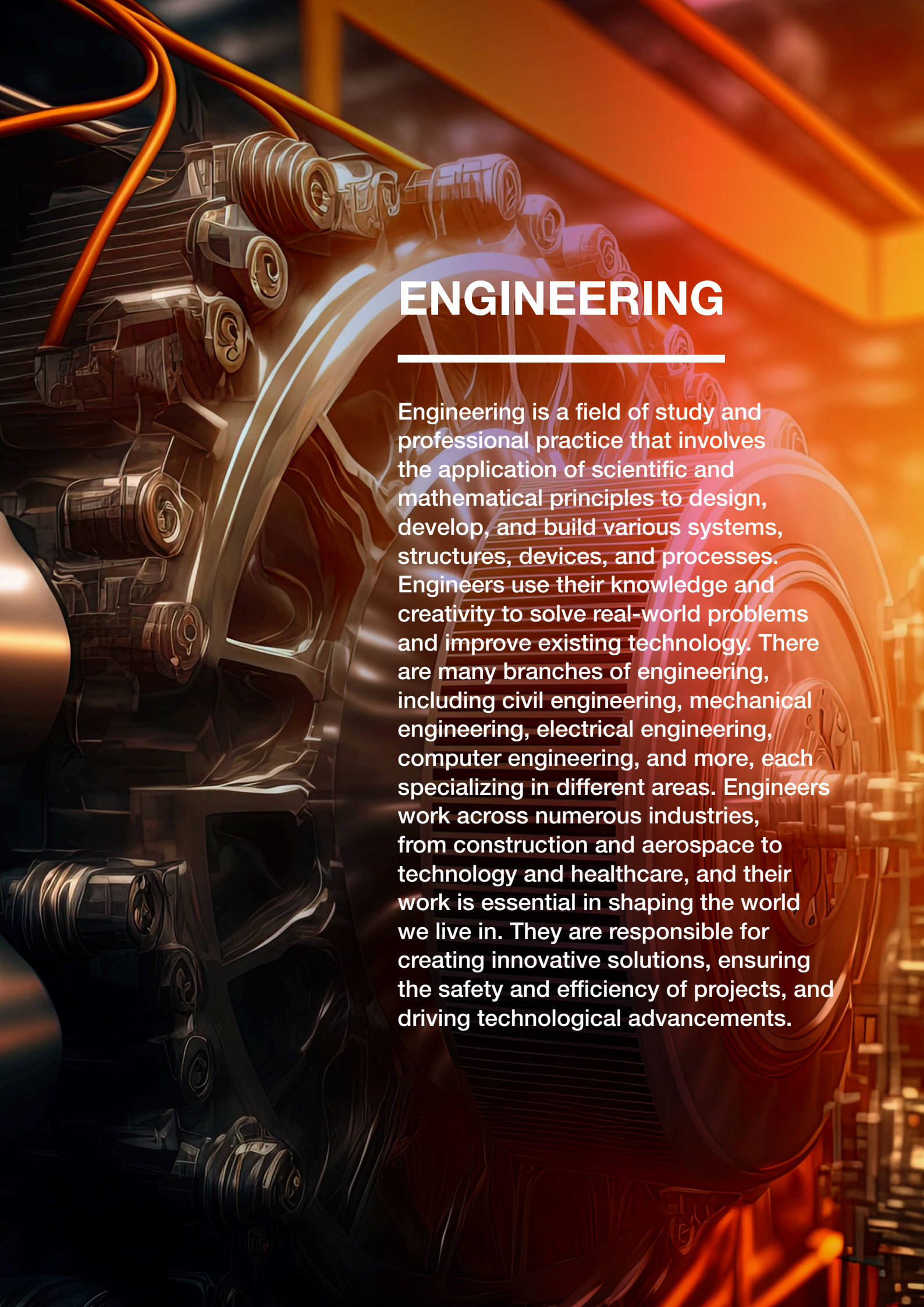
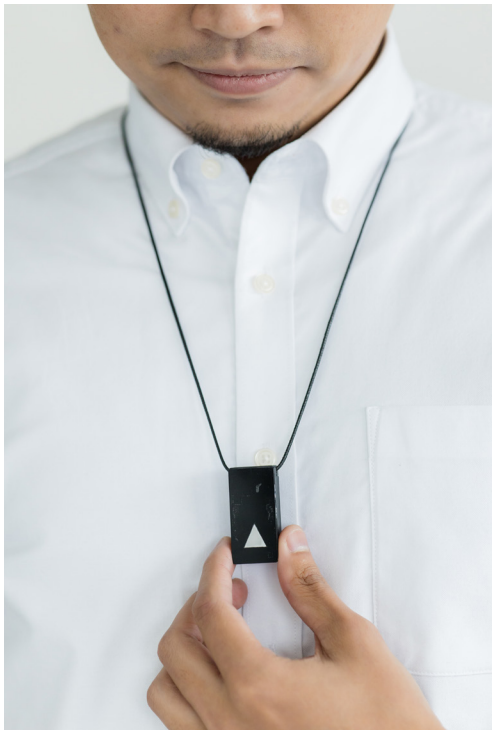


ENGINEERING

Engineering is a field of study and professional practice that involves the application of scientific and mathematical principles to design, develop, and build various systems, structures, devices, and processes. Engineers use their knowledge and creativity to solve real-world problems and improve existing technology. There are many branches of engineering, including civil engineering, mechanical engineering, electrical engineering, computer engineering, and more, each specializing in different areas. Engineers work across numerous industries, from construction and aerospace to technology and healthcare, and their work is essential in shaping the world we live in. They are responsible for creating innovative solutions, ensuring the safety and efficiency of projects, and driving technological advancements.

