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DE LA SALLE UNIVERSITY

RESEARCH • INNOVATION • SUSTAINABILITY

Questions



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QUESTIONS

QUESTIONS

In this issue of QUESTIONS, we share some of De La Salle University's major research projects that tackle issues on environmental preservation and disaster risk reduction, as well as the protection of intellectual property, the mental wellbeing, and the holistic development of the Filipino people. Through these initiatives, DLSU underscores its commitment to shape a humane and sustainable future.

QUESTIONS is a publication of De La Salle University featuring research projects and creative endeavors by its faculty.

QUESTIONS supports De La Salle University's vision-mission to be "a leading learner-centered and research university, attuned to a sustainable Earth, bridging faith and scholarship in the service of society, especially the poor and marginalized."



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A photograph of a clear plastic bottle and two crumpled plastic bags (one brown, one white) on a light-colored surface. The bottle is lying on its side, covered in water droplets. The bags are crumpled and tangled together.

How do we deal with plastic waste?

Biology associate professor Dr. Chona Abeledo and her team of researchers launch a community initiative to understand the makeup of plastic waste in Pasig River.

Project against plastic pollution

The Pasig River Communities Against Plastic Pollution Project, also called EcoSquad Goals Initiative, is a citizen science project that seeks to identify the different types of household plastic wastes that end up in our waters. The proponents believe that identifying the predominant types of plastic wastes will result in more effective and sustainable solutions to address water pollution.

As in any citizen science project, volunteers are at the heart of data gathering. The researchers had to ensure that their volunteers are adequately trained to document instances of pollution, assess the types and amount of plastic wastes found in the river, and consolidate all pertinent information in a database.

So far, the data being collected have given the researchers an invaluable snapshot of what kinds of waste flow through the Pasig River, providing them ideas about potential sustainable interventions.

An online initiative

The project started during the lockdown days of the pandemic, when Abeledo’s team, consisting of Abeledo and a group of DLSU Biology graduate students, joined a UNESCO project calling for youth involvement in projects about circularity.

Concerned about the Philippines being the third highest contributor of plastic pollution in the world’s oceans, the team sought solutions at the most basic level. Their initial project was to create a set of modules to teach school children how to identify the different types of plastic waste in their own homes.

They enlisted Br. Alfred Shields Ocean Research Center (SHORE) Director Dr. Wilfredo Licuanan, College of Computer Studies faculty member Courtney Ann Ngo, and Communications Professor Dr. Angeli Diaz for help in creating an interface for information collection.

The resulting online project got the attention of the United Nations Development Programme (UNDP), which then called on the group to do a face-to-face version in selected barangays in Pasig City, near the river.

The team took on the challenge. They were given only three months to complete a scaled up version of their online project. This meant an extra 16 hours of their usual training workshops, which had the added element of being conducted in person.

“From working with children online, we started working with local government units and whole barangays, to design the face-to-face version of the project,” Abeledo recalls.



Implementing citizen science

The first phase with UNDP involved several focused group discussions with the different partner communities. In the second and third months, workshops were held to teach participants more about plastic use, problems, as well as plastic waste issues around the world. In the fifth month, the volunteers started uploading their own data from the one kilogram plastic waste they collected from the river four times a month.

Apart from developing citizen science skills, the team hoped for something more for the volunteers—an awareness of consumer behavior and the negative impacts of single use plastic. These, they believe, are knowledge that will facilitate sustainable life practices.

A unique approach on plastic pollution

Abeledo observes that a lot of initiatives to combat plastic pollution involve plastic waste collection, such as coastal cleanups and recycling events in barangays, malls, and schools. But the effect, she admits, is limited by the fact that different types of plastics need to be recycled in different ways, and more often than not, there is a lack of facilities

to deal with all the collected plastic waste.

This is why even though the funded portion of the project is over, the team has continued to train people as citizen scientists.

“At the end of the day, our efforts are never enough to collect the amount of data that we require. We need

as many people as possible to collect data so that it can keep trickling into our database even though we don’t have the funding anymore. We are now focusing on training the trainers. We started with teachers from PUP and Xavier School, and are now working with institutions from different parts of the country,” Abeledo says.





A river of hope

The Pasig River is vital in its provisions to local citizens and industries as well as in its role as connector of two other important bodies of water, Laguna de Bay and Manila Bay. Various local government units and NGOs have time and again exerted efforts to revive its overall quality and tributaries, but plastic waste still continues to contaminate it and threaten the waters and communities connected to it.

