



DEPARTMENT OF SCIENCE AND TECHNOLOGY  
PHILIPPINE COUNCIL  
FOR INDUSTRY, ENERGY  
AND EMERGING TECHNOLOGY  
RESEARCH AND DEVELOPMENT  
(DOST-PCIEERD)



# DOST-PCIEERD x BOI

## Compendium of Technologies



## Message from the BOI Executive Director for Industry Development Services



The BOI is proud to partner with DOST-PCIEERD in doing this Compendium. This collaboration is a testament to our shared advocacy in pursuit of INCLUSIVE INNOVATION that serves the needs of the people and ultimately, propels the economy towards sustained industrialization.

To our industry partners, we enjoin you to look through the pages of this Compendium and you might just find the technology you need for your businesses. Likewise, we encourage you to reach out to us for your research and development needs and together, let us drive innovation for a more prosperous Philippines. **"Make It Happen in the Philippines"**.



**MS. MA. CORAZON HALILI-DICHOSA**  
BOI Executive Director for Industry Development Services

**T**he BOI congratulates DOST-PCIEERD and our Filipino researchers and innovators for the different technologies featured in this Compendium. The selected technologies have been carefully studied and are ready for adoption and commercialization.

## Message from the PCIEERD Executive Director



**T**his compendium provides a brief summary of projects that was supported by the DOST-PCIEERD GIA Programs. The summary includes the problem addressed by each project, the proposed solution, description, target market, technology applications and potential uses, competitive advantage, current status, intellectual property assets, and interesting photos of the concerned technologies.

Throughout the years, DOST PCIEERD and the Board of Investments have worked together in promoting science and technology in the country, it is now at the threshold of another milestone. It is through our concerted efforts, and unrelenting coordination these science endeavors now stakeholders reach industry and industry. Through this compendium, we renew our partnership in bringing more responsive and competitive scientific and technological innovations and improving the quality of life of all Filipinos.

By continuing to spur innovation and drive technological transformation in the Philippines, DOST-PCIEERD will keep its commitment to support and champion solutions for the industry. These research and development initiatives, will not only enhance human resources in the S&T, but also produce more appropriate policies, strategies, and directions for the maximum benefit of all Filipinos. Reaching its tenth year, we continue to forge more partnerships for a more efficient and effective means of translating the outputs of Our supported projects and initiatives, as well as the fulfillment of its mandate.

This collection of technologies is valuable resource and reference for especially among investors and those prospecting new businesses because it will help them navigate the different Filipino-made innovations and breakthroughs. It will hopefully serve as a guide in make smarter and sound decisions to enhance our country's competitiveness.

Thank you *and mabuhay tayong lahat!*

  
**DR. ENRICO C. PARINGIT**  
PCIEERD Executive Director

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# HormoGroe™: Nanoformulated Plant Growth Regulators

## THE PROBLEM

The use of chemicals and the inefficient absorption of agricultural inputs such as fertilizers and nutrients by plants.

## THE SOLUTION

A controlled-release nanoformulation of the plant hormones (auxins, cytokinins, and gibberellins) derived from naturally occurring plant growth-promoting bacteria. growth regulators which enhance seed germination and increase the survival of seedlings and stem cuttings. Unlike other plant stimulants or growth regulators, HormoGroe™ is non-synthetic and nanoformulated for controlled release to increase uptake in plants.

## THE MARKET

Ornamentals, vegetables, banana, cacao, coffee, cassava, sugarcane plantations/farms/industries

## THE COMPETITIVE ADVANTAGE

| Product       | HormoGroe™   | Commercially Available PGR 1   | Commercially Available PGR 2  | Commercially Available PGR 3  |
|---------------|--|--|---|---|
| Systemic      | Yes  | No   | No  | No  |
| Non-Synthetic | Nanoformulated plant growth regulators derived from naturally occurring plant growth promoting bacteria. | Regulated plant growth regulator that depends on the action of chemicals to produce the same result as HormoGroe™. | Regulated plant growth regulator derived from & kidney disease & diabetes for systemic treatment. | Regulated plant growth regulator derived from the same mechanism with HormoGroe™. However, HormoGroe™ is nanoformulated, which makes it is in a controlled release, making the technology superior over PGRs. |

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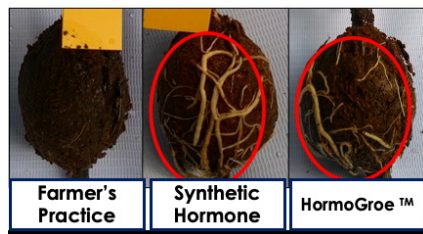
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## THE DEVELOPMENT STATUS

The technology has already completed the laboratory testing and the field testing. The prototype has been characterized for its properties and has been field tested using several crops, including coffee, cassava, sweet pepper, banana, and some ornamental plants, including hybrid gumamela and bougainvillea.

## WHAT WE NEED

We are seeking for investors and partners in distributing the product and for efficacy tests in various plants/crops.



# Fish-i Inc.

## THE PROBLEM

Underwater visual census (UVC) methods are conducted by divers to collect and document information on fish species and fish population densities to assess the health of the marine environment. UVC methods have demonstrated challenges such as requiring substantial time, training and specialization in fish identification, as well as minimizing observer bias due to fish behavioral avoidance in the presence of the diver conducting the survey.

## THE SOLUTION

Fish-i is a semi-automated stereo vision-based underwater visual census system that can be used by divers with minimal knowledge of fishes.

## THE MARKET

The target market of Fish-i include the academe, Department of Environment and Natural Resources (DENR), Local Government Units (LGUs), Private Organizations (POs) and Non-governmental Organizations (NGOs) who are tasked to monitor, evaluate and manage Marine Protected Areas (1,800 MPAs)

## THE SOLUTION FEATURES

The Fish-i system provides highly accurate fish species distribution, population density, and biomass estimates, as well as a permanent visual record for site monitoring and assessment purposes. The system measures the following key parameters: fish species count and distribution, population density, and biomass. Fish-i circumvents the data collection bottleneck by crowdsourcing data collection to any licensed diver.

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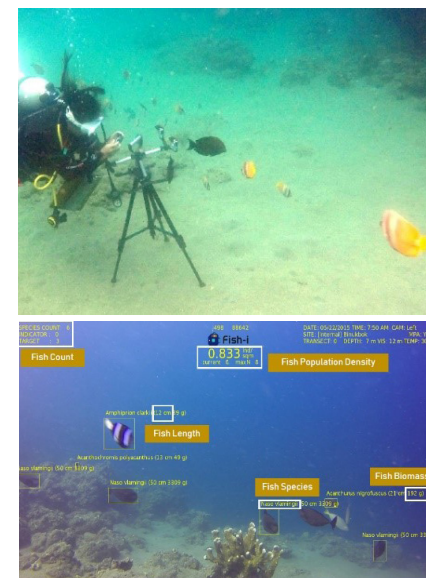
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## CURRENT STATUS

Fish-i has been tested in over 50 sites within the Philippines. Currently, the system can identify 517 species from 62 fish families, out of which more than 295 species can be identified with high confidence (97% accuracy). Species recognition by the DeepNet Video Analyzer is constantly being improved for other species as more data is collected and identified.

## WHAT WE NEED

We need partners who can help us commercialize this technology more strategically, as well as connect us to potential customers of our product



## Gitara ni Juan

### THE PROBLEM

In the guitar-making industry, it is saddening that our local entry-level classical guitar brands can hardly compete with imported brands in terms of price over sound quality, playability, and manufacturing consistency. As a result, most Filipino players turn to purchasing imported entry-level classical guitars.