Compact Wearable Spectroradiometer



This invention is a compact, cost-effective IoT-enabled wearable spectroradiometer. Typical high-resolution spectroradiometers are large and expensive, making them unsuitable for personal use or applications like urban farming. This miniature device employs smaller sensors to enhance portability and reduce cost. To overcome the limitations of lower resolution data, the innovation incorporates machine learning through a process known as Neural Spectral Reconstruction.

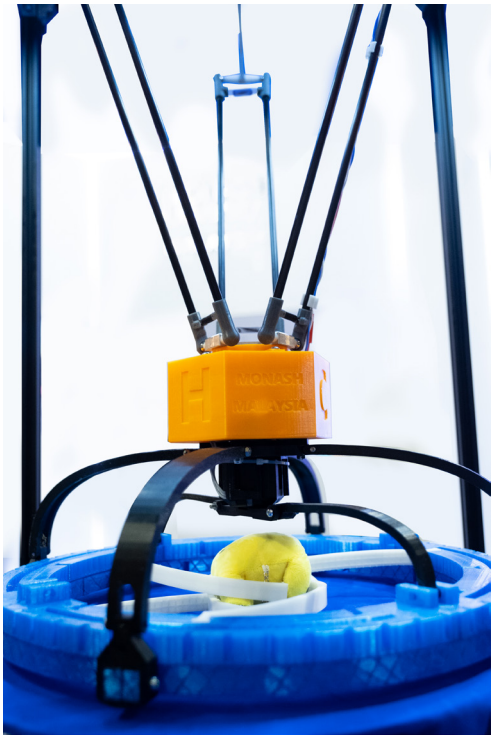
This method employs neural networks to augment the resolution and accuracy of visible light spectra, optimizing measurements for attached subjects. The resulting device offers enhanced accuracy and usability, at a more affordable price point.

Malaysian Patent Pending PI 2021007592

Customizable Soft Gripper

Soft grippers can incorporate soft materials and adapt to objects of different shapes and sizes, hold great promise for enhancing P&P operations in both industrial and service mobile robots.This innovation introduces an unmanned aerial vehicle featuring a novel gripper design and an optimization method. The gripper is fully 3D printed and equipped with a motor at its top. Elastic ribs, also 3D printed, enable the gripper to conform and "wrap" around objects, maximizing contact and grip. The gripper's performance is further enhanced through a co-optimization process involving structural design and control parameters, facilitated by machine learning algorithms. This innovation has the potential to revolutionize the capabilities of UAVs for grasping and handling objects in a variety of applications.

Malaysian Patent Pending PI 2021006636
Indonesian Patent Pending P00202212411



Greywater Treatment System

Erractic weather and more frequent pollutions of water sources has led to the need to source for alternative water source to sustain daily activities which requires water. This greywater treatment system is compact and easy to use. A single biodegradable membrane that could remove contaminants and disinfect at the same time contributes to reduce the space requirements, allowing the system to be easily retrofitted into existing households. The treated water could be used safely for non-potable activities such as toilet flushing, gardening, car washing and cleaning of refuse areas - allowing greater availability of freshwater reserved for potable activities.

Malaysian Patent Pending UI2016703927

Self Healing Rubber Glove

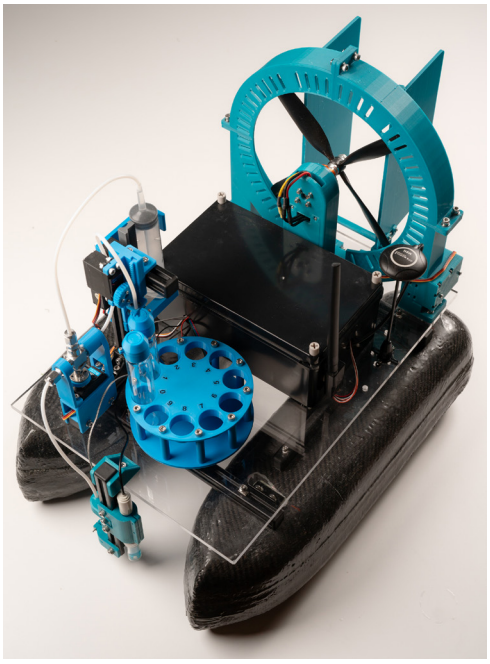
Gloves are important in ensuring the protection of workers aganist hazardous chemicals in various industries. To ensure safety of workers, the gloves has to be durable and chemical resistant. Our team of researchers have now developed a self-healing rubber glove, providing the gloves extended working life which indirectly contributes to reducing waste generation.
Its key benefits are:

- Ultra-durable, with multiple cycles of self-healing
- Light-weight
- Biodegradable

These features of the self-healing glove enable applications across various industries while offering a sustainable solution both for workers safety and environmental concerns.

Malaysian Patent Pending PI 2021007279
PCT Application PCT/MY2022/050123

Unmanned Surface Vehicle for Water Quality Monitoring



Water pollution is a global environmental concern, commonly monitored through manual sampling or stationary monitoring stations. Manual methods are labor-intensive, while fixed stations are expensive and limited to specific locations. Unmanned surface vehicle offers a versatile solution, being lightweight and mobile on water surfaces, even in vegetated areas. It can be controlled manually or autonomously and provide continuous real-time water quality monitoring. Additionally, this vehicle can collect up to 10 water samples simultaneously which makes it a comprehensive and efficient solution.

