

*"Leading University - Industry  
One Stop Centre"*



INNOVATION & COMMERCIALISATION CENTRE

# PRODUCT PROFILE

Innovation and  
Commercialisation  
Centre (ICC)  
2009 - 2016



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# ABOUT US

## VISION

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To be an efficient one stop management centre for technology innovation and commercialisation.

## MISSION

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To assist in IP management and exploitation, to add value to the technologies towards achieving innovative and commercially viable products that meet the market needs for the nation's wealth creation.

## STRATEGIES

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To work strategically with the faculties, Research Alliances and Centre of Excellence in tandem with government agencies and industries in promoting UTM's technologies.

# FOREWORD

Innovation and Commercialisation Centre (ICC) was established to support researchers in Universiti Teknologi Malaysia (UTM) to protect and commercialise their inventions.

ICC was formed by UTM in June 2010, as a technology transfer and innovation business entity to drive on the commercialisation part of UTM's invention from the laboratory to the marketplace.

This is where ICC assists in securing and protecting novel innovations through the intellectual property processes and identifying applicable commercialisation strategies for the created intellectual property. ICC has developed successful over the years in a number of phases and actively involved in the technology transfer activity, has grown with the formation of UTM Holdings Sdn. Bhd. and other spin off companies.

In ICC, we adopt new innovative concept from time to time to encourage extended entrepreneurship activities amongst the university residents. The latest approach adopted is termed the Quadruple Helix Model where the interaction between Government, Academia, Industry and Civil Society will be stressed upon to ensure the successful emergence of industry-university business collaborations and knowledge transfer process. We also work closely with the Student Innovation Office and the Entrepreneurship Centre to inspire and produce the new generation of Innopreneurs. As, such we are pleased to invite everyone to join us in the quest to turn ideas into wealth generation.

# SERVICES OFFERED



## INNOVATION POINT

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1. Innovation Awareness Program
2. Innovation Activities Program
3. Innovation Community Program

## INNOVATION IDEA INCUBATION

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1. Innocomm Screening Program
2. Innovation Funding Program
3. Sprinter Incubator and Business Training Program
4. UTM-MTDC Symbiosis Program

## INNOVATION PROJECT DEVELOPMENT

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1. Prototype Development
2. Industry Solution Unit

## INTELLECTUAL PROPERTY MANAGEMENT

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1. IP Management
2. IP Acquisition
3. IP Licensing

## TECHNOLOGY LICENSING

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1. Technology Licensing
2. Commercialisation Projects
3. Spin-off Company Formation
4. Business Plan/ Business Proposal/ Market Survey/  
Market Validation Assistance for Potential Product
5. Commercialisation Training
6. Commercialisation Data Reporting (MyRA, MYMOHES, etc)

## MARKETING, EXHIBITION & INDUSTRIAL NETWORKING

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1. Marketing of UTM products, technologies and expertises.
2. Industry Networking and collaboration
3. Trade Exhibition and Technology Transfer Showcase (TTS).
4. Publication and Publicity (Media Coverage)

## LEGAL AND STANDARD MANAGEMENT

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1. Legal advice for intellectual property exploitation
2. Commercialisation documentation, standards and  
policy management and execution.

# LIST OF PRODUCTS

## ENGINEERING

### AUTO GUIDED VEHICLE (AGV)

#### ROV PLECO

#### COBRA

Colour Coded Heart Rate Continuous Monitoring System

#### COOL ISLAND PAVEMENT

#### DIRECT CURRENT COMPRESSOR - AIR CONDITIONING(DCC)

#### M-TRAP

Practical Mosquito Trap to Control Mosquito Borneo Diseases

#### DUST BUSTER

Dust Control Technology

#### ECO GREEN BRICK (EGB)

Cement Free Concrete

#### ENERGY AND THERMAL COMFORT : ETC-2

Ejector as an expansion device on the air conditioners

#### HYDRO CHEESE

#### EDUCATIONAL TESTRIG

Intelligent Active Vibration Control Educational Testrig

#### Natural Colourant from Areca Catechu Linn for Textile Industry

#### MYEV

Malaysia Electric Vehicle Charging Network Infrastructure

#### PALM ECO CRETE

Fibrous Nano-Biomass Concrete (FNBC)

#### M-FINDER

Particle Detector in Gas Insulated Switchgear Using Image Processing

#### SINE SLAB

Innovative and Cost Effective, Improved Method for Shore Erosion Control

#### STREET LIGHT MONITORING SYSTEM

#### ANTI-THEFT GROUNDING SYSTEM FOR INDUSTRIAL APPLICATION

## SMART HOME AND SECURE AMBIENT MONITORING

#### SMART IBS

Smart Industrialised Building System

#### TremorX

#### RESLE

(Release Sleeve)

#### Qfinder

#### WeX

Wheel Explorer

#### eBraille Al-Quran

## SCIENCE

#### SILDENAFIL KIT:

Mobile Test Kit For Detection of Sildenafil

#### STRESS PROFILING

#### DERMAGs SKIN SOLUTION

#### BIRD NEST NOVEL ESSENCE

#### MOLLUSCURE

(Bivalve Mollusc Toxic Metals Removal System)

#### CRUDE PALM OIL REFINING SYSTEM

Crude Palm Oil Refining Pilot Plant

#### MEMBRANE CONTACTOR FOR CO<sub>2</sub> GAS REMOVAL

Membrane Contactor System

#### MICROCLEAR

#### NANONEEDLE

Novel Rigid Nanoneedle for Single Cell Surgery and Drug Delivery Application

#### PINA PAPER

Production of Paper From Pineapple Leaves

#### PINA PLASTIC

From Pineapple Waste into Degradable Plastic Composite

#### SMART BIOSWITCH

An Active Packaging for Food Safety

#### WATER TREATMENT

Water Treatment Using Membrane System

#### YES PACK

#### ANALYTICAL CLOTH

Cloth-Based Microfluidic Analytical Device (UCAD)  
Embedded in Sanitary Napkin for on-Site Urine Analysis

#### NATUREL KISS LIP MOISTURISER

## INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

#### COMPUTER ON WHEEL

Computerised Mobile Workstation

#### VERIFY HALAL

#### IMBAS ARQIS

#### iASSET

Property Appraisal for Tax Purposes Using Mass Appraisal System (iASSET)

#### AMIR CPU

New 32-bit CPU

#### PBWA

Portable Broadband Wireless Access System

#### SMS PARKIR

#### TAJMA™ Personality Plus (TPe+)

#### SYCUT

Syariah-Compliant Automated Chicken Processing System (Halal)

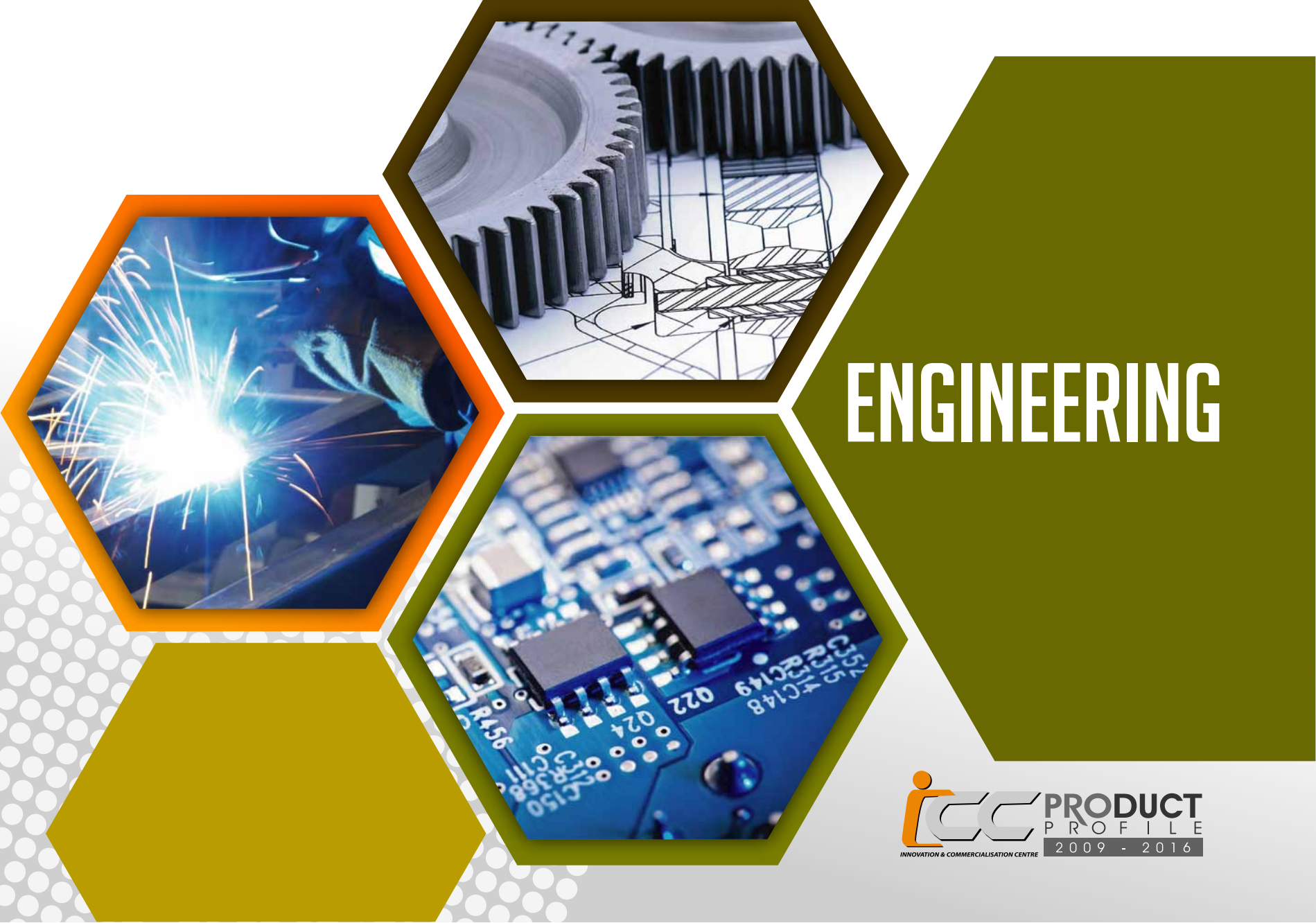
#### HAJSIM

Design and Development of an Immersive Hajj Simulator

#### APPLAM

Surge Arrester





# ENGINEERING

“

Art without engineering is dreaming.  
Engineering without art is  
calculating. ”

- Steven K. Roberts, Journalist



### DESCRIPTION

AGV is an Automated Guided Vehicle that can move on its own to deliver goods from one location to another location. It is suitable to be used in production line, store, office or any working environment where routine point-to-point deliveries required.