### THE SOLUTION

Development of an entry-level classical guitar design specifically catered to our local backyard luthiers which uses local and sustainable wood including the standardized procedure for construction of guitar, along with the proper wood preparation and treatment.

### TARGET MARKET

The rising number of concerts and live performances is a major driver for the growth of the global guitar market. The growing interest in music among the youth population has led to the formation of numerous musical bands that perform various types of music. Global Industry for acoustic and electric guitar manufacturing posted an annual growth rate of 1.4% from 2012-2017 and is expected to continue until 2022. Worldwide market of guitars is expected to grow at a CAGR of 3.5% over the next 2 years.

### UNIQUE SELLING PROPOSITION

|                       | Gitara Ni Juan | Manuel Rodriguez C11 | Merida T25        | Jose Ramirez entry-level Classical Guitar |
|-----------------------|----------------|----------------------|-------------------|---|
| Material              | All solid      | All solid            | All solid         | All solid                                 |
| Affordability         | P 15,000       | P 25,000             | P 60,000 - 70,000 | P 150,000                                 |
| Sound and Playability | Good sounding  | Good sounding        | Good sounding     | Slightly bigger, more bass                |

### CURRENT STATUS

There are thirteen prototypes (1 control and 12 local) made from select local woods. A compendium for guitar making is also prepared.

### WHAT WE NEED

We need partners for the transfer of innovation to the local guitar-making industry, specifically in establishing the luthiers' guild to set up the stage for a scalable and sustainably guitar-making industry.



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## TITAN

### THE PROBLEM

There is an abundance of camera surveillance networks, but most video feeds are still left unprocessed due to a lack of computing capacity and manpower, hence, the need for creative solutions that leverage existing IT infrastructure and equipment.

### THE SOLUTION

A software system that can process videos of various traffic road scenes under different weather conditions. A system that can track vehicles according to type and pedestrians; can generate useful traffic data such as traffic volume and density, speeds of movement, and identify concentrations of vehicular and human activity over long periods of time.

### THE MARKET

Institutions engaged in Traffic Management (e.g. MMDA, SBMA, and LGUs), business establishments that monitor vehicular and foot traffic for business operations and strategic planning (e.g. ad agencies, mall operators, real estate developers, oil and gas stations, restaurants, and fast food chains)

### FEATURES

- Scalable
- Can perform in real-time
- Easy to setup
- Compatible with existing infrastructure (i.e. camera networks)
- Customizable reports
- Does not require expensive hardware

### CURRENT STATUS

The Technology is already hosted in the Cloud, and can accommodate any number of traffic surveillance cameras. Performance is at par with state-of-the-art vision-based monitoring technology, and performs even better in the context of outdoor road surveillance operations.

### WHAT WE NEED

Business development partners and mentors, companies/institutions for product pilot-testing and technology validation



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## Monascus Red™ Natural Colorant

### THE PROBLEM

Existing colorants in the market are mostly synthetic which lead to various safety concerns such as cancer, allergic reactions, and worsening of hyperactivity in children. Many of these colorants are not safe for human consumption, thus alternative sources are being studied and explored. Red being the most widely used color for food-related applications. However, there is no existing local company that produces these alternative natural colors.

### THE SOLUTION

Monascus Red™, a natural bio-based colorant that is safe for use and has additional functional properties. It contains Monacolin K, a cholesterol-lowering compound, as well as higher antioxidant content than commercially available Vitamin E.

### THE MARKET

Monascus Red™ is an alternative colorant suitable for branded consumer goods (snacks, candies, chocolates, beverages, coffee, biscuits, noodles, cosmetics), as well as agro-industrial commodities such as flour, meat products, eggs, and animal feed.

### SOLUTION FEATURES

The colorant is produced using a patent-pending process using locally-available materials and is more sustainable compared to other natural colorants available in the market. It comes in powder form, with a fruity, fermented scent, and is soluble both in water and in alcohol. Monascus Red™ is a non-toxic, non-mutagenic, safe-to-use alternative colorant with up to two (2) years shelf life.

### CURRENT STATUS

We currently have two (2) filed production patents, one (1) approved trademark with Freedom-to-Operate, technical and material safety data sheets, as well as USFDA-based toxicity test results. Market validation studies are being done for further refinement and user-acceptability of the product.

### WHAT WE NEED

We are currently looking for companies who are interested to license and commercialize Monascus Red™.



### Technology Generator's Contact Details

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## Versatile Instrumentation System for Science Education & Research

### THE PROBLEM

Out of approximately 13,000 high schools across the Philippines, more than 4,500 have no access to a designated (and working) laboratory for their students. On the other hand, from the fraction which have working laboratories, around 2,800 have no access to newer, digital tools. Science can be taught using books, but learning is more effective when practical applications are shown. However, specific equipment that are needed for experiments have to be acquired individually and are oftentimes expensive due to high costs of purchasing and importing advanced tools and educational aids.

### THE SOLUTION

VISSER, or the Versatile Instrumentation System for Science Education and Research, is a research-grade laboratory system developed by researchers from the University of the Philippines. It is a handheld device that serves as a hub for various sensors that can be used to perform experiments in various fields of science.

VISSER was designed in order to put modern science laboratories in every school and college across the country and contribute to the enhancement of Philippine science education and research.

### THE MARKET

VISSER was designed for use by high school students in the STEM track.

### SOLUTION FEATURES

The VISSER basic set contains sensors and modules designed for experiments following the K-12 STEM curriculum. It has over 60 experiment modules in the following disciplines: biology, chemistry, physics, engineering, and environmental science. VISSER is more affordable as compared with other imported science laboratory systems available in the current market.

### CURRENT STATUS

All our manuals and modules are copyrighted. Several units have been deployed to different science high schools nationwide, specifically in Zamboanga, Leyte, and Mindoro.

### WHAT WE NEED

We are currently looking for companies who are interested to license the technology for manufacturing and subsequent distribution of VISSER.



### Technology Generator's Contact Details

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COSMETICS

COCONUT WINE

FUNCTIONAL DOG TREATS

## Contactless Apprehension of Traffic Violators on a 24-Hour Basis and All-Vehicle Detection System

### THE PROBLEM

The Mobility of people, goods, and services in cities and provinces is one of the biggest problem we face today. According to the study conducted by Japan International Cooperation Agency (JICA), the transportation problem in the Philippines cause daily economic loss of 3.5 billion pesos, and it may increase up to 6 billion pesos by 2030. The ability of transport systems to respond to mobility needs of citizens and goods is hampered by a continuous increase in traffic demand because of higher levels of motorization, urbanization, population growth and changes in population density. There is a growing demand for modern tools to cope with the increased challenges in urban planning and traffic and transport management in metropolitan cities. In addition, with the outbreak of COVID 19 Pandemic, big demand of crowd mobility monitoring to avoid health risk need to be addressed.

### THE SOLUTION

CATCH-ALL visual intelligence software is an artificial intelligence-based CCTV monitoring system that can automatically count, classify, and identify vehicles and people. It offers customized solutions based on customer needs. Its main applications include traffic monitoring and congestion analysis, traffic violations detection, license plate recognition (Philippine license plates), and pedestrian foot traffic counts, and crowd analytics. The solutions are offered in on-premise, on cloud service deployments, and portable traffic counters using edge device technology.

### THE MARKET

The video analytics market provides new opportunities for automated monitoring applications and smart city technologies. The market by application includes traffic monitoring and management, license plate recognition, as well as crowd analytics and management. The market by end user includes city and specific area surveillance, government, law enforcement, traffic management, transportation, retail stores & malls, and public safety.

