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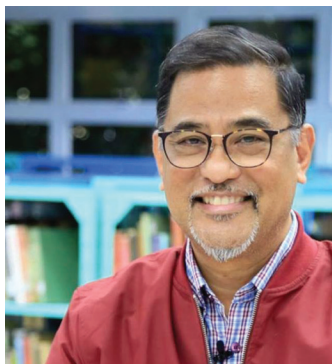
S&TPOST

APR-JUN 2019



TECHNOLOGY
— FOR THE —
PEOPLE

Technology for the people



"The Department of Science and Technology (DOST), the science and technology community, and the public and private sectors will work together to promote transfer and adoption of Filipino innovations into the market." This is the commitment of DOST Secretary Fortunato T. de la Peña on creating innovative infrastructures for the benefit of the Filipino population.

We have always believed that having our research outputs published in some journals is some kind of guarantee that our discoveries and innovations will be noticed by the right people or the right group who will use them for further research or develop them into tangible products to be used by people.

However, we now realize that we need to be more proactive in order to make our developed technologies reach our intended audience. These are the individuals or groups who can use our developed technologies as bases in developing new products, services, or platforms that will ultimately be developed for public use.

Thus, being more proactive means engaging researchers and potential industrial partners, and promoting these technologies in every opportunity that comes. Collaboration among research partners is one strategy harnessed by the DOST that has resulted in significant increase in number and relevance of our research outputs.

In this issue of the S&T Post, we feature a few of our technologies ready for transfer to investors and technology users. We offer only a slice of the whole pie, just a few of the many interesting technologies that the Department has produced through engagement and collaboration.

Still quite a number of other interesting technologies up for the taking are featured in some DOST-produced materials—printed, broadcast or—online or presented in our various public engagements such as forums, Technology Transfer Days, the National Science and Technology Week and its regional versions, among others.

We continue to be aggressive in promoting these technologies because we at the DOST firmly believe that these technologies improve processes and provide solutions to the country's pressing needs.


 Richard P. Burgos

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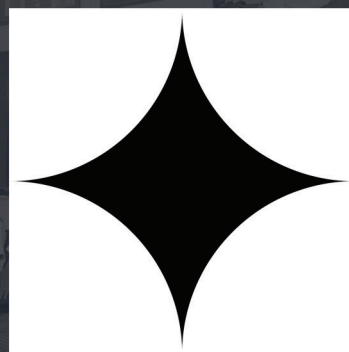


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ABOUT THE COVER

The two fingers touching symbolizes the connection between technology and the people —how technology is created by the people and for the people. The technologies developed by the Department of Science and Technology and by local scientists/inventors featured in this issue show how such connection between technology and the people can create tremendous impact in addressing societal concerns in agriculture, healthcare, education, infrastructure, and other key sectors in the country.

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ERRATUM:

On page 33 ("Honoring our Pinay Scientists") of the S&T Post First Quarter 2019 issue, we identified the lady wearing "Wonder Woman" costume as "Sky Jabson." Her full name is Reinzie Jabson and she is from the DOST-Philippine Textile Research Institute, not DOST-Philippine Council for Health Research and Development. Our apologies.

DOST launches 3D printing research facilities

By Raissa Jean C. Ancheta, DOST-PCIEERD

Photos from DOST-PCIEERD

IN ITS bid to leapfrog ASEAN countries in the additive manufacturing industry, the Department of Science and Technology (DOST) has launched two 3D printing research facilities in the country.

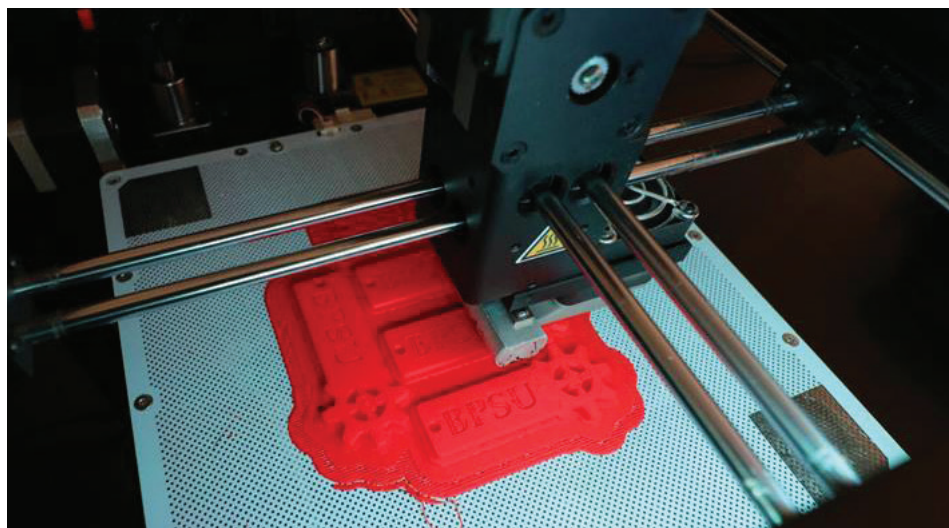
One is the Additive Manufacturing Research Laboratory (AMREL), which DOST Secretary Fortunato T. de la Peña and other DOST officials recently inaugurated at the Bataan Peninsula State University (BPSU). AMREL is a state-of-the-art 3D printing research facility equipped with the latest machines on additive manufacturing.

Another is the Additive Manufacturing Center (AMCen), which had its groundbreaking recently at the DOST-Metals Industry Research and Development Center (MIRDC). The AMCen

is conceived to be the country's leading research center in innovative 3D printing technologies, processes, and materials.

At the groundbreaking ceremony of AMCen, Sec. de la Peña emphasized the importance of partnerships with different agencies—national government organizations, non-government agencies, private companies, and the academe—in optimizing the program objectives.

DOST Undersecretary for Research and Development Dr. Rowena Cristina L. Guevara also encouraged the academe and the industry to collaborate with AMCen to produce new products, substitutes for parts/components, and/or realize other applications of 3D printing.



Products of 3D printing made in the first additive manufacturing laboratory in the Philippines.

“With the recent trends in Industry 4.0, advance additive manufacturing will support our independence from many imported items and sustain our development. It will also serve as buffer with regard to the economic effect of importation, inflation, and dollar fluctuation while enhancing the technical support of the government to the industry,” said Usec. Guevara.

Meanwhile, Dr. Enrico C. Paringit, executive director of the DOST-Philippine Council for Industry, Energy, and Emerging Technology Research and Development (DOST-PCIEERD), expressed optimism over the prospects of additive manufacturing in the country with the opening of the two new facilities.

“We are launching two centers for 3D printing research and development and we in DOST-PCIEERD are privileged to be part of this game-changing initiative. The additive manufacturing research industry will open the doors to previously unimaginable possibilities, and every single 3D-printed product will unfold more innovations. Soon, how we create things will be different from what we’re used to,” said Director Paringit.

3D printing, from small parts to big structures, can be used in aerospace, defense,



3D printing, from small parts to big structures, can be used in aerospace, defense, biomedical, healthcare, printed electronics, agricultural machinery, and automotive industries.

The proposed Additive Manufacturing Center building design.

biomedical, healthcare, printed electronics, agricultural machinery, and automotive industries.

AMREL is the first additive manufacturing research laboratory in the Philippines and, since 2 July 2018, it has been used to conduct research for undergraduate and graduate theses.

During the inauguration of AMREL, Prof. John Ryan C. Dizon, project leader of AMREL, shared some studies on the applications of 3D printing for defense applications and health care. He also had a technology demonstration with junior high school students of the Bataan National High School, successfully creating a 3D printed drone.

“These are all blessings for all of us and for the future generations,” said Dr. Gregorio J. Rodis, president of BPSU, who expressed his gratitude on behalf of the University for being the first recipient of a research laboratory that focuses on 3D research and development.

AMREL will be used for the following thrusts: development of new materials; testing and characterization of materials; faculty and student sharing and creating of ideas; rapid prototyping, tooling, and manufacturing; training, education, and empowerment; and designing and analysis of parts and systems.

Meanwhile, AMCen is expected to rise after nine months, and will be operational on its second year of implementation.

Two DOST agencies will lead the management of AMCen: the DOST-Industrial

Technology Development Institute will develop new materials for additive manufacturing while the DOST-Metals Industry Research and Development Center will handle the advanced prototyping.



(From L-R): DOST-PCIEERD Executive Director Dr. Enrico C. Paringit, DOST-ITDI Project Leader Dr. Blessie A. Basilia, DOST-MIRDC Director Engr. Robert O. Dizon, DOST-ITDI Director Dr. Annabelle Briones, DOST Secretary Fortunato T. de la Peña, AMCen Consultant Dr. Rigoberto C. Advincula, DOST Undersecretary for R&D Dr. Rowena Cristina L. Guevara, and DOST-MIRDC Project Leader Engr. Fred P. Liza.



Senate OKs creation of PH space agency

By Allan Mauro V. Marfal, DOST-STII

THE PHILIPPINE Senate has approved the bill establishing the Philippine Space Agency in recognition of its impact in improving the services of various sectors in the country.

With an 18-0 vote, Senate Bill 1983, also known as an Act Establishing the Philippine Space Development and Utilization Policy and Creating the Philippine Space Agency (PhilSA), passed the Senate's third and final reading on 22 May 2019.

The bill was crafted under the National Space Promotion, Awareness, and Capabilities Enhancement (SPACE) Development Program of the Department of Science and Technology-Philippine Council for Industry, Energy, and Emerging Technology Research and Development (DOST-PCIEERD).

According to Dr. Rogel Mari D. Sese, program leader of National SPACE Development Program, the creation of PhilSA, including developing and utilizing space policy as mentioned in the bill, will serve as the country's primary strategic roadmap for space development and embody the country's goal of becoming a space-capable and space faring nation within the next decade.

The bill states that the PhilSA will be an attached agency of the Office of the President because of the cross-cutting applications of space in defense security, communications, disaster assessment, science, agriculture, environment, trade, and diplomacy, said Sese.

“Having a space program is expensive, but not having a space program is more expensive in the long run because the absence of a space program will obstruct the technological progress of the Philippines”

Under the bill, initial funding for the space program in the amount of PhP 10 billion will be charged to the current fiscal year's appropriation of the Office of the President.

Aside from that, the PhilSA may get additional funding of PhP 10 billion from the gross income of the Philippine Amusement and Gaming Corporation and the Bases Conversion and Development Authority for five years after the passage of the law, with PhP 2 billion to be released to PhilSA annually.

PhilSA may derive income from its specialized products, services, and royalties. The Agency may also accept funding from loans, contributions, grants, bequests, gifts, and donations provided that such grants, requests, contributions, and donations from foreign governments will be approved by the President upon the recommendation of the PhilSA director general.

The bill also states that the PhilSA will be located in Clark Special Economic Zone in Pampanga and Tarlac.

The space policy under PhilSA will cover six key development areas, namely national security and development, hazard management and climate studies, space research and development, space industry capacity building, space education and awareness, and international cooperation.

In his statement, Senator Paolo Benigno “Bam” A. Aquino IV, principal author of the said bill, said that a solid space program can improve disaster management, enhance the lives of Filipino farmers, speed up our internet and telecommunications systems, and help us build more livable cities.

Dr. Sese said that having a space program is expensive, but not having a space program is more expensive in the long run because the absence of a space program will obstruct the technological progress of the Philippines.

DOST Secretary Fortunato T. de la Peña has been giving all-out support for the establishment of PhilSA, especially in enhancing the capabilities of different space technology applications. At the regional S&T celebration in Butuan City last year, he said that though space development programs cost a lot, these would bring long-term benefits.

He cited the images captured by the DIWATA-1 and DIWATA 2 microsatellites which provide relevant information in monitoring upcoming disasters, crop productivity, and national security.

DOST recognized for successful performance evaluation of contractors

By David Matthew C. Gopilan, DOST-STII

THE PHILIPPINE Domestic Construction Board (PDCB) acknowledged the Department of Science and Technology (DOST) for its “extraordinary efforts and successful implementation of CPES.” The recognition was held 25 April 2019 by the Association of Accredited CPES Evaluators of the Philippines, Inc. and the PDCB at the Pan Pacific Manila Hotel, Malate, Manila.

The CPES or Constructors Performance Evaluation System provides a grading system for the performance evaluation of a constructor who implements an infrastructure project of the government.

The evaluation runs throughout all stages of actual construction of the project—from the day a “Notice to Proceed” was issued up to project completion. This aims to ensure that all infrastructure projects adhere to specific requirements stipulated by project owners.

At present, the DOST has seven active CPES evaluators, namely Engr. Arnaldo C. Reyes, Roberto P. Peredo, Brian U. Rasco, and Ivo Matthew D. Cruz from DOST-Central Office; Raul D. Castañeda from DOST IV-A; Willy F. Evangelista from DOST-Philippine Atmospheric, Geophysical and Astronomical

Services Administration; and Christian M. Ibañez from DOST-Metals Industry Research and Development Center. Engr. Reyes currently leads the CPES Implementing Unit.

The revised implementing rules and regulations of the Government Procurement Reform Act (Republic Act 9184) requires agencies that implement infrastructure projects to use CPES and have a CPES evaluator.

PDCB is an implementing arm of the Construction Industry Authority of the Philippines, an attached agency of the Department of Trade and Industry.



The Seven CPES evaluators from the DOST with Engr. Liberto V. Espiritu (rightmost), board member of Philippine Domestic Construction Board.

DOST, US Embassy partner for online course on innovation process

By Rodolfo P. de Guzman, DOST-STII

INNOVATION IN formal and informal learning organizations and communities is fast becoming competitive and creative as well.

To further beef up its delivery of S&T information services, the Science and Technology Information Institute (STII) of the Department of Science and Technology (DOST) has partnered with the American Spaces of the United States (US) Embassy in the Philippines and the Bureau of International Information Programs of the US Department of State. The DOST-STII availed of the program called Massive Open Online Courses (MOOCs) Camp for capacity building.