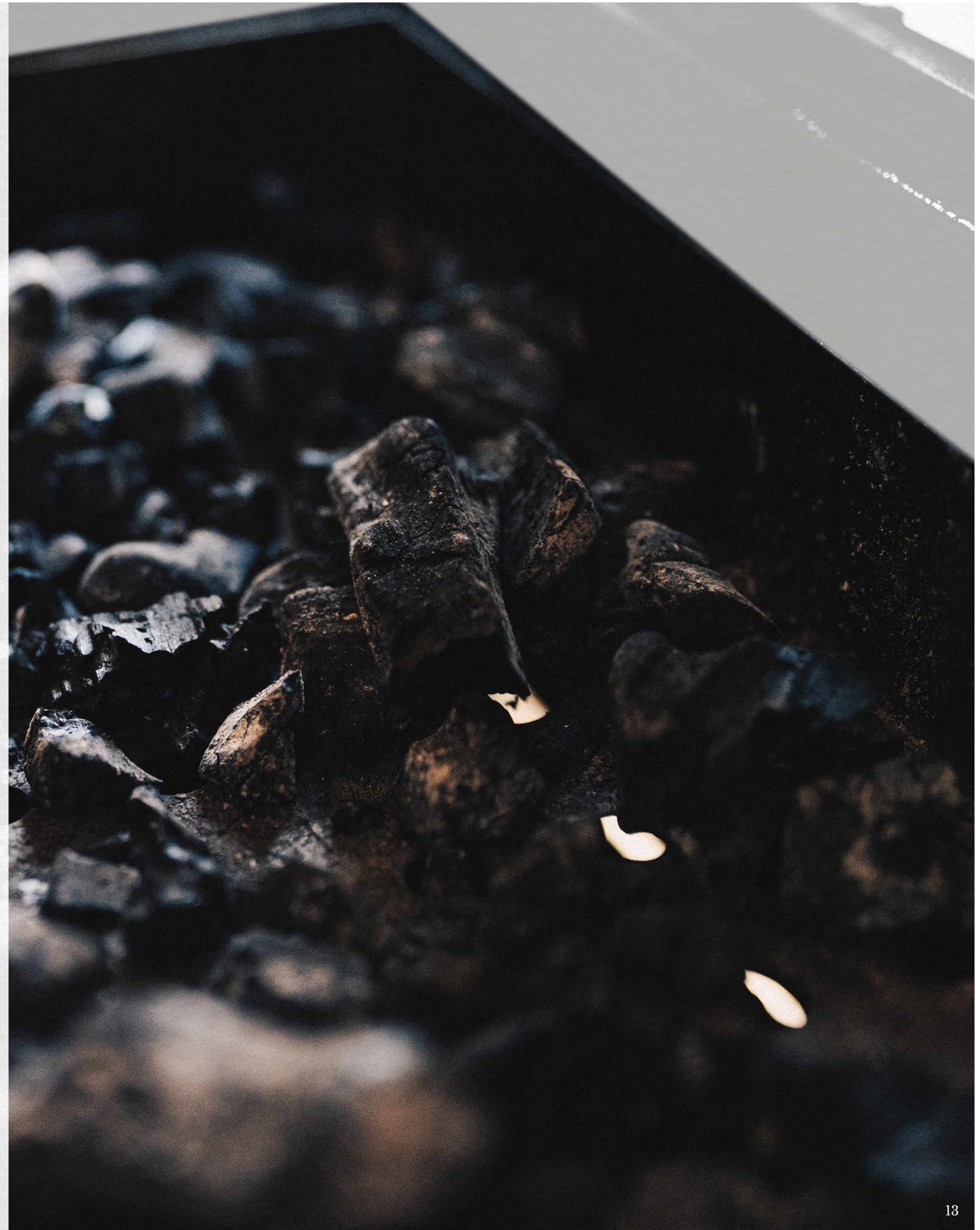
Abeledo hopes that the recent passage of the Extended Producer's Responsibility (EPR) Law, can be the start of lasting change for Pasig River. With EPR, companies will be legally responsible for the plastic packaging throughout the lifecycle of their products. There may soon be a need for them to start investing in recycling facilities. This served as a boost for the team to double up on serving data that can provide a basis for the kinds of recycling facilities that businesses will acquire.

Along with this, the team also worked on a guide for local government units about the dominant type of plastic wastes in rivers, so that there can be community-wide initiatives on reusing, recycling, or repurposing these materials.

For the EcoSquad Goals team, doing "good science" in the Philippines requires a certain amount of investment, whether in terms of money or time. They have confidence that lasting impact on plastic pollution will come with the constant involvement of citizen scientists, not only as knowledge collectors, but also as advocates of a sustainable, eco-conscious lifestyle.

How can we safeguard the environment from acid mine drainage?

Faculty members from the Department of Chemical Engineering collaborate on a research project that seeks an alternative solution to protect water bodies from acid mine drainage.



A permeable reactive barrier development

Mining and mineral processing are essential industries in the Philippines and other parts of the world. However, these industries are being challenged by the impacts of wastes generated during and after mining and processing operations.

To help address this concern, a group of faculty and students from the DLSU Department of Chemical Engineering conducted a research project on acid mine drainage (AMD), which is one of the wastes that needs to be managed properly for these industries to thrive sustainably while protecting the environment. AMD is characterized by low pH and high concentrations

of hazardous elements, and has been considered as the most widespread, serious, and costly environmental problem associated with mining and mineral processing operations.