### PRODUCTS AND SOLUTIONS

#### *Traffic Violations Detection using License Plate Recognition Technology*

- Continuous monitoring and apprehension is enhanced with AI automation.
- Streamlined workflow using the operator validation interface.

#### *Road Traffic Analytics using Vehicle Classification and Passenger Counting Technology*

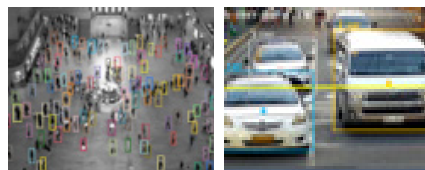
- Auto-generation of reports for congestion monitoring.
- Analytics and visualization of traffic data over various time scales.

#### *Crowd Analytics using People Counting and Risk Profiling Technology*

- Auto-generation of reports for congestion - COVID 19 monitoring.
- Analytics and visualization of social distancing, face mask and face shield utilization.

### WHAT WE NEED

We need business partners to help us on strategic marketing of this technology, as well as connecting us to potential customers. Both from Government and Private Sectors.



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## Lactic Acid Technology

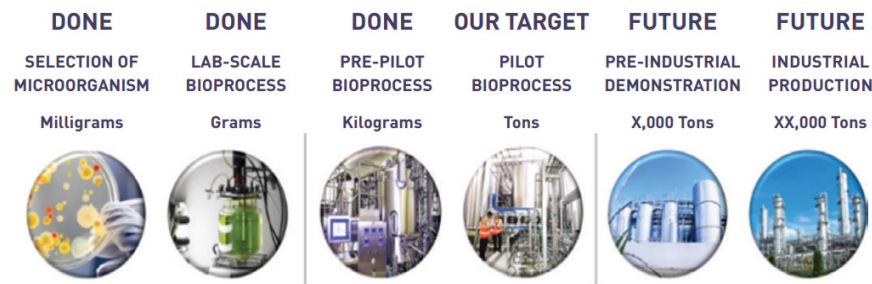
### THE PROBLEM

Because of single-use plastic pollution in the environment, especially in the oceans, alternative packaging materials are being explored and promoted to consumers. The bioplastics industry utilizes various materials to switch to biodegradable packaging, which include Polylactic Acid (PLA), a biodegradable polymer of Lactic Acid. In the Philippines, there is no local manufacturer of lactic acid and PLA. All lactic acid and PLA needs of the country are imported from other countries.

### THE SOLUTION

The UP Mindanao lactic acid technology is a technology that can directly utilize starch materials and other industry by-products to produce L-Lactic Acid using a strain of microorganism discovered in the Philippines. It is capable of directly converting starch into L-Lactic Acid in 24 hours at room temperature. Using a one-stage fermentation technology, it can lower the cost of producing lactic acid by eliminating the costly pretreatment and enzymatic hydrolysis. The technology will eventually lower the cost of producing other lactic acid derivatives such as Polylactic Acid (PLA) for biodegradable plastic packaging materials.

### CURRENT STATUS



### THE MARKET

The lactic acid has a wide range of applications in many industries such as in the food and beverage industry, pharmaceutical, chemical, and cosmetics industries, and in the bioplastics industry as a main material in the manufacture of biopolymer polylactic acid (PLA). The PLA also has a wide range of applications such as in the manufacture of computer and mobile phone casings, biodegradable medical implants, and biodegradable packaging materials. It is also used in 3D printing and a lot more.

### WHAT WE NEED

Funding grant for the pilot-scale bioprocess

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# Manage Your Assets, Properties and Map it for Visualization

## THE PROBLEM

Local Government Units (LGUs) are mandated to collect real property taxes. However, due to outdated market value references and classifications, the government foregone a substantial amount of revenue at approximately 30 billion pesos a year. The lost opportunity is directly associated with tax mapping activities where there is no sufficient technical manpower to do tax mapping and most of the LGUs have no GIS and computer-aided valuation system. Moreover, almost all LGUs in the country practice onsite tax collections where paying taxes is a bit cumbersome in the LGU premises.

## THE SOLUTION

MapX is a computer-aided valuation and collection system. It is a web GIS platform for tax mapping, assessment, valuation and collection. It provides LGUs with interactive web interfaces for real property classification, sectioning, zoning, and other activities using their existing manpower and computing resources. Real property owners are also provided with mobile application for property listing, tax dues, payment notification and collections.

## FEATURES

### Web Portal for real property owners:

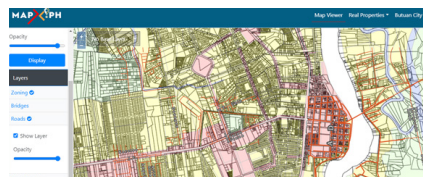
- Notifications
- Schedule of Payments
- Property Listing and Payments
- OnApp Payment
- Property Tagging

### WEB PORTAL FOR LGUS:

- Web GIS Mapping
- Computer-Aided Valuation
- Tax Mapping and Verification
- Notification and Collection
- Performance Dashboard
- API for Legacy System

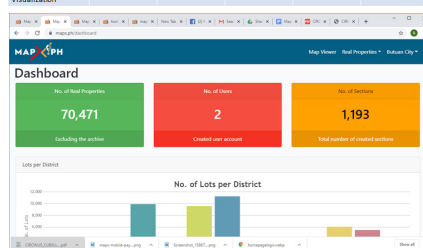
## TARGET MARKET

There are 81 provinces, 145 cities and 1,489 municipalities in the country, all mandated to collect real property taxes as a source of revenue. There are approximately 25 million land titles in the country excluding non-tenured rights in a form of tax declarations and 24.22 million housing units. Roughly around 50 million real property units are required to pay taxes to the government.



## COMPETITIVE COMPARISON

| CRITERIA   | MAPX | Geo Surveys and Mapping Inc. (GSM) | SmartGeo | Thinking Machines GeoManor | Map Plus (US-based) |
|--|------|------------------------------------|----------|----------------------------|---------------------|
| Real Property Information System                 | ✓    |                                    |          |                            | ✓                   |
| GIS  | ✓    | ✓                                  | ✓        | ✓                          | ✓                   |
| Geospatial Analytics                             | ✓    |                                    |          |                            |                     |
| Interactive Online Tax Mapping and Visualization | ✓    |                                    |          |                            |                     |



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# Universal Structural Health Evaluation and Recording System

## THE PROBLEM

With our country located along the typhoon belt and Pacific Ring of Fire, disaster preparedness and infrastructure resilience are of high importance. Currently, only visual inspection is the most common practice in monitoring the structural integrity of bridges, buildings and other structures. However, visual inspections have proven to be insufficient in determining the actual health condition of structures.

## THE SOLUTION

The patent-pending technology, the USHER System, can be installed in buildings, bridges, dams and other critical structures, allowing property managers to monitor the structural integrity of the building, and ensure economical and hassle-free compliance with Philippine structural code and government regulations. Unlike existing products, USHER has streamlined and tailored the system to the local market, making it remarkably lower in cost while still offering the most advanced solution to ensure business continuity and public safety.

## THE MARKET

In 2015, the DPWH issued NBCDO Memorandum Circular No. 1, requiring government and private buildings, to install Earthquake Recording Instruments (ERI) as part of the Implementing Rules and Regulation of the revised National Building Code. The installation of ERIs shall apply to all structures located in Seismic Zone 4 (the entire Philippines, except Tawi-Tawi and Palawan) of around 85,000+ in number.