Malaysian Patent Pending UI 2022002364

Wearable Foot Trajectory Measurement

We have a wearable foot trajectory measurement meeting international standards for gait analysis. This invention is an instrumented shoe with various sensors that enables the following :

- Realistic measurements of walking and running in an open environment.
- Direct and responsive data collection
- Measures foot orientation, step count, stride time, and various walking and running parameters.

This wearable offers a more versatile and applicable approach in assessing foot movement beyond the confines of a controlled environment.

Malaysian Patent Pending PI2019006897

Infrared Etching Control System

This is a cost-effective, tabletop system developed for precise endpoint detection during wafer fabrication processes like etching thin aluminum films on substrates. Traditional technologies are costly and complex, limiting their use in research and development. This innovative system uses infrared endpoint detection, ensuring the etching process stops at the right time. Unlike other infrared systems, it measures IR radiation's transmittance intensity and uses interface electronics to lift the wafer from the etch tanks, preventing over-etching. This versatile system is suitable for various applications in wafer fabrication, PCB etching, and educational and research laboratories, offering an affordable solution.

Malaysian Patent Pending PI 2018000482

Light-Driven Object Recognition System

This is a novel system for pattern recognition without use of a multispectral camera or complex image processing algorithms. The designed lighting enables visual inspection, by distinguishing different objects of interest effectively using the light source itself. This approach combines spectral imaging performance with an ordinary camera, offering cost-effective object recognition and commercial potential.

Malaysian Patent Pending PI 2018702841

Production of Complex Polymer Shapes

This technology involves the assembly of electrospinning systems to produce complex shaped thin film polymeric articles. This technology is more superior than the existing dip coating methods as it enables the use of various polymer types, reducing material waste and production time. The expansion of material applicability allows the incorporation of additives for smart functions or the production of active films.

Malaysian Patent Pending PI 2021004216

Rapid Recovery Sensor Enclosure

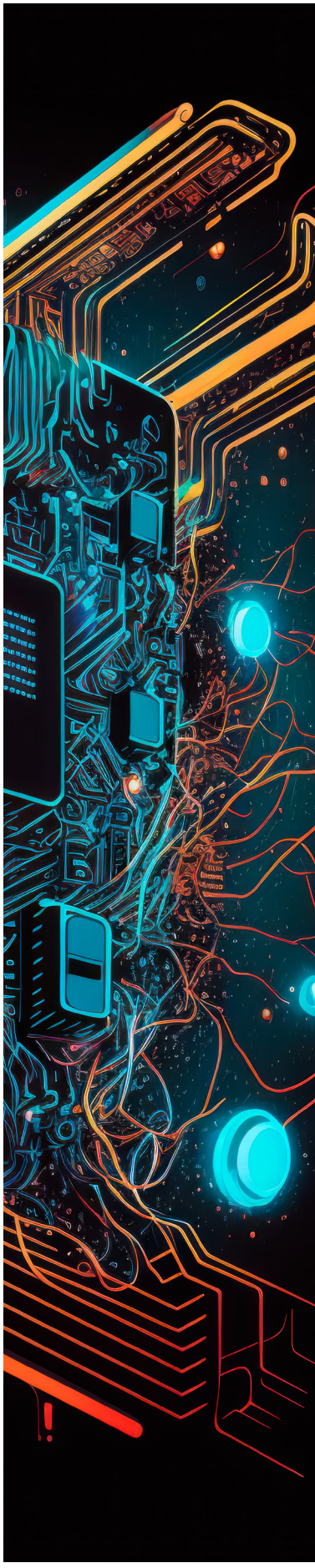
Typically, sensors used for environmental sensing experience delays in recovery time after exposure to certain substances. This invention introduces an enclosure and mechanism for achieving continuous sensor measurements with zero recovery time. This invention addresses that issue by allowing sensors to continuously interact with the measurable quantity without recovery delays. It employs a rotary mechanism and vent within the enclosure, enabling sensors to alternate between exposure and recovery. This innovative approach is not specific to any sensor material or medium, easily adaptable to modern microcontrollers, and applicable to any sensor suffering from long recovery times. It provides a valuable solution for accurate and real-time sensor measurements.

Malaysian Patent Pending PI 2022006970

Smartphone Lithography

This photolithography apparatus aims to create cost-effective and lens-free microelectronic device fabrication. The set of apparatus include a photosensitive substrate, a display screen, and an optional photomask with interdigital (ID) patterns. When the photomask is not used, the display screen emits light to project ID patterns from an application program and the patterns will be transferred onto the substrate. This photolithography apparatus addresses the need for an affordable and efficient photolithography process.

Malaysian Patent Pending PI 2018002475



Stable Anaerobic Wastewater Treatment

This invention involves a predictive model-based control scheme to conduct anaerobic digestion of high-strength wastewaterin a stable manner. The stability of anaerobic digester is crucial to ensure that the treated effluent meets regulatory discharge standards and production of biogas of consistent quality that can be used for energy generation.
This innovative solution could:

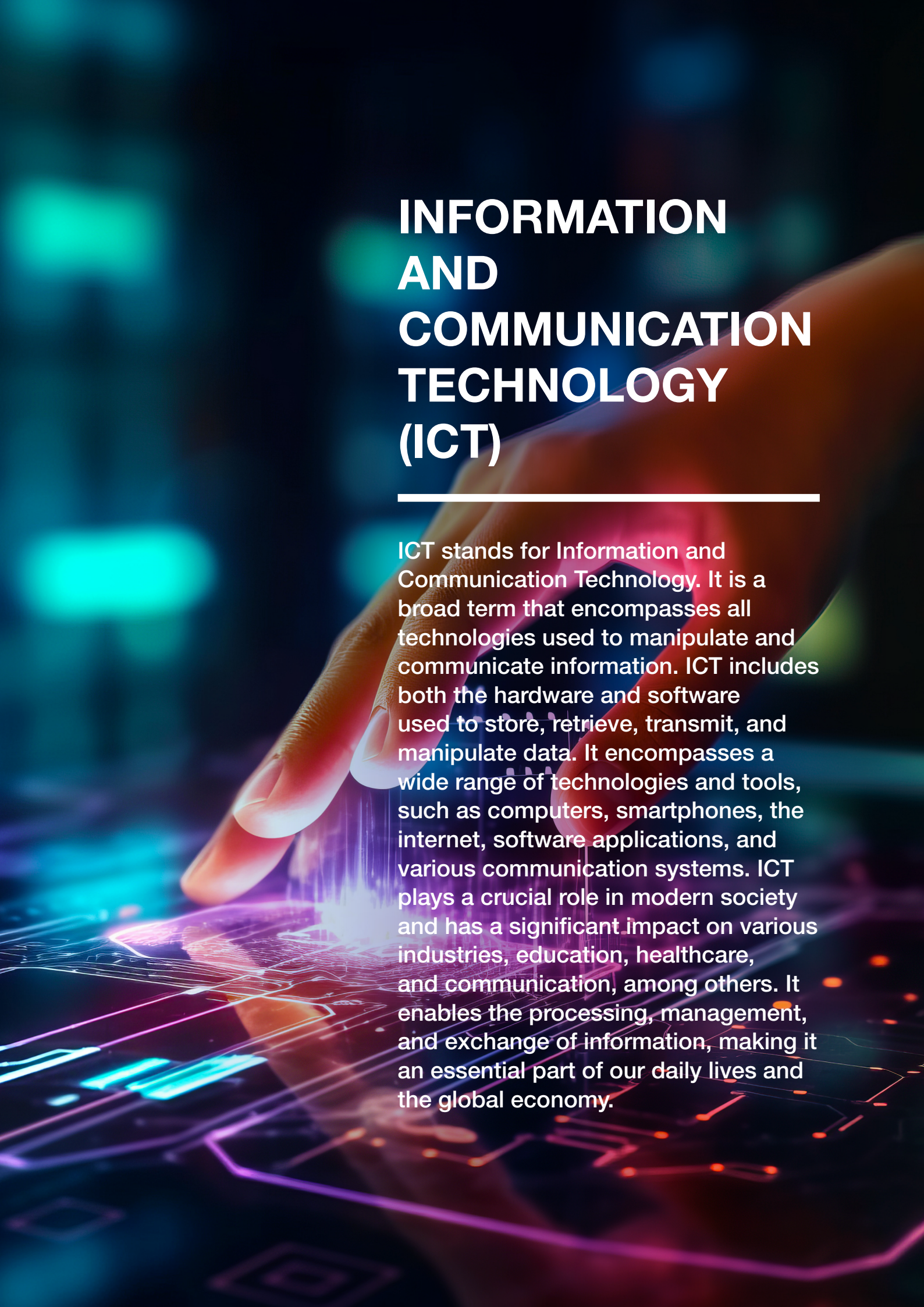
- Able to handle high organic loads
- Minimizes reactor failure risks
- Requires no specialized operators
- Eliminates extensive pilot testing
- Reduces implementation costs
- Promotes worthwhile biogas recovery
- Maintain effluent quality consistency

Malaysian Patent Pending PI 2019002291 and PI 2023002042

Ultraviolet (UV) Sensor

This is an electromagnetic radiation sensor for detecting radiation like UV light. This product provides a cost-effective means to accurately gauge radiation levels under sunlight or indoor lighting conditions. The system includes a UV-dependent variable piezo capacitor sensor connected to an amplifier oscillating circuit, logic circuit, microcontroller, and Bluetooth module. An Android app receives live sensor data, displaying real-time UV measurements, UV index, UV types, and alerts users in cases of excessive UV exposure. The sensor can be incorporated into wearables, smart devices, or accessories.

Malaysian Patent Pending PI 2019002451



INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

ICT stands for Information and Communication Technology. It is a broad term that encompasses all technologies used to manipulate and communicate information. ICT includes both the hardware and software used to store, retrieve, transmit, and manipulate data. It encompasses a wide range of technologies and tools, such as computers, smartphones, the internet, software applications, and various communication systems. ICT plays a crucial role in modern society and has a significant impact on various industries, education, healthcare, and communication, among others. It enables the processing, management, and exchange of information, making it an essential part of our daily lives and the global economy.

Anatomy Smart Table

The Smart Table revolutionizes anatomy learning within tertiary education students. This invention is a versatile solution to promote small-group active learning in classrooms and practical labs.

The Smart Table has following functions and benefits:

- Engages students with multimodal learning, combining books, heavy models/specimens and instruments with digital resources
- Promotes active learning and collaboration
- Multi-touch tabletop computer with high specifications enables sharing of digital content, manipulation of digital 3D models and view details of microscopic impages
- Bidirectional high-resolution streaming video from the instructor's to students' tables
- Durable, easy to use and maintain
- Stylish with futuristic design

Malaysian Patent Granted MY-177519-A

Augmented Reality Cardiac Teaching Tool

Atrial fibrillation (AF) is a complex heart arrhythmia, often challenging for healthcare professionals and biomedical science students to learn due to its complexity. Therefore, an Augmented Reality (AR) application was developed. This AR App is easily accessible on mobile devices, and students found it to be an effective way to grasp complex materials, improving their understanding of AF. It is more engaging in comparison to other interactive learning tools. Additionally, the App included a patient information section, which was seen as a valuable resource to enhance patients' understanding of the disease and their engagement with treatment options.