The DLSU group was composed of project lead Dr. Aileen Orbecido, with faculty members Dr. Arnel Beltran, Dr. Michael Promentilla, and Dr. Joseph Ortenero; and research assistants Engr. Casey Oliver Turingan, Engr. Regina Damalerio, Joshua Pocaan, Engr. Christian Jay Balboa, and Engr. Cyrielle Lorio. The team worked in partnership with Curtin University, Australia, the National Research Council of the Philippines, and Carmen Copper Corporation.



Orbecido cites a report (Igarashi et al, 2020) that in the United States alone, there are over 500,000 small to midsize abandoned hard rock mines and over 13,000 abandoned coal mines, the majority of which are generating AMD that is costing the US government at least US\$1M/day for treatment—a fair warning for the local sectors, she points out.

“In the Philippines, AMD must be treated before going downstream as it can contaminate the water, soil, and life, otherwise the health and environment of the communities, animals, plants, and the environment can cease to exist,” she emphasizes.

Because of the serious negative environmental impacts of AMD, she shares that researchers have continued to explore promising prevention and remediation solutions. Active and passive remediation methods—which both work by raising the pH of AMD to precipitate dissolved contaminants—are currently considered the most practical options for treating AMD.

“Passive treatment is seen to be a sustainable approach for legacy or abandoned mines in the Philippines. Our research group has explored single- or successive- process trains of alkaline drain and/or permeable reactive barrier (PRB) using locally available materials namely, limestone, laterite mine wastes, concrete waste, and fly ash for the treatment of AMD,” she explains.

According to Orbecido, these materials are locally abundant and cost effective. They also have either neutralizing capability and/or adsorption capacity that could increase the pH and remove heavy metals in the AMD.

With the completion of their project last year and in support of an integrated approach for the sustainable management of acid mine drainage, other projects in the same direction are currently being undertaken by DLSU’s Chemical Engineering faculty. Among these are two projects—Project 1 entitled “A novel technique for the recovery of valuable metals from AMD through bimetallic

materials”, with research lead Dr. Vannie Joy Resabal of Mindanao State University – Iligan Institute of Technology; and Project 2, “A two-step neutralization ferrite process as active remediation technique for environmental treatment of AMD”, with Orbecido leading the research team. Another ongoing project is “Biodiversity positive mining for the net zero challenge (Bio+Mine)”,

with project leaders Dr. Richard Herrington of Natural History Museum in United Kingdom and Dr. Arnel Beltran of DLSU.

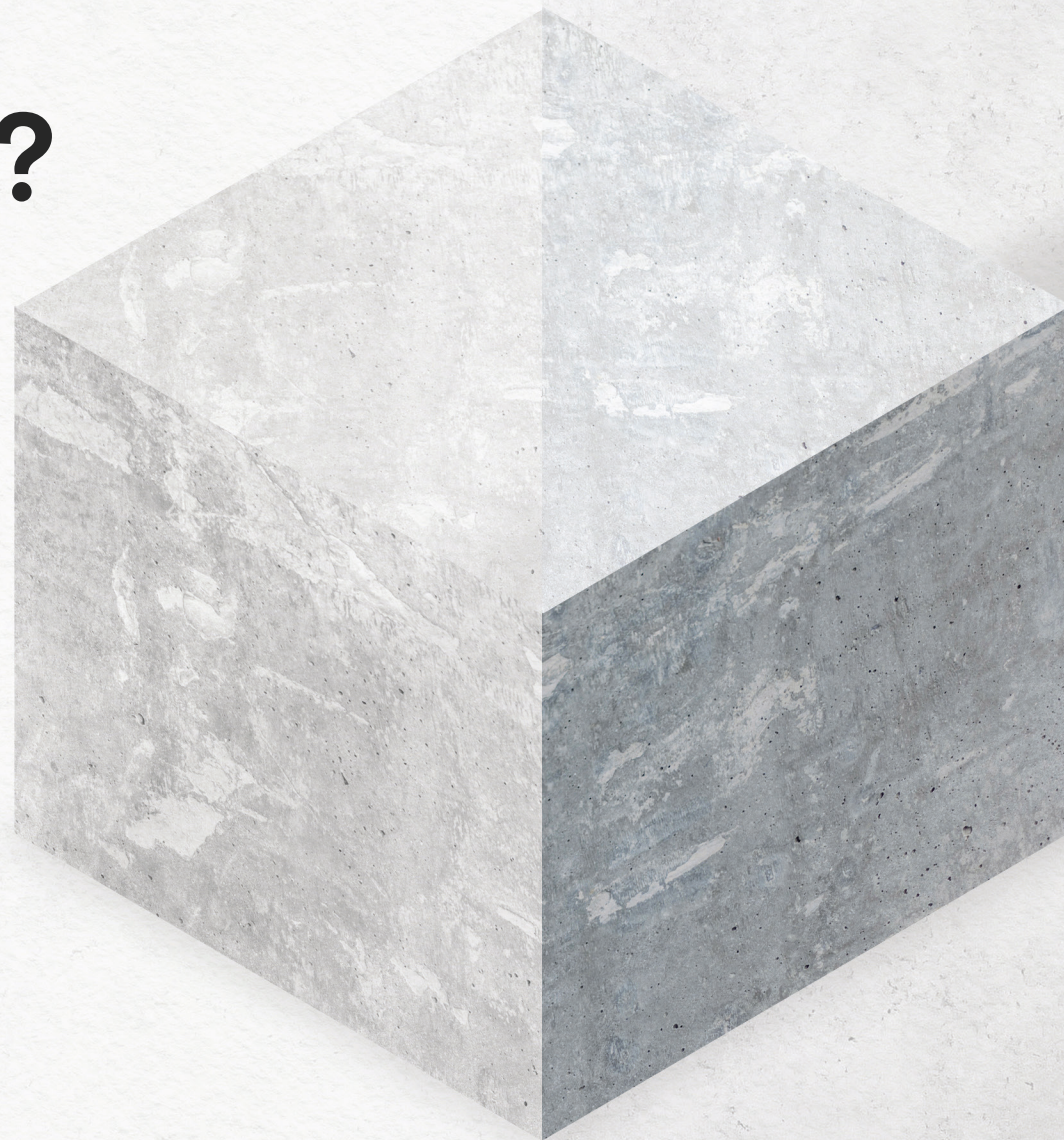
“The results of our studies will help the government and other stakeholders in crafting policies and initiatives that will help protect our water resources as well as all living things that are dependent on them,” she says.