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## FEATURES

| USHER Sensor Device  | USHER Portal & Mobile Application  | End to End Service and Technical Support  |
|--|--|---|
| <ul style="list-style-type: none"> <li>Locally made and cost-effective structural health and earthquake recording instrument</li> <li>Easy to install</li> <li>Cost-effective</li> <li>Low maintenance</li> <li>Locally manufactured</li> <li>Parts are readily available</li> <li>Design specification based and more than DPWH guidelines</li> <li>Seismic Qualified and Certified under International Building Code (IBC)</li> <li>FDAS, FA and other Building System Integration Ready</li> <li>Light warning system for easy interpretation and response</li> </ul> | <ul style="list-style-type: none"> <li>Allows remote monitoring of your building's structural health</li> <li>Provides a decision support tool for building owners, structural engineers, LGU building officials, and the DPWH</li> <li>Web-based Command Center Monitoring application</li> <li>Structural Health Index Module for automatic data interpretation based on set thresholds before, during and after an earthquake</li> <li>Wireless data retrieval, storage, archiving</li> <li>24/7 data analytics module</li> <li>Alarm system (e.g. SMS, email)</li> <li>Public Announcement (PA) system ready</li> <li>Mesh Network early warning and alert technology enabled (IP wave and 5 wave)</li> <li>AI Technology integration ready</li> </ul> | <ul style="list-style-type: none"> <li>Pre-assessment of buildings</li> <li>Installation and certification</li> <li>Post-assessment of buildings</li> <li>Annual data interpretation and report</li> <li>Annual building certification</li> <li>24/7 technical support</li> <li>Pool of USHER Structural Engineering Partners (USHER)</li> <li>Bounce Back to Work Program - low down payment and easy-value for money package for building owners</li> </ul> |

| ERI MARKET COMPARISON MATRIX |                                |                                |                 |                             |            |                                   |
|------------------------------|--------------------------------|--------------------------------|-----------------|-----------------------------|------------|-----------------------------------|
| Country/Region               | Unit Cost with Insurance (USD) | Unit Cost with Insurance (PHP) | 10 Years Payoff | Automated Monitoring Module | Mobile App | Local R&D and Manufacturing Plant |
| Philippines                  | P585,000.00                    | \$11,900.00                    | ✓               | ✓                           | ✓          | ✓                                 |
| Australia                    | P1,200,000.00                  | \$24,750.10                    | ✗               | ✗                           | ✗          | ✗                                 |
| South Korea                  | P1,000,000.00                  | \$20,827.50                    | ✗               | ✗                           | ✗          | ✗                                 |
| USA                          | P950,000.00                    | \$19,596.20                    | ✗               | ✗                           | ✗          | ✗                                 |
| Taiwan                       | NT\$30,000,000                 | \$15,058.13                    | ✗               | ✗                           | ✗          | ✗                                 |
| Japan                        | P1,400,000.00                  | \$28,578.61                    | ✗               | ✗                           | ✗          | ✗                                 |
| Italy                        | P800,000.00                    | \$16,302.06                    | ✗               | ✗                           | ✗          | ✗                                 |

**USHER-ERI MAX**  
(EARTHQUAKE RECORDING INSTRUMENT) USHER TECHNOLOGIES INC.

ushertechologies/

## X-LIPAD

### THE PROBLEM

In the Philippines, there is currently a gap on supplying affordable industrial-grade educational drones with learning modules for STEM Education.

### THE SOLUTION

X-LIPAD DREAM (Drones Reimagined for Educational Application and Modification) System is a complete and flexible drone educational system that can be easily integrated in a school's curriculum to explore multiple areas of technology using UAV Technology.

### THE MARKET

With only 10% of the Senior High Schools in the Philippines, there is a potential market of Php. 647,000,000.00.

### THE DREAM SYSTEM

#### Hardware

The DREAM System comprises of the drone, tools, and other equipment that are handpicked and tested according to the needs of the experts during research.

#### Software

The DREAM System programming brings the UAV education into new statures of integration by having a reliable software for calibration and flying of UAVs.

#### Modules

The modules are developed and crafted for the an extensive exchange of knowledge from the minds of the UAV experts of X-LIPAD to its end users.

### CURRENT STATUS

The Team is currently in negotiations with Private Schools and State Universities and Colleges (SUCs) for possible deployments.

### WHAT WE NEED

We need partners who can help us commercialize this technology more strategically, as well as connect us to potential customers of our product.



#### Technology Generator's Contact Details

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## Solar Cell Surface Energy Conversion Efficiency Mapper

### THE PROBLEM

To determine which regions of the solar cell have high/low energy conversion efficiency (and other photovoltaic parameters simultaneously).

### THE SOLUTION

Development of a scanning confocal mapper capable of generating an accurate image map of the energy conversion efficiency and other photovoltaic parameters in a single scan of the solar cell active area.

### PROJECT DESCRIPTION

Future developments in materials synthesis for energy harvesting including solar cells would involve exhaustive characterization techniques to determine the homogeneity and quality of the materials. A fast, non-invasive, non-destructive and, relatively, inexpensive technique such as the proposed efficiency (and other photovoltaic parameters) image mapper will be ubiquitous in future materials research and engineering especially in the solar cell industry.

### THE MARKET

Semiconductor (Including solar cell) industry and academe doing research related to energy harvesting.

### TECHNOLOGY'S APPLICATIONS AND POTENTIAL USE

In addition to generating an image map of the efficiency across the surface of a photovoltaic material, it can also identify, simultaneously, which regions have abnormal parasitic resistances. Hence, it will be a good tool for the industry and the academe for a fast non-destructive feedback to improve their processes.

#### Technology Generator's Contact Details

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### TECHNOLOGY'S COMPETITIVE ADVANTAGE

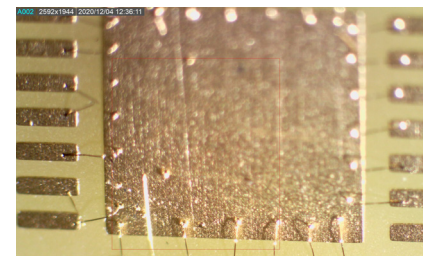
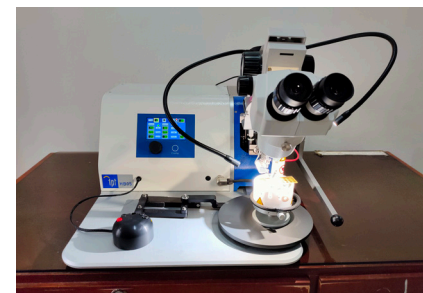
It is a fast, non-invasive, non-destructive technique that allows generation of many photovoltaic parameters and parasitic resistance maps in a single scan.

### CURRENT STATUS

The development is in its early stages although initial experiments proved it is feasible.

### WHAT WE NEED

Collaborators in the materials science and engineering field (industry and academe) that are open for provision of samples for testing and who will be the early adaptors of the technology. Investors can also help in design improvement and optimization and marketing of a potential compact product.



# Hibla: An Alternative Sound Absorption Material

## THE PROBLEM

There is an increase of inevitable noise present in commercial and work spaces in our modern communities thus leading to noise pollution. This emerging problem is solved by costly acoustical treatment that most developing countries cannot avail. Furthermore, these acoustical treatments pose health hazards to humans such as skin irritations and respiratory problems. Moreover, due to global warming, there is an increased demand in the production of sustainable heat insulating products worldwide, thus resorting to synthetic insulating materials.