### FEATURES

- a) Allow easy access battery.
- b) Built with safety features (laser and bumper sensor).
- c) Reduces high labour reliance.
- d) Increasing workload efficiency.

### APPLICATION

- a) The AGV is an Automated Guided Vehicle that can move on its own to deliver goods (such as pallets, boxes and finished goods) from one location to another automatically.
- b) It can be programmed to run automatically without human interaction and only controlled by server wirelessly.
- c) The front of the AGV is equipped with lasers and bumper sensors to safely avoid people and obstacles.

### OPPORTUNITIES / BENEFITS

- a) 30 percent cheaper
- b) Customised services
- c) Increase efficiency

### TARGETED MARKET

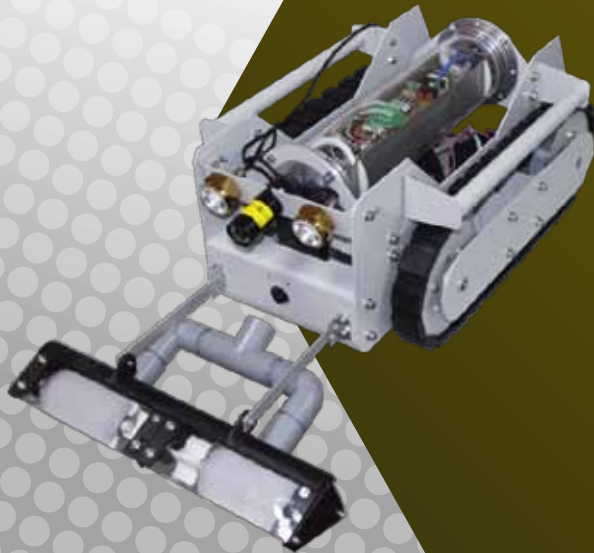
- a) Manufacturing
- b) Office
- c) Automotive
- d) Warehouse
- e) Chemical industries
- f) Food and beverage industries

# AVG

(AUTO GUIDED VEHICLE)



# ROV PLECO



### DESCRIPTION

Clean water supply is distributed from water storage tanks. Sediment that accumulates over time in water storage tanks will deteriorate the water quality. Therefore, ROV Pleco is proposed to clean the water storage tanks.

### FEATURES

- a) Fully submerge and mobile at all water tanks & reservoirs.
- b) Equipped with high resolution camera with LEDs.
- c) Underwater Search, Rescue & Monitoring.
- d) Strong suction to remove all types of sediment in water tank.

### APPLICATION

- a) Water utility industries.
- b) Water service reservoirs.
- c) Commercial swimming pools.
- d) High rise building water tanks.

### OPPORTUNITIES / BENEFITS

- a) Cost effective solution.
- b) Minimise water pipe bursting due to sudden change in water pressure during manual cleaning.
- c) Reduce cost and time for cleaning.
- d) Safe method, instead of diver who clean the tanks.

### TARGETED MARKET

- a) Suruhanjaya Perkhidmatan Air Negara (SPAN)
- b) Syarikat Air Johor (SAJ)
- c) Syarikat Bekalan Air Selangor (SYABAS)
- d) Other water utilities companies
- e) Maritime Search & Rescue
- f) Commercial swimming pools

**DESCRIPTION**

A watch like bracelet with LED colour changing in virtue of intensity and frequency of exercise. It was inclusive of digital screen with four programming buttons.

**FEATURES**

- a) Enable user easily to note the optimal exercise intensity can be done by using this device.
- b) Colour display in accordance to exercise exertion level.
- c) Increase motivation and feedback.
- d) Suitable for individual or group exercise.
- e) Suitable for beginner to elite user.

**APPLICATION**

- a) Colour code itself is a trendy idea that differentiates our product.
- b) Wireless sensor network for group training.

**OPPORTUNITIES / BENEFITS**

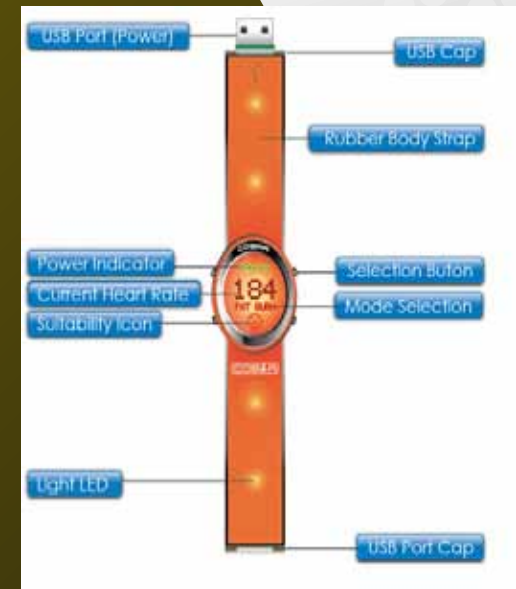
- a) Cobra is using colour coding technology, which the colour of LED strip will indicate the target heart rate zone desired by the user.
- b) No need for a slowing down / stop exercise to interpret the small numerical display.
- c) Increase motivation on exercise intensity.
- d) Reminder to user under or over exercise.
- e) Reminding and preventing the risk of overdoing the exercise.

**TARGETED MARKET**

- a) Sports, schools and training centre in Malaysia.
- b) Direct sales of heart rate monitoring system.
- c) Elderly or young, patient of heart malfunction or other related diseases.
- d) Heart attack patients.

# COBRA

## COLOUR CODED HEART RATE CONTINUOUS MONITORING SYSTEM



# COOL ISLAND PAVEMENT



### DESCRIPTION

- a) Reduce the impact of Urban Heat Island (UHI) phenomenon.
- b) Practical during the peak time of solar intensity.
- c) Improves the eco-living especially in modern township area.
- d) Offers cooling surrounding, ambient and useful to promote better health, living in the society.
- e) Used mainly for exterior surfaces.

### FEATURES

- a) Innovation from crushed wasted ceramic tiles.
- b) Light in colour with special anti-stored material to reflect the radiation or heated temperature from sunlight.
- c) High reflectivity, durability and waterproofing capabilities.
- d) Anti-fungus and crack resistance.

### APPLICATION

- a) Cool Island Coating, roof and tiles.
- b) One Stop Solution (consultation, cleaning + coating + warranty).

### OPPORTUNITIES / BENEFITS

- a) Cool Island Coating with high reflectivity, durability, and waterproofing capabilities.
- b) Used mainly for exterior surfaces (roofs and walls).
- c) Offer various colours with anti-fungus and crack resistance features.
- d) Reduce electricity consumption and maintenance cost.

### TARGETED MARKET

- a) Developer
- b) Residential areas.
- c) Commercial parking lots (For Green Image)
- d) Pedestrian walk.
- e) Offices (Corporate parking)
- f) Green and environmental company (focus target market).

## DIRECT CURRENT COMPRESSOR - AIR CONDITIONING (DCC)

### DESCRIPTION

The compressor of the automotive air conditioning is driven by an electric motor which in turn is operated by electrical battery (12Volt). The system operating with inverter and an intelligent controller installed to vary the speed of the compressor for load matching and thermal comfort.

### FEATURES

- a) Capability of controlling DCC for automotive /vehicle air conditioning system with variable-speed operation.
- b) Ability of matching the performance of DCC for automotive /vehicle air conditioning system with cooling load.
- c) Temperature controller based on reset value of fuzzy logic control.
- d) Simple installation and maintenance together with the potential to conserve energy.

### APPLICATION

- a) A variable speed of DCC -air conditioning is the system that could distribute conditioned air at different temperatures.
- b) The system with variable-speed control can control the cooling capacity by changing the rotational speed of the DCC for load matching and thermal comfort.
- c) A good control scheme to maintain comfort under any conditions.
- d) The DCC aims for air-conditioning system operating with inverter and an intelligent controller installed to vary the speed of the compressor for load matching and thermal comfort.

### OPPORTUNITIES / BENEFITS

- a) Relieves the internal combustion engines from driving air-conditioning compressors, thus enable to contribute towards energy saving.
- b) Environmental-friendly features in modern passenger cars.

### TARGETED MARKET

- a) Replacement of conventional (belt-driven) automotive /vehicle air conditioning systems with DCC .
- b) Replacement of the conventional control systems in conventional automotive / vehicle air conditioning systems with intelligent control system.





# M-TRAP

### PRACTICAL MOSQUITO TRAP TO CONTROL MOSQUITO BORNEO DISEASES



#### DESCRIPTION

M-Trap is the first product developed in Malaysia which is designed to specifically attack mosquitoes only instead of insects. M-Trap is based on the theory that mosquito are attracted by the dark colour object. Therefore, the grid installed in the trap is usually black in colour.

#### FEATURES

- a) Construction using on hand materials.
- b) Black grid as attractant and killing method.
- c) Equipped with a sensor for operational and efficiency controller.
- d) Safe and conserves environment and ecosystem.
- e) The power supply could be either plug-in socket or rechargeable battery.

#### APPLICATION

- a) Similar products on the market intended to trap mosquitoes and insects. However, M-Trap only select mosquitoes and no dependence on the UV light.
- b) No other competitor in the market equipped with a sensor to maintain its efficiency.
- c) Colour as an attractant to mosquitoes without any chemical originates.

#### OPPORTUNITIES / BENEFITS

- a) Kills more mosquitoes and spare other insects.
- b) Saves time, energy and money.
- c) No harmful chemical
- d) Low maintenance

#### TARGETED MARKET

- a) Hospitals
- b) Residential area
- c) Schools
- d) Commercial area

## DUST BUSTER

### DUST CONTROL TECHNOLOGY

#### DESCRIPTION

The Dust-Buster helps significantly in minimising dust from demolition projects, in both machine removal applications and implosions, reducing the potential for health concerns, complaints and fines. It is powerful mist of atomised water droplets collides with airborne particles to drive them to the ground and avoids over-saturating debris.

#### FEATURES

- a) Compact size
- b) Reaching a very large surface area
- c) Oscillating with a wide range of coverage
- d) Low noise emission
- e) Low energy consumption

#### APPLICATION

- a) The high capacity tanker will incorporate a fully functional high-performance oscillating dust suppression unit mounted on the back and can be completed with booster pump and adjustable elevation.
- b) Well suited to demolition applications, one of the few technologies capable of delivering dust control via surface wetting and airborne capture.