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Is there a new way to create concrete using industrial waste?

A researcher from the DLSU iNano Laboratory explores three types of industrial wastes to determine if these can be utilized for the production of affordable, reliable, and safe geopolymer concrete.



In pursuit of geopolimer research

Geopolymer concrete, or concrete made of industrial waste material such as fly ash, is not a new discovery by any means. The production of this type of concrete not only reduces stocks of industrial waste, but it also helps reduce carbon emission by reducing Portland cement demand. It has been deemed as a viable alternative to Portland cement, and it can be used for the construction of residential and commercial buildings.

Contributing to the further study of geopolimer concrete, DLSU iNano Laboratory researcher Christian Maestre, together with Physics Department Full Professor Dr. Gil Nonato Santos, conducted research on three types of industrial wastes found in three different areas in Mindanao: gold mine tailings from impounding facilities of a carbon-in-pulp plant located in Mainit, Davao de Oro, coal fly ash from a coal power plant in Villanueva, Misamis Oriental, and sugarcane bagasse ash from a sugar refining manufacturing company in Maramag, Bukidnon.

To create the geopolimer concrete from these materials, Maestre and Santos made use of bismuth oxide nanomaterial (BiNP) as an additive filler and studied its influence on the electromagnetic interference shielding efficiency (EMI-SE) and high thermal property of the geopolimer concrete.

“By utilizing bismuth oxide nanomaterial,



we were able to increase the strength of our solid material, which is comparable to the traditional cement. We were also able to enhance its thermal resistivity. And lastly, we were able to increase its efficiency to shield electromagnetic interference or radiation,” shares Maestre.

Following this discovery, commercial production of geopolimer concrete made from the various industrial wastes is now possible. Companies who will make use of Santos and Maestre’s study to make geopolimer concrete will not only aid in reducing industrial waste from the different areas in Mindanao, but will also contribute to the reduction of carbon emission when producing regular Portland cement. The viability for use in construction of the