The MOOC Camps provide free online courses offered by US universities with a combination of online course content, thought-provoking case studies, discussions, and activities that challenge participants to learn from both the online course and in-person meet ups.

The course called “The Iterative Innovation Process” was conducted from 18 March to 12 April 2019 by the Massachusetts Institute of Technology (MIT), one of the most prestigious educational institutions in the US. The course was done through edX, a massive open online course provider.

The course intends to change and refine the way that people view the innovation process

by providing the learners the foundation on which to build future innovation.

One of those who took the course was Irene Alis-Brillo, a librarian from DOST-STII. According to Brillo, the course taught her how to think like an innovator based on the premise that innovation is an iterative process and not a linear one. Ms. Brillo is expected to bring the learning home to the Institute to further improve the library services of DOST-STII.

Randolf D. Mariano, deputy director of the Public Affairs Section of American Spaces, said that innovation involves thousands of sources of uncertainty in technology, implementation, and markets.

The course will teach participants how to cycle through these sources of uncertainty until the right pieces come together in an innovation, he said. The course will help the participants build the innovation process model step-by-step with real examples and exercises.

“The course was rigorous but worthwhile. I think the best material benefit I got, aside from having a certificate from MIT, is that I can be of help in facilitating our own version of MOOC Camp in the Institute. While the best intellectual benefit I got is the realization

that science and technology and any other invention is not innovation in itself,” said Brillo.

“Innovation, in reality, is an embodiment of a useful idea that creates value over time and has an impact to the marketplace,” she explained.

“It has to satisfy two realms: an economic realm that involves people and how they interact and how they trade value with each other, and the physical reality of the universe,” said Brillo.

Some of the topics discussed were on: The Three Basic Elements in the Innovation Process, Generic Nature of Innovation, Patent Searching, Evaluating a Patent Landscape, Market Application, the Iterative Innovation Process, and Fundamental and Incremental Innovation.

The course instructors included Professor Eugene Fitzgerald of the MIT Department of Materials Science and Engineering; Andreas Wankerl, operations director of Innovation Interface; and Arne Hessenbruch, co-founder and partner of Muninsight.

This course is viewed as only the start of a long term partnership of DOST-STII with American Spaces and the U.S. Embassy in the Philippines by conducting more MOOC Camps in DOST that will entice more communities and organizations to learn about innovation as a driver of positive change.



Participants from the DOST-STII, via video conference, view the presentation on innovation by Filipino-American entrepreneurs. (Photo from Irene A. Brillo, DOST-STII)



DOST Secretary Fortunato T. de la Peña (left) and DOST-TAPI Director Edgar I. Garcia (right) look at the Fish-I technology that allows for rapid reef fish assessment, which was on display at the booths during the 2019 National Technology Transfer Day.

21 techs pitched at the Nat'l Tech Transfer Day

By Jund Rian A. Doringo, DOST-TAPI
Photos from DOST-TAPI

A TOTAL of 21 technologies developed by some of the country's technology generators and innovators were pitched to possible investors and adoptors during the recently concluded National Technology Transfer Day 2019.

Held on 4 April 2019 at the Philippine International Convention Center in Pasay City, the National Technology Transfer Day 2019 was led by the Department of Science and Technology (DOST), through the Technology Application and Promotion Institute (TAPI).

The National Technology Transfer Day provides the necessary mechanism for speeding up the transfer and commercialization of funded and generated technologies of the Department by virtue of Republic Act (RA) 10055 or the Philippine Technology Transfer Act of 2009.

Since the conception of the Technology Transfer Day in 2016, six technologies were already commercialized by seven technology adoptors all over the regions.

"The technologies we present today focus on the five-pillar innovation ecosystem which provides great contribution in raising the country's performance in the Global Competitiveness Index by the World Economic

Forum," said DOST Secretary Fortunato T. de la Peña during his keynote speech.

"We realized that the objective of RA 10055 in the speeding up and cascading of technologies generated from publicly funded research and development into the market fell into our hands to challenge the current system by creating innovative infrastructures for the benefit of the Filipinos," added Sec. de la Peña.

This year's celebration presented an opportunity for micro, small, and medium enterprises (MSMEs), investors, fabricators, and adaptors to invest in local technologies developed by Filipino technology generators and innovators. The technologies presented were concentrated in the areas of agricultural productivity, disaster resilience, information technology development, MSME competitiveness, and quality healthcare.

The new format of the National Technology Transfer Day supports the provision of a platform for recognition and dissemination of top and recent DOST breakthroughs that have potential significant impacts for global competitiveness.

This year's event includes two preparatory activities before the actual National Technology Transfer Day—the Regional Offices (ROs) meet



Secretary de la Peña delivers his keynote speech during the 2019 National Technology Transfer Day on 4 April 2019 at the Philippine International Convention Center, Pasay City.

Technology Generators (Tech Gens) and the Tech Gens meet Chief Executive Officers.

"Businessmen may not have the patience to wait that long in order to obtain a clearance before they can finally get a license from government-funded technologies," said DOST-TAPI Director Edgar I. Garcia.

That's why we have our industry-based ideal licensing or spinoff terms that you may be interested to use, where we can substantially reduce the waiting time from 60 to 90 days, to just one day up to 15 days," added Garcia.

At the 2019 "ROs meet Tech Gens," 21 selected technologies of the DOST-Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development and the DOST-Forest Products Research and Development Institute were presented to the regional offices.

Subsequently, the ceremonial signing of the amended implementing rules and regulations of RA 10055 between the DOST, represented by Sec. de la Peña, and the Intellectual Property Office of the Philippines, represented by Director General Josephine R. Santiago, was held during the National Technology Transfer Day 2019.



Orientation on how to use the charcoal briquetting equipment.

Marawi receives technologies, livelihood training from DOST

By Julie Anne H. Baculio, DOST-X

Photos from DOST-X

FAMILIES AFFECTED by the Marawi siege just had their hopes renewed, particularly in improving their livelihood. This is after the Department of Science and Technology (DOST) through the Industrial Technology Development Institute (ITDI) provided three technologies that the families can use to establish sustainable livelihood programs using natural resources that are available to them.

The DOST-ITDI handed over to the Maranao People Development Center, Inc. an essential oil extractor, a charcoal briquetting equipment, and a tea bag processing equipment. The DOST eyed these technologies to help in the livelihood and development of internally displaced persons (IDPs) and families of the Marawi siege. The turnover ceremony was held 10-11 April 2019 at the Provincial Capitol in Marawi City.

The essential oil extractor can extract essential oils from citronella grass and other plant materials abundant in Marawi City. Essential oils are the aroma-giving constituents of aromatic plants. These oils have become popular as safe, cost-effective, and natural therapy for a number of health problems.

Meanwhile, the charcoal briquetting equipment is made up of DOST-ITDI-developed modified drum carbonizer, crusher, mixer, and manual briquettor. Briquetting is a process of molding or compacting materials such as charcoal fines of biomass or coal, with or without binder under pressure.

Lastly, the tea bag processing equipment will allow processing of plant materials to produce herbal tea and herbal capsules. To maximize the equipment, the beneficiaries were also trained on herbal processing. They were able to process moringa herbal tea and turmeric herbal tea out of the collected moringa and turmeric plant materials.

Aside from the turned-over equipment, the DOST-ITDI also trained the IDPs on how to

produce personal and home care products like dishwashing liquid, hand wash, and different kinds of soaps.

The DOST-ITDI conducted the equipment turnover and training of the IDPs in collaboration with Task Force Bangon Marawi, the National Disaster Risk Reduction and Management Council, The Ethne Essence Project, the local government unit of Marawi, and the Province of Lanao del Sur.



Marawi IDPs were trained on how to extract citronella oil using the essential oil extractor.

Mindanao gears up to be PH's electronics powerhouse

By Raissa Jean C. Ancheta, DOST-PCIEERD

AN EMERGING electronics expert, that is how the Department of Science and Technology-Philippine Council for Industry, Energy, and Emerging Technology Research and Development (DOST-PCIEERD) sees Mindanao nowadays. The Mindanao State University-Iligan Institute of Technology (MSU-IIT), meanwhile is being primed as the training hub of integrated circuit (IC) designers.

To realize its vision for Mindanao, the DOST-PCIEERD provided funding support to MSU-IIT for the program “ μ C-IC: Design of Microprocessor Integrated with Energy Harvesting and Power Management”, now on its third year of implementation.

The program aims to design and fabricate customized microcontroller IC chips that can harvest energy from ambient sources and perform vital functions for smart buildings, smart farming, risk reduction control, industrial applications, among others.

DOST-PCIEERD Executive Director Dr. Enrico C. Paringit called on the electronics industry players to set their sights on Mindanao for experts in IC design as the MSU-IIT continues to produce highly trained and knowledgeable

engineers in the said field. He also believes that the program did not only produce good design but better IC designers.

“Mindanao is not only the land of promise but of promising engineers in the field of electronics. The engineers that MSU-IIT produced under our research programs are at par with their peers elsewhere in the country, and may even be better,” Dir. Paringit said.

MSU-IIT Engr. Allenn C. Lowaton, program leader of the μ C-IC, said the program was driven by their desire to cultivate microelectronics awareness in Mindanao by designing IC chips.

“We want to be pioneers of R&D (research and development) in the electronics field by not only delving into designing and fabrication of IC chips but also by preparing the needed human resource for sustainability,” explained Engr. Lowaton.

With the increasing expertise and human resources in the field of electronics, Dir. Paringit is optimistic that the Philippines’ chances of soon becoming an electronics powerhouse is increasing.

“We believe that with the exemplary accelerated pace capabilities at which

electronics experts are being produced, Mindanao will offer technology-oriented industries to complement its strong economic base,” said Dir. Paringit.

The first MSU-IIT designed chips that were fabricated in Taiwan and China have all been executed and are scheduled for testing in April to May 2019. The second chip fabrications are targeted between August and September, also this year.

By 2020, deployment of the final wireless sensor network board is expected, together with an industry partner and company customer revisit.

Also anchored in the program is the MSU-IIT Microelectronics Laboratory’s capability in designing and fabricating digital ICs with product development. Relative to this are various IC design trainings such as Basic Analog IC Design, Integrated Circuit Design Layout, and Operational Amplifier Design that were conducted for students and faculty in twelve different universities in Mindanao.

Mentoring was also provided to academe partners like Surigao State University, Holy Cross of Davao College, Xavier University, Jose Rizal Memorial State University, and Notre Dame of Midsayap College, among others.

More than the trainings, the program was able to produce a total of 40 Bachelor of Science in Electronics and Communications Engineering graduates, 14 of whom are now working in local IC design companies. Meanwhile, 10 Master of Science in Electrical Engineering graduates are currently working in the academe and in local IC design companies as well.

As a result of the extensive capacity building, nine paper publications related to the program were presented and recognized internationally during the 2018 IEEE International Conference on Control, Electronics, Renewable Energy, and Communications and the 10th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management.

Meanwhile, Lowaton shared that partnerships were already sealed with CAMP, Iligan Light and Power Inc., and Pilmico Foods Corp. as industry partners or customers for product evaluation. In addition, Xinyx Semiconductor, Surigao State College of Technology, and Holy Cross of Davao College inked agreements for further training partnership and manpower pooling. More trainings are slated for year three of the program.



Mindanao State University, where the μ C-IC program is being implemented. (Photo from Mindanao State University)



Fresco Biofuel, a wood chips producer in La Carlota City in Negros Occidental, was among the companies evaluated.

DOST-FPRDI, FMB team up to strengthen wood processing industry

By Apple Jean C. Martin- de Leon, *DOST-FPRDI*
Photos from DOST-FPRDI

TO HELP revitalize the local wood industry, the Department of Science and Technology-Forest Products Research and Development Institute (DOST-FPRDI) and the Forest Management Bureau (FMB) of the Department of Environment and Natural Resources, partnered in a project to assess the wood processing plants in the Philippines.

The one-year project involved the evaluation of requirements and procedures in issuing wood processing permits (WPPs); assessment of the production capacity of selected WPP holders; and value chain analysis of various wood-based products. Seventeen WPP holders were evaluated.

According to the DOST-FPRDI, the results of the study will be used in updating MAO 50, Series of 1986 or the Integrated Regulation on the Establishment and Operations of Wood Processing Plants in the Philippines.

“MAO 50 sets guidelines in issuing WPPs,” Dr. Dwight A. Eusebio, chief of the Material Science Division of DOST-FPRDI, said.

“With permits, companies may operate sawmills, plywood mills, veneer plants, pallet factories, and wood-treating plants. They are also allowed to produce products such as lumber veneer, plywood, fiberboard, pallets, builders’ woodworks, and wood chips.”

He added, “Since its crafting in 1986, MAO 50 has been essentially unchanged except for some minor revisions. It is high time that we revisit and update this regulation since the enabling environment

for local wood processing companies has changed through time.”

Results of the project showed no problems in the value chain of products—from raw materials processing to product marketing.

“However, one issue that we should look into is the insufficient local source of raw materials. Strict regulations on forest resource utilization affect timber supply,” shared Forester Alberto V. Nicolas, chief of DOST-FPRDI’s Technical Services Division.

Nicolas stressed the impact of Executive Order 23 which prohibits the cutting and

harvesting of timber in natural and residual forests.

“This policy challenged the wood processing industry since raw materials sources had been limited,” he noted.

To enhance the flow of timber supply and broaden the resource base of wood industries, the project team crafted recommendations that address policy, technology transfer, information dissemination, and value chain issues.

The project is in line with FMB’s program geared towards the rationalization of wood-based industries. A writeshop was held in 2018 to validate the results of the study.



The DOST-FPRDI team together with FMB officials evaluate a sawmill in Excel Wood Industries, Inc. in 2017.

Young researchers from Region X learn basic research methods

By Hadassah Lois G. Matito, DOST-X

TWENTY-FIVE JUNIOR researchers from different member-institutions of the Northern Mindanao Consortium for Health Research and Development were recently trained on basic health research proposal preparations.