#### OPPORTUNITIES / BENEFITS

- a) The most effective method for dust control at demolition site by providing the best attraction between dust particles and water droplets.
- b) Use less water than traditional hand water spraying, thus avoiding flooding at the demolition site.
- c) Reduce labour and operating cost for dust control at demolition site.
- d) Meet local authority requirement and environment regulation.
- e) Modified nozzle, fan and 180° rounding system.

#### TARGETED MARKET

- a) Construction site
- b) Cement factory
- c) Mining industry
- d) Demolition site





# EGB

(ECO GREEN BRICK)  
CEMENT FREE CONCRETE



### DESCRIPTION

EGB is one of the CFC products. EGB is manufactured using fly ash or palm oil fuel ash (POFA) along with optimum proportions of lime and gypsum. EGB is an alternate to clay bricks and it is proving to be a revolutionary invention that produces bricks without the sintering process and consequently no greenhouse gases are emitted.

### FEATURES

- a) Eco Green Brick with environmentally friendly concept.
- b) OPC is fully replaced by agro industrial wastes (POFA + PFA).
- c) The manufacturing process is the same as clay brick.
- d) Highly durable, resistance to aggressive environment.

### APPLICATION

- a) Recycling of agricultural and industrial wastes for construction materials.
- b) Reducing the effect of urban heat island.
- c) EGB produces low carbon and environmental friendly brick.

### OPPORTUNITIES / BENEFITS

- a) Cost effective.
- b) Reduces CO<sub>2</sub> emission into the atmosphere.
- c) Recycling and using of waste materials.
- d) Good fire resistance.
- e) Alternative to clay bricks.
- f) Uses of agro waste materials.

### TARGETED MARKET

- a) JKR/Construction Industry Development Board (CIDB)/Local Authorities.
- b) Marine structures.
- c) Projects in tropical environment.
- d) Precast concrete products.

# ENERGY AND THERMAL COMFORT

## ETC-2 EJECTOR AS AN EXPANSION DEVICE ON THE AIR CONDITIONERS

### DESCRIPTION

The ejector as an expansion device has a saving energy potential in the application on the air conditioners. Increasing of the system performance will reduce power consumption significantly. The ejector as an expansion device is to improve the performance by reducing the throttling losses caused by the use of a capillary tube in the split type air conditioners.

### FEATURES

- a) Geometry and dimension of the ejector.
- b) Ability of matching the performance of the air-conditioning system with the variation of condenser temperature.
- c) Green technology
- d) Low power electricity supply to the compressor.

### APPLICATION

- a) Achieving energy savings up to 50%.
- b) Comfort temperature
- c) System stress –reliability
- d) Efficiency in maintenance durability of the compressor.

### OPPORTUNITIES / BENEFITS

- a) Replacement of the conventional expansion device on the air conditioning system for residential, commercial and automotive.
- b) Save energy
- c) Easy to install and low service.
- d) Free maintenance

### TARGETED MARKET

- a) Air conditioning manufactures
- b) Commercial building
- c) Office
- d) Household
- e) Automotive manufactures
- f) Vehicle owner



# HYDRO CHEESE



### DESCRIPTION

The Hydro Cheese system is designed with a squares' shape and porous structure. The installation consists of units of single modules arranged in various possible configurations to form a wave barrier with permeable sharp-edged tiers and holes of various sizes to act as a breakwater-reef system.

### FEATURES

- a) Lower construction cost and shorter construction period.
- b) Simple installation and maintenance.
- c) Maintain use of the sandy beaches and preserve coastal vegetation.

### APPLICATION

- a) The fabrication of the new breakwater system is easy and the material is easily available.
- b) This product is compatible with the current breakwater system in the market.
- c) It was also designed to improve the eco marine system that is fast disappearing.

### OPPORTUNITIES / BENEFITS

- a) Submerged breakwater for shore protection.
- b) Artificial reefs provide shelter for marine life.
- c) Through the flow of water with appealing effect.
- d) Designed for controlling obstruction of sediment movement.
- e) Initiate creation and establishment of marine life communities.

### TARGETED MARKET

- a) Maritime industries
- b) Coastal property owners
- c) Engineering Consultants

# EDUCATIONAL TESTRIG

INTELLIGENT ACTIVE VIBRATION  
CONTROL EDUCATIONAL TESTRIG

## DESCRIPTION

This product is a complete prototype of an educational vibration control rig using mechatronic design approach employing novel. It is a simple conventional feedback control. In addition, act as Artificial Intelligence (AI) algorithms for active vibration control of flexible structures. It covered a wide range of mechanical, electrical courses and laboratories including instrumentation, control, mechatronics, vibration and so on.

## FEATURES

- A portable experimental rig with signal conditioning and controller box integrated with Matlab.
- Graphical User Interface (GUI)
- Able to stimulate and conduct experiments to study the behavior of the flexible structures and the performance of PID controller in active vibration suppression of the flexible structure system.
- The active vibration control method works by artificially generating sources that absorb the energy caused by the unwanted vibrations in order to suppress or reduce their effect on the overall system.
- Suitable for Higher Learning Institution Educational Rig.

## APPLICATION

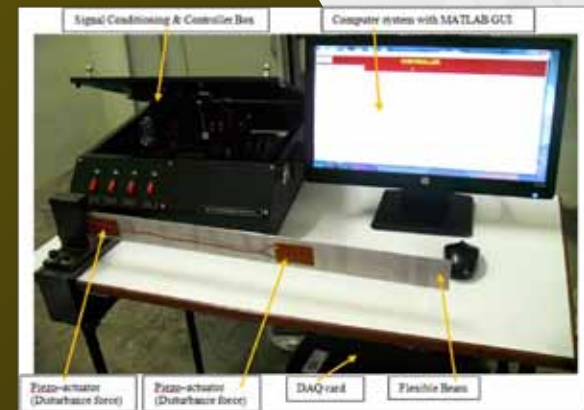
- Beneficial platform for educational purpose or for test and verification of algorithm.
- An Active Vibration Control (AVC) signal has been developed by generating an anti-force signal based on the conventional and intelligent methods.

## OPPORTUNITIES / BENEFITS

- Product can be switched to either in simulation mode only or experimental mode or both.
- Effective vibration reduction of flexible structures with various boundary conditions and complete with robust controller algorithms.
- Easily implemented in real-time and interactive graphical user interface.

## TARGETED MARKET

- Aircraft system
- Automation system
- Automotive industries



# NATURAL COLOURANT FROM ARECA CATECHU LINN FOR TEXTILE INDUSTRY



### DESCRIPTION

Natural Colourant was obtained from Areca Catechu Linn or locally known as 'Buah Pinang' using a green extraction. Usage of non-toxic solvent and high responsive process. It also can yield high colour recovery containing high amount of antioxidant activity preserves in the extract.

### FEATURES

- a) Natural Colourant produced from natural products.
- b) Colour obtained through green and non-hazardous extraction method.
- c) Contained catechin that are beneficial to human health and have high antioxidant activity.
- d) Catechin is ranked 2nd in antioxidant activity.

### APPLICATION

- a) Quick response and the green extraction method can produce up to 39 percent natural colourant.
- b) It is a plant based dye extracted using green extraction technologies.

### OPPORTUNITIES / BENEFITS

- a) Natural Colourants show signs of better biodegradability.
- b) It has a unique property whereby it is not just an ordinary textile colourant, but its compounds may also have therapeutic uses (i.e. compounds such as catechin and tannins).
- c) It is long lasting colour and the extraction technology is environmentally friendly and safe.

### TARGETED MARKET

- a) Potential for textile industry
- b) Natural brown colour
- c) Toys, cosmetics and food colourants



## MYEV

### MALAYSIA ELECTRIC VEHICLE CHARGING NETWORK INFRASTRUCTURE

#### DESCRIPTION

This product is to solve the problems in Electric Vehicle (EV) that not have standard charging requirements or protocol available. An EV owner needs to have different chargers for different cars. Moreover, it limited to a dedicated charging location. By the way is very important to any EV owner to get information regarding of using charge at any universal EV charger in a cashless mode with up to date online record maintenance.

#### FEATURES

- a) Secured MyEV Cloud Service
- b) Link to payment gateway
- c) Universal EV charger

#### APPLICATION

- a) The shelf life of the product is 10 years of service and ongoing.
- b) Sustained industry collaboration.
- c) Continuous Researcher and Development (R&D) with industry partners via agreements.

#### OPPORTUNITIES / BENEFITS

- a) Ease of use and very user friendly.
- b) Support multiple charging requirements.

#### TARGETED MARKET

- a) EV owner –users of cloud service
- b) EV operators –maintain charger service
- c) Advertising companies/organisations



# PALM ECO CRETE

## FIBROUS NANO-BIOMASS CONCRETE (FNBC)



### DESCRIPTION

Palm Eco-Crete is a product of composite materials that utilise biomass waste which is abundantly available at low cost. Palm Eco-Crete can be produced at three density levels which are lightweight (low strength), medium weight (normal strength) and normal weight (high strength). So, making it a product with a wide range of applications along with being low cost and environment friendly.

### FEATURES

- a) It's durable and Eco green for building materials and construction industry.
- b) Reduce the use of cement in concrete, thus reduce the CO<sub>2</sub> in the atmosphere.
- c) High strength (>80 MPa) (2030 kg/m<sup>3</sup>).
- d) Medium strength (> 30MPa) (1250 kg/m<sup>3</sup>).
- e) Low strength (>7MPa) (1090 kg/m<sup>3</sup>).

### APPLICATION

- a) Reduce waste from palm oil industries.
- b) Environment friendly and green products.
- c) Reducing the effects of Urban Heat Island (UHI).

### OPPORTUNITIES / BENEFITS

- a) Cost effective.
- b) Reduces CO<sub>2</sub> emission into the atmosphere.
- c) Recycling and reuse of byproducts from agro-industrial wastes.

### TARGETED MARKET

- a) Housing developers
- b) Local Authorities
- c) Construction Industry Development Board (CIDB)
- d) Projects in tropical environment
- e) Marine structures
- f) Palm oil industries
- g) Public Works Department (JKR)



## DESCRIPTION

M-Finder is a computer aided which able to detect particle specifically and it's designed for high voltage gas insulated switchgear visual inspection. It has an ability to improve power system quality over the long term by introducing better quality control during the installation process.

## FEATURES

- a) Particle detector (as small as 1 mm particle).
- b) Real time video display
- c) Portable and user friendly
- d) Suitable for most high voltage Gas Insulated Substations (GIS).
- e) Interchangeable scopes and tips

## APPLICATION

- a) M-Finder can be customising according to the client need.
- b) The interchangeable flexible and articulated bore scope comes with various lengths and diameter.