## THE SOLUTION

Soundproofing is defined as making a room resistant in the passage and reverberation of sound while thermal insulation is referred to as the reduction of heat transfer between objects in thermal contact thus minimizing the heat energy present in the space given. Infrastructures ranging from conference rooms to classrooms that have little to no acoustical and insulating treatment applied hinder attainment of goals, therefore improving sound quality is a must. The product offers an acoustical treatment by trapping the sound waves into its voids thus lessening the noise and reverberation present in the area. Moreover, it serves to slow down the flow of heat in a specific area adding coolness and comfort brought by the natural sources of the insulating materials. Alongside with the traditional "in-wall treatment," Hibla can also be used in acoustical furniture (curtains, seat cushions, and alike), and customized 3 dimensional wall art panel.

## THE MARKET

The target industries of the project are the Acoustic and Thermal Insulation Industry. By 2022, the Acoustic Insulation Market has a projected growth to ₱751.0 B in the global market. Also, some of the specific target customers are non-woven textile manufacturers, construction firms, government organizations, government-owned spaces (libraries, museums, hospitals, etc.), private institutions (hotels, theaters, religious buildings, etc.), non-government organizations, recording studios, and school classrooms and facilities.

## PROJECT DESCRIPTION

Hibla is an acoustic and insulating material made from natural biomasses Abaca, Bamboo, and Water hyacinth with polyester as the carrier fiber. It is feasible to be used in classrooms, recording studios, theaters, and the like by layering between walls, acoustical furniture such as curtains, seat cushions, panels, and as three dimensional wall art panels. It offers an environment-friendly aspect for acoustic treatment without sacrificing product quality. It is capable of absorbing sound waves from low to high frequencies controlling noise and reverberation in a given room. Aside from being a soundproofing treatment, Hibla possess heat-insulating property, with high tensile strength, high decomposition temperature, and fire-retardant.

## TECHNOLOGY'S APPLICATIONS AND POTENTIAL USE

The product offers an acoustical treatment by trapping the sound waves into its voids thus lessening the noise and reverberation present in the area. Moreover, it serves to slow down the flow of heat in a specific area adding coolness and comfort brought by the natural sources of the insulating materials.

## INTELLECTUAL PROPERTY ASSETS

2 Pending Philippine Patents (Process and Product)

## WHAT WE NEED

The project requires funding for further product development, test partners, licensees, buyers, technology adapters, development partners, joint ventures, manufacturers, distributors, and sales forces.



## TECHNOLOGY'S COMPETITIVE ADVANTAGE

- The Hibla panels guarantee quality products having high tensile strength, and fire-retardant. They were made with proportions of natural fibers locally harvested in the Philippines making them environment-friendly.
- The Hibla panels can absorb a large portion of noise especially in high frequencies with Abaca (59%), Bamboo (58%), and Water hyacinth (82%) in 6300 Hz respectively. The three biomass fibers also possess heat insulating properties up to 353.37°C, 348.69°C, and 277.41°C respectively.
- A large number of acoustic panels presently available in the market are made from pure synthetic fibers. As mentioned by Singh and Bhalla in 2017, these appeared to have negative effects (skin irritation & respiratory problems) on human health and a serious threat to ecological balance. Hibla, on the other hand, has a blend of natural fibers which proved to have no health risks involve.
- The commercial cost of Hibla panels is relatively cheaper than its competitors with a price of ₱50.00/sqm while Rockwool (one of the most common imported acoustic panels available in the market) has an approximate price of ₱166.67/sqm.
- As source of employment and commerce, Hibla can empower thousands of local farmers and can be produced easily by semi-skilled persons with locally available materials.
- Several tests were conducted to prove the properties of the panels in terms of having sound absorption property and being a non-woven material.
- The use of Abaca and Bamboo fibers in Hibla will boost the Abaca and Bamboo industries in the country while promoting Filipino ingenuity.
- The use of Water hyacinth fibers in one variation of Hibla will help lessen the number of this highly territorial plant that kills aquatic biodiversity and causes flooding worldwide.



## CURRENT STATUS

The Hibla panels passed the American Society for Testing and Materials (ASTM) and Underwriters Laboratories (UL) standardized tests including:

- Standard Test Method for Impedance and Absorption of Acoustical Material (ASTM E1050 - 12) conducted in Riverbank Acoustical Laboratories, Illinois, USA.
- Flammability Test (UL 94 / ASTM D618) conducted in the Department of Science and Technology - Standard Testing Division of the Industrial Technology Development Institute (DOST - ITDI STD).
- Breaking Load in Tension Test (ASTM D2343) conducted in DOST - ITDI STD.

Analyzed under Perkin Elmer Sta 6000 including:

- Thermogravimetric Analysis conducted in DOST - Advanced Device and Materials Testing Laboratory (DOST - ADMATEL).
- Differential Thermal Analysis conducted in DOST - ADMATEL
- 2 Pending Philippine Patents (Process and Product).

## Technology Generator's Contact Details

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## Low Temperature-grown GaAs Terahertz Photoconductive Antenna Device

### THE PROBLEM

The market for terahertz antenna devices for terahertz time-domain spectroscopy is growing and at present the market for these terahertz devices has been cornered by only about 4-5 commercial entities. This situation offers a chance for the Philippines to possibly join in this niche technology-based market.

### THE SOLUTION

We incorporate own optimized molecular beam epitaxy growth and device fabrication protocols that we are developing, to offer competitive terahertz photoconductive antenna devices to end-users, abroad.

### PROJECT DESCRIPTION

On GaAs substrates, GaAs thin films are grown at low temperatures using molecular beam epitaxy. These semiconductor layers are then fabricated to photoconductive antenna devices using UV photolithography and electron-beam deposition. The photoconductive devices, having bandwidths from ~300GHz to ~2 THz with signal to noise ratios of ~5dB are then tested using an in-house terahertz time-domain spectroscopy system.

### THE MARKET

Academe-based and technology company-based research laboratories who conduct terahertz-time domain spectroscopy research.

### TECHNOLOGY'S APPLICATIONS AND POTENTIAL USE

It is a terahertz transmitter and receiver that is used in an advanced research equipment called, terahertz-time domain spectrometer. Terahertz spectroscopy has applications in law enforcement, pharma and semiconductor testing/Q&A, and lastly basic scientific research.

### TECHNOLOGY'S COMPETITIVE ADVANTAGE

With proper support in the device research and development.

### CURRENT STATUS

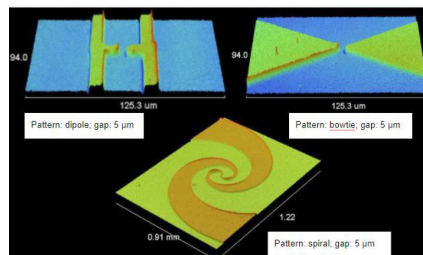
The MBE-grown layers have been optimized and we will be able to supply research laboratories in need of low-temperature grown GaAs wafers for their own photoconductive antenna device studies. Our antenna device fabrication protocols are currently under research and development. With proper support we hope to be able to optimize the process in 1 to 1.5 years; and be ready for full commercialization.

### INTELLECTUAL PROPERTY ASSETS

We have applied patents for one of the molecular beam epitaxy growth protocols that we developed while another protocol is currently being applied for (possibly) utility model. Additionally, we will be disclosing IP's for 2 photoconductive antenna designs that we have developed.

### WHAT WE NEED

Collaborators who are experts in metal semiconductor contact fabrication, specifically on GaAs and Au alloys, possible industry partners.



### Technology Generator's Contact Details

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## Small Molecule Organic Compounds as Corrosion Inhibitors in Mild Steel

### THE PROBLEM

Corrosion is a big problem in the industries leading to leakage, structural failure, and could cost a lot in damages.