The Training on Basic Research Methods, held on 10-12 April 2019 at N Hotel in Cagayan de Oro City, focused on enhancing the capacities of the young researchers in health research proposal preparation.

A total of 11 health research problems were identified and presented before the plenary and critiqued by the trainers during the three-day workshop.

Among the research presented were the prevalence of heterophyiasis, resilience

in post-war, relapse after rehabilitation, breastfeeding practices, care of dementia patients, suicidal ideation, portable database for health information collection, and a mobile application for diabetic individuals' data and information technology wearables.

Participants to the training were young researchers from Bukidnon State University, Cagayan de Oro College-PHINMA, Capitol University (CU), Central Mindanao University (CMU), Iligan Medical Center College, Liceo de Cagayan University, Mindanao State University-Iligan Institute of Technology, Xavier University (XU), and Northern Mindanao Medical Center.

The trainers were composed of the consortium's very own officers/members,

namely: Dr. Peter R. Orbase of CMU, Dr. Ester L. Raagas of XU, and Dr. Fidela B. Ansale of CU.

All trainers have been trained and have completed the Basic Research Methods Training of Trainers on 11-13 December 2018 in Davao City, and the Research Proposal Critiquing Workshop on 14 March 2019 at the Manila Manor Hotel in Manila.

The said training was spearheaded by the Department of Science and Technology-Philippine Council for Health Research and Development.

More training activities related to producing quality health researches will be conducted to enhance the capacities of the young researchers.



The participants of the Training on Basic Research Methods. (Photo from DOST-X)

DOST-X aids Ozamiz complementary food facility

By Joanne Katherine R. Banaag, DOST-X



Turnover of 60,000 pieces RMS baby food blend packaging to Ozamiz City LGU with Maria Lucy Cabalit (third from left) and PSTC-Misamis Occidental Director Eufresnie Ann D. Simbajon (third from right), together with PSTC staff. (Photo from DOST-X)

TO IMPROVE and hasten the production of complementary food products, the Department of Science and Technology-Region X (DOST-X) provided additional funding support of Php 300,000.00 to the Ozamiz City Complementary Food Production Facility (CFPF).

Aside from the funding coursed through the DOST-X Provincial Science and Technology Center (PSTC) Misamis Occidental, the regional office also provided assistance on the packaging, labelling design, and initial execution of the rice mongo sesame (RMS) baby food blend.

Prior to the additional funding support, the facility also received a mechanical bean

roaster and an electric double deep fryer on 11 February 2019.

Previous to that, Ozamiz City's Supervising Administrative Officer Maria Lucy R. Cabalit, together with the CFPF head Lelita G. Navarez, received the 60,000 pieces of RMS baby food blend packaging materials 8 April 2019.

Because of the DOST support, Cabalit expressed confidence that the RMS baby food blend produced by the CFPF will be able to compete with other commercial brands.

Moreover, to support waste management, Navarez said that customers receive discounts in their next purchase after

returning used packaging materials. These packaging materials will then be used to produce eco bags, wallets, and other novelty items.

Three years ago in 2016, the Ozamiz City LGU was one of the beneficiaries of the DOST-Food and Nutrition Research Institute project on the roll-out of complementary food production facilities. The project helped address malnutrition among young children with ages 6-59 months old.

The Ozamiz City CFPF is capable of producing RMS baby food blend for 6-24 months-old toddlers and rice mongo crunchies for 25 to 59 months old children.

DOST-PCIEERD supports project on hassle-free bus reservation

By Raissa Jean C. Ancheta, DOST-PCIEERD
Photos from DOST-PCIEERD



The booking kiosk shows Easybus PH's partner bus operators.

VACATIONERS LOOKING to enjoy some of the country's top provincial tourist destinations, as well as commuters going to and from the provinces, will now have an easier time getting a bus ride through a digital platform that enables online ticket booking.

Easybus PH, an online bus booking platform, enables commuters to book a bus to some of the provincial tourist destinations in the country. Destinations included in the app are Baguio City, Banaue and Lagawe in Ifugao; Daet in Camarines Norte; Naga City and Iriga City in Camarines Sur; Legazpi and Tabaco Cities in Albay; and Gubat, Matnog, and Sorsogon City in Sorsogon.

Easybus PH is a startup supported by the Department of Science and Technology-Philippine Council for Industry, Energy, and Emerging Technology Research and Development (DOST-PCIEERD). The start-up company aims to provide a better alternative in going to the regions with an easy to navigate online portal.

DOST-PCIEERD Executive Director Dr. Enrico C. Paringit expressed optimism that Easybus PH will be a boon to the tourism industry as well as to the regular commuting public. Through the platform, commuters will have an easy, convenient, and faster way to get bus tickets to some of the provincial destinations in the country.

"With Easybus PH, Filipino commuters can enjoy a mountaintop view or a picturesque sea breeze in just a few clicks," Paringit said. "We urge the public to avail of these services and tick off your travel bucket lists with ease."

Commuters can access the portal www.easybus.ph which shows the date and time of departure of the bus, its destination, the bus line, the bus type, and the number of available seats left. Payments can be done online or through payment centers, with a minimal service fee.



Amihan Bus Lines uses Easybus PH's digital booking platform to easily book bus seats for their clients.

Easybus PH Chief Executive Officer Janmar P. Dimaano said the struggles of Filipino bus commuters who manually buy bus tickets and endure long queues, sometimes to no avail, inspired them to venture into creating the online bus ticketing platform.

"Digitization will lead to exponential benefits to both the passengers and the bus operators," Dimaano said.

Ohayami Trans, one of the bus companies that integrated Easybus PH's booking platform in their system, shared that the platform greatly helped their business by making the reservation process easier. Jodelle Manghi-Imayamo, reservations manager of Ohayami Trans, said their bookers and administrators

can easily detect double bookings and other reservation problems.

"I think, the most important thing that Easybus PH has done for us is that it made our reservation and payment processes easier for passengers," Imayamo said. "Previously, we only accepted bank, PayPal, and Western Union as payment options which take one to two days to complete. With Easybus PH, it now takes only minutes to reserve."

"Moreover, even when I'm not in the booking station, I can easily book seats using my mobile phone anytime, anywhere. This saves me from calling the booking stations to reserve," she added.

Furthermore, Imayamo said that she is grateful for the technology because "Ohayami Trans leveled up and is now at par with big bus companies in terms of online reservation. I know that Easybus PH will go far because the people behind it are very dedicated to their craft and very supportive to their clients."

Meanwhile, Dimaano said that the grant from DOST-PCIEERD enabled them to enhance and perfect the platform, and proceed to various projects, including their partnership with the Naga Bicol Central Station for continuous testing. Further, the grant also enabled his team to explore the possibility of creating more innovations stemming from the original digital booking platform.

"It has immensely helped us accelerate the growth of Easybus PH. We are thankful for the trust that was given to us. This gives us the additional drive to fulfill our goals and ultimately impact the transport industry through innovation," he said.

Dimaano added that they see 2019 as an exciting year for Easybus PH to further integrate with current partners and introduce the system to more bus operators. They are scheduled to launch the use of kiosks in various locations for their systems to reach more users.

"Our goal for the year is to stamp a mark on the transport industry, and be known as the leader in the digitization of bus booking," Dimaano concluded.



Balik Scientist recommends work hazard compensation for metro traffic enforcers

By Geraldine B. Ducusin, *DOST-STII*

Photos by Henry A. de Leon

In a study that assessed the cardio-pulmonary health of 158 traffic enforcers from Metropolitan Manila Development Authority (MMDA), a team of researchers found that exposure to black carbon and heavy metals affected the blood pressure (BP), inflammation, and lung function of traffic enforcers on duty. The research team was led by Balik Scientist Dr. Emmanuel S. Baja of the National Institutes of Health at the University of the Philippines Manila.

According to Dr. Baja, the findings can provide some evidence of traffic enforcers having some form of occupational hazard and therefore must be compensated.

Investigating the effect of black carbon on diastolic and systolic BPs, the research team also studied whether these effects vary according to the participating enforcers' individual characteristics. The researchers also wanted to find out the link between exposure to traffic-related air pollution and other cardiovascular and pulmonary outcomes at times within days of exposure.

Systolic BP refers to the top number of the BP reading, while diastolic refers to the bottom number. The former refers to the force

emitted by the heart as it pushes blood and creates pressure on the blood vessels. The latter refers to the pressure in the arteries when the heart rests between beats, when the heart gets filled with blood and oxygen.

Effects on cardio-pulmonary health

The study found out that exposure to increasing ambient black carbon, a marker of vehicular gas and diesel traffic-pollution, may increase the systolic blood pressure among traffic enforcers who are women and those who are "ever smokers."

Additionally, the study showed that black carbon may decrease lung function among enforcers who are obese, or who are non-smokers, or who are men.

Regarding exposure to heavy metals, lead was found in the enforcers' blood which may be associated with increased C-reactive protein (CRP), a marker of systemic inflammation. More susceptible to the increase in CRP are enforcers who are female, or who are never smokers.



Dr. Emmanuel S. Baja presents his study findings during the DOSTkusyon conducted by the DOST for the Balik Scientist program.

Dr. Baja also said that the study provides additional evidence that heavy metal or black carbon via the inflammation pathway may be a factor in heart damage of traffic enforcers.

Hazard pay for enforcers

"Currently, the traffic enforcers don't have any kind of hazard pay as part of their salary," Baja said.

"This evidenced-based research could help them ask for certain compensation from the Department of Budget and Management and local government units."

Hazard pay for traffic enforcers has been constantly proposed in the past. Dr. Baja hopes that the results of their study would serve as strong evidence of the need for such occupational hazard compensation for traffic enforcers and traffic aids.

According to Dr. Baja, his team did the health assessment of the enforcers along Epifanio Delos Santos Avenue in Metro Manila from 5:00 AM to 2:00 PM. The enforcers' toenails and blood were collected for metal exposure assessment and their blood for inflammatory marker. They also assessed the enforcers' lung function and blood pressure.

This health research was funded by the Department of Science and Technology-Philippine Council for Health Research and Development, the government agency that funded health-related technologies, such as the RxBox, Biotek-M, OL Trap, Lagundi tablet and syrup, Sambong tablet, Yerba buena tablet, Tsaang Gubat, and Axis Knee System, among others.



DOST-FNRI makes powder mixes from fruits, veggies for kids

By Salvador R. Serrano, DOST-FNRI



An estimated one-third of children five years old and below in developing countries like the Philippines are stunted—short in height compared with other children of the same age.

Indicative of past malnutrition problems, stunting is the result of long-term undernutrition caused by years of inadequate intake of nutrients. Such condition stagnates growth and development.

Based on the results of the 2013 National Nutrition Survey (NNS) of the Department of Science and Technology-Food and Nutrition Research Institute (DOST-FNRI), undernutrition persists among Filipino children. This finding is backed by a 2015 study conducted by the United Nations Children's Fund, which says that a large proportion of children are deficient in one or more micronutrients.

To help address undernutrition and protein-energy malnutrition among children, the DOST-FNRI developed complementary food blends.

Complementary food is any nutrient-dense food given to babies from six months until two to three years of age as opposed to breastfeeding which is continuous. This is because at six months, breast milk alone is not

enough to meet a baby's increasing nutritional needs for proper growth and development.

Appropriate complementary feeding starting six months of age and continuous breastfeeding up to two years is critical for children's optimal growth and development.

MGM enhanced food blends

The DOST-FNRI NNS revealed that from 2008 to 2013, there was an increase in the number of underweight children. The 2013 NNS also revealed that anemia prevalence was at 55.7 percent and was highest among infants 6-11 months old.

To address this issue, the DOST-FNRI thought of enhancing complementary food blends with the multi-nutrient growth mix (MGM) that contain vitamins and minerals.

The MGM is a mixture of affordable, locally available, and culturally acceptable food based add-on to complementary food.

Three MGM variants were developed using locally-grown fruits and vegetables rich in vitamins and minerals. These fruits and vegetables were individually processed and blended in different proportions until three MGM variants were found acceptable.

The three MGM variants developed were Carrot-Anchovies, Yellow Sweet Potato-Spinach, and Squash-Banana blends.

Acceptable formulations were selected based on sensory evaluation, raw material cost, and estimated nutritional content. The formulations were then standardized and stored at room temperature to determine shelf-life.

A series of sensory evaluations was conducted during trials, optimization, standardization runs, and storage study of the products. Sensory panelists rated the blends "like slightly" to "like moderately".

Chemical, physicochemical, and microbiological analyses were also done during the storage study. Packed in laminated foil, the MGM was stable after one year of storage under room temperature.

The MGM blends advantage

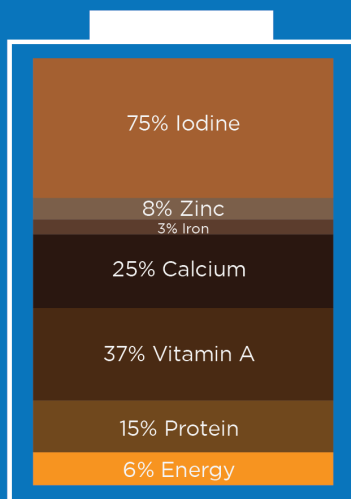
Locally grown fruits and vegetables are rich sources of vitamins and minerals but are not available daily in most Filipino meals due to seasonality and short shelf-life.