## OPPORTUNITIES / BENEFITS

- a) Reduce human error on quality check due to human fatigue.
- b) Introduce better quality control during assembling (GIS).
- c) Produce long lifespan (GIS).
- d) Reduce Specific Fuel Consumption (SFC) emission occurred during construction of GIS.

## TARGETED MARKET

- a) Gas insulated switchgear manufacturers
- b) Power systems contractors
- c) Power utilities providers

# M-FINDER

## PARTICLE DETECTOR IN GAS INSULATED SWITCHGEAR USING IMAGE PROCESSING



# SINE SLAB

INNOVATIVE AND COST EFFECTIVE,  
IMPROVED METHOD FOR SHORE  
EROSION CONTROL



### DESCRIPTION

Sine-Slab is a flexible pre-cast concrete system with special aesthetic design features. The product provides an efficient alternative solution to existing coastal erosion control systems since it promotes improved energy absorption and sediment accumulation.

### FEATURES

- a) New improved design to facilitate production by automation, installation and maintenance /replacement.
- b) Additional size, shapes to cater different site conditions.
- c) New material composition (using waste material).
- d) Reinforcement method (prevention of wastage, corrosion).

### APPLICATION

- a) Flexible
- b) Interlocking
- c) Hollow part as canal system
- d) Cost effective
- e) Eco-friendly, soft solution with vegetated cover.

### OPPORTUNITIES / BENEFITS

- a) Designed to withstand hydraulic forces, stable, flexible and durable.
- b) Less costly to install and maintain.
- c) More durable and less destructible.
- d) Interlocking and longer lasting.
- e) Unique, made from precast concrete using a newly patented system.
- f) Able to compete globally.

### TARGETED MARKET

- a) Coastlines
- b) Riverbank improvements
- c) Infrastructure development

# STREET LIGHT MONITORING SYSTEM

## DESCRIPTION

Street Light Monitoring System (SLMS) is a mechanism which addresses the need to facilitate monitoring, identifying, locating and rectifying fault lights within a feeder network. A feeder control unit (FCU) will measure the current/power on the feeder and record any changes (ie. Drop in current indicating a faulty lamp in that particular feeder line). Data collected at the feeder points will be remotely monitored by a central control system located in the central/regional offices. SLMS also provides the basic requirements to qualify as a remote monitoring system, with added functionalities such as SMS alerts, although these are also available in current competing systems.

## FEATURES

- a) Self-adaptation to existing lighting network and no calibration required.
- b) Easy and fast installation.
- c) Portable and lightweight.
- d) No extra wiring required.
- e) Improve security with vibration sensor, motion sensor and door sensor.

## APPLICATION

- a) Efficient continues Research and Development (R&D) from UTM.
- b) Backed by 24/7 technical services.
- c) Real time SMS alert.

## OPPORTUNITIES / BENEFITS

- a) Monitor up to hundreds of lights.
- b) Reduce outage time and optimises streetlight uptime.
- c) Facilitates lamp replacement and extend lamp life.
- d) Enhances public safety.
- e) Improve operation and maintenance planning activities.
- f) Reduce energy consumption and operating expenses.
- g) Cost effective

## TARGETED MARKET

- a) Local municipalities
- b) Power utility companies
- c) Universities



# ANTI-THEFT GROUNDING SYSTEM FOR INDUSTRIAL APPLICATION



### DESCRIPTION

This product is designed to deter the theft of copper grounding wires and rods which prevalent throughout the world. In conventional grounding systems, the key component used in all accessories is copper. Due to the increasing prices of scrap copper, there has been a sharp increase in theft of grounding rods all over the world. This invention eliminates the incentive in the copper theft by replacing the copper down conductor used in the grounding system with galvanised steel which is much more cheaper to implement and has a very low resale value (around 300 percent lesser) compared to copper.

### FEATURES

- a) Galvanised steel wire and naturally available material as the grounding system
- b) Low ground resistance to remote earth with easy installation and reinstallation.
- c) Cheaper grounding system for electrical networks, lightning protection system, gas pipelines.
- d) Less prone to theft.

### APPLICATION

- a) Hard methods (including concrete encapsulation, spiking and protective shielding).
- b) Alarm methods (use of alarms, monitoring).
- c) Camouflage
- d) Theft deterrence using alternative materials than copper.

### OPPORTUNITIES / BENEFITS

- a) Able to improve the system performance when applied for a building (which does not extract very high power levels from the electricity lines).
- b) Reducing the cost
- c) Preventing theft

### TARGETED MARKET

- a) Telecommunications
- b) Electrical distribution
- c) Building Industries

# SMART HOME AND SECURE AMBIENT MONITORING

## DESCRIPTION

The Smart and Secure Ambient Monitoring System offers an integrated security and automated living system for houses, offices, shops and other suitable premises. The system is designed to have a small footprint for easy deployment and cheap maintenance. Moreover, this system utilises ubiquitous technology and could be accessed almost anywhere at any time.

## FEATURES

- a) Most attractive to younger generations.
- b) Safety and security features.
- c) Advanced electronic sensors.
- d) Use of wireless technology Wireless Sensor Network (WSN).

## APPLICATION

- a) The framework comprises of home infrastructure sensors such as camera, audio, pressure, motion and appliances capable of notifying their status in addition to body sensors of various types such as accelerometer.
- b) The TelG mote is an alternative solution with a cheaper cost that provides customers the opportunity to engage in WSN for real-time monitoring of their homes.

## OPPORTUNITIES / BENEFITS

- a) Saving energy and controlling safety in whole house.
- b) Control of home appliances.
- c) Entertainment control and home health.
- d) The system is user friendly and allows for web-based and GSM network access seamlessly. Strong password protected security and robust features are included onboard.

## TARGETED MARKET

- a) Consumer awareness
- b) Industry/Industry and Business developer





# SMART IBS

## SMART INDUSTRIALISED BUILDING SYSTEM



### DESCRIPTION

The technology is a method for constructing a building, such as house or school by using the precast concrete technology with smart mechanical joints. It is also a precast based system suitable for various formation of buildings using reinforced concrete materials.

### FEATURES

- a) New method in construction technology.
- b) Variety of building shapes can be produced.
- c) Earthquake prevention embedded in between elements.
- d) Transportable components

### APPLICATION

- a) Ability to form various building shapes while not restricting the architect or interior decorator creativity.
- b) Connections between elements can be used or extended to embed the earthquake protection devices to strengthen the whole buildings against earthquake, high wind or tsunami.

### OPPORTUNITIES / BENEFITS

- a) Time saving because it uses the same components for various types of buildings.
- b) Renovation works in the future will require less effort because the materials can be disassembled and assembled easily.
- c) The construction process requires less manpower since all components are prefabricated at the factory.
- d) The concrete using is a sustainable construction material and components are reusable.

### TARGETED MARKET

- a) Education industry
- b) Housing industry
- c) New township development
- d) Defense industry
- e) Ad-hoc industry (Cabin for school and offices)

**DESCRIPTION**

This invention presents a simple, cost-effective, lightweight and user-friendly pen sleeve as another option to the various available products. Designed based on an extensive research on the ergonomic and functionality, this product assists users to write without putting stress on the user's hand. This sleeve absorbs vibrations and from users and offers a good grip.

**FEATURES**

- a) Acts as a sleeve for pens or any writing devices.
- b) Absorbs vibrations from the user's hand.
- c) Comes in different sizes, according to the user's grip size.
- d) Functions to provide comfort to the user while writing.
- e) Assists writing without putting stress on the hand.

**APPLICATION**

- a) Patients usually face problems like shakiness, tremors and difficulty writing.
- b) People suffering from this disease have difficulty in writing just because they cannot hold the pen properly.
- c) To help people with this disorder, there are now many writing aids available which can help to overcome this imperfection. These grips can easily be mounted on your pencil to give patients a firm hold.
- d) It comes in different shapes and sizes allowing you to choose the right one for your specific problem.

**OPPORTUNITIES / BENEFITS**

- a) Lightweight, robust assistive writing device for tremor patients.
- b) Custom-tuned to each individual patient's condition.
- c) Ergonomically designed
- d) Mechanically tested
- e) Can be used for any pen

**TARGETED MARKET**

- a) Everyone who wants more comfortable writing experience.
- b) Parkinson patients
- c) Autism patients
- d) Hospitals

# TREMORX





# RESLE (RELEASE SLEEVE)



### DESCRIPTION

Release Sleeve or ResLE is a special pipe sleeve made from uPVC (Un-Plasticised Polyvinyl Chloride) to remove or drain out the water from mortar layer of the floor. ResLE used as drainage pipe, waste pipe or floor trap, gutters and etc. to replace the existing pipe sleeve or cast iron in plumbing and drainage system.

### FEATURES

- a) Preventing leakage
- b) Made from U-PVC material.
- c) Special design angle to drain out water from the mortar layer.
- d) Lightweight
- e) Design is comply with BS4576.
- f) Applicable for both existing and new development.

### APPLICATION

- a) Durable main material.
- b) Easy installation and maintenance.
- c) Cost reduction of 52 percent for repair work at existing building, including material and manpower.
- d) Less destruction work for installation.
- e) Time effective by percent.

### OPPORTUNITIES / BENEFITS

- a) Easy to install at reasonable cost for both product and installation services.
- b) Add-on to the existing water proofing product for prevention of concrete leakage.
- c) Improve the service life of the waterproofing.

### TARGETED MARKET

- a) Existing development
  - Residential buildings, Commercial buildings, Offices/Factories.
- b) New development
  - Developers, Contractors
- c) Wholesalers/Distributors
  - DIY shops, Hardware shops

# QFINDER

## DESCRIPTION

Visually impaired people have always faced problems in identifying the direction they are facing. Even though it is possible for them to determine the direction in places where they are familiar with such as their house, there are times where they need assistance in identifying the direction and surrounding. This scenario might cause visually impaired people to limit their activity only in places that they are familiar with. Qfinder can assist visually impaired people in identifying direction of Qibla.

## FEATURES

- a) Assist Qibla identification in Malaysia.
- b) Emit sound and light to indicate desired direction.
- c) Cost effective
- d) Pocket size robust.
- e) Act as compass for the visually impaired.

## APPLICATION

- a) Lightweight, user-friendly.
- b) Long-lasting battery.
- c) Ergonomically designed
- d) Mechanically tested.

## OPPORTUNITIES / BENEFITS

- a) Functions for Qibla direction identification.
- b) Acts as a compass for the visually impaired.
- c) Emits sound and light to indicate desired direction.

## TARGETED MARKET

- a) Visually impaired Muslims.
- b) Non-Muslim community.
- c) Sighted people



# WEX WHEEL EXPLORER



### DESCRIPTION

Mobile games and apps nowadays only involve human-smartphone interaction. This project further explores Edutainment aspect by including "robot in-loop" function to increase user's interest in learning while playing games.