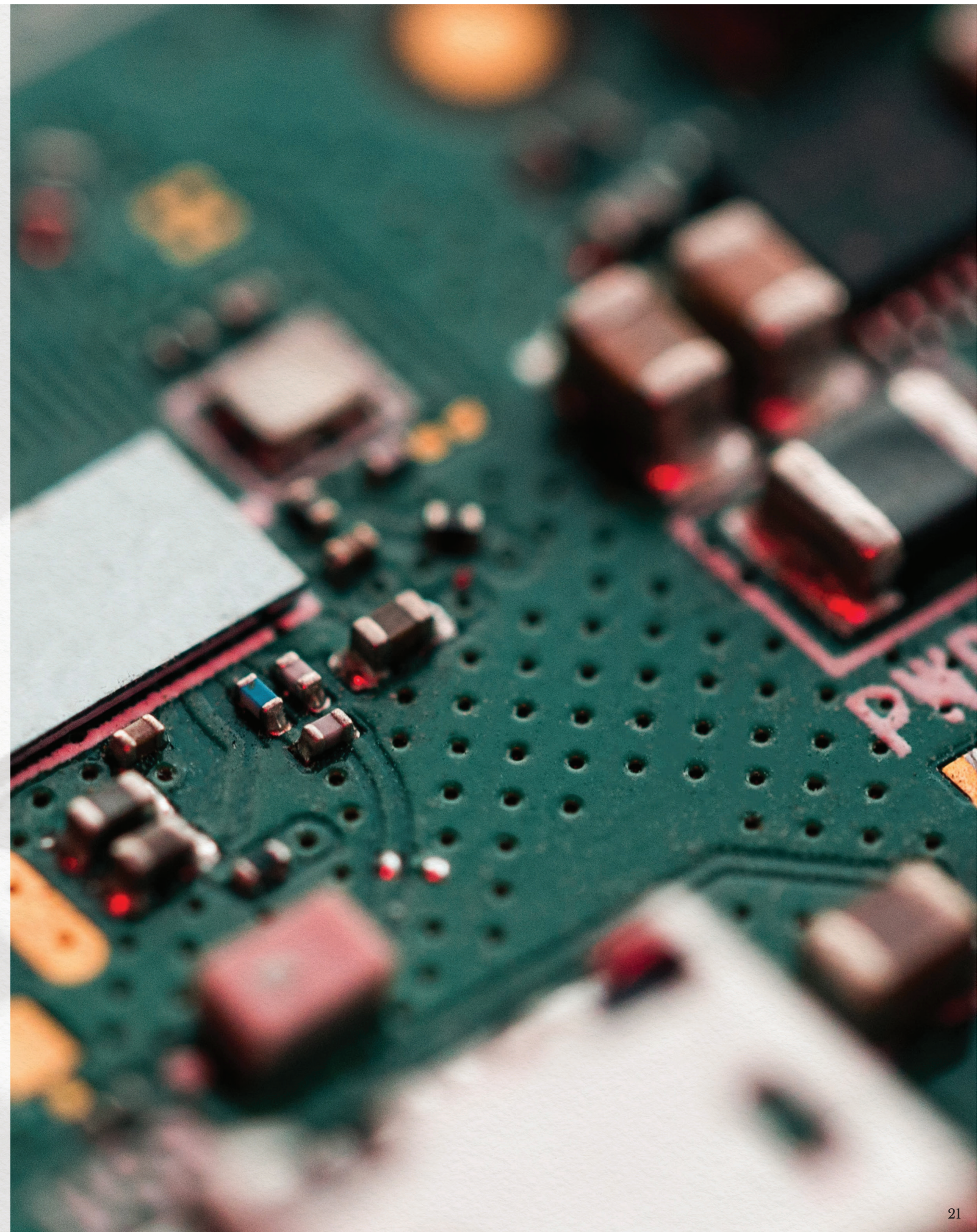


geopolimer concrete produced using BiNP, however, is still limited to residential houses and low-rise buildings. Despite this, Maestre is confident that the industry is going in the right direction in terms of looking for alternative options that are cost-efficient, affordable, and sustainable.

“For further research, we can improve on the strength of our geopolimer so we can use it for large-scale construction projects. Also, we found out that gold mine tailings contain mercury and cyanide, which are both harmful to people and the environment. We can also investigate if these toxic materials are properly immobilized or encapsulated in the geopolimer concrete,” Maestre ends.

What can this next gen AI offer to our remote communities?

One of De La Salle University's fast-rising faculty researchers, Dr. Ann Franchesca Laguna, seeks to build artificial intelligence (AI) that can learn how to learn in a faster, more energy-efficient way.



Creating memory layers with software-hardware

In 2022, the Philippine Statistics Authority released a report on Information and Communication Technology (ICT) that covered 17 sectors in the non-core ICT industries. Of the 275,735 establishments it had surveyed in 2019, the agriculture, forestry, and fishing and other service activities lagged behind in terms of use of computers and internet access, among others.