Development of the multi-nutrient growth mixes using fruits and vegetables

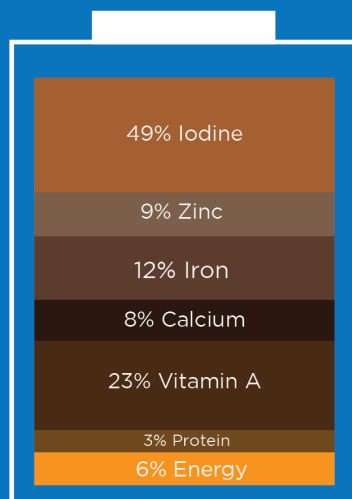
Recommended Energy and Nutrient Intake

(for kids, 1-3 years old)

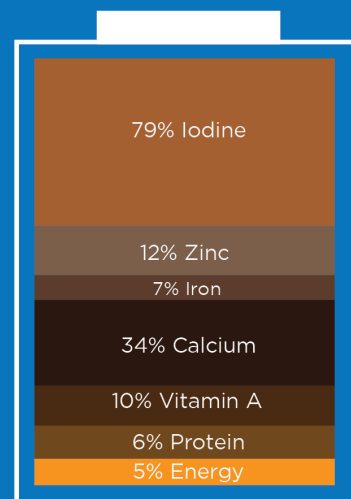
Carrot-Anchovies



Yellow Sweet Potato-Spinach



Squash-Banana



Costs of MGM blends (per 15g)

PhP 24.45



Carrot-Anchovies

PhP 9.16



Yellow Sweet Potato-Spinach

PhP 10.72



Squash-Banana

*The differences in costs are attributed to the cost of raw materials used in the formation of each variant.

in ready-to-use sachets can help address availability and perishability. The MGM blends are always available to mothers and caregivers in convenient form.

Vitamins and minerals from local plants naturally fortify the ordinary "lugaw" or rice porridge usually given to young children to complement the protein and energy-dense blends also developed by the DOST-FNRI.

Underweight children six months to two years old, mothers and caregivers of underweight children, barangay health and nutrition workers, as well as small and

medium scale enterprises can benefit from these technologies.

The MGM technology is ready for adoption by interested entrepreneurs, local government units, and non-government organizations.

A food-based strategy is a sustainable approach because it allows the mother, caregivers, and household to take responsible control of the quality of food by growing their own nutrient-rich foods.

This strategy will also provide farmers with livelihood through the planting of local crops used in producing MGM.

For more information on the Micronutrient Growth Mixes, food technologies and other food and nutrition concerns, contact: Dr. Mario V. Capanzana, Director, Department of Science and Technology-Food and Nutrition Research Institute, DOST Compound, General Santos Avenue, Bicutan, Taguig City; Tel./ Fax Numbers: 8372934 and 8373164; email: mvc@fnri.dost.gov.ph, mar_v_c@yahoo.com; FNRI-DOST website: <http://www.fnri.dost.gov.ph>; Like us on Facebook or follow our Twitter account at twitter.com/FNRI_DOST.

Designed by: DOST-STII

Researchers bat for stronger food safety measures

By Geraldine B. Ducusin, DOST-STII

Food service eating facilities and home-prepared food are more prone to outbreak occurrences, according to a study of the 209 reported foodborne disease outbreaks (FBDOs) in the Philippines.

The research team recommends the need to officially monitor, document, and validate FBDOs to promote public health and safety.

The team also suggests that “the Department of Education and higher education institutions should strengthen their food safety measures on the food service operations and vendors within the academic premises, as well as for the Department of Interior and Local Government, along with the local government units, to re-evaluate their roles in the implementation of the food safety regulation.”

The research team, led by Dr. Maria Patricia V. Azanza of the Department of Food Science, College of Home Economics at the University of the Philippines, conducted a secondary archival data analyses on reported FBDOs, covering reports between 2005 and June 2018.

The team found that multiple implicated foods are associated in majority of the studied outbreaks. Next to multiple implicated foods with high FBDO incidences are meat-based dishes (pork, chicken, beef, and other kinds of meat either fresh or processed).

The institutionally prepared food (e.g., catering, school and work place canteens,

hotel and restaurants), followed by home-prepared food (e.g., birthday, outing, funeral), shows the highest incidence involving multiple food vehicles.

Outbreaks with multiple implicated food vehicles refer to those cases that involve consumption of several types of food. No exact food vector was definitively identified as the cause of the outbreak.

What explains the high occurrence of FBDOs under the institutionally prepared category could be “the fact that these establishments cater to large number of consumers, which in turn increases the probability of FBDOs occurrence and likelihood to attract more media attention and reports.”

Of the 209 cases, there were 74 occurrences reported in food service eating facilities that include school, canteen, restaurants, and hotels, while 102 occurrences were reported in households (single and multiple households’ involvement).

Of the 74 FBDOs in food service establishments, over 50 percent occurred in small scale establishments, “specifically within school premises, while 16 percent and nine percent happened in restaurants and in hotels, respectively. The rest of the cases (six percent) were linked to food sold outside the school premises by ambulant street food vendors.”

The research also cited previous studies stating that the key health problem in the country’s street food was the absence of clean water to wash hands and utensils during vending, as well as the “minimal hygienic and sanitary practices in certain places near a university in Manila.”

The results of the study became the basis for the development of a three-year risk-based research project that was considered for funding and implementation this year by the Department of Science and Technology-Philippine Council for Industry, Energy, and Emerging Technology Research and Development.

Studies pointed out that there is a high prevalence of FBDOs in developing countries due to poor sanitation. Among the unhygienic food preparation conditions cited in studies are poor personal hygiene of food handlers, restricted access to clean facilities, and lack of food storage facilities at appropriate temperatures.

According to the United States Center for Disease Control and Prevention, FBDO is “an occurrence in which at least two persons experience a similar illness resulting from the ingestion of a common food.”

This research is published in the Philippine Journal of Science. Link to this research can be found at: <https://bit.ly/2EABzEz>



Institutionally prepared food (e.g., catering, school and work place canteens, hotels, restaurants), followed by home-prepared food (e.g., on occasions such as birthday, outing, funeral) are prone to foodborne disease outbreaks, according to a study. (Photo by Henry A. de Leon, DOST-STII)



DEPARTMENT OF SCIENCE AND TECHNOLOGY

in celebration of the

2019 NATIONAL SCIENCE AND TECHNOLOGY WEEK

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2019 NSTW focuses on S&T's role in attaining sustainable dev't goals

By Raymond O. Torres, *DOST-TAPI*

TO CELEBRATE the breakthroughs in science and technology (S&T) in the Philippines, the Department of Science and Technology (DOST) will hold the 2019 National Science and Technology Week (NSTW) on 17-21 July 2019 at the World Trade Center, Pasay City.

Through Proclamation No. 169 of 1993, the NSTW is celebrated every third week of July to highlight the significant contributions of S&T to national development.

Moreover, the celebration has become a platform for heralding S&T advocacy in the country.

DOST Secretary Fortunato T. de la Peña said that the NSTW celebration “has the noble intention of harnessing the power of innovative technological ideas and concepts to power the Philippines toward new boundless opportunities to solve long-standing societal problems.”

This year's theme, “Science for the People: Enabling Technologies for

Sustainable Development,” underpins the event's showcase on the latest innovations in technologies, products, and research that can help achieve the country's Sustainable Development Goals (SDGs).

Dotting the venue will be interactive exhibits that are free for public viewing. DOST agencies and partners, including the local S&T community, showcase current innovative knowledge products and services addressing eight of the 17 SDGs set by the United Nations.

Said products and services are in the areas of food security, energy and environment, aging society, health and medical care, S&T human resource development, equity and growth in the countryside, biodiversity and sustainable use of biological resources, sustainable cities and communities, resilience and innovation, and international linkages.

Moreover, the NSTW is the perfect venue for the science community and

science enthusiasts, particularly the technology developers and investors, including the S&T service providers and clients, to interact, exchange ideas, and pursue potential opportunities in technology commercialization and linkages.

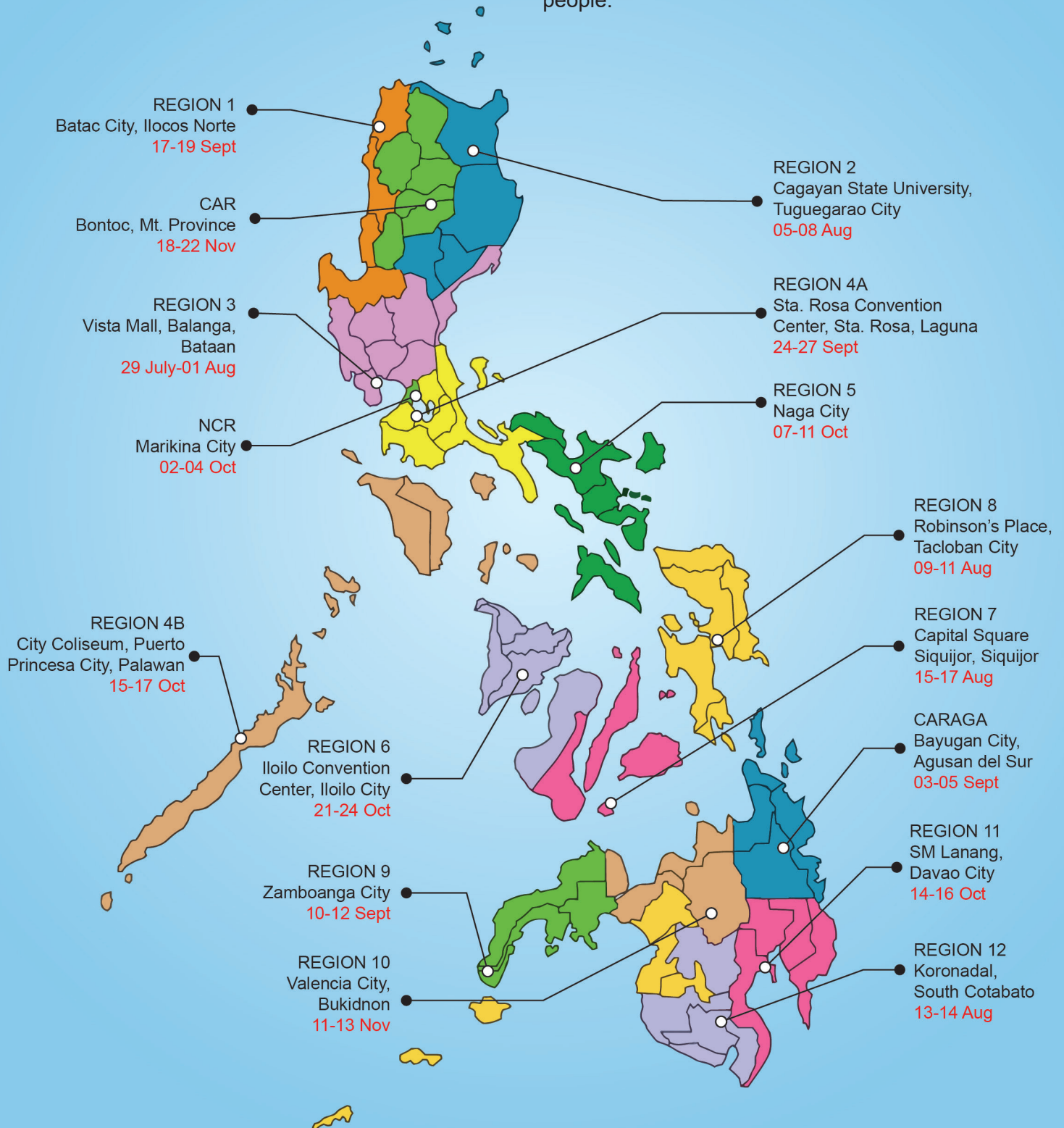
Included in the NSTW celebration are the recognition of individuals in the science community who have shown great endeavors in basic and applied research, and technology transfer, promotion, and commercialization.

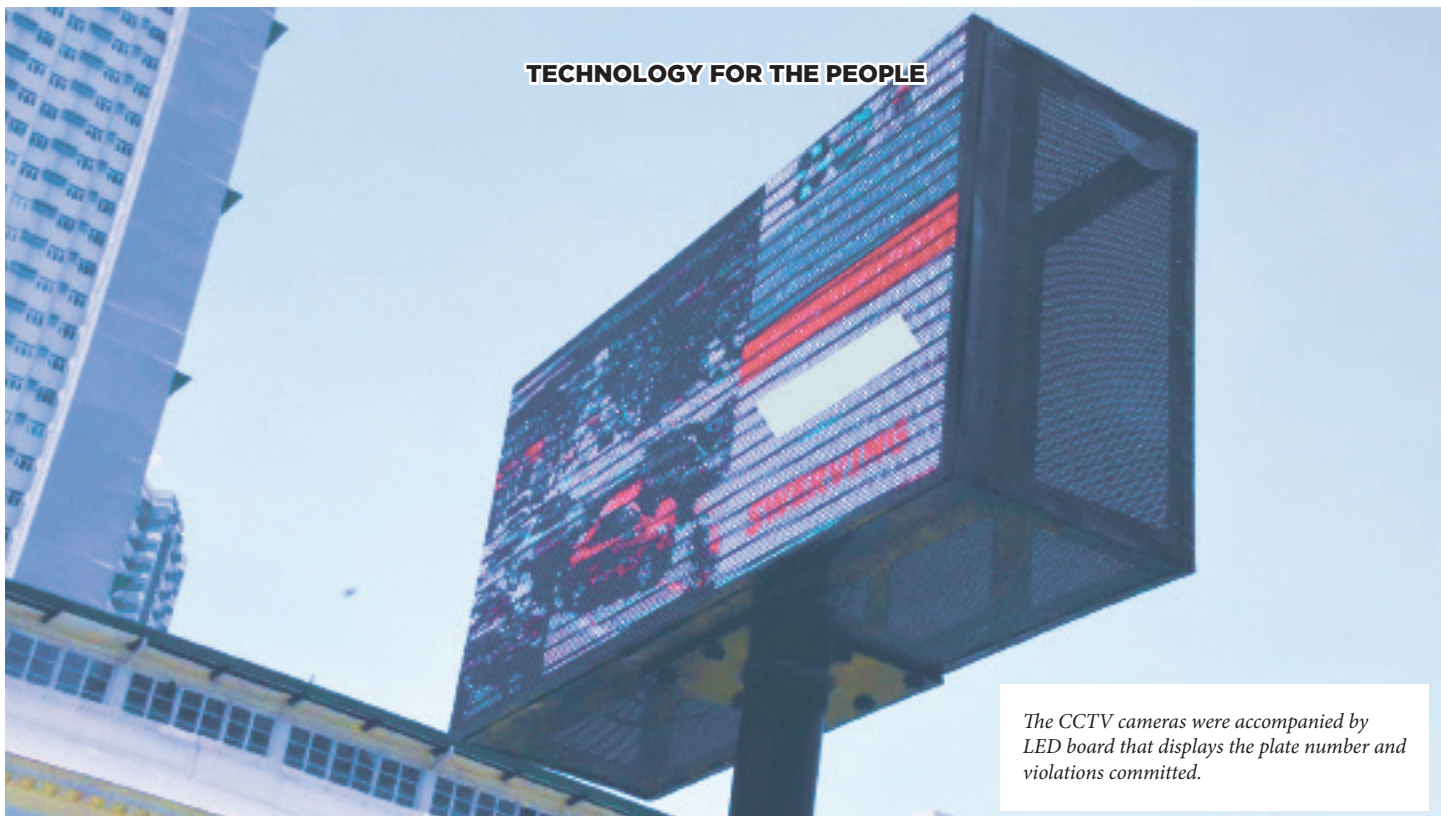
Also, scientific meetings, technical and investment forums, technology demonstrations, and technical tours are lined up as part of this year's NSTW.