### FEATURES

Wheel Explorer (WEX), a mobile robot controlled using mobile apps which provide phycho-motor activities and increase children curiosity in learning. Mobile robot can be re-programmed for amateur robot learning kits.

### APPLICATION

- a) Mobile apps on smartphone
- b) Bluetooth
- c) Microcontroller
- d) Mobile Robot
- e) Racing Track

### OPPORTUNITIES / BENEFITS

- a) To expose participants with basic principle of microcontroller and its application.
- b) To develop innovation and creativity thinking among participants.
- c) To engage participants with current technologies.
- d) To promote Universiti Teknologi Malaysia as a premier educational-technology-based hub in Malaysia.

### TARGETED MARKET

- a) Primary and secondary students.
- b) Young hobbyist
- c) Training centre.

# EBRAILLE AL-QURAN

## DESCRIPTION

Electronic Braille Al-Quran is an aid to teaching and learning Al-Quran for the visually impaired. This project circulates an Al-Quran database in digital Braille codes easily downloadable into eBraille Panel. The eBraille Panel functions as a monitor for the visually impaired. A line of Braille cell will represent the line on Braille Al-Quran. The visually impaired user will read the Braille display using their sense of touch.

## FEATURES

- a) Portable
- b) Multi-Purpose System
- c) User Friendly
- d) Novel Braille T & L
- e) Modern ICT Usage

## APPLICATION

Among the features of the eBraille Al-Quran :

- a) Simple and precise menu selections - ease the process of finding the verse.
- b) Adjustable audio and audio jack accommodates for beginner learners.
- c) Interchange of displaying Braille dots can be done automatically or manually.
- d) The user has complete control over the speed of the interchange.
- e) Users can bookmark the verse or ayah where they stop at.
- f) Rechargeable battery for usage of more than 2 hours (when fully charged).

## OPPORTUNITIES / BENEFITS

- a) World's first eBraille Al-Quran which effectively stores a complete Al-Quran.
- b) A lightweight, portable and user friendly eBraille Al-Quran system.

## TARGETED MARKET

- a) Blind society especially Muslim blind society for Quran and Iqra' (National and Worldwide)
- b) NGO for Blind
- c) Government Organisation (Schools)
- d) Public library



“

At it's heart, ENGINEERING  
is about using SCIENCE to find  
CREATIVE Practical  
Solutions ”

-Queen Elizabeth II



# SCIENCE



“

Invention is the most important product of man's creative brain.

The ultimate purpose is the complete mastery of mind over the material world, the harnessing of human nature to human needs.”

- Nikola Tesla, My Inventions



**DESCRIPTION**

Sildenafil Kit is a Mobile Test Kit to detect sildenafil in food and beverages. This product can simplify the conventional process that only can be done in the laboratory. Usually in the laboratory using equipment such as infrared spectroscopy and liquid chromatography for detecting the existing of sildenafil.

**FEATURES**

The technology comprises of two processing stages :

- Production of reagent for mobile testing of sildenafil.
- Packaging of reagent with other testing tools, sampling bottle, test bottle, instruction kit and disposal containers.

**APPLICATION**

The developed mobile test kit is suitable for detection of sildenafil. It can be used as an alternative or substitute for analytical device that only available in the laboratory. The kit provides accurate result, practical usage and instant result. Besides that, it saves times and avoids result dispute per current lab based practice. Sildenafil mobile kit also can be used as one of the kits to detect the sildenafil in the food. Due to its mobility consumers could undertake own home testing.

**OPPORTUNITIES / BENEFITS**

- User friendly – The mobile kit is easy to use. User needs to mix the test sample with reagent and then the result can be evaluated based on the solution colour.
- The Fast-Analysis result can be obtained within few seconds. Unlike the practice now, lab testing took weeks to complete.
- Highly Accurate-The formation of ion-association complexes of sildenafil and BCG give an intense colour of yellow. The intense yellow color based on concentration of sildenafil formed ion-association complex with Bromocresol Green (BCG).

**TARGETED MARKET**

- Distributing Company
- Original Equipment Manufacturer (OEM)
- National Pharmaceutical Control Bureau (NPCB), Ministry of Health
- Department of Chemistry Malaysia, Ministry of Science, Technology and Innovation (MOSTI)

# SILDENAFIL KIT

## MOBILE TEST KIT FOR DETECTION OF SILDENAFIL



# STRESS PROFILING



### DESCRIPTION

Useful Stress Profiling helps to detect existence of stress amongst teachers and working population. Besides that, it is able assist in identifying stress level and recommend strategies to overcome stress at work. Moreover, it helps to motivate staff better at work by analysing their level and source of stress at work that affect their work performance.

### FEATURES

- a) Increase motivation in workplace.
- b) Reduce health impact on working population.
- c) Detect existence of stress at workplace.
- d) Identify suitable treatments for your stress.
- e) Identify and measure your stress level.
- f) Create more motivated worker.
- g) Helping those in high stress profession.

### APPLICATION

The product was specifically designed for teaching professionals in Malaysia, which include kindergarten teachers, primary school teachers, secondary school teachers, university and college lecturers and other similar teaching professionals. This product can also be used by people who are not from the teaching profession. However, the accuracy of the results may be debatable.

### OPPORTUNITIES / BENEFITS

- a) Acknowledgement of the stress with spiritual and physical exercises.
- b) Tackles irrational thinking.
- c) Stress reduction skills (communication and time management).
- d) Relaxation strategies
- e) Life structure and knowing one's identity.

### TARGETED MARKET

- a) Global market
- b) Organisations
- c) Individual
- d) Teachers

# DERMAGS SKIN SOLUTION

## DESCRIPTION

DERMAGs skin solution utilises active compound produced from mangosteen pericarp known as alpha-mangostin intended to whiten, lighten skin color and even skin tone from dulling and blotching effect that pronounced upon aging. In other words, it will help to address age-related dark spots, skin pigmentation, freckles and other skin pigmentation disorders. This product also has anti-aging function and can help to stimulate synthesis of collagen in our skin. Exclusively formulated by using nanotechnology, which attempts to provide a complete nutrient for the skin cells through better penetration and delivery of active ingredients in skin.

## FEATURES

- Lightening product is based on retinoic acid, hydroquinone, kojic acid and some from (AHA). However, as prescription products only as they are known to cause severe irritation and promote skin sensitivity to sunlight and others are leading to raw and red skin.
- (AHA) functions in a similar way, prompting exfoliation of the skin.
- Use of hydroquinone over months or years may cause exogenous ochronosis, a skin condition which manifests as bluish-black hyperpigmentation."

## APPLICATION

- DERMAGs Skincare preparation intended to whiten and lighten skin coloration, at the same time helps to reduce skin's wrinkle.
- This product has anti-aging function which intends to make lines and wrinkles less noticeable, and moisturising the skin.
- It also can increase the collagen in our skin. It gives our skin strength and elasticity, and helps replace dead skin cells.
- Increasing collagen levels can help our skin looks firmer, increases smoothness, and helps skin cells keep renewing and repairing normally.

## OPPORTUNITIES / BENEFITS

- Natural ingredients that spontaneously moisturise, brighten and treat uneven skin tone naturally while minimising the hypoallergenic effect,
- Scientific studies of alpha-mangostin proved skin can be whitening better than synthetic chemicals like arbutin, kojic acid, paraben and hydroquinone.
- DERMAGs have anti-aging function and can increase the collagen in skin cells.
- DERMAGs price for natural brightening much lesser comparable with others -competitor's product such SKII, Shiseido, Laneige, Kiehl's, Clinique, Body shop and etc.
- Made from plant based (-mangostin) and biodegradable surfactant (niosomes).

## TARGETED MARKET

- Skin care or Wellness business
- Pharmalogical
- Cosmetic agent
- SPA centre
- Final consumers (career woman), middle group, age > 25 years old



# BIRD NEST NOVEL ESSENCE



### DESCRIPTION

The technology is based on Edible Bird's Nest (EBN) extraction cleaning process of nest waste without using any toxic chemical, bleaching agents or additives used in the cleaning process. The extractor is able to recover of up to 9 percent additional pure-extract from the unclean raw bird nest.

### FEATURES

- a) Corneal cell regeneration
- b) Osteoarthritic treatment
- c) Anticancer
- d) Skin proliferation

### APPLICATION

- a) New range of product.
- b) The new behavior of consuming EBN.
- c) Pioneer of the product.

### OPPORTUNITIES / BENEFITS

- a) Innovation for market share.
- b) Fulfill the market demand.
- c) Variable products
- d) Instant consumable and don't need prior time to prepare.
- e) Health benefits
- f) Attracting youth
- g) Middle class rule
- h) Noble product in the market.

### TARGETED MARKET

- a) Health product stores
- b) EBN specialty shops
- c) Ready customer
- d) Tourism centre

**DESCRIPTION**

This product uses the catalytic chelation technology. It adopts sustainable and green technology as it uses chelating agent such as Sodium Citrate and Sodium Acetate. By that, this product potentially produces unharmed and non-toxic bivalve mollusk.

**FEATURES**

- a) Chelating agents
  - i) Eg : Sodium Citrate, Sodium Acetate
  - ii) Removing toxic and heavy metals presence in bivalve.
- b) Catalyst
  - i) Enhance the chelating process
  - ii) Chemical composition commonly available in potable water.

**APPLICATION**

- a) First innovation technique for removal of toxic and heavy metals in bivalve mollusk (Eg: green mussel, cockles, and oyster) achieving Malaysia and EU Food Standards.
- b) Utilisation of cost effective chemicals and equipment for efficient treatment at affordable cost bivalve mollusk products from Malaysian aqua farms able to penetrate global markets.

**OPPORTUNITIES / BENEFITS**

- a) Increase production of mollusk.
- b) Can export seafood worldwide.
- c) Environmental friendly (No harmful waste).
- d) Healthy seafood products.
- e) Low cost (common oxidant and catalyst).

**TARGETED MARKET**

- a) Small and medium bivalve mollusk farm industries.
- b) Aquaculture industries
- c) Technology industries

# MOLLUSCURE

(BIVALVE MOLLUSC TOXIC METALS REMOVAL SYSTEM)





# CRUDE PALM OIL REFINING SYSTEM

## CRUDE PALM OIL REFINING PILOT PLANT



### DESCRIPTION

Using membrane-based technology in refining crude palm oil would definitely give a strong impact on the quantity of effluent discharged and cost reduction, mainly attributed to its advantages of degumming and deacidifying crude palm oil simultaneously without using additional chemicals and less energy intensive.