Trademark Registered TM2021001011

Drone Management Hub

DroneHub is a drone management hub that leverages Internet of Things (IoT) technology for efficient drone tracking. It is a user-friendly, central system adaptable to various drone models. This innovation combines a mobile app with a custom PCB and a lightweight RFID tag embedded in the drone's enclosure for flight planning and authorization. Once approved, the drone follows predefined routes, tracked accurately by long-range RFID readers. DroneHub also offers advanced features, including a magnetic gripper for small metal object retrieval and an optional computer vision module for tasks like object tracking and detection. This system enhances drone management and performance.

Malaysian Patent Pending PI 2023002465

Linux Board Game

Learnux - Linux Board Game is an innovative solution aimed at simplifying the learning of Linux commands, a valuable skill for researchers and students dealing with big data and cloud computing. Many individuals lack familiarity with Linux, and its command line interface can be intimidating. Learnux seeks to gamify Linux command learning through a board game that incorporates Linux commands to create a gaming environment. This engaging approach introduces Linux to newcomers, enabling them to learn and practice command lines on mobile devices, fostering a unique and enjoyable learning experience. Learnux has a huge potential as a versatile and effective teaching tool.

Copyright Registered LY2020004172

Linux Mobile App Game

Learnux-M is an innovative modile app game aimed at simplifying the learning of Linux commands, a valuable skill for researchers and students dealing with big data and cloud computing. Many individuals lack familiarity with Linux, and its command line interface can be intimidating. Learnux seeks to gamify Linux command learning through a mobile app that incorporates Linux commands to create a gaming environment. This engaging approach introduces Linux to newcomers, enabling them to learn and practice command lines on mobile devices, fostering a unique and enjoyable learning experience. Learnux has a huge potential as a versatile and effective teaching tool.

Copyright Registered LY2023W00097

Drone Tracking System

Drones have versatile applications in various fields but also raise concerns about privacy invasion and the lack of standardized regulations. Currently, there are no nationwide guidelines governing drone usage, allowing them to operate freely in unrestricted areas. This invention is a Drone Tracking System (DroGatLight-DGL). It utilizes existing street lights, IoT technology, and computer vision to detect and track drones or objects with specific frequencies.
The system integrates with IoT streetlights, triangulating object locations, and employs machine learning for tracking. An accompanying app, DroGatLight-DGL, provides live updates, offering a solution to monitor and manage drone movements while respecting privacy and regulations.

Malaysian Patent Pending PI 2020004932

Indoor Navigation Mobile Application

This is an advanced indoor navigation mobile application using augmented reality (AR) and an innovative localization technique. Unlike previous technologies, it doesn't rely on QR codes or user inputs to determine the starting location.The application can navigate around obstacles, traverse narrow corridors, and function effectively in complex indoor environments. This solution is valuable for large and intricately designed indoor spaces, without the need for initial environment mapping. It offers limitless potential and can be applied to various indoor settings with minimal effort, automating network address recognition for seamless navigation.

Copyright Registered LY 2023W01758

Data Hiding & Encryption for JPEG XT Image

This invention enhances the security and functionality of JPEG XT still image coding standards. Encryption transforms the image into a noise-like appearance, while data hiding allows administrators to manage the image. The technology is compatible with JPEG XT and enables secure applications such as watermarking, secret communication, and authentication. It can be developed into software or applications and supports High Dynamic Range (HDR) images. It is the first to introduce data hiding and encryption in JPEG XT-encoded images, leveraging the format's unique dual-layer structure. Additionally, it's the pioneering method to achieve data hiding in an encrypted image encoded in JPEG XT format.

Malaysian Patent Pending PI 2020000760

Complete Quality Preserving Data Hiding Technique for Animated GIF Image

This innovative technique conceals data within animated GIF (aGIF) images, allowing applications like detecting modified segments of the GIF, conveying additional (hidden) information, and linking related document. It offers three key features: complete image quality preservation, scalable data capacity, and reversibility. This technique allows for a modified aGIF image to appear exactly the same as its original counterpart. It exploits aGIF's unique transparent pixels for preserving quality and enabling scalable data hiding, making it a groundbreaking approach.

Malaysian Patent Pending PI 2021005522

A Clickbait Detection for Youtube

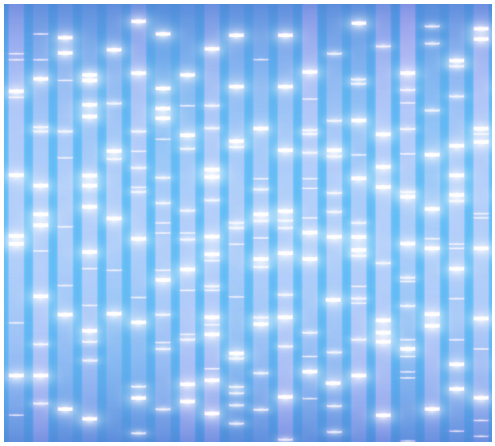
This invention addresses the problem of clickbait on YouTube, where videos lure viewers using enticing titles and thumbnails. It employs a multi-model deep learning architecture that goes beyond the traditional title and thumbnail analysis. Instead, it utilizes various video attributes like the audio track, tags, comments, and statistics. When the system identifies a video as clickbait, it alerts the user, preventing them from wasting time on irrelevant content. Social media companies can also use this technology to avoid recommending clickbait videos to their users. This approach is more comprehensive and effective due to the integration of the audio analysis.