Admission is free and exhibits are open to the public from 8:00 AM to 5:00 PM. For more information on the 2019 NSTW, please visit <http://nstw.dost.gov.ph/> or like the Facebook page <http://www.facebook.com/2019nstw/>

2019 RSTW Schedules

The Regional Science and Technology Week (RSTW) celebrations showcase local innovations developed by local experts for Filipinos. This is the Department of Science and Technology's way of bringing science to the people.





The CCTV cameras were accompanied by LED board that displays the plate number and violations committed.

CATCH-ALL 24/7 Tool in Spotting Traffic Violators

DOST-funded project offers better ways to track traffic violators.

By Allan Mauro V. Marfal, **DOST-STII**
Photos from **DOST-PCIEERD**

Traffic woes are a day to day fare in Metro Manila and other urban cities. More serious than this is the traffic violators and enforcers coming at odds with each other and add to traffic problems.

To address this concern, a group of researchers from the De La Salle University (DLSU) is developing a software that would help the authorities to identify traffic violators in faster and more efficient ways.

Called CATCH-ALL or Contactless Apprehension of Traffic Violators on a 24-Hour Basis and All-Vehicle Detection System, it is a software that can detect and track vehicles, recognize plate numbers, and profile vehicles. It can also detect several breaches such as number coding violation, beating the red light, and swerving.

The research and development of CATCH-ALL was funded by the Department of Science and Technology-Philippine Council for Industry, Energy, and Emerging Technology Research and Development (DOST-PCIEERD) with a Php 3.5 million grant.

According to Dr. Elmer P. Dadios, DLSU professor and project leader of CATCH-ALL, the software features closed-circuit television (CCTV) cameras equipped with artificial intelligence software for real-time monitoring of traffic situation. He explained that it is an automated system that can be used to catch

people without contact on a real-time basis through the cameras installed on the streets.

“Our ultimate goal is to allow CATCH-ALL to be tied up into the database of the Land Transportation Office. With this, we can come up finally with a no-contact apprehension and penalty sanctions to the violators,” Dr. Dadios explained.

As part of testing the effectiveness of CATCH-ALL, a pilot run was held 15 May 2017. Ten CCTVs were distributed around Metro Manila to test the software. Two were located along Estrada Street beside DLSU accompanied by a LED board that displays the plate number of vehicles and the violation committed.

Aiming to test the effectiveness of CATCH-ALL software, 10 CCTVs were distributed around Metro Manila—two were located along Estrada Street beside DLSU.





Feeding Fishes and Shrimps

Low-cost microalgal paste offers cost savings for hatcheries.

By David Matthew C. Gopilan, **DOST-STII**
Photos from slideshare.com

Aquaculture farmers can now readily feed their fish and shrimp hatchlings with microalgal feeds that are conveniently in paste form.

Branded as the Juan Algae microalgal paste, this project is seen as the answer to the limited and sometimes insufficient microalgal production. Juan Algae microalgal paste is developed by Soledad S. Garibay from the University of the Philippines Visayas in Miag-ao, Iloilo.

Microalgal feeds are made from algae which size may range from a few micrometers to a few hundred micrometers such that they can only be seen through microscope. Microalgae are usually consumed as food by organisms that live in freshwater and marine systems.

While aquaculturists want to use microalgae as feeds for fish or shrimp hatchlings, microalgae are not easy to reproduce in farms as weather and culture conditions come into play.

Microalgae play a vital role in aquatic ecosystems as these organisms are at the base of food chains. Also, microalgae are eaten by water-living organisms in their early stages of life.

Life-giving

Juan Algae is made of concentrated microalgal cells that can be used as feeds to hatchlings on-site. Also, this algal paste has the same performance as that of cultured microalgae.

Lastly, since the microorganisms in the paste are alive, aquaculturists can still use the paste to grow a new batch of algal culture in their fishponds.

Low-cost

Aquaculturists usually spend PhP 22,500 for the labor and maintenance of microalgal culture. But Juan Algae can trim down the cost by 25 percent as the microalgal paste needs no labor and maintenance, and is ready to use.

Since the product is locally-developed, it could also cut the shipping costs and delivery delays in getting imported feeds.

Soledad S. Garibay, from the University of the Philippines Visayas and the proponent of Juan Algae, currently looks into market validation and commercialization of Juan Algae.





Coffee Dryer



Coffee moisture meter



Waker Upper for the Local Coffee Industry

By Geraldine B. Ducusin, **DOST-STII**
Photos from **DOST-TAPI**

DOST funds affordable, eco-friendly technologies for coffee production.

The aroma of freshly-brewed coffee upon waking up is indeed a treat to many. Now, it's time to give the local coffee industry a knock-up for that much needed push to get it going further.

The Department of Science and Technology (DOST) funded the development of coffee technologies that are now available for commercialization. These technologies were designed to help farmers enhance their coffee production and improve the lives of those in the industry, and to be competitive in the global market.

Among these three coffee technologies is the portable medium-scale mechanical coffee depulper, designed to reduce breakage of coffee cherry during the depulping process to achieve high quality beans. This affordable coffee depulper is capable of increasing capacity and pulp parchment separation efficiency by at least 20 percent.

Another technology is a coffee dryer that provides an alternative method for drying coffee beans instead of directly exposing it to sunlight. This greenhouse-type solar dryer retrofitted with biomass furnace for coffee beans is capable of operating at low temperature with no source of electricity.

The third technology is a coffee moisture meter which is non-destructive, inexpensive, simple, yet provides accurate results in determining the moisture content of coffee beans. The moisture content affects the quality of coffee and determines the right process to take in drying and roasting to maintain the quality expected from farmers and producers.

Developed by the Philippine Centre for Postharvest Development and Mechanization, these technologies were funded by the DOST through the Philippine Council for Agriculture, Aquatic and Natural Resources Research and

Development (PCAARRD). These technologies are seen to contribute to the Philippine coffee industry's vision of guaranteeing a coffee industry that is cost-competitive, at par with global quality standards, reliable, environment-friendly, and capable of providing sustainable benefits to farmers, processors, traders, and exporters.

"Sixty to seventy percent of coffee production in the Philippines comes from the small farmers, who just practically use their backyards to grow the commodity," Helen Martinez of PhilMech emphasized in a gathering of coffee industry stakeholders last year, as reported by the Philippine News Agency.

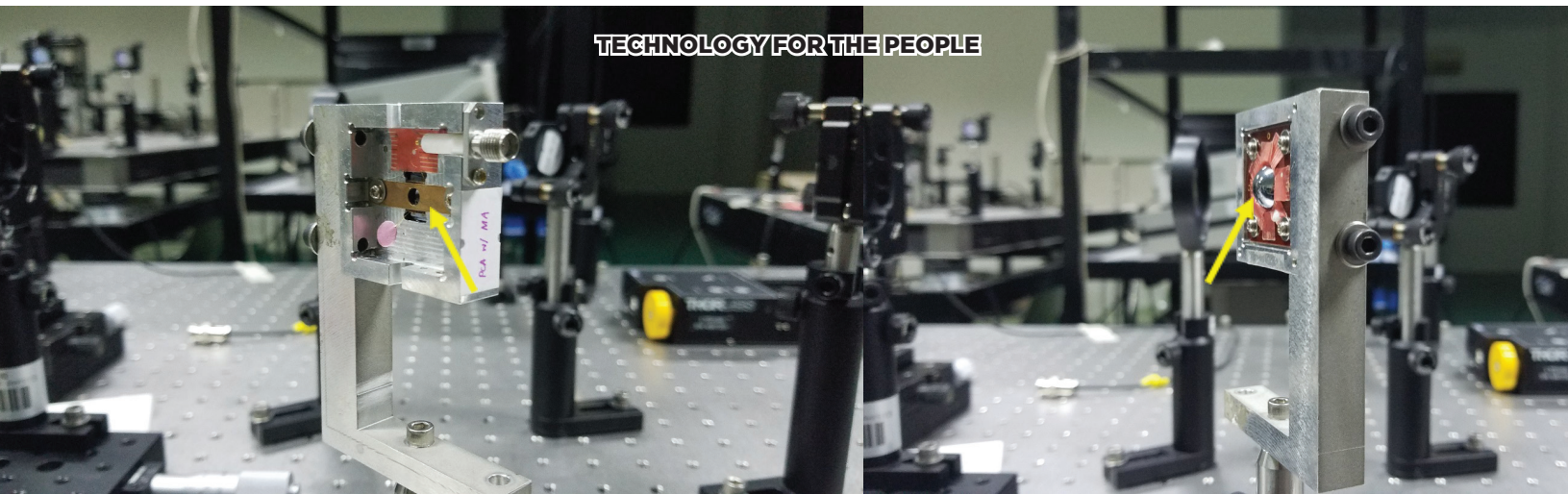
"Farmers would not invest much in mechanization and processing. They cannot afford it. But one way to do it is by consolidation of production through community-based production and processing of coffee," Martinez added.

According to the Department of Trade and Industry, the country's current coffee output is pegged at 37,000 metric tons a year. The country's coffee industry roadmap aims to increase coffee output to 214,626 metric tons by 2022.

This is expected to increase the country's coffee self-sufficiency level from the current 41.6 percent to 161 percent.

Coffee depulper ▶





► Above images show a mounted THz-PCA to be used in a THz time domain spectroscopy setup. Left image shows the front perspective view of the mounted PCA. The yellow arrow indicates the active area of the PCA, which is illuminated by femtosecond laser pulses. Right image shows the rear perspective view of the mounted PCA. The yellow arrow indicates the location of the silicon lens, which collimates the output THz radiation produced by the PCA.

Antenna for Many Uses

Balik Scientist leads design of local multi-use broadband antenna.

by Allyster A. Endozo, *DOST-STII*

Photos from up.edu.ph

Led by a Balik Scientist, a team of applied physicists from the University of the Philippines Diliman's National Institute of Physics constructed photoconductive antenna (PCA) devices based on a semiconductor film that was "grown" using a process called molecular-beam epitaxy (MBE).

Through the process called MBE, the team was able to develop the film by "firing" gaseous beams of gallium and arsenic using effusion cell "guns" onto a silicon-based material. The process enabled the team to build up very thin layers of gallium arsenide (GaAs) at "ultra-fast" pace.

Leading the research team was Dr. Elmer S. Estacio, a 2012 Balik Scientist awardee of the Department of Science and Technology. Estacio was an assistant professor at the Research Center for the Development of Far-Infrared Region in Japan's University of Fukui when he came back

to the Philippines as a Balik Scientist.

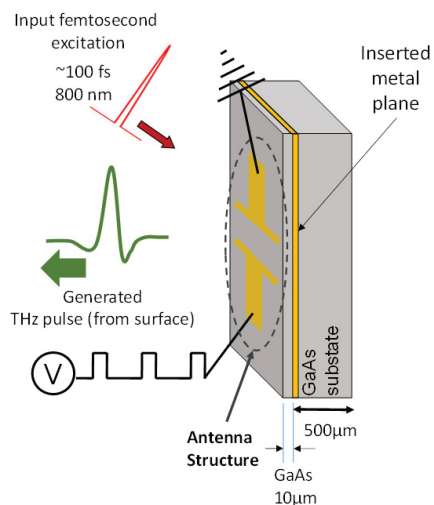
GaAs molecules are exceptionally good at receiving and transmitting broadband radiation at the terahertz level, the frequency at which is already too high for typical electronic devices to actually harness.

Remarkably, the new PCA devices show very good scanning speed and signal-to-noise ratio.

The former is critical in the productivity of end-use devices while the latter ensures high-quality digital captures.

Such properties would make this innovation particularly useful for high-quality imaging and spectroscopy in a wide range of applications—including biology, fine arts, materials science, medicine, and even security.

The Balik Scientist program of the Department of Science and Technology encourages overseas Filipino scientists, professionals, and technologists to return to the Philippines and share their expertise to help accelerate the scientific, agro-industrial, and economic development of the country.



► Dr. Elmer S. Estacio, a 2012 Balik Scientist led the research team that designed and developed the photoconductive antenna (PCA) devices.



► Dr. Rogel Mari Sese works on one of the drone models.



Tracking the Sky for a Safer Philippines

LAWIN eyes the sky to mitigate disaster risk, assess environment.

By Rodolfo P. de Guzman, **DOST-STII**
Photo from **DOST-PCIEERD**

LAWIN or the Low-altitude Aircraft for Wide-field Imaging and Navigation has set its eyes on the conduct of aerial survey under the Unmanned Aerial Vehicle (UAV) Research Project of the team of Dr. Rogel Mari D. Sese, program leader of UAV research and development (R&D) program.

The R&D project is titled “Design and fabrication of an airframe for medium-range, short take-off and landing UAV.” It is a multi-million research grant funded by the Department of Science and Technology (DOST) for the development of a medium-range, long-endurance UAV primarily for disaster risk reduction and management.