### FEATURES

- a) As an alternative to the conventional refinery processes.
- b) Production of oil with high quality of colour, taste, odour and stability.
- c) Less energy intensive.

### APPLICATION

- a) A designed and developed a new membrane-based system for simultaneous degumming and deacidification of crude palm oil for the production of oil with high quality of colour, taste, odour and stability.
- b) The long term performance of the developed membrane must be carefully monitored to minimise the deterioration.

### OPPORTUNITIES / BENEFITS

- a) Low energy consumption.
- b) Safety with no addition of chemicals.
- c) Retention of nutrients and other desirable components in the oil elimination of wastewater treatment.
- d) Simple operation and easy change of scale.

### TARGETED MARKET

- a) Palm Oil Refinery industry
- b) Palm Oil Food industries

# MEMBRANE CONTACTOR FOR CO<sub>2</sub> GAS REMOVAL

## MEMBRANE CONTACTOR SYSTEM

### DESCRIPTION

This product was built with Porous Polyvinyliden Fluoride (PVDF) hollow fiber membrane with ultra-skin layer, high surface porosity, small pore sizes (10-50nm) and inner skinless layer flow mass transfer resistance. Besides that, it is also high wets resistance, high permeability, high CO<sub>2</sub> absorption flux and long term stable operation of CO<sub>2</sub> absorption. Functionality of this device are acting as removing CO<sub>2</sub> to meet specifications before the gas can be delivered to the pipeline, reducing CO<sub>2</sub> content in natural gas and performance as removal of contamination CO<sub>2</sub> gas.

### FEATURES

- a) Compact solution through design and development of high energy efficient membrane-based system.
- b) Improved polymer performance, membrane structure, module fabrication and process design contributed to increase the quality of the gas stream.
- c) Suitable for various applications in research and commercialisation.

### APPLICATION

- a) Most rapidly growing segments of the gas separation industry.

### OPPORTUNITIES / BENEFITS

- a) Low operating cost and capital
- b) Low energy requirement
- c) Ease of operation

### TARGETED MARKET

- a) Oil and gas industries
- b) Petrochemical industries



# MICROCLEAR



## DESCRIPTION

Group of microorganism that are capable removing colour from dye containing wastewater. Dye molecules (non-degradable) are broken down or are degraded into smaller and readily degradable molecules for safe discharge of effluent. Function under sequential facultative anaerobic and aerobic condition.

## FEATURES

- Alternative green solution to replace/ complement the conventional coloured wastewater treatment method.
- Carbon and nitrogen act as nutrients influence the efficiency in the treatment.

## APPLICATION

- The effective biological treatment process by these specialised groups of decolourising bacteria provides alternative green solution for the treatment of dye containing wastewater with improved effluent quality that complies with regulation standards.
- Large volumes of water, such as those from the textile industries can be recycled.
- The utilisation of these microorganisms is more economical as compared to chemical methods besides minimal maintenance is required.

## OPPORTUNITIES / BENEFITS

- Improve effluent quality that complies with regulatory standards.
- Minimum sludge produces.
- Minimum maintenance required.
- Recycling of water for potential reuse.
- Treat coloured wastewater.

## TARGETED MARKET

Coloured wastewater from :

- Textile industries
- Food industries
- Domestic wastewater
- Paint wastewater
- Agricultural wastewater such as palm oil mill effluent (POME) –in progress-.

**DESCRIPTION**

The first Nanoneedle that successfully performs a precise and clean cutting at single cell. The first product that possesses a high rigid Nanoneedle structure for applications on cell stiffness profiles, drugs delivery, dissection, severing, implanting of single cells, Deoxyribonucleic acid (DNA) manipulation Nanotech other applications.

**FEATURES**

- a) Much rigid and small enough to puncture a single cell cut cleanly or delivers drugs into the the cell.
- b) Multiple uses ability.
- c) Made of inorganic material able to withstand the sterilisation process.
- d) Withstand handling vibration.

**APPLICATION**

- a) Multiple uses as it is possible to sterilise the Nanoneedle after uses.
- b) Small enough that it can be seen at naked eye, below micron size.
- c) Electro-conductive materials.
- d) Produced in house laboratory with a very cost effective method.

**OPPORTUNITIES / BENEFITS**

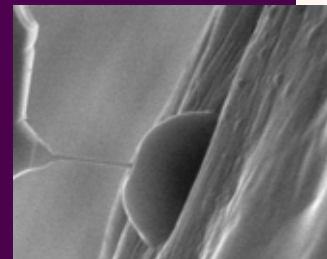
The rigidity and extremely small size give the advantage to the Nanoneedle to be used in microscopy, as it is a superior device in comparison with current (AFM cantilever), it brings forward the frontier of research as it allows to act in a single cell only.

**TARGETED MARKET**

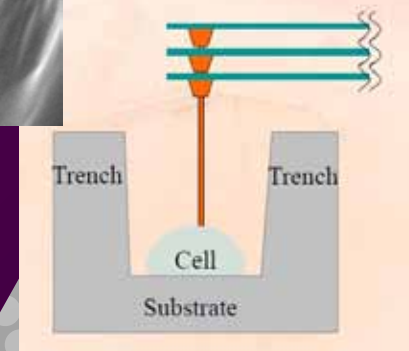
- a) Forensic
- b) Research in microbiology
- c) Tissue engineering
- d) DNA studies and other application that requires an extremely small tool to operate under Scanning Electron Microscope (SEM) conditions.

# NANONEEDLE

## NOVEL RIGID NANONEEDLE FOR SINGLE CELL SURGERY AND DRUG DELIVERY APPLICATION



**SOLUTION:**  
The rigid nanoneedle could overcome the problem.



# PINA PAPER

## PRODUCTION OF PAPER FROM PINEAPPLE LEAVES



### DESCRIPTION

A process for producing a bio-paper comprising the steps of blending a homogeneous mixture of hewed agro based fibers through conventional chemical pulping process and then compression molding the treated agro based fibers to yield the paper sheet.

### FEATURES

- a) Recyclable, sustainable and renewable.
- b) Environmentally friendly.
- c) Economic Agro-Resources (Pineapple leaf from waste resources).
- d) Decrease global warming problem (Reduces chopping down the trees).

### APPLICATION

- a) The raw material used in the development of this bio-paper is an agricultural waste which is fully biodegradable, and available abundantly at low cost.
- b) In the present invention, the polymeric composition contains a pineapple waste portion which is consumed by microorganism and subsequently left over the synthetic polymer skeleton to be further decomposed by natural element.

### OPPORTUNITIES / BENEFITS

- a) Utilisation of agriculture waste into value-added product.
- b) Better mechanical properties than other cellulose based fiber.
- c) Substitute for current wood based paper.
- d) Increase and improve the biodegradability of the polymeric composition.

### TARGETED MARKET

- a) Paper industry
- b) Box industry
- c) Craft industry
- d) Packaging
- e) Industry
- f) Agro-based Industry



# PINA PLASTIC

## FROM PINEAPPLE WASTE INTO DEGRADABLE PLASTIC COMPOSITE

### DESCRIPTION

Bio-composite comprising the steps of extruding a homogeneous mixture of a thermoplastic powder of dried agro based fibers to form pellet in the presence of a dispersing agent at a temperature in between 150°C to 200°C; coating the formed pellet with a liquid mixture containing vinyltrimethoxysilane (VTMO), dicumyl peroxide and dibutyl dilaurate; injection molding the coated pellet to produce the bio-composite.

### FEATURES

- a) Utilising waste from pineapple canning industry.
- b) Melt process able; suitable to be used in conventional plastic processing equipment.
- c) Non-toxic materials.
- d) Inexpensive renewable raw materials; pineapple waste.

### APPLICATION

- a) The raw material used in the development of this bio-paper is an agricultural waste which is fully biodegradable, and available abundantly at low cost.
- b) In the present invention, the polymeric composition contains a pineapple waste portion which is consumed by microorganism and subsequently left over the synthetic polymer skeleton to be further decomposed by natural element. Hence, the present invention increase and improve the biodegradability of the polymeric composition.

### OPPORTUNITIES / BENEFITS

- a) Low cost and very economical solution.
- b) Simple and cheap processing method.
- c) Easy technology transfer.
- d) Various Application (Fibre Loading).
- e) Environmentally friendly.

### TARGETED MARKET

- a) Craft industry
- b) Packing industry
- c) Agro-based industry



## SCIENCE

# SMART BIOSWITCH

AN ACTIVE PACKAGING  
FOR FOOD SAFETY



## DESCRIPTION

A special type of plastic films used as smart labels, secondary packaging or food coating to provide barrier and protection as well as a freshness pH colour indicator of packaged food. Better alternative to existing types of plastic packaging and wax dipping as it is based on natural source and designed to extend shelf life of packaged food while maintaining the appearance, nutritional value, quality and safety.

## FEATURES

- Active packaging to provide barrier and protection, plus extra functions. Designed to extend shelf life of foods, while maintaining the nutritional quality and safety.
- PH label to detect the degree of fermentation in food or product or detect the spoil age of food freshness of microorganisms or chemical reaction.

## APPLICATION

- Our technology imposed no dangerous chemical to be applied as dipping or coating for the fruits/vegetables.
- Wax dipping made from modified starch reduces damage or burn of the fruit skin layer and it also preserves the taste and nutrient.
- This application could be used for food effectively in the form of plastic, stretch film or liquid coating for fruits and vegetables.

## OPPORTUNITIES / BENEFITS

- Prolong shelf life of packed/coated food.
- Preserves taste and nutrients.
- Detect the degree of continuous natural fermentation in food products.
- Detect the spoilage of non-fermented food by microorganisms/chemical reaction by pH changes.
- Healthy and Safety as no harmful chemical used.

## TARGETED MARKET

- Food and beverages industry
- Cosmetic
- Pharmaceutical
- Nutraceutical

# WATER TREATMENT BY USING MEMBRANE SYSTEM

## DESCRIPTION

This device is high performance membranes for industrial water and water treatment process. It was supported with high performance of Thin Film Composite (TFC), Nanofiltration (NF), and Reverse Osmosis (RO) membranes by optimising mainly top thin selective layer. The TFC membranes also provide various separation.

## FEATURES

- a) Vary the substrate properties made of different polymeric materials and/or polymer-inorganic materials.
- b) Vary the substrate characteristics to open the opportunities of using TFC membranes for various industrial applications.

## APPLICATION

- a) Low cost in producing commercial-scale water purification system and wastewater treatment system.

## OPPORTUNITIES / BENEFITS

- a) Provide quality water from osmosis system.
- b) Wastewater treatment system at relatively low cost compared to other international companies.