### THE SOLUTION

In order to protect steel surfaces from corrosion, corrosion inhibitors may be used to reduce the corrosion rate.

### PROJECT DESCRIPTION

Small molecule organic compounds that are aromatic and contain heteroatoms were shown to significantly reduce corrosion. These compounds were mixed in an acidic solution where the steel surface is exposed and electrochemical measurements show that the resistance of the surface increased, resulting in the reduction of corrosion rates.

### THE MARKET

Energy companies, manufacturing companies, etc.

### TECHNOLOGY'S APPLICATIONS AND POTENTIAL USE

Corrosion inhibition of steel surfaces

### TECHNOLOGY'S COMPETITIVE ADVANTAGE

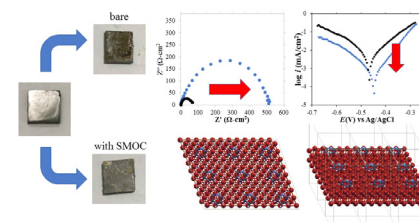
The compounds can be simply mixed with the aqueous solution, effective in highly acidic environment, less toxic than typical corrosion inhibitors.

### CURRENT STATUS

Experimental stage

### WHAT WE NEED

Equipment, materials, actual testing



### Technology Generator's Contact Details

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## Exhaled Breath Analyzer for Lung Diseases

### THE PROBLEM

Present diagnostics for lung diseases are expensive and complicated for use as a point-of-care- detection tool.

### THE SOLUTION

The use of gas sensors on the other hand makes it simple, cheap, non-invasive with direct access to physiological and non-physiological parameters.

### PROJECT DESCRIPTION

Gas sensors can be utilized to analyze human breath and rapidly detect person with lung diseases. This technology aims to elevate diagnosis into a faster and cheaper way. Since most of lung diseases are contagious, this technology also helps in rapid detection to implement immediate medical assistance to diagnosed patients.

### THE MARKET

Health clinics and diagnostic centers, medical practitioners, public health centers and hospitals

### TECHNOLOGY'S APPLICATIONS AND POTENTIAL USE

Rapid detection of lung diseases

### TECHNOLOGY'S COMPETITIVE ADVANTAGE

The technology is a rapid testing method to determine the patient's lung disease. The technology is relatively cheaper compared to standard diagnosing techniques.

### CURRENT STATUS

The project is still on-going. The technology is in prototyping stage.

### INTELLECTUAL PROPERTY ASSETS

Technique utilized in fabricating the gas sensor; the device design.

### WHAT WE NEED

Investors and adoptors



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## Removal of Arsenic from Contaminated Water Using Modified Biopolymer-Silica Nanocomposite Materials

### THE PROBLEM

Water purification especially the removal of heavy metals is available only for consumers who are serviced by water service providers that utilize reverse osmosis or ultrafiltration for water purification. Households that do not have access to treated water need to have an inexpensive water treatment for drinking and cooking water that can remove heavy metals such as arsenic, cadmium, and lead. The mining industry is also faced with the problem of inexpensive water treatment options that will enable them to comply with environmental regulations.

### THE SOLUTION

The use of iron-modified nanosilica filter beads provides an inexpensive alternative method for water purification.

### PROJECT DESCRIPTION

The invention describes a process of producing iron-modified nanosilica powder and iron-modified nanosilica filter beads to be used for treating water and collecting arsenic and other heavy metals. The technology makes use of rice hull ash as its raw material. The isolated silica was then modified via an iron salt to increase its affinity for arsenic.

### THE MARKET

The potential market identified for this technology are mining companies, water filter manufacturers, and households especially in suburban and rural communities.

### TECHNOLOGY'S APPLICATIONS AND POTENTIAL USE

The technology presents an inexpensive passive treatment for drinking/cooking water for households and SMEs and water treatment for wastewater in the mining and semiconductor industries.

### TECHNOLOGY'S COMPETITIVE ADVANTAGE

Low production cost and low energy costs for the passive water purification process unlike reverse osmosis and ultrafiltration which are energy-requiring processes.

### CURRENT STATUS

Bench scale production of the beads and community deployment of the filter

### INTELLECTUAL PROPERTY ASSETS

Patent application at IPOPHIL ongoing as well as international patent application through the Patent Cooperation Treaty. The technology has been identified by the WIPO for mentoring under the Enabling . The technology was identified for mentoring by the WIPO under the Enabling Innovation Environment program for IP and Technology Support.

### WHAT WE NEED

Collaborators for production trials, field validation, adoptors



### Technology Generator's Contact Details

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# Nanoscaffolds for Biological Applications

## THE PROBLEM

The study of biological processes and the effects of various drugs, substances, etc. on tissues along with the reconstruction of tissues and organs for regenerative medicine requires a biological system that closely mimics the characteristics and behavior of cells in the body. This requires mimicking the chemical and physical environment of the organs and tissues in the body. At present, much work needs to be done to develop these in vitro environments to develop near-natural tissues for research and regenerative medicine.

## THE SOLUTION

Our group is currently investigating the suitability of materials derived from natural Philippine fibers (abaca, kapok, etc.) generated by DOST-ITDI for the maintenance and differentiation of cells in culture in order to support the advancement of the biological nanomaterials field in the country.

## PROJECT DESCRIPTION

Our project aims to create a biocompatible material composed of conventional cell matrix materials infused with materials derived from natural fibers that provide mechanical stability to the material. We hope to initially optimize the material for the growth of breast cancer cells and neurospheres which can be used to screen for bioactive compounds that can be used as drugs for cancer and neuronal disorders.

## THE MARKET

Researchers in basic biology, drug screening and regenerative medicine.

## TECHNOLOGY'S APPLICATIONS AND POTENTIAL USE

Development of this technology can facilitate studies in basic and applied biology, regenerative medicine, create a system for drug screening (for cancer for example), etc.

### Technology Generator's Contact Details

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## TECHNOLOGY'S COMPETITIVE ADVANTAGE

Scaffolding materials made from natural polymers have been shown to be less toxic and have good biocompatibility for cells in culture. Using material derived from local plant sources and produced locally can drive down the cost of the technology, allowing it to be more accessible to local researchers, hopefully expanding the number and types of studies that use this technology in the Philippines.

## CURRENT STATUS

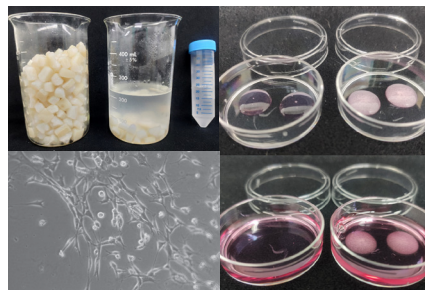
We have begun to test several formulations of the polymer-infused matrix for their biocompatibility with neurosphere cultures and cancer cell cultures. We are now characterizing the effect of the matrix on the physical characteristics of the cells to see if they are capable of supporting or inducing cell differentiation.

## INTELLECTUAL PROPERTY ASSETS

We hope to produce biocompatible matrices embedded with natural polymers from Philippine plants

## WHAT WE NEED

At present, we are at the preliminary stages of our research and would be glad to collaborate with individuals who are generating natural polymers or who have the capability to do physical characterization of our materials.



# Reinforced Abaca fabric for EMI shielding and Thermal Resistance Applications

## THE PROBLEM

Electromagnetic interference (EMI) as a form of signal interference and noise will interfere in the signal processing and purpose of sensors and other electrical devices that process data and function depending on the commands such as pacemakers, point of payment (POS) devices, etc. At the same time, temperature difference to materials may cause malfunction, or worst damage.