This research project is being funded by the DOST in partnership with the Aeronautical Engineering and Aircraft Maintenance Technology Department of FEATI University, with the latter as the implementer. The project is also being done in collaboration with the Philippine Fiber Industry Development Authority of the Department of Agriculture and the DOST-Industrial Technology Development Institute.

With an average of 20 storms hitting the country per year, the development of the UAV will substantially mitigate disaster risk and heighten monitoring capability and environmental assessment.

The first prototype of the medium-range UAV was

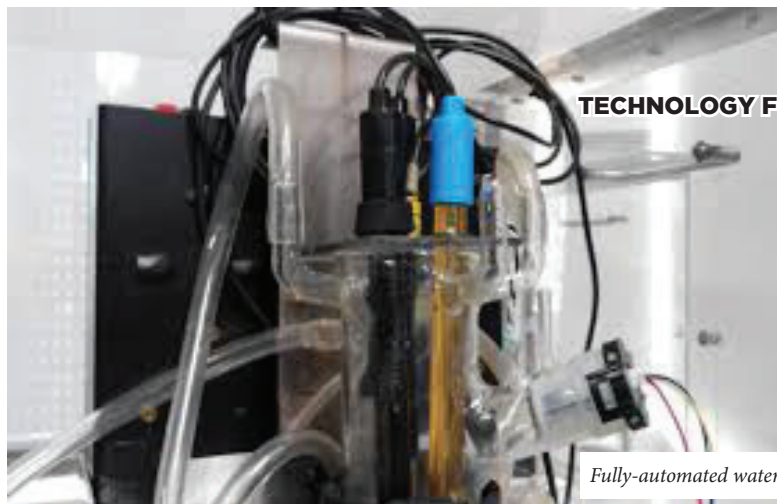
named LAWIN-1 that was inspired by the FEATI Seahawks, the name of the university’s own basketball team.

The R&D activities of the UAV project involve three universities. First is FEATI University, which was tasked with creating the design and fabrication of the airframe of LAWIN-1. Likewise, the team from FEATI will integrate the components of the UAV.

On the other hand, the De La Salle University is currently developing the flight controller for a modular UAV. Lastly, the Ateneo de Manila University is developing the user-customizable communications system and imaging payload of the UAV, as well as the cooperative capability of LAWIN-1 with other UAVs and other ground units.

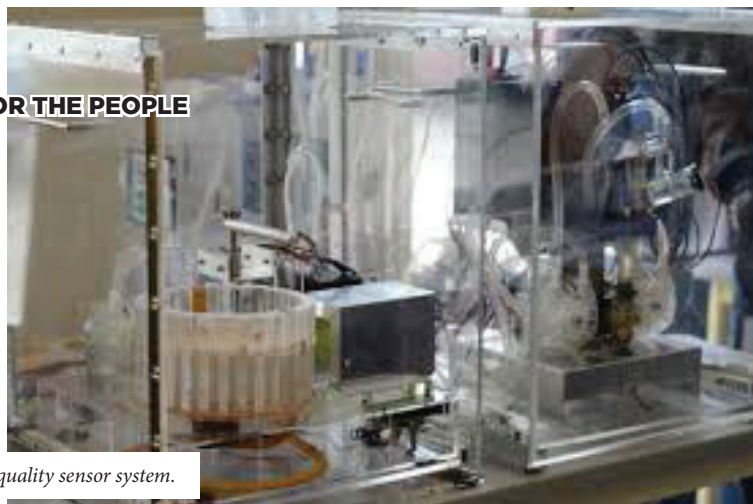
The project component activities include the creation of the airframe of the UAV and its supporting internal structures that include the power plant and mounting provisions and the one-to-one scale mock-up of the UAV.

Since the project also targets the establishment of research capability, part of the output will be the enhancement of the capabilities of the Aeronautical Engineering Research Laboratory of the Aeronautical Engineering and Aircraft Maintenance Technology Department of FEATI.



TECHNOLOGY FOR THE PEOPLE

Fully-automated water quality sensor system.



Photos by aim.edu

Make Sense of What You Drink with AquoSense

AquoSense is a rapid, easy-to-use water quality sensor system that allows remote access to data in real time.

by Rodolfo P. de Guzman, **DOST-STII**

Water is life! And there is life in water when you make sense of it by ensuring that it passes the highest standard of quality because it went through a rigorous test process.

So, it makes good sense that the Department of Science and Technology-Philippine Council for Industry, Energy, and Emerging Technology Research and Development is keen on supporting innovations in the field of “clean” technology by funding the development of “AquoSense.”

AquoSense is an automated water quality monitoring system developed by Engineer Jose Claro Monje, assistant professor from the Department of Electronics, Computer, and Communications Engineering of the Ateneo de Manila University.

The technology is a rapid, easy-to-use water quality sensor system that allows remote access to data in real time. The system is designed to enable the sensor to store and transmit via the Internet water quality readings to an analytics cloud server.

What's inside

The device that Engr. Monje designed and developed makes use of a sensor system composed of electronic sensors that can measure acidity or pH levels, dissolved oxygen, conductivity, turbidity, and temperature quantitatively in real-time. Further, it measures salinity and ammonia levels. Also, it comes with a mobile phone application for data logging and analysis.

An add-on feature of the device are the attached chemical strips to detect mercury in water through an image that is captured in less than 15 minutes. The chemical strips are ready-to-use and the device has no filtration.

Other competitors do not have the mercury detection feature.

The AquoSense comes in two variant models, the Stationary Sensor Unit and the Handheld Sensor Unit.

The Stationary Sensor Unit is fully automated, autonomous, and user-customizable. It can test the water

quality of six samples per hour and can detect mercury for up to 28 days with automated image capture capability.

It also has automated pre-cleaning and calibration feature which is an all-in-one calibration solution. The device runs using rechargeable lithium-poly battery plus solar power unit and is equipped with mobile phone control unit.

The Handheld Sensor Unit also provides real-time water quality testing and is easy to operate as it is lightweight (weighing only 900 grams with batteries included) and portable, measuring 15mm x 20mm x 550mm with telescopic frame measuring 15mm x 20mm x 1800mm.

Furthermore, the portable unit requires no special training to operate it and is 20 percent lower in cost.

Both units can test different kinds of water like fresh water, chlorinated water, and brackish water.

Add-ons

The Stationary Sensor Unit can be acquired by industries involved in aquaculture, water utility, and monitoring agencies. Clients will be provided with technical support such as product orientation, demonstration, upgrade and customization, spare parts replacement, purchase of consumables, data analysis, and after sales service.

For those with limited financial capability, the device can be leased with technical assistance and maintenance.

Water works up

At this stage, the prototypes for both the stationary and handheld versions have been completed. Water testing is working up just fine to ensure its reliability as well as accuracy. Likewise, the certification for ISO 9001 is being worked out and the commercial scale production can commence in one to two years' time.

AquoSense is also being applied for trademark and patent registration for protection from copycats and once in full steam, the product born of Filipino ingenuity promises clean water for everyone and that will really make sense for AquoSense and its future clients.

Say Cheese!

***Making cheese creamier,
tastier through bread mold.***

By David Matthew C. Gopilan, *DOST-STII*

Cheesemaking in the country gets a boost, thanks to a cheaper alternative that is sourced from common bread mold instead of rennet from an animal source. Traditional rennet is taken from the stomach of carabaos, goats, and cows in slaughterhouses.

The Biotech Rennet, invented by Dr. Susana M. Mercado from the University of the Philippines Los Baños National Institute of Molecular Biology and Biotechnology (UPLB BIOTECH), makes the size and weight of cheese more stable. It can also lead to creamier and more calcium-rich cheese as it keeps the protein and fat intact from the milk.

The microbial rennet is made from the common bread mold *Rhizopus chinensis*.

With the microbial rennet there is no need to slaughter animals at a very young age to get the rennet from their stomachs. Moreover, the microbial rennet was found to have the same efficacy and characteristics as animal rennet.

Plus, cheesemakers can make more than half a kilo of white cheese from one liter of milk compared with animal rennet that can produce only as much as 250 grams.

Lastly, cheesemakers who plan to use BIOTECH rennet can now cater their products to lacto-ovo-vegetarians or vegetarians who eat eggs and dairy products as the rennet they use to make cheese is not sourced from an animal.

The microbial rennet is available in both liquid and granulated forms.



► Dr. Susana M. Mercado ranked first in the Outstanding Creative Research (Likha Award) category in the 2012 National Invention Contest and Exhibition for her "Microbial Rennet for Cheese Making" invention. (Photo from science.ph)



Quick Test for Swine Diarrhea

By Rodolfo P. de Guzman, *DOST-STII*
Photos from *DOST-PCAARRD*

Locally developed test kit called PEDV RT-LAMP for swine diarrhea is seen to decrease mortality rate of hogs.

To address the high mortality rate in swine, a team of researchers from the Central Luzon State University (CLSU) in Nueva Ecija developed a fast, highly reliable, and simple diagnostic method that can detect one of the pathogens that may cause swine diarrhea.

Led by Dr. Clarissa Yvonne J. Domingo and Dr. Rubigilda C. Paraguison-Alili, the team looked into quick detection of the swine gastrointestinal microorganism that causes Porcine Epidemic Diarrhea Virus (PEDV).

The technology is called PEDV RT-LAMP Test Kit, a quick, reliable, and cost-effective diagnostic tool for the early detection and control of PEDV in swine. With the fast and timely diagnosis of PED infection through the test kit, production losses due to mortality rate will be consequently reduced.

On the macro perspective, this diagnostic kit will play an important role in ensuring food security for the country because swine production in the Philippines is a PhP 191-billion industry, tagged as the largest among the livestock and poultry industries.

In fact, pork consumption in the country is about 60

percent of the total animal meat consumption of Filipinos. Furthermore, the swine industry is ranked eighth in the whole world in terms of the volume of pork production and the number of breeding sows.

LAMP protocols

The diagnostic method is based on the principle of Loop-mediated Isothermal Amplification or LAMP. Incidentally, the LAMP that is used to detect PEDV is only one of the six LAMP protocols developed by the team for common swine respiratory and gastrointestinal pathogens causing different diseases.

Other diseases that can be detected using the LAMP method are the following: *Pasteurella multocida*, *Haemophilus parasuis*, *Actinobacillus pleuropneumoniae*, *Cryptosporidium sp.*, and the *Salmonella sp.*

The test kit can be used by farmers to detect the virus causing PED even before the symptoms appear.

The test kit has been tested with 320 freshly excreted diarrheic stools collected from different ages of live pigs from commercial and small-scale farms in the provinces of



Batangas and Bulacan.

Compared with the more expensive Enzyme-Linked Immunosorbent Assay and polymerase chain reaction diagnostic protocols, the LAMP diagnostic test kit is more affordable to swine growers. LAMP is also less affected by the presence of non-targeted DNA or inhibitory molecules because of its high specificity and sensitivity.

After a number of field tests, the diagnostic kit for swine was proven to be effective and is now commercially branded as Andali RT-LAMP Test Kit for Porcine Epidemic Diarrhea.

Sealing the test kit

The development of the Andali RT-LAMP Test Kit was funded by the Department of Science and Technology-Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD). It is one of the efforts of the DOST in providing solutions to problems confronting the agriculture sector.

With this research project on the diagnostic test kit, the proponent CLSU inked a memorandum of agreement (MOA) with three Regional Animal Disease Diagnostic Laboratories of the Department of Agriculture. The MOA institutionalizes the LAMP assays to be part of their routine diagnostic protocol.

Further, a pilot laboratory was established for the production of the PED RT-LAMP test kits based at the CLSU campus. This way, more research activities can be done in the future.



(Sources: DOST-PCAARRD articles titled "Local test kit for swine diarrhea developed" by Rose Anne M. Aya published 28 July 2016; "Philippine pork to the world" by the Livestock Research Division, DOST-PCAARRD on 24 February 2016; and "Diagnosing Porcine Epidemic Diarrhea (PED) in Minutes" published 22 July 2015)



► A member of the CLINN-GEM research team sifting for gold in the pilot plant.



► Dr. Herman "Doc Judge" Mendoza (left) of the UP Diliman-DMMME and Dr. Oscar "Oskee" Ferrer (right) of the UP Diliman-Department of Community Development.

Better Gold in Green

By Rodolfo P. de Guzman, **DOST-STII**
Photos by Celeste Llaneta, **UP-MPRO**

Gold, one of the most precious commodities in the world, has turned green!

With the new technology developed by Dr. Herman D. Mendoza, gold mining has become environment friendly—from extraction up to the disposal of waste materials like mine tailings.

The new technology was developed to address the environmental as well as health issues that confront the mining industry particularly in the artisanal and small-scale mining (ASM) sector.

Dr. Mendoza of the University of the Philippines (UP) Diliman College of Engineering's Department of Mining, Metallurgical and Materials Engineering (DMMME) is the and project leader of the Community-Led Integrated Non-Mercury Non-Cyanide Gold Extraction Method or CLINN-GEM.

The Better Mines Program of the Department of Science and Technology (DOST) focuses on promoting eco-friendly methods that include "green mining." This kind of mining involves the use of technologies, best practices, and mine processes as a means to reduce the use of toxic chemicals like cyanide and mercury in gold extraction and processing. It is funded by the DOST-Philippine Council for Industry, Energy, and Emerging Technology Research and Development (DOST-PCIEERD).

When gold turns to green

"The Better Mines Program is meant to make the mining and mineral industry better, but we were interested in small-scale mining. We knew there were serious problems in ASM," said Dr. Mendoza in one of his press statements published in the UP Diliman website.

First, the project focused on the elimination of health and environment hazards by introducing a process that does not use toxic chemicals like mercury and cyanide.

CLINN-GEM zeroed in on how mercury and cyanide can be taken out of the equation in the extraction process by developing an alternative method: using gravity to separate the gold from the ore, even as taking advantage of gold's specific gravity and the way it behaves when mixed with water.