Malaysian Patent Pending PI 2021006742

LIFE SCIENCES

Life Sciences is a vast and dynamic field dedicated to exploring the mysteries of living organisms, from microscopic cells to complex ecosystems. It encompasses various scientific disciplines, such as biology, genetics, ecology, and medicine, and it plays a pivotal role in understanding the fundamental processes of life. Researchers and innovators in Life Sciences strive to unravel the intricacies of genetics, disease, and evolution while also addressing critical issues like healthcare, environmental sustainability, and biodiversity. Life Sciences provides a glimpse into the wide-ranging and ever-evolving world, where curiosity, discovery, and innovation converge to illuminate the complexities of life on Earth.

Customizable Nucleic Acid Marker Series



ENDless © provides a series of customizable nucleic acid markers with bands up to 184 kb, to achieve crisp separation of high molecular weight DNA during electrophoresis. These markers are produced from the different combinations of restriction endonucleases and DNA from different bacterial strains.

- It is the first marker to provide 184 kb bands via single digestion of bacterial artificial chromosomes (BACs).
- It relies widely available restriction endonucleases and cost-effective bacterial culture.
- It allows customization of banding patterns by having different combinations of restriction enzymes and BACs.
- Ensures intense and well-spaced bands with known DNA quantities.

Malaysian Patent Granted MY-194822-A

FarmMate-S1

Growth of aquaculture animals are often compromised by increase in stocking density. FarmMate-S1 is the first marketed Streptomyces probiotic developed as a functional feed additive with the ability to deter early mortality syndrome caused by Vibrio parahaemolyticus.

FarmMate-S1 comes with 10 vials, where each vial contains more than 1 billion CFU of Streptomyces sp. Aside from Streptomyces sp., FarmMate consists of a natural red colouring (Astaxanthin) which serves as an indicator of homogenous mixing and an excipient to promote the general well-being of aquaculture animals.

Malaysian Patent Pending UI2022005128

Food Pathogen Detection Kit

CampySalDeTECT invention addresses foodborne infections linked to Campylobacter and Salmonella, primarily associated with poultry like chicken. Current identification methods involve culture-based techniques, which are time-consuming, or PCR, requiring specialized equipment.

CampySalDeTECT, a two-step, culture-free detection kit, identifies these pathogens in poultry meat in under 1.5 hours. It utilizes LAMP technology, eliminating the need for culture enrichment and specialized equipment, making it affordable and user-friendly. The kit provides a simple color change result when Campylobacter and Salmonella are present. Implementing this kit in poultry industry testing can effectively reduce foodborne infections, benefitting public health and healthcare systems while promoting community well-being.

Malaysian Patent Pending PI 2023005293

Linearization of Circular DNA

This is a method for creating linear DNA from circular DNA within mammalian cells using the bacteriophage N15 protelomerase TelN.

It allows the transfer of pKAN-TelN, enabling the linearization feature in commonly used mammalian cells like HeLa and NIH3T3. This method enables in-cell linearization of plasmids, including large circular DNA like BACs, leading to the creation of linear chromosomes with hairpin telomeres. Additionally, the dual prokaryote/mammalian promoter in pKAN-TelN enables TelN expression in E. coli for evaluating linearization in bacteria before transferring into mammalian cells, streamlining the research process.

Malaysian Patent Pending PI2018701391

MEDICAL TECHNOLOGY

Medical technology, often referred to as medtech, encompasses a wide range of tools, devices, equipment, and techniques used in healthcare to diagnose, treat, monitor, and manage medical conditions. These technologies play a crucial role in improving patient care, enhancing the efficiency of healthcare delivery, and advancing medical research. Medical technology includes everything from simple diagnostic instruments like thermometers and blood pressure monitors to more complex devices such as MRI machines, robotic surgical systems, and telemedicine applications. The field of medical technology is dynamic and continually evolving, with innovations that aim to enhance medical outcomes, patient comfort, and overall healthcare quality.

Custom Exoskeleton for Rehabilitation

This lower limb exoskeleton is an advanced assistive technology designed to provide comprehensive support for individuals with gait impairments resulting from spinal cord injuries and stroke. This design offers both mobility assistance and effective rehabilitation through electrical muscle stimulation (EMS), with aims to improve the quality of life and rehabilitation outcomes. Its advantages are:

1. Comprehensive Rehabilitation: Integration of EMS for muscle rehabilitation provides a holistic approach to recovery.
2. Precise Torque Control: Incorporation of ultra-compact torque sensing ensures precise control and adaptability to different user needs and conditions.
3. Customized Comfort: Its fully modular design allows for personalized adjustments which enhances user comfort and usability.

Malaysian Patent Pending PI 2020005002

DITE (Deaf in Touch Everywhere)

Deaf individuals in Malaysia encounter healthcare challenges arising from limited access and low health literacy. Unlike many countries, Malaysian legislation does not mandate sign language interpreters for its 55,000 deaf population, resulting in neglected healthcare needs and insufficient research. In view of this gap, DITE ™ (Deaf in touch everywhere) app has been developed, facilitating connections between deaf individuals and remote interpreters via secure video conferencing. The app provides secure video-based interpretation services, a medical sign language dictionary, health-related videos, and GIFs, offering an innovative solution to enhance healthcare accessibility and communication for the Deaf community in Malaysia.

Trademark Registered TM2018019083

Fabry Disease Rapid Quantification Kit

EasyGb© offers a cost-effective and user-friendly solution for the sensitive quantification of globotriaosylceramide (Gb3) in diverse biological samples like urine, plasma, and lipid lysates. This method surpasses existing techniques in terms of sensitivity and accuracy while requiring only small sample volumes. Its diagnostic kit design facilitates portable use, making it accessible even in technology-constrained areas. EasyGb© minimizes both capital investment and production expenses, providing a more economical option for Gb3 quantification, thus addressing the need for a simpler, efficient, and cost-effective approach in diagnosis of Fabry disease.