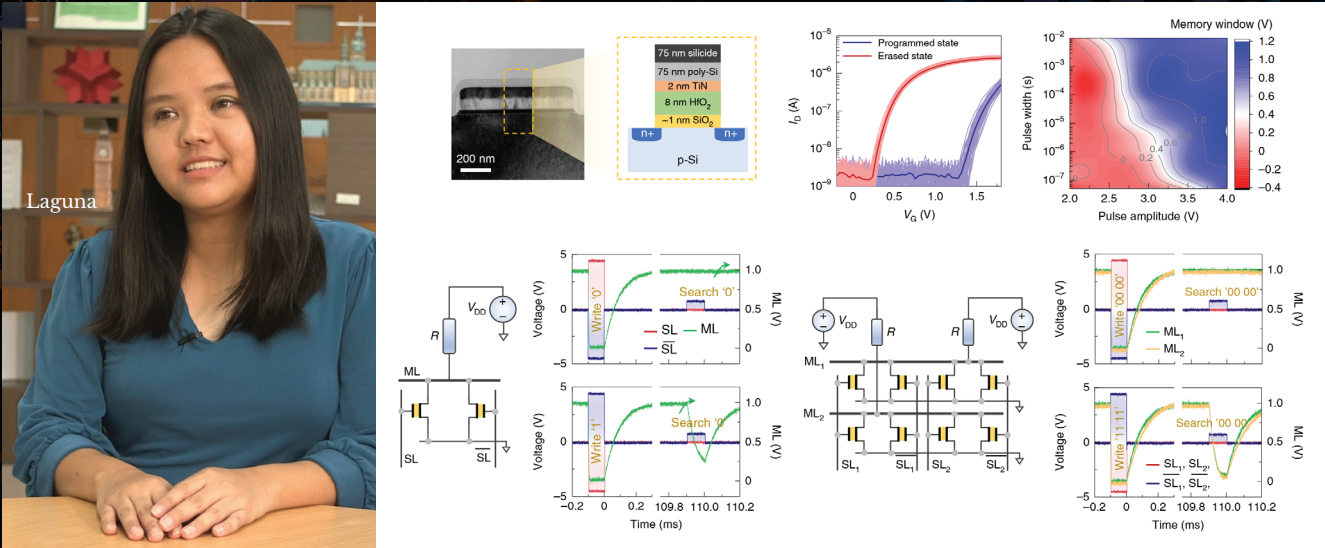
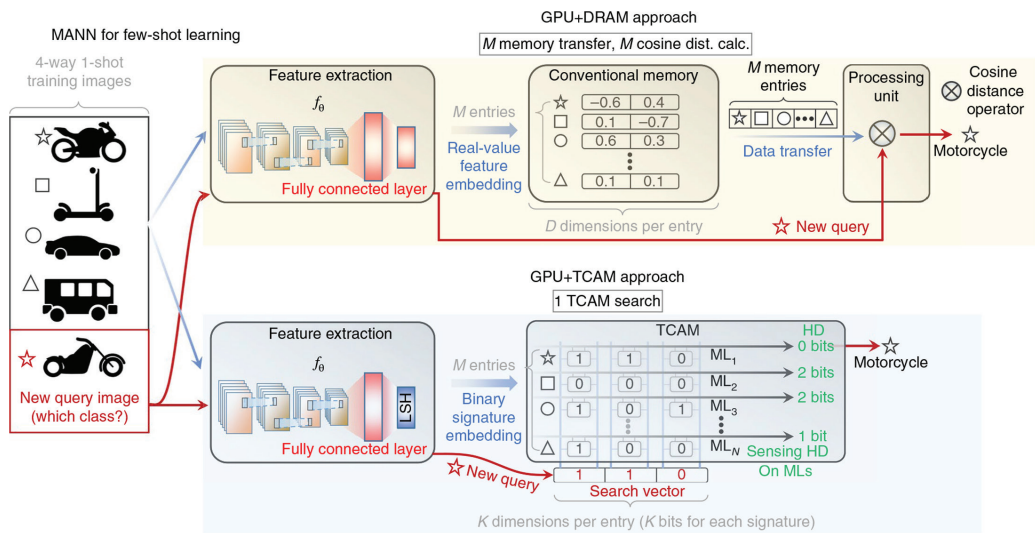
IT opportunities remain expensive and elusive for many Filipinos, noted Laguna. “My ultimate goal is to democratize artificial intelligence. I hope we can bring it to more people, like farmers or fisherfolk who don’t easily get access to the internet when they’re out in the middle of the farm, or the ocean, or the forest,” she says.

A faculty member of the DLSU Department of Computer Technology, Laguna recently completed her post-grad at the University of Notre Dame in Indiana, USA, where she was able to explore her interests in digital signal processing, artificial intelligence, and software-hardware co-design. During that period, she became a member of the Applications and Systems-driven Center for Energy-Efficient Integrated Nano Technologies (ASCENT), one of the centers in the Joint University Microelectronics Program of Semiconductor Research Corporation.



From her experience at ASCENT, Laguna directed her research thrust toward creating a greener, more accessible AI. Co-authored research papers that came out in Nature Electronics and Nature Communications (top tiered-ranked journals in

Scopus) reflected her move toward that direction. Her continuing research on meta-learning is multifaceted, with her team tackling both software and hardware components; she is handling the architecture, algorithms, and application part.



“Meta-learning is a way to teach the AI to actually learn how to learn,” she points out. Laguna further explains that the project is an attempt to make AI think a little bit closer to how humans do, as it creates layers of memories and learns to infer from old data. As an analogy to the software component part of the research, she gave an example of a person who can play the violin wanting to learn another stringed instrument like the cello. “You can certainly pick up some of the things that you learned when you were playing the violin, and apply it to the cello,” she explains.

“When we talk about AI, we talk about huge amounts of data. But with our project, what we wanted is for the AI to be able to learn with only a few examples,” she says, adding that “with meta-learning, we teach the machine to be able to reuse what it learned in the past into a different task.”