Dr. Mendoza used this principle to harness centrifugal force to enhance the separation of very fine gold particles and recover gold from the non-gold particles. This process is called enhanced gravity concentration and it works well in collecting both the free coarse gold and the very fine gold particles. The good thing here is that the process no longer uses toxic chemicals.

To extract gold without resorting to amalgamation and cyanidation, the team of researchers led by Dr. Mendoza experimented on the use of flotation and leaching in gold extraction.

Leaching is the process of extracting substances from a solid by dissolving them in a liquid.

No time to waste

Dr. Mendoza and his team, fully aware of the danger of the mine tailings using traditional methods, also wasted no time in finding a solution to address the hazardous waste water coming out of the mines. They had to act fast to stop the waste water in polluting river systems in the area of operation.

According to Dr. Mendoza, only 0.1 percent of the batch of ore processed is considered valuable while the

remaining 99.9 percent are waste materials that contain fine particles that can endanger the state of the marine environment. This reality holds true for large-scale mining as well as in ASM.

The waste produced during the flotation process is composed of associated gold that is placed into settling ponds to allow the separation of fine solids from the bulk liquid. Since the CLINN-GEM process for gold extraction uses no harmful chemicals, both liquid and solid wastes are considered inert or chemically unreactive and stable when released in the environment.

On the other hand, in the leaching process, the waste liquid contains heavy metals thus prompting the research team to introduce natural minerals and organic materials as “absorbents” to remove the heavy metals from the waste.

Empowering Technology

As technology becomes the driver of change, the change introduced by Dr. Mendoza’s new way of extracting and processing gold to far-flung mining communities as field testing sites in Benguet, Camarines Norte, Compostela Valley, and Caraga Region met some resistance from ASM miners.

Dr. Mendoza was just too aware of this challenge because the ASM miners live on a hand-to-mouth existence and their primary concern is to put food on the table. Although the mining communities where Dr. Mendoza conducted field testing were rather receptive to innovation, the economics of trying a new method of finding gold somehow became an important factor in adopting the technology.

But Dr. Mendoza was prepared for this and so he incorporated in the CLINN-GEM project the social component by partnering with Dr. Oscar P. Ferrer of the Department of Community Development of the UP Diliman College of Social Work and Community Development. Dr. Ferrer designed a strategy that will address the anticipated social impact of technology to the communities.

The question was not on the viability of the CLINN-GEM project but more so on how to convince the ASM

miners to realize the long-term benefit of green mining. In the case of the Benguet miners, the research team reached out to the Benguet Federation of Small-Scale Miners, Inc. who has the power to encourage their members to try the new technology.

Next step, the group employed the experiential approach by conducting side-by-side competition or parallel testing by using both the old and the new methods.

“Our framework is technology for empowerment... give the communities the technology so they hold the mode of production. Teach them everything—marketing, sourcing, legal, and paralegal skills—so they can be autonomous and self-reliant. Then they can say, we can provide for ourselves and we are empowered,” said Dr. Ferrer in his statement published by the UP Diliman in their website.

True enough, the research team was able to convince the ASM miners to try the new technology. The whole process involved organizing the miners for a common cause—teaching them about the technology, basic mining, and metallurgical engineering in the language they can comprehend; providing added skills training for women and children for alternative livelihood to augment their income; and teaching them about the laws so that they will not be ignorant of their rights as protection from those who had been taking advantage of them.

Thus the ASM community in Itogon, Benguet has fully embraced the technology and has put in place an operational facility that can produce up to 10 metric tons of gold ore per batch.

With the new technology that promises a better life for small-scale miners, challenges remain because there are other communities that are still in the dark and still to be convinced of the benefits of the CLINN-GEM project—of what green mining for gold can do to make their lives much better and their children’s future more secured.



► The aerial view of the CLINN-GEM pilot facility at the UP Diliman DMMME building capable of conducting gold extraction to waste treatment.



► Small-scale miners in a mining community in the Philippines mine for gold using traditional methods. (Photo from the ILO in Asia and the Pacific on Flickr)



Maria Gloria Guifaya happily shares the story behind Maria's Native Bibingka.

Rice cake biz makes sweet profit through DOST's SETUP

By Mary Margarette B. Marvas, *DOST-II*
Photos by DOST-II

Where will your PhP 50 take you? For Maria Gloria Guifaya, owner of Maria's Native Bibingka, her PhP 50 together with her courage and determination to succeed, became the start of a blooming business that is now the bread and butter of her family.

In 1995, with only PhP 50 as her initial capital, Maria took the courage to put up a business in Naguilian, Isabela. With that amount of money, she bought sugar, coconut, and glutinous rice then mixed the ingredients to cook rice cake, with hopes of turning her recipe into a profitable source of income for her family.

Her native *bibingka* (rice cake) quickly became a neighborhood favorite, with her neighbors as her initial customers. Soon after, her rice cake branded as Maria's Native Bibingka, became an all-time favorite snack in their place.

With the increasing demand for her product and with limited staff and equipment, the 61-year-old entrepreneur found it difficult to sustain customers' demands. It's a good thing that an agency referred her to the Department of Science and Technology (DOST) to avail of its Small Enterprise Technology Upgrading Program (SETUP), which helped her expand her business.

"Noong una hindi talaga ako bilib, pero nang sinubukan ko, totoo pala. (At first, I had my doubts [about the program], but when I tried it, it proved me wrong)," she shared, recalling her hesitation with the program.

In 2013, the skeptic business woman became a believer as the sets of equipment acquired through SETUP addressed her problem with production. Her traditional way of cooking rice cakes using a stone stove was upgraded into a more modern way of using an oven that could churn out 150 plates of rice cakes compared with the usual 30 plates.

With the SETUP assistance, the native rice cakes were also provided with an attractive packaging. Aside from improving the product's aesthetics, the improved packaging extended the product's shelf life as well. Now, aside from the product's superb taste, customers are guaranteed of the cleanliness and sanitation in its production.

FEATURES



► One of the employees of Maria's Native Bibingka with a freshly baked batch of rice cakes.

Also part of the DOST intervention is the enterprise's compliance to food safety standards having acquired a certification from the Food and Drug Authority for a license to operate. In fact, the floor plan of the building where the business operates was structured based on the Food Safety Standards.

With all the DOST-SETUP intervention, Maria's Native Bibingka was able to triple the volume of its production and income, which allowed Maria to help more people. From three workers, she now employs ten. She is also able to provide scholarships to students from less fortunate families.

Her success in business is not only reflected in the sales of her bibingka but also in the recognition she received. Maria was awarded as the Most Outstanding Entrepreneur by Gawad Saka 2017 of the Department of Agriculture for her support to the coconut and rice



► The delicious rice cake of Maria's Native Bibingka. (Photo from the Pasalubong Center of Finest Cagayan Valley Products Facebook page)

farmers and banana leaves suppliers who sustain the raw materials of her product. She also received the Kapatid Mentor Me award as she continues to inspire small scale entrepreneurs to go into business.

Maria shared that without SETUP, they would not have reached what they have achieved in the business. "Lahat ng equipment na ginagamit namin ngayon ay galing sa SETUP. Hinding-hindi ko talaga makakalimutan ang DOST, kahit saan man makarating ang bibingkahan namin. (All of the equipment that we've been using came from SETUP. I will never forget DOST, no matter how far our rice cake business goes)," said Maria.

So what, you may ask, is the secret recipe to the continuous success of Maria's Native Bibingka? It's a mixture of Maria's perseverance and determination, with just the right mix of science, technology, and innovation intervention.

PH microsats find home at the Mind Museum

By The Mind Museum and DOST-PCIEERD
Photos from DOST-PCIEERD

The Philippines' microsatellites have found a new home.

The Mind Museum, together with the Department of Science and Technology (DOST), has launched exciting and interactive exhibits to popularize the Philippines' venture into space technology. The exhibits are likewise eyed to entice students to get into careers in science.

Said exhibits are composed of permanent installations at The Mind Museum's Universe Gallery and a nook at the Space Adventure Travelling Exhibition. Highly interactive, the exhibits showcase the different space technology projects spearheaded by the DOST.

► Visitors try out the Virtual Reality tour inside the Diwata-2 microsatellite. In this module, the visitors are shown the vital components that consist the microsatellite.



FEATURES

The new exhibits were designed to capture the interest of guests of all ages, from young children to adults. They feature games and virtual reality tours that showcase the many benefits of space technology in people's everyday lives. The exhibits also highlight the purpose and function of the Earth-observing microsatellites Diwata-1 and Diwata-2.

These microsatellites were made by Filipino engineers from the DOST-Advanced Science and Technology Institute (ASTI) and the University of the Philippines Diliman (UPD), in collaboration with Japan's Hokkaido University and Tohoku University. There will also be a feature on Maya-1, the Philippines' first cube satellite, which was built and designed by Filipino scholars participating in the BIRDS-2 Project in Kyushu Institute of Technology.

"There is something deeply human about the excitement for space exploration," said The Mind Museum curator Maria Isabel Garcia.

"Just look at how excited young kids can be about outer space. Through these exhibits, we hope to show to kids that they can actually pursue a career based on their sense of wonder and adventure," Garcia added.

Officials from the DOST are also

excited that the country's efforts in space science are getting a wider audience. DOST Secretary Fortunato T. de la Peña welcomed the idea of having another avenue to popularize the innovations of Filipino scientists and engineers.

"This is an important step in advancing science, technology, engineering, and mathematics (STEM) education in the country," said Sec. de la Peña.

"By showing young Filipinos what our scientists and engineers have accomplished, we can inspire students to go into STEM fields and contribute to science in the country," he added.

For Dr. Enrico C. Paringit, executive director of the DOST-Philippine Council for Industry, Energy, and Emerging Technology Research and Development (PCIEERD), these space technology projects are for the benefit of Filipinos.

"Since these projects are publicly funded, we at the DOST believe that communicating our projects' benefits to Filipinos is a crucial part of what we do," Dir. Paringit said.

Some of the exhibits will be housed permanently at The Mind Museum located at Bonifacio Global City, Taguig City. Meanwhile, other

exhibits will be included as part of Space Adventure exhibit.

Space Adventure is previously one of the museum's traveling exhibitions and located at the Canopy Plaza of The Mind Museum until 21 April 2019. From thence, it will travel to different sites in the country to bring the excitement of space exploration to more guests.

The exhibits were designed and created by The Mind Museum, with support from DOST-PCIEERD, DOST-ASTI, UPD, and the Development of Philippine Scientific Earth Observation Microsatellite or PHL-Microsat Program which was succeeded by the Space Technology and Applications Mastery, Innovation and Advancement (STAMINA4Space) Program.

"The STAMINA4Space Program appreciates the efforts of DOST-PCIEERD and The Mind Museum in showcasing the outputs of the program to young Filipinos," said STAMINA4Space Program Leader and DOST-ASTI Acting Director Dr. Joel Joseph S. Marciano Jr.

"We look forward to continued partnership with The Mind Museum in pursuit of our objective of advancing and promoting space technology research and development for the benefit of Philippine society," he emphasized.

► *The Philippines Goes to Space exhibit features interactive activities such as "Collecting Space Junks" in Space.*

DOST-ITDI researchers cited at Asian Scientist 100

By David Matthew C. Gopilan, *DOST-STII*



The works of Dr. Marissa A. Paglicawan of DOST-ITDI mostly involve rubber, polymer, and composite materials as well as biodegradable nanotechnology applications. (Photo from dostv.ph)



Dr. Rosalinda C. Torres of the DOST-ITDI studies mostly applications of chemistry on natural products, drug discovery, as well as medicinal and pharmaceutical chemistry. (Photo from dostv.ph)

DR. ROSALINDA C. Torres and Dr. Marissa A. Paglicawan were two of eight Filipino scientists who were featured in the 2019 edition of Asian Scientist 100. Dr. Torres is from the Standards and Testing Division while Dr. Paglicawan is from the Materials Science Division, both under the Department of Science and Technology-Industrial Technology Development Institute (DOST-ITDI).

Dr. Torres was recognized for her research on larvicidal potential of Philippine medicinal plants like avocado, guyabano, and pomelo. These plants, based on her studies, have extracts that are toxic for pests like mosquito while in their larva stage.

Dr. Paglicawan's research efforts to use Manila hemp or abaca in engineering materials led to her citation. In their previous project, "Tryk ni Juan", Dr. Paglicawan developed a composite material made of resin and abaca fiber as roofing for tricycles. This innovation makes tricycles more appealing and lighter as well. Abaca or Manila hemp is Philippine endemic.

The Asian Scientist Magazine aims to highlight outstanding Asian researchers for their achievements in respective disciplines. Accordingly, the citation reads, "the honoree must have received a national or international prize in 2018 for his or her research. Alternatively, he or she must have made a significant scientific discovery or provided leadership in academia or industry." Some categories include environmental science and geology, astronomy, leadership, chemistry, among others.

Others from the Philippines were Dr. Artemio M. Salazar of the University of the Philippines (UP) Los Baños for Agriculture; Dr. Rody G. Sy of the UP Manila for Biomedical Science; Engr. Ricardo S. Balog of the University of Sto. Tomas and Dr. Elmer Jose P. Dadios of De La Salle University for Engineering; Dr. Gay Jane P. Perez of UP Diliman for Environmental Sciences and Geology; and Dr. Charissa Marcaida Ferrera of UP Diliman for Life Sciences.

Dr. Artemio M. Salazar, professor at the Institute of Plant Breeding at the University of the Philippines Los Baños, leads the project "Environmental Characterization and Development of Integrated Crop Management" Project 2 of the program Smarter Approaches



Dr. Artemio M. Salazar

WHO'S WHO?

for Reinvigorated Agriculture as an Industry (SARAI) in the Philippines. Funded by the DOST-Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD), SARAI is designed to be a nationwide online platform for smarter decisions on agricultural farming activities.

Dr. Salazar recently received the Leads Agri Award for Agricultural Research by the Philippine Association for the Advancement of Science and Technology.