## TARGETED MARKET

- a) Drinking water industries
- b) Reverse osmosis companies
- c) Refinery industries



# YES PACK



### DESCRIPTION

In terms of sustainability, Yes Pack can help to reduce the pollution of the ecosystem, but more importantly, re-induce energy from the value chain that was completely given up before. This product is good in practicing a zero energy waste attitude and the benefits of one-way products at the same time.

### FEATURES

- a) As a comparison between edible film and traditional synthetics, edible film can be consumed with the packaged products.
- b) Customised film with optimisation for improved physical and mechanical properties.
- c) Synergistic effect with incorporated natural antimicrobial ingredients, antioxidant, colours and flavours.

### APPLICATION

- a) Reduced packing and sustainable packing are becoming more frequent.
- b) The motivations can be government regulations, consumer pressure, retailer pressure, and cost control.

### OPPORTUNITIES / BENEFITS

- a) Reducing in packing.
- b) The edible active film offers a good oxygen barrier and mechanical properties.
- c) As a primary packaging.
- d) Edible films can be consumed by package products.
- e) There is no package to dispose.
- f) Contribute to the reduction of environmental and pollution.

### TARGETED MARKET

- a) Food and drink industry (Nestle, Kraft Food, Giant, Ramly Burger)
- b) Animal Feed (Nuhfra)
- c) Ready meals sector : travel-food (TESCO, Air Asia)
- d) Hospitality (KPJ Hospital)



**DESCRIPTION**

A combination of diagnostic/assay kit made in cotton fabric with the daily sanitary product, e.g sanitary napkin, to carry out, early detection of diseases from secreted body fluid, e.g. urine, in a seamless and easy way for the user by colorimetric method, similar like pH test paper.

**FEATURES**

- a) Using cotton fabrics and wax as low-cost basic materials with batik-inspired fabrication technique.
- b) The device is embedded in wearable sanitary products.

**APPLICATION**

- a) The use of microfluidic technology makes use of small amounts of reagent to carry out the assays, thus lowering the cost per assay.
- b) Bringing the "Diagnostic Lab" near to everyone for the daily routine check.
- c) The product is made from sustainable raw material and also biodegradable.

**OPPORTUNITIES / BENEFITS**

- a) Environmental friendly : Biodegradable
- b) Source material: Sustainable.
- c) Low cost of material and fabrication process.
- d) Easy to use and to interpret.
- e) In situ sampling.

**TARGETED MARKET**

- a) Sanitary product industry
- b) Health care industry

# ANALYTICAL CLOTH

## CLOTH-BASED MICROFLUIDIC ANALYTICAL DEVICE (UCAD) EMBEDDED IN SANITARY NAPKIN FOR ON-SITE URINE ANALYSIS





# NATUREL KISS

## LIP MOISTURISER



### DESCRIPTION

Naturel Kiss Lip Moisturiser is 100% natural products contain 100% plant-based ingredients and Roselle colour extract. Naturel Kiss Lip Moisturiser is made up from several plant oils as moisturisers and emollients such as castor Oil, Sweet Almond Oil, Avocado Oil, and Shea Butter. Besides, it contains botanical extracts from Roselle Calyces, which is dark-purple-red colour as a pigment and synergy with oil extraction from Roselle seeds as active ingredients to promote wound healing on lip skin.

### FEATURES

This product is free from synthetic preservative, which plant-based Vitamin E is used to prolong the shelf-life. A 100% natural, with 100% plant-based Naturel Kiss Lip Moisturiser is what the consumer needs for their lips as we eat what we applied on the lips.

### APPLICATION

Naturel Kiss Lip Moisturiser is highly rich in antioxidants and vitamins. With frequent usage, it can reduce wrinkles, fine lines on lips with anti-aging effect. It prevent lips from dryness and cracking. It also contains lemon oil to brighten lips.

### OPPORTUNITIES / BENEFITS

- a) Made from 100% plant-based and 100% natural ingredients which much better when compared with petroleum-based lip moisturisers.
- b) Contains vitamin C and e from Roselle extract.
- c) Can be used by everybody including children and pregnant woman.
- d) Contains pure Vitamin E and pure lemon oil for anti-aging and whitening.
- e) Prevent lip dryness and cracking.

### TARGETED MARKET

- a) Skin care or Wellness business
- b) Cosmetic agent
- c) Final consumers (career woman), middle group, age > 25 years old

# ICT



“

Design is a funny word. Some people think design means how it looks. But of course, if you dig deeper, it's really how it works. ”

Steve Jobs, Apple

**DESCRIPTION**

The mobile computerised workstation or cart or trolley also called a Computer on Wheel (COW) or workstation gaining access to critical systems and information for clinicians in most of the hospitals worldwide.

**FEATURES**

- a) Lithium Ion Polymer (LiPo) rechargeable battery which can operate for 8 hours at a stretch. Equipped with a battery indicator.
- b) Wi-Fi connectivity with a central database server.
- c) Short charging time.
- d) Unlimited users with 125 kHz Radio-Frequency Identification (RFID) secure access.
- e) Supports Electronic Medical Records (EMR), Hospital information System (HIS) or Patient Information System (PIS)
- f) Compatible with different Operating Systems (OS).

**APPLICATION**

- a) The product prototype has been tested and still in use in some of the University's local Malaysian clinics.

**OPPORTUNITIES / BENEFITS**

- a) They can be rolled into any patient room and used at the point of care.
- b) Height adjustability option allows for optimised ergonomics.
- c) One clinical workstation can be used to carry out tasks through several rooms.

**TARGETED MARKET**

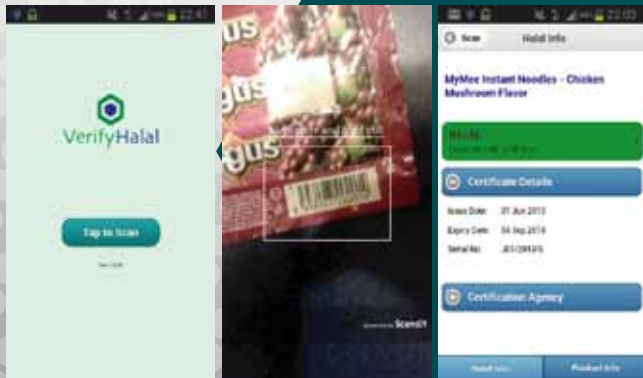
- a) Public hospitals
- b) Private hospitals
- c) Medical Centre
- d) Retirement housing / Old folks home

# COMPUTER ON WHEEL

## COMPUTERISED MOBILE WORKSTATION



# VERIFY HALAL



## DESCRIPTION

Muslim consumers are faced with the dilemma on the halal status of products and services. Because of that, Muslim consumers are advised to check on the Halal status of any products before purchasing the items. Checking on the Halal status should be a habit. This is to prevent any doubts which could arise after that. For solving this issue, this app will help the Muslim consumer to checking the Halal status of any products before purchasing the items. This app can be accessed via consumer smartphones and user friendly.

## FEATURES

Verify Halal provides real time information on the halal status based on halal certificate information provided by the halal certification agency like JAKIM. Based on the information provided by Verify Halal, the consumers can make more informed consumption decision and are able to consume with confidence.

## APPLICATION

A smartphone application where muslim consumers scan barcode on product packaging or at food outlet. The app will written the halal status of the food product or the food outlet.

## OPPORTUNITIES / BENEFITS

The Verify Halal app not only provides real-time information on the halal status of products and services, but it can also serve as Customer Relationship Management platforms for companies to reach out to Muslim consumers.

## TARGETED MARKET

- Halal Certification Agency
- Food producers, restaurants and slaughter house
- Muslim consumers



## DESCRIPTION

Academic certificates are highly sought paper qualification. Thus, it is often forged. Employers are always in a dilemma to determine if a potential employee has valid qualification when presented with academic certificates. Currently, there is no easy and quick method to determine the authenticity of academic certificates. Imbas Arqis provides an end-to-end to solution to this dilemma.

## FEATURES

Imbas Arqis provides a novel solution using QR code – called Counter-Fake Technology which enables the recipients to verify the authenticity and validity of the documents.

## APPLICATION

Imbas Arqis is a suite of applications :-

- (1) Software to produce encrypted, verifiable academic certificates.
- (2) Software to enable real-time verification of these academic certificates.

## OPPORTUNITIES / BENEFITS

The application benefits academic institutions by protecting their brand and images. For the consumers, e.g. employers, they have the ability to verify the authenticity of the academic certificates on real-time with confidence.

## TARGETED MARKET

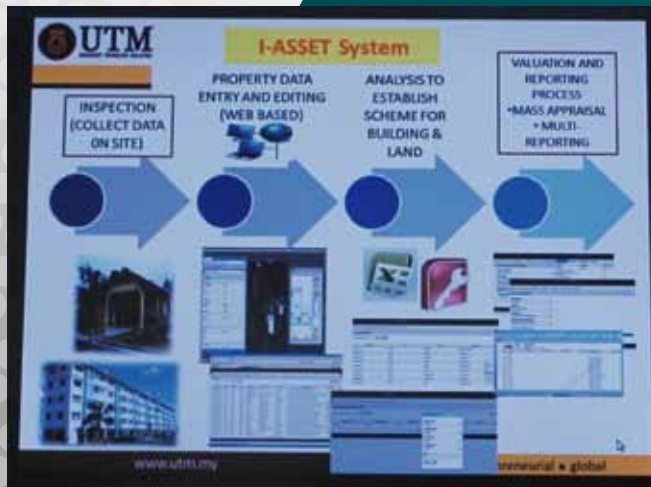
- a) Academic institutions
- b) Employers

# IMBAS ARQIS



# IASSET

## PROPERTY APPRAISAL FOR TAX PURPOSES USING MASS APPRAISAL SYSTEM (IASSET)



### DESCRIPTION

Enable appraisal and valuation of property to be conducted on a mass basis within a limited time.

### FEATURES

- a) Ability to appraised property on a mass basis and one property at a time.
- b) Display information on each property, building plan, location map Geographic Information System (GIS) and picture.
- c) Ability to value 100,000 properties and report in approximate 20 minutes.

### APPLICATION

- a) No expansion in manpower
- b) Cost effective
- c) More transparent
- d) Literacy of Information Technology (IT) varies
- e) Efficient use of technology

### OPPORTUNITIES / BENEFITS

- a) Valuation and Property Management Department for local authorities in Malaysia and Indonesia.
- b) Valuation and Property Services Department, Ministry of Finance Malaysia.