For the hardware part, her team designed “content addressable memories”, which can implement fast parallel search. “The good

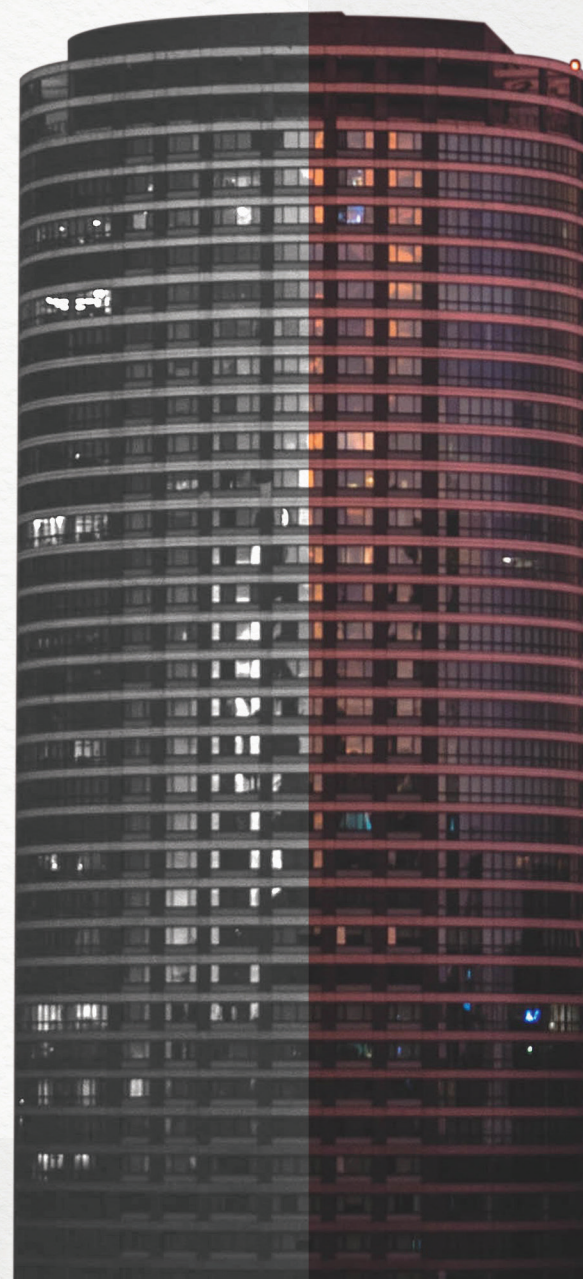
thing about meta-learning is that we don’t need to use huge amounts of data to be able to train artificial intelligence,” she shares. Using a hardware-software co-design approach promotes a cheaper, faster, and more energy-efficient AI (and therefore lesser carbon footprint).

As to the future of the project, Laguna expresses hope that this type of computing will be adopted by various sectors, in

areas like language development, health, or agriculture. Her work in meta-learning was supported by industry partners Global Foundries and Hewlett Packard. The goal is to move towards the fabrication of an entire working chip that can be used, for instance, in speech production. She shares that doing so can be quite expensive, but work continues anyway.

How can AI help us prepare for The Big One?

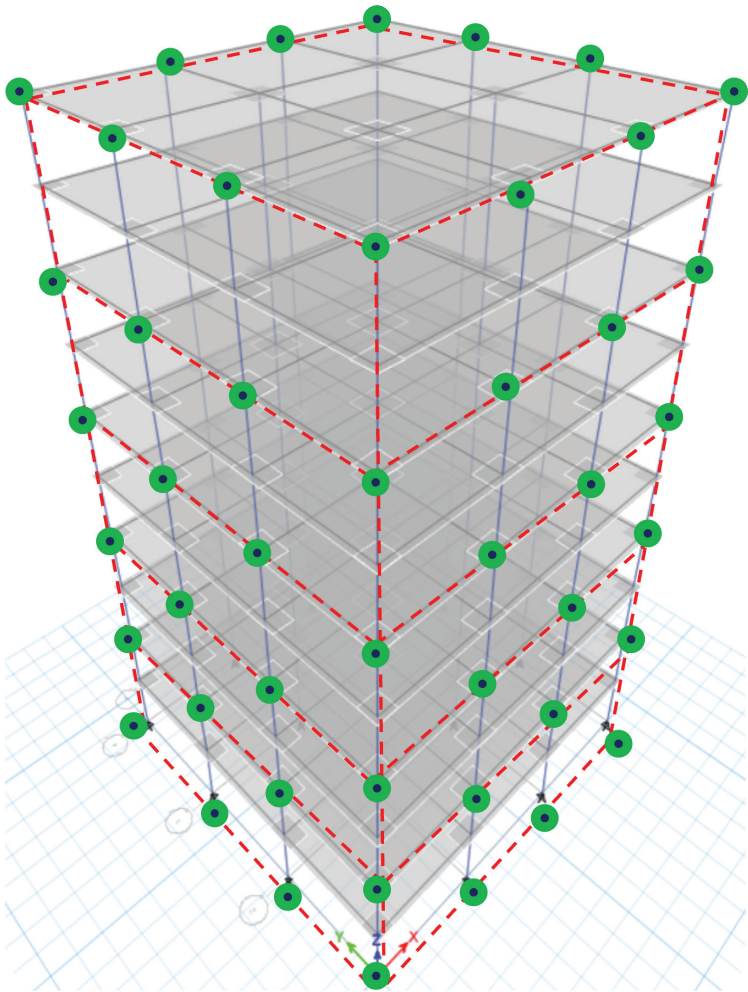
An ongoing research by faculty members and students from the Departments of Computer Technology, Software Technology, and Civil Engineering seeks to create a low-cost mesh of tremor sensors—an AI-based monitoring system that is geared towards disaster risk reduction and management, especially in Metro Manila and major cities across the country.