Meanwhile, Dr. Rody G. Sy is the program leader of the Cardiovascular Genetics Project of the Philippine Genome Center. His research titled "Genomic Research on Hypertension, Coronary Artery Disease, and Dyslipidemia towards the Development of Individualized Diagnostic and Therapeutic Strategies" highlights the importance of putting cardiovascular genetics research into clinical practice. Said research was funded by the DOST-Philippine Council for Health Research and Development.



Dr. Rody G. Sy

Engr. Ricardo S. Balog is currently part of the team assigned to Project 5 (Innovative Marketing and Distribution Strategies for Balut and New Products) of the ITIK Pinas Program. Itik Pinas is funded by the DOST-PCAARRD. Engr. Balog is the consultant in the design, development, and prototyping of the "Balut Vending Machine."

Dr. Elmer Jose P. Dadios, meanwhile, was one of the 2009 DOST Scholar Achievers and was National Research Council of the Philippines Achievement Awardee in 2010. Further, he has completed 19 projects, including the DOST TECHNICOM project



Engr. Ricardo S. Balog

"Soccer Robot System" and published 79 scientific papers locally and internationally. He currently leads the project called CATCH-ALL or the Contactless Apprehension for Traffic Violators on 24-Hour Basis and All-Vehicle Detection System which is funded by the DOST-Philippine Council for Industry, Energy, and Emerging Technology Research and Development.



Dr. Elmer Jose P. Dadios

In 2018, Dr. Dadios received the David M. Consunji Award for Engineering Research for his various researches in robotics and machine learning. A postdoctoral fellow at the National Aeronautics and Space Administration, Dr. Gay Jane P. Perez led the team that developed remote sensing products for Diwata-1 in the Remote Sensing and Product Development component of the PHL-Microsat program.

Dr. Perez won the fourth annual ASEAN-US Science Prize for Women for her impressive work that helps farmers by predicting drought and identifying the best areas for planting through data gathered by satellite.



Dr. Gay Jane P. Perez



Dr. Clarissa Marcaida Ferrera

Lastly, Dr. Charissa Marcaida Ferrera specializes in marine biogeochemistry, studying the relationship of chemistry, geology, and biology of the marine ecosystem. She obtained her bachelor's degree in Chemistry in 2004 and her MS in Marine Science in 2012, both in UP Diliman, as a DOST scholar. Later, she obtained her PhD in Mechanical and Environmental Informatics in 2016 at the Tokyo Institute of Technology in Japan. Last year, she was named National Fellow of the 2018 L'Oréal-UNESCO for Women in Science Fellowship.

The listing began in 2016 and at most ten Filipinos each year were already featured.

Filipina scientists who make us proud

The second series of our features on Filipina scientists who make us proud.



MERCEDES B. CONCEPCION is recognized for her work in population and for helping improve the health and welfare of individuals through her contributions in the field of population research and policy.

She graduated with an undergraduate degree in Chemistry at the University of the Philippines (UP) Diliman in 1951. Later, she earned a certificate in Statistics at the University of Sydney, Australia in 1954.

In 1963, she graduated with her doctoral

degree in Sociology at the University of Chicago, USA.

She is a trustee of the Philippine Center for Population and Development and Foundation for Adolescent Development. Her body of work as an academic/scholar and as an institution-builder has earned her the title of National Scientist, the highest distinction bestowed to Filipino scientists by the Philippine government. In 2005, the United Nations (UN) also conferred Dr. Concepcion the UN Population Award for her notable contributions to population research and policy.

Dr. Concepcion's primary affiliation was the University of the Philippines where she served as founding director of the UP Population Institute. She has retired from the university as Professor Emeritus of the UP College of Social Sciences and Philosophy and was later given the Distinguished Alumna Award by the UP Alumni Association for her professional achievements.

She is an Academician of the National Academy of Science and Technology and was bestowed the National Scientist Award in 2010.



MICHELLE GRACE V. PARASO is recognized for her important researches that established the link between animal health and environmental health issues, including aquatic exotoxicology that determined the impact of environmental pollutants on fish health and the identification of hotspots of livestock and poultry concentration as well as potential disease and pollution risks in Laguna province, allowing for targeted interventions.

Currently, she works as Associate Professor at the University of the Philippines Los Baños, her alma mater, where she took up Veterinary Medicine and graduated in 1997. She got her graduate degree in Veterinary Medicine in 2001 at the Swedish University of Agricultural Sciences, and her doctoral degree in Philosophy in Environmental Science at the University of the Philippines Los Baños in 2011.

She received the Outstanding Young Scientist Award in 2012.



NELIA P. SALAZAR is a recognized biologist-epidemiologist, and researcher at the Department of Health's Research Institute for Tropical Medicine where she is lauded for her outstanding contributions to knowledge advancement in biological sciences as applied to health. Her groundbreaking achievements in public health highlight her dedication to improve peoples' health and safety.

Her research achievements include the discovery of *Capillaria philippinensis*, a species of parasite that causes intestinal capillariasis; the isolation of *Cryptosporidium* organisms from the first reported AIDS patient in the Philippines; the use of plants known as *Tinospora rumphii* Boerl. in the treatment of scabies; and the use of *Quisqualis indica* Linn. plant in the treatment of parasitism with intestinal nematodes.

In 1954, she graduated from the University of the Philippines Diliman with a degree in Biology. She earned her graduate degree in Entomology at the University of Hawaii in 1966, and her doctoral degree in Microbiology at the Mahidol University, Bangkok in 1973.



PERLA D. SANTOS-OCAMPO

Dr. Perla Santos-Ocampo's research achievements in diarrheal diseases resulted in the development of a super oral rehydration solution and provided the basis for diarrhea-related policies of the Department of Health. Her researches on malnutrition's effects on the growth and development of children led to the rational management of nutritional problems among

Filipino children. These researches were published in over 100 articles in peer-reviewed local and international journals.

She graduated with her degree in Medicine at the University of the Philippines Diliman in 1965. She finished her residency in Pediatrics at the UP-PGH Medical Center in Manila, and pursued a fellowship in Developmental Pediatrics at the Case Western Reserve University in Cleveland, Ohio.

Dr. Santos is an Academician of the National Academy of Science and Technology and received the National Scientist award in 2010.

On June 29, 2012, the scientific community joined in mourning for the demise of Dr. Ocampo at the age of 80. Her legacy as a scientist and institution builder is only equaled by her unparalleled care for children.



RACHEL JUNE RAVAGO-GOTANCO

Dr. Rachel June Ravago-Gotanco is recognized for her pioneering works on DNA marker development and its application towards studies on the management, ecology, and evolution of marine organisms. She was credited for her numerous scientific publications on the application of molecular genetics approaches to ecology, population genetics, biogeography, and evolution of marine species.

She previously worked as a University Research Associate at the University of the Philippines (UP) Diliman until 2006 working on research projects on the development of DNA-level markers for analysis of genetic variation and population genetic structure of several marine taxa. She has completed her doctorate studies in Marine Science from the UP Diliman, supported by the Global Environment Fund-Coral Reef Targeted Research Program. Currently, she works as Assistant Professor also at UP Diliman.

She received the Outstanding Young Scientist Award in 2010

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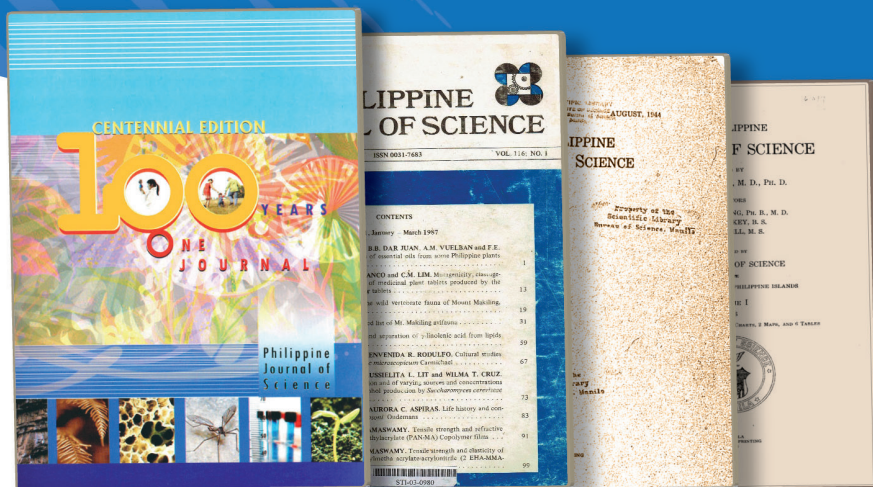
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in celebration of the

2019 NATIONAL SCIENCE AND TECHNOLOGY WEEK

ENABLING TECHNOLOGIES FOR SUSTAINABLE DEVELOPMENT

GENERAL PROGRAM OF ACTIVITIES

TIME	TITLE OF ACTIVITY	VENUE AND ADDRESS	LEAD AGENCY
17-21 JULY			
9:00 AM - 5:00 PM	Viewing of Exhibits	World Trade Center	
9:00 AM - 5:00 PM	Film Showing	Cluster 2: Aging Society, World Trade Center	DOST-FNRI
18-21 JULY			
8:00 AM - 5:00 PM	NuLab STEM Modules (2 sessions per day)	WTC Parking Area	DOST-SEI
17 JULY			
9:00 AM - 5:00 PM	Free Nutrition and Diet Counselling	Cluster 2: Aging Society, World Trade Center	DOST-FNRI
10:00 AM - onwards	Opening Ceremony (By Invitation)	Main Stage, World Trade Center	DOST-PCHRD
12:00 NN - 2:00 PM	Press Conference	Forum Hall 3, World Trade Center	DOST-STII
1:00 AM - 5:00 PM	Launching of NuLab (By Invitation)	STHRD Cluster / WTC Parking Area	DOST-SEI
1:00 PM - 5:00 PM	Using Digitized Arts for HIV-AIDs-Related Advocacies	Main Stage, World Trade Center	DOST-NRCP
3:00 PM	Cooking Demo	Cluster 2: Aging Society, World Trade Center	DOST-FNRI
18 JULY			
8:00 AM - 11:45 AM	Resilience Summit for Kids	Main Stage, World Trade Center	PAGASA/PHIVOLCS/ASTI
8:00 AM - 5:00 PM	NuLab STEM Modules (2 sessions per day)	WTC Parking Area	DOST-SEI
9:00 AM - 3:00 PM	SDG 17: Cracking the Code for Sustainable Development (By invitation)	Function Rooms 1 (Luna), World Trade Center,	DOST-ITCU
1:00 PM - 5:00 PM	In Touch with Excellence (By invitation)	Philippine International Convention Center	DOST-SEI
3:00 PM	Cooking Demo	Cluster 2: Aging Society, World Trade Center	DOST-FNRI
19 JULY			
8:00 AM	Symposium for the Youth	Main Stage, World Trade Center	DOST-NAST
8:00 AM - 12:00 AM	Facts for Awareness on Science & Technology (FAST) Talk	Function Room 1, World Trade Center	PAGASA/PHIVOLCS/PNRI
8:00 AM - 5:00 PM	DOST-SEI Graduate Scholars and Industry Forum (By Invitation)	Philippine International Convention Center	DOST-SEI
9:00 AM - 12:00 NN	Launching of TBI 4.0 (By Invitation)	World Trade Center	DOST-PCIEERD
9:00 AM - 12:00 NN	Joint PCHRD-FNRI Forum on Genomics and Functional Foods (By Invitation)	Function Room 4, World Trade Center	DOST-PCHRD/FNRI
9:00 AM - 5:00 PM	DOST-ASTI industry 4.0 Technology I/O-Initiatives and Opportunities (By Invitation)	Function Room 2, World Trade Center	DOST-ASTI
10:00 AM	Forum topic: The Eel Fishery Tributaries along Lagonoy Gulf: Implications to Management and Conservation	Function Room 3, World Trade Center	DOST-PCAARRD
1:00 PM	(Re)discovering the Indigenous Vegetables in the Philippines	Function Room 3, World Trade Center	DOST-PCAARRD
1:00 pm - 1:15 PM	ADMATEL: The 3D Computed Tomography Xray (By Invitation)	Function Room 4, World Trade Center	DOST-ITDI
1:00 pm - 5:00 PM	Resilience Summit for Stakeholders (By Invitation)	Function Room 1, World Trade Center	PAGASA/PHIVOLCS/PNRI
2:00 PM	Turnover of National Scientists Posters	Main Stage, World Trade Center	DOST-NAST
2:00 PM - 2:45 PM	PTD: Smart Packaging Technology (By Invitation)	Function Room 4, World Trade Center	DOST-ITDI
2:45 PM - 3:30 PM	NML: Metrology New Calibration services (By Invitation)	Function Room 4, World Trade Center	DOST-ITDI
3:00 PM	Germplasm conservation of select indigenous forest trees in Mt. Makiling Forest Reserve	Function Room 3, World Trade Center	DOST-PCAARRD
3:30 PM - 4:15 PM	STD: New Testing Offered by ONELAB ITDI	Function Room 4, World Trade Center	DOST-ITDI
20 JULY			
8:00 AM - 12:00 NN	Hataw Agham 5.0	World Trade Center, Pasay City	DOST-PCHRD
8:00 AM - 5:00 PM	#ScienceJournoAko: A Seminar-Workshop on Vlogging (By Invitation)	World Trade Center	DOST-STII
8:00 AM - 12:00 NN	Grassroots Innovation Launching and Forum (By Invitation)	Hotel Jen Manila by Shangri-La, Pasay City	DOST-11
9:00 AM - onwards	Opportunities for the Philippine Textile and Garment Industry 4.0 (By Invitation)	Function Room 3, World Trade Center	DOST-PTRI
21 JULY			
	STII's WHATCHAMAKULIT (By Invitation)	DOSTV Holding Room, World Trade Center	DOST-STII
8:00 AM - 3:00 PM	Awarding Ceremonies (Best Packaging and Labeling Award, Best Community Award and Best SETUP Adoptor Award)	Main Stage, World Trade Center	DOST REGIONAL OFFICE

For more details, please visit: www.nstw.dost.gov.ph

World Trade Center, Pasay City

17-21 July 2019