### TARGETED MARKET

- a) Financial Institution
- b) Property Institution

## DESCRIPTION

The AMIR CPU soft processor is an advanced 32-bit CPU core designed for the an Operating System (OS) of the 21st century conceived in parallel with the modern OS requirement for Portable Operating System Interface (POSIX) compliance exemplified by the stability of the Linux kernel 2.6 yet maintains the elegance and simplicity of a clean design which is easy to learn. The CPU has unmatched architectural advantage by incorporating the best and proven CPU designs while leaving out the acknowledged mistakes from more than 30 years of CPU implementation. Moreover, the CPU can be placed just about anywhere in an electronic product from the simple microcontroller application to high-end multiprocessing in System on Chip (SOC) designs. In addition, the 32-bit CPU can run on 8-bit or 16-bit systems with essentially the same codes for a truly versatile creation.

## FEATURES

- a) Processor architecture that maps into POSIX software standard and broadband Applications.
- b) Processor architecture that is clean from acknowledged mistakes of more than 30 years CPU implementations, such as inadequate OS modeling, segmentations etc.

## APPLICATION

- a) Internet of Things (IoT)
- b) Wearable Devices
- c) PCs
- d) Mobile Devices
- e) Instrumentation Systems
- f) Automations
- g) Broadband Communications"

## OPPORTUNITIES / BENEFITS

- a) Outperforms present world leaders in CPU market namely Intel and ARM in terms of CPU architecture.

## TARGETED MARKET

- a) Consumers and Industries.
- b) IoT and Wearable Devices markets alone is worth more than USD 6 Trillion.

# AMIR CPU

## NEW 32-BIT CPU



# PBWA

## PORTABLE BROADBAND WIRELESS ACCESS SYSTEM



### DESCRIPTION

The Portable Wireless Broadband Access (PWBA) system is an integration of wireless system and modem router that could function as the core system to provide or create a Wireless Local Area Network (WLAN). The PWBA system is equipped with wireless modem which allows it to connect to an Internet Service Provider (ISP), along with self-developed management software to allow it to function as a managed router. In current form, the PWBA is capable of connecting to cellular data networks using 3G technology or High Speed Packet Access (HSPA+). It then acts as a WiFi Access Point (AP) or wireless hotspot, using the unlicensed Industrial, Scientific, and Medical (ISM) 2.4 GHz Radio Band and can be used for either indoor or outdoor applications.

### FEATURES

- a) Polarisation
- b) Bandwidth enhancement technique
- c) Using a monopole antenna
- d) Can also be powered using solar power due to low power requirements

### APPLICATION

The main targets of this product is public transportation industry, mainly buses and trains or in locations where mobile broadband access via WiFi is required. The intention of this product is the need of internet connection during travel for the consumers and can act as a premium service provided by the buses to the travelers to attract more crowds.

### OPPORTUNITIES / BENEFITS

- a) Can operate on battery power.
- b) Can be used for indoor and outdoor application.
- c) Operation modes using hotspot and an access point.
- d) The product is a hotspot.
- e) Low power consumption

### TARGETED MARKET

- a) Telecommunication operators
- b) Broadband service providers
- c) Public transportation
- d) Traveler
- e) Ceremony and Exhibition hall

## DESCRIPTION

The SMS parking payment system is an integrated with enforcement interface facility for easy monitoring and data service. Without initial registration, parking fee is directly charged to mobile phone credits. It is location independent and can be integrated with the existing parking payment system. Customer just need to park and Short Message Service (SMS) their parking details. Later, an SMS would be sent before expiry time as a reminder.

## FEATURES

- a) A parking payment system via SMS which is equipped with open parking monitoring and data management services.
- b) This innovative system is also integratively supported which allows all components integrated in SMS Parkir to interact automatically in real time.

## APPLICATION

- a) The system facilitates the process of parking payment with both payment and parking can be made via continuation SMS without using coupons.
- b) Without the need for pre-registration, parking fees are charged directly to the mobile phone credit.
- c) Location is free and can be integrated with existing parking payment systems.

## OPPORTUNITIES / BENEFITS

The operators would significantly reduce their operating costs as the system requires less manpower, low maintenance and no middlemen and at the same time increase their collection efficiency as payment is charged directly to customers mobile credits.

## TARGETED MARKET

- a) Urban city centres
- b) Central business districts
- c) Areas of dense development
- d) Shopping centres
- e) Hospitals

# SMS PARKIR





# TAJMA™ PERSONALITY PLUS (TPE+)



## DESCRIPTION

The newest web-based psychological expert system specially designed for schools, colleges & universities, and organisations in Malaysia. The system consists of two standardised psychological tools: i) TAJMA™ Personality Plus (TPE+), and ii) TAJMA™ Career Interest Plus (TCIP+). TPE+ measures 12 personality traits (Assertiveness, Analytical, Self-Confidence, Extraversion, Leadership, Caring, Achievement, Cross-Cultural, Resiliency, Integrity, Patriotism, and Distortion). TCIP+ measures an individual's career interest based on John Holland's Career Theory. The six types of career traits are: (Realistic, Investigative, Artistic, Social, Enterprising & Conventional) also known as R.I.A.S.E.C. Has been copyrighted since 2003.

## FEATURES

- The tools are specially designed based on the Malaysian psychology.
- Reliable, accurate, and statistically validated.
- Accessible anytime and anywhere.
- User friendly and navigation driven.
- Individual ID and security code to login.
- Individual and group database display.
- Randomised Items.
- Can be customised to suit the clientele's need.
- Available in three versions (School, College & University, and Organisation).
- Computer-based scoring and real-time interpretation.

## APPLICATION

- Latest ICT technology applied fully in the software development.
- TPE+ and TCIP+ tools take about 10 to 15 minutes only to complete.
- TP+ website is compatible for browsing on smartphone, iPad, and tablet.

## OPPORTUNITIES / BENEFITS

- Important psychological tools to students, teachers, counsellors, HR practitioners, administrators, and parents.
- Provides quick, valid, and valuable feedback to students, teachers, counsellors, HR practitioners, administrators, and parents.
- Important psychological tools for student-staff recruitment, selection, placement, training, academic advising, counselling, coaching, and personal development programs.

## TARGETED MARKET

- Schools
- Colleges & Universities
- Government Agencies
- Private Sectors
- Counselling & Career Centres
- Recruitment Agencies
- HR Practitioners
- Training Consultants
- Parents
- Individuals for believe in self-improvements

## DESCRIPTION

The Syariah-Compliant Automated Chicken Processing System (SYCUT) is designed specifically to ensure adherence to the halal requirement of chicken in a slaughterhouse to give Muslim consumers a peace of mind in their poultry purchase

## FEATURES

- a) The system is a user-friendly, web based network, control and monitoring system which ensures the halal compliance of the slaughtered chicken.
- b) The visual detection system (cameras) is simple enough to be installed in various parts of a slaughterhouse as it is light, small in size and uses standard electrical and network appliances.

## APPLICATION

- a) The SYCUT system can be used by small and large producers alike as the model is scalable according to size.
- b) The system is easy to install and requires minimal renovation to a slaughterhouse because it can be customised to each location.
- c) It can be installed in any slaughterhouse with electricity and internet access.

## OPPORTUNITIES / BENEFITS

- a) Ensuring syariah compliant slaughtering process.
- b) Preventing human error in the determination of the halal slaughtering process.
- c) A compact design and cost effective system.
- d) Providing a more consistent quality, premium and authentic halal product.

## TARGETED MARKET

- a) Government and private slaughterhouses
- b) Muslim consumers
- c) Halal product manufacturers

# SYCUT

## SYARIAH-COMPLIANT AUTOMATED CHICKEN INSPECTION SYSTEM (HALAL)



# HAJSIM

## DESIGN AND DEVELOPMENT OF AN IMMERSIVE HAJJ SIMULATOR



### DESCRIPTION

HajSim developed skills in performing rituals which somehow build their confidence and readiness to perform rituals. HajSim allows pilgrims to visualise new environments virtually within 3D context. Therefore, the simulator would indirectly improve the pilgrims' fitness level.

### FEATURES

- a) 3D simulator Hajj ritual activities.
- b) User-friendly interface, simple and easy operational system.
- c) Collaboration system- fitness assessment.
- d) Evaluation of energy consumption and nutritional guidance.
- e) Skill development and drill for practicing the Hajj and Umrah ritual activities.

### APPLICATION

- a) Individual health-related physical fitness monitoring.
- b) Evaluation of energy expenditure and nutritional guidance.
- c) Training program for Hajj and Umrah ritual activities.

### OPPORTUNITIES / BENEFITS

- a) Can provide information based on individual fitness level among the pilgrims before they embarked on their Hajj journey.
- b) Facilities immersive environment of Hajj ritual using 3D Virtual Reality.

### TARGETED MARKET

- a) Lembaga Tabung Haji Malaysia
- b) Travel Agencies for Hajj and Umrah
- c) Medical and Health Care's Services
- d) Department of Islamic Development Malaysia (JAKIM)

## DESCRIPTION

APPLAM is used to check regularly the efficiency of the metal oxide surge arrester in service that are installed on the high voltage transmission and distribution networks. It allows to carry out the condition monitoring while the surge arrester is in service, analysing by means of a special current clip-on transformer the leakage current in the surge arrester ground connection. The resistive component of this leakage current may increase due to different stresses causing ageing and finally causing arrester failures.

## FEATURES

- a) Customised programming using high speed microcontroller.
- b) Added information on the leakage current-waveforms and digital display.
- c) Enhanced reliability with detailed analysis.
- d) Programmable for artificial intelligence and correlation with other methods.
- e) Enhanced reliability with detailed analysis.

## APPLICATION

- a) Smart features (programmability, flexibility).
- b) Embedded intelligence (database, trending).
- c) Flexible /Programmable device.
- d) Portability/Controllable.
- e) Database trending.
- f) Upgradable (for remote condition monitoring, multiple sensor input).

## OPPORTUNITIES / BENEFITS

- a) Cost effective (competitive price).
- b) Reduced man-hour.
- c) Reliable, fast and user friendly.
- d) Rich experience/ professional advice.
- e) Added information on leakage current-waveform and analysis
- f) Enhanced reliability with detailed analysis.
- g) Light and compact.
- h) Upgradable to include database and trending analysis

## TARGETED MARKET

- a) Power transmission in Malaysia (TNB)
- b) Independent power generation in Malaysia
- c) Asian Region Power Generation Institution

# AppLAM

## SURGE ARRESTER



“

TECHNOLOGY like art is a  
Soaring Exercise of the Human  
IMAGINATION ”

Daniel, Bell



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**UTM**  
UNIVERSITI TEKNOLOGI MALAYSIA

Innovation and  
Commercialisation  
Centre

innovative . entrepreneurial . global

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