Malaysian Patent Pending PI2019007511

Nanotube-boosted Gels for Tissue Repair

Osteomyelitis is an infection in a bone which often require multiple surgeries and non-biodegradable implants. Prolonged antibiotic use is the common treatment method but it poses risks like toxicity and antibiotic resistance. We have found a promising solution which involves hydrogel scaffolds. The hydrogel can be minimally invasively injected into affected areas, protecting surrounding cells and reducing infection risks through local antimicrobial delivery. Its potential applications include skin wound repair, cartilage regeneration, and potential blood vessel formation.

- This product is able to fill irregular defects through a minimally invasive approach.
- Incorporated with nanoclay to reinforce polymer strength, while offering antibiotic delivery at the local site.
- High biocompatibility and biodegradability with natural biomaterials such as bacterial cellulose and gelatin.
- Hydrogel can be injected as liquid and gelation occur 10 minutes after the injection.
- Addition of halloysites improves drug loading and release.

Malaysian Patent Pending PI 2022003865

Natural Tocotrienols-infused Wound Dressing

Instead of a typical plaster, this is an all-in-one biodegradable dressing, enriched with vitamin E tocotrienols. This wound dressing enriched with vitamin E offers mulitiple benefits:

- Promote blood clotting
- Absorb exudates
- Allow gas exchange
- Faster wound healing
- Reduce scar formation

This product user-friendly (just like any plaster), cost-effective and eco-friendly solution for wound care.

Malaysian Utility Innovation Granted MY-197687-A

Treatment for Male Infertility

This invention is a potential solution to male infertility. With a limonoid-rich fraction from the extracts of Skyfruit seeds, our product is one that does not have side-effects (i.e.: cancer, heart attack and stroke) compared to present treatment options.

Different from hormone replacement therapy and erectile dsyfunction medication, this invention:

i) is a dietary supplement with a pharmaceutical-acceptable carrier

ii) is a product safe and suitable for oral consumption, easily applied and effective for sexual dysfunction.

Malaysian Patent Granted MY-190272-A

Inorganic-organic Hybrid Drug Nanocarriers

Novel biodegradable inorganic-organic hybrid nanoparticles are emerging as a solution for more effective cancer therapies. This produt can efficiently transport nucleic acids, peptides, proteins, and conventional drugs. The key benefits of these nanoparticles are:

- Superior delivery efficacy
- Reduced toxicity
- Flexibility of particle size
- High cell-targeting capabilities
- Potent therapeutic effects

Malaysian Patent Granted MY-187773-A
Canadian Patent Granted 3,008,095

Nanoparticles for Cancer Treatment

Our team of researchers have developed Strontium sulphite nanoparticles that enables efficient delivery of therapheutic sIRNAs to cancer cell. Comparing to other existing methods, these nanoparticles have high efficacy, biocompatibility, suitability for multiple delivery routes, and the capability to transport various therapeutic agents. This invention holds great potential in improving cancer treatments.

Malaysian Patent Pending PI 2019003158

Oral Insulin

We are revolutionizing the delivery of insulin for diabetic patients with Insulin-loaded Barium salt nano-precipitates. Nanoparticles derived from Barium salt acts as a carriers to for proteins to attach, allowing transportation of insulin, overcoming barriers and maintaining therapeutic efficacy, eventually regulating blood sugar levels. This product could reduce the inconvenience of insulin injections and has been tested in diabetic rats.

Malaysian Patent Pending PI 2021000801

Self-Cleaning Hemodialyzer

The challenge in treating end-stage renal disease (ESRD) patients is removing uremic toxins during dialysis. Fouling occurs as large proteins accumulate on the porous hollow fiber, necessitating regeneration for reuse. Current regeneration methods require costly and potentially damaging chemical reagents like bleach or peracetic acid. To address this issue, a self-cleaning hemodialyzer with a thermo-regulated microgel coating has been developed. This technology can replace expensive chemical reagents with ultrapure water during regeneration, significantly reducing costs. Moreover, the use of inert ultrapure water preserves the hollow fiber's original structure designed for hemodialysis, preventing damage. This innovation enhances the dialysis process for ESRD patients.

Malaysian Patent Pending PI 2019005463

Smart Nanomaterials for Targeted Therapy

Intracellular delivery and controlled release of therapeutic agents, including small molecule drugs, nucleic acids (DNA, siRNA), and proteins, is crucial for effective treatment and reducing side effects.

Our smart nanoparticles offer a solution by binding and protecting therapeutics, regulating biodistribution, and enabling controlled release at target sites. These biodegradable, pH-sensitive nanoparticles vary in size and shape, efficiently delivering a wide range of therapeutic molecules, enhancing efficacy, and minimizing off-target effects. They also respond to different drug characteristics, allowing the selection of suitable nanoparticles for effective drug delivery.

Malaysian Patent Granted MY-182352-A

PHYSICAL SCIENCES

Physical sciences is a broad category of scientific disciplines that explore and investigate the fundamental principles governing the natural world. These disciplines are primarily concerned with understanding the physical and chemical properties of matter, energy, and the universe. Physical sciences include physics, chemistry, astronomy, and geology, among others.Physical sciences play a foundational role in scientific inquiry and technological advancements. They contribute to our understanding of the natural world, and their principles underpin innovations in various fields, from engineering and environmental science to materials science and beyond. By studying the physical sciences, we gain insights into the fundamental laws of nature that shape our world. Engineering and ICT represent applied sciences and practical domains which physical sciences provide the foundational knowledge upon. Engineering and ICT build and apply their principles to solve practical problems and develop new technologies.