Intelligent structural health monitoring

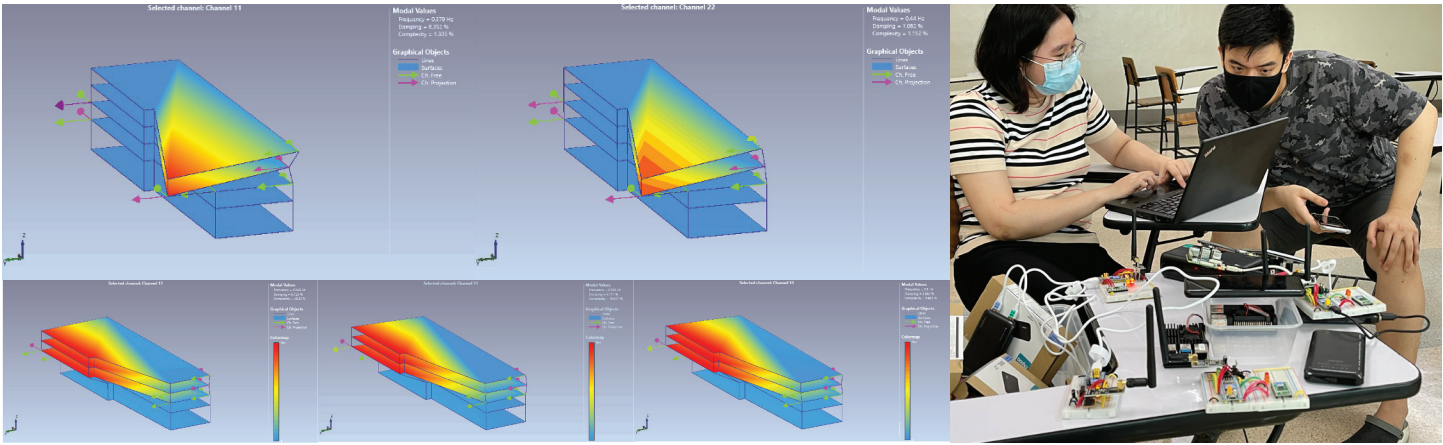
“We are preparing for The Big One,” says Dr. Marnel Peradilla, associate professor from Computer Technology and lead researcher of a three-year project called “Intelligent Structural Health Monitoring via Mesh of Tremor Sensors (meSHM)”.

Set for completion in 2024, the meSHM project is funded by the DOST Philippine Council for Industry, Energy and Emerging Technology Research and Development as part of its mandate to support research geared towards national development. In this case, the research team from De La Salle University seeks to help engineers who are in charge of planning the reinforcement of megacity structures like high-rise buildings, elevated rails, and skyways, and make them withstand major tremors.



Peradilla notes that while everyone anticipates the big earthquake, various areas are, in fact, experiencing microtremors that make structures deteriorate. These structural anomalies may also be caused by weather conditions or the structure’s weakening over time. For Metro Manila and other key cities in the country, the mesh of tremors sensors augments the current approach and implementation of detecting such anomalies in structural integrity.

“It is like a stethoscope for structural engineers. With the help of artificial intelligence, we try to find anomalies in structural signals in order to help structural engineers make decisions on the infrastructure,” he explains.



Collecting microtremors data

Peradilla shares that currently, local property owners and other stakeholders are being required by the Department of Public Works and Highways (DPWH) to deploy accelerograph—an equipment that collects seismic information when triggered by an accelerated motion such as an earthquake.

He points out that in their case, the mesh of tremors sensors collects acceleration information even without any felt earthquake

in an area. “We collect data on microtremors, which degrade the integrity of structures. With each node, we can collect a hundred samples per second, so imagine the data accumulated over a period of seven days, or a month,” he says.

Currently, the team has already developed over 50 nodes that have been deployed on the DLSU Manila Campus. Their target is to develop hundreds

more of those nodes, wrap them on a structure for a period of time, then gather and analyze the data with the help of supervised machine learning algorithms.

The team uses visualization for better report monitoring. One of their AI modules aims to create a system that can predict what will happen to a structure if hit by a certain magnitude.



Partnerships and research-based policies

The meSHM proponents are