## THE SOLUTION

Packaging with EMI shielding property and thermal resistance is the solution for unnecessary signals and thermal difference to the environment.

## PROJECT DESCRIPTION

Reinforcing the abaca fabric with nanomaterials can be used as packaging, container, or enclosure to prevent point of interest from unnecessary signals, harmful electromagnetic interferences, and drastic temperature difference. This material is also studied as potential fabric for spacesuits application.

## THE MARKET

Electronics industry, people with pacemakers, people with high exposure to equipment with different frequencies of EM waves.

## TECHNOLOGY'S APPLICATIONS AND POTENTIAL USE

Packaging, container, or enclosure applications

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## TECHNOLOGY'S COMPETITIVE ADVANTAGE

Utilization of abaca makes the material cost-effective because abaca is abundant and Philippines is one of the largest producer of it. Moreover, the material is biodegradable and flexible to different applications depending on the client's needs.

## CURRENT STATUS

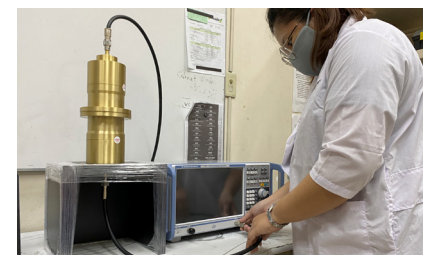
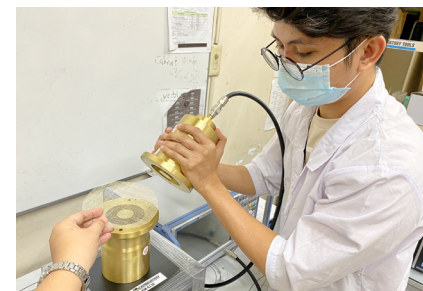
The project is on-going. It recently started and currently on the process of optimization.

## INTELLECTUAL PROPERTY ASSETS

Method of synthesis of nanomaterials reinforced on abaca fabric

## WHAT WE NEED

Investors and adoptors



## Developing Plastic Alternatives from Plant Based Oils for Water Filtration Devices and other Materials

### THE PROBLEM

There is a present problem of over-use of fossil fuel based plastics which causes pollution.

### THE SOLUTION

Develop plastics from plant-based renewable resources.

### PROJECT DESCRIPTION

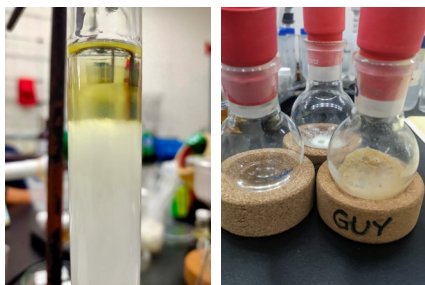
The project makes use of plant based oils to develop plastic components to be used as water filtration device to sequester heavy metal species in water/ bodies of water. The project will be using unsaturated fatty acids as well as bio-based oil by-products in developing plastic alternatives.

### THE MARKET

Users of plastic products specifically plastic packaging and water filtration materials.

### TECHNOLOGY'S APPLICATIONS AND POTENTIAL USE

Plastic packaging and films as well as water filtration devices.



### TECHNOLOGY'S COMPETITIVE ADVANTAGE

Use of plant-based oils as raw materials which are more sustainable.

### CURRENT STATUS

Initial/ Investigative Stage

### INTELLECTUAL PROPERTY ASSETS

Development of Water Filtration Materials Based on this Technology

### WHAT WE NEED

Collaboration ongoing. Investors can be invited when product prototype becomes promising. Funding for more research when prototype becomes successful.



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## Automated Water Level and Rain Monitoring using Real-Time Observation

### THE PROBLEM

The ALeRTO Flood Early Warning System was developed to address the impending flood hazards brought about by localized weather disturbances such as LPA, thunderstorms, etc.

### THE SOLUTION

Alerto Flood Early Warning System will provide near real time status of the river systems in a particular area. The alert system will be sent out through SMS or via the website.

### PROJECT DESCRIPTION

A flood early warning system that monitors the sensors of the Advanced Science and Technology Institute (DOST-ASTI) website for critical water level and rain data across different rivers in the Zamboanga Peninsula, and interpret it into threshold categories: high, medium, and low. The acquired data is the basis of information dissemination to LGUs and other government agencies in cases of impending flooding.

### THE MARKET

Local Government Units (LGUs)

### TECHNOLOGY'S APPLICATIONS AND POTENTIAL USE

Information Technology

### Technology Generator's Contact Details

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### TECHNOLOGY'S COMPETITIVE ADVANTAGE

Alerto utilizes the existing PAGASA sensors for the near real time observations of the river systems. Alert system is communicated via sms directly to the LGUs.

### CURRENT STATUS

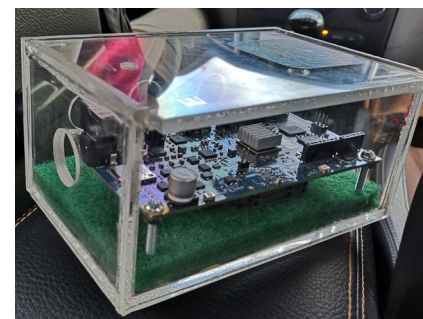
Ready for roll out. Innovations are also under way.

### INTELLECTUAL PROPERTY ASSETS

Patent applied

### WHAT WE NEED

Collaborators



# Fabric Supercapacitor

## THE PROBLEM

Many regions in the Philippines have limited access to electricity, an important utility needed to enhance productivity and quality of life. Recently, society's demand for power has also greatly increased due to new technologies. Along with this demand, decreasing availability of fossil fuels, and climate change has resulted in the gradual shifting from fossil fuels to renewable and environmentally-friendly sources of energy. However, renewable energy sources such as solar and wind power are naturally variable. This prevents them from being a primary source of power in many areas.

## THE SOLUTION

The problem with irregular energy availability can be overcome with the development of new energy storage devices, like batteries and supercapacitors, that store and release energy on-demand. These devices store large amounts of energy, guarantee operational safety, cost efficient, sustainable, and portable. Supercapacitors differ from batteries by having higher power output and cyclic stability at the cost of lower energy storage, perfect for applications require frequent and repeated inputs/ outputs at variable currents. Most energy storage devices are made from materials that offer good storage capacity, but potentially hazardous. Supercapacitors can be made from ecologically better components, in this study for example, fabric substrates, and active materials that are relatively non-toxic such as conducting polymers and carbon materials. Conducting polymers have high capacitances, but only moderate conductivity and poor cycling stability. Carbon materials like carbon nanotubes have high stability and conductivity, but only moderate capacitance. These materials used together cover each other's weaknesses and enhance their electroactive and mechanical properties. Additionally, the use of textiles with natural fibers provides flexibility to the material. These materials give our supercapacitors distinct advantages over batteries and other energy storage systems that require specialized systems.

## PROJECT DESCRIPTION

Society's shift to solar and wind power as sources of energy has been difficult due to their variable and fluctuating energy generation which is highly dependent on weather conditions. Energy storage devices such as supercapacitors help solve these problems by storing excess energy and releasing it on-demand. Our technology focuses on using fabrics in supercapacitors and this produces flexible energy storage devices suitable for wearable devices.