Geraniin Phospholipid Complexes

The rind of the tropical fruit Nephelium lappaceum (rambutan) contains a high concentration of the geraniin. Geraniin exhibits a wide range of beneficial properties, including antiviral, anti-inflammatory, anticancer, antimicrobial, and antioxidant effects. It can also help improve metabolic parameters like hypertension. However, its low bioavailability has been a challenge for clinical and cosmetic applications. Our researchers have developed a phospholipid formulation of geraniin, increasing its oral bioavailability by over 90%. This improved formulation is suitable for use in nutraceuticals and cosmeceuticals.

Malaysian Patent Pending PI 2017704622

Palm Milk

Traditional commercial plant-based milk often falls short as a dairy milk substitute due to low protein content and digestibility. Palm milk leverages palm kernels, recognized for their high protein content and digestibility, for plant-based milk production. Enzymes are employed to improve protein extraction from palm kernels. With palm kernel being a low-cost raw material, production expenses can be as low as RM0.5 per liter. This innovation delivers comparable protein content (~1%) to existing plant-based milk products and protein digestibility (85%) akin to cow's dairy milk (89%). Utilizing readily available food industry equipment, it introduces a new food source, diversifying the food supply chain.

Malaysian Patent Pending UI 2023001869

Stable Anthocyanin Food Colourant

Anthocyanins are popular natural food colorants, but they are unstable at low acidity or neutral pH. This instability has driven the demand for anthocyanins with enhanced pH resilience, particularly those with multiple acylated groups. We have now developed a colour-stable Anthocyanin-based food colouring sourced from local natural materials which has the following features:

1. superior color stability during prolonged storage
2. better heat stability than betalain colorants

This improved color stability enables expansion of its application to a broader range of food products.

Malaysian Patent Granted MY-192399-A

Vegetarian Capsule

Vegetarian Capsule is a groundbreaking solution to address multiple concerns associated with traditional animal-based capsules. The aim is to eliminate the risk of disease transmission inherent in animal-based gelatine capsules. It is an alternative for individuals with religious concerns by using source from plant biomass. By utilizing this eco-friendly material, we reduce production costs and avoid factory-produced pharmaceutical gelatine, known for its toxic treatment processes and excessive chromium content.

The Vegetarian Capsule is derived from modified cellulose, extracted from plant biomass, serving as an effective targeted delivery system to the small intestine. Its key benefits are:

- 100% Vegetarian, organic and bio-safe
- Vegetarian capsule meets the dietary, cultural and personal preferences
- Rapid disintegration for efficient absorption
- No taste and odour which makes it ideal for consumer compliance

Malaysian Patent Pending PI2020006332

Food-grade Bioadhesive Emulsion

A cost-effective and eco-friendly food-grade bioadhesive emulsion system has been developed, addressing limitations in existing carrier systems used for controlled delivery of oil-soluble drugs. This innovation offers an inexpensive solution suitable for food and feed applications without relying on synthetic chemicals. It eliminates conventional surfactants or emulsifiers, utilizing naturally occurring and affordable food-grade bioadhesive particles. This environmental approach can be seamlessly integrated into industry practices, as it does not require specialized equipment.

Malaysian Patent Pending PI 2019005463

Phytochemicals Extraction from Palm Oil

Palm oil is rich in carotenoids and tocols. However, refining processes often degrade these beneficial compounds. Traditional extraction methods risk solvent contamination. They are energy-intensive and require specialized equipment. Liquid Antisolvent Precipitation (LAP) selectively extracts palm carotene by partitioning it to stearin, which can be easily precipitated. LAP operates under mild conditions, yielding up to 90% palm carotene in a single batch and over 15,000 ppm after multi-stage processing. This phytochemical-rich product has diverse applications in food, supplements, cosmetics, and more.

Malaysian Patent Pending PI 2021003449

Whitening Skin

There is an increasing demand for cosmetics using natural active ingredients instead of synthetic compounds, to avoid side effects and allergies. Utilizing a phytochemical from ginger, the compound is formulated into a lipid-based carrier which results in a skin whitening cream with enhanced solubility and skin penetration. The derived natural ingredient has broad benefits for various stakeholders:

1. Clinically Proven Efficacy - it has undergone human trials, demonstrating its whitening efficacy and gaining consumer trust in evidence-based products.
2. Fairer and Healthier Skin - it promotes fairer and healthier skin, boosting users' confidence.
3. Boost to the Agriculture - by using ginger as the source of the compound, it supports local farmers and therefore contributes to the agricultural growth and benefiting rural communities.

Malaysian Patent Pending PI 2023003219

Contact us

The Commercialisation Unit, located within Research Excellence Unit (REU), is dedicated to support Monash University Malaysia's aspirations in research commercialisation and industry collaboration. Our unit oversees the entire spectrum of intellectual property, industry partnerships and commercialisation endeavours, driven by a mission to encourage, protect and promote our breakthroughs and innovations. We are committed to ensuring that our discoveries not only enhance lives but also contribute to economic development on both local and global scales.

The Commercialisation Unit offers the following support and services:

- Intellectual Property Management
- Technology Transfer
- Commercialisation Strategy, including licensing and spin-offs
- Industry Collaboration Facilitation
- Business Development
- Internal Advisory Support
- Capacity Building

Explore potential licensing or collaboration opportunities by reaching out to us at **mum-reugeneral@monash.edu** We welcome inquiries and are eager to explore mutually beneficial partnerships that can drive innovation and advance research, and contribute to shared success.

CONTACT US

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