## THE MARKET

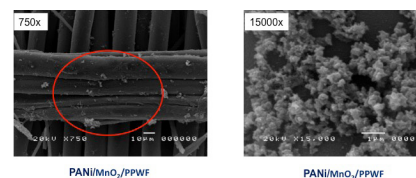
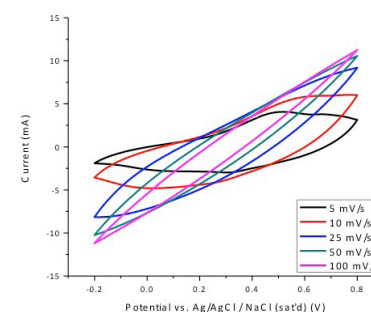
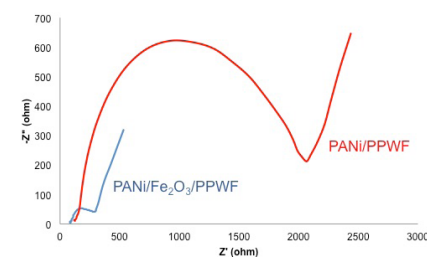
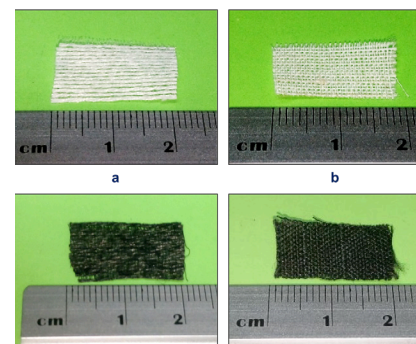
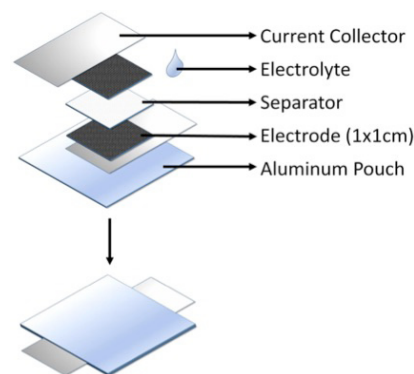
Energy industry for energy storage solutions. Consumers using wearable devices for every day, health monitoring, or emergency use.

## TECHNOLOGY'S APPLICATIONS AND POTENTIAL USE

Storage from variable energy sources to power wearable medical tags and sensors, portable light fixtures, car battery starters and power banks

## TECHNOLOGY'S COMPETITIVE ADVANTAGE

Our technology is different from other energy storage devices because our device is made of fabric containing waste fibers and uses non-toxic and eco-friendly electrolytes. The fabric makes the energy storage device flexible, light, and easily interfaceable with wearable devices.



## CURRENT STATUS

Results obtained from the project, "Fabrication of supercapacitors using indigenous textiles as electrode materials," clearly demonstrates that Philippine natural fiber-polyester blended fabrics can be used as base materials for supercapacitor electrodes. Coating the fabrics with both conducting polymers and CNT leads to high conductivity ( $\sim 0.4 \text{ S cm}^{-1}$ ) and areal capacitance values of  $237 \text{ mF cm}^{-2}$  to  $426 \text{ mF cm}^{-2}$ . The fabric composites were successfully used as electrodes in two supercapacitor prototypes – a rigid and a flexible device. The PANi/CNT/WHPWF rigid acrylic prototype produced the best characteristics, with specific energy and power as high as  $3.30 \text{ Wh Kg}^{-1}$  and  $1299 \text{ W Kg}^{-1}$ . These values are comparable with other studies using the same conducting polymer/carbon/fabric composites. To further prove that the devices can store energy, they were used to power a 3V red LED. Four devices in series could light up the LED brightly for 11 s. More research and development are needed to create larger prototypes, interfacing with other devices, and mass production.

## INTELLECTUAL PROPERTY ASSETS

Utility model filed with DOST-TAPI

## WHAT WE NEED

Investors and adoptors specifically in the energy, circuitry, and battery industry. Marketing experts and personnel to assist in the marketing and sales of the developing product. In the future, large scale manufacturer or industrialist to mass-produce the developed devices.

## Technology Generator's Contact Details

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## SPICE - Smart Plant Production In Controlled Environments

### THE PROBLEM

The need for food security and the rising demand for higher and more efficient production yield.

### THE SOLUTION

Controlled environment indoor vertical farming employing the hydroponics method.

### PROJECT DESCRIPTION

SPICE developed a controlled environment farm system using a vertical growing platform that takes advantage of electronics, sensors, and automation for a higher yield produce. The vertical growing platform employs the hydroponics method to grow crops coupled with a control system for environment monitoring and automated operation. This results to a higher production yield using significantly less water and space.

### THE MARKET

Farmers, agribusinesses, vegetable producers

### TECHNOLOGY'S APPLICATIONS AND POTENTIAL USE

Crop production, agricultural farms, restaurant use, household use



### TECHNOLOGY'S COMPETITIVE ADVANTAGE

Less water consumption, less space occupied, higher yield produce, weather-proof facility, pesticide/insecticide free harvest.

### CURRENT STATUS

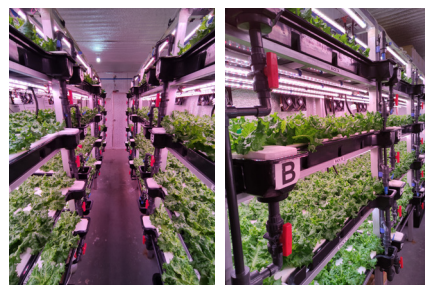
Iterative prototype, ongoing process for patent application, and currently looking for technology adopters, manufacturers.

### INTELLECTUAL PROPERTY ASSETS

SPICE Trademark

### WHAT WE NEED

Manufacturers of growing platform, electronic devices, technology distributors.



### Technology Generator's Contact Details

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## Kapok Sorbents

### THE PROBLEM

Removal of different types of pollutants by adsorption require customized sorbents for optimum results. Current sorbents like activated carbon and polymer-based sorbents are effective but non-selective. Regeneration and subsequent disposal of used-up sorbents are also an environmental issue.

### THE SOLUTION

We offer kapok fiber-based sorbents tailored for each type of pollutant. The kapok sorbents are highly efficient, biodegradable, reusable with zero to low dust content.

### PROJECT DESCRIPTION

Kapok sorbents are customizable sorbents for targeted removal of various type of pollutants. The sorbents are effective, biodegradable, cost-effective and reusable.

### THE MARKET

Waste water treatment, automotive, marinas, manufacturing, warehouse

### TECHNOLOGY'S APPLICATIONS AND POTENTIAL USE

It can be used as is or as fillers in booms or socks to suit your needs. It can be tailored to remove dyes, heavy metals, oil or organic solvents for optimum results.

### Technology Generator's Contact Details

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### TECHNOLOGY'S COMPETITIVE ADVANTAGE

The technology can be customized for targeted removal of different types of pollutants. It is effective, biodegradable and reusable. For the removal of oil and other hydrocarbons, it can removed 2000-4000% of its weight compared to commercial product which is from 300-1400% only.

### CURRENT STATUS

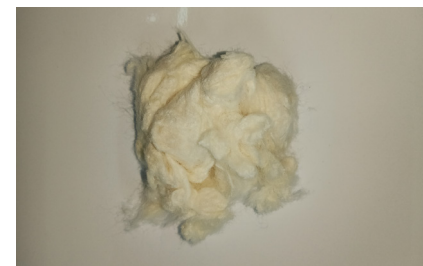
Lab scale

### INTELLECTUAL PROPERTY ASSETS

Trade secrets, know-how

### WHAT WE NEED

Investors and adoptors for manufacturing





Philippine Council for Industry, Energy and Emerging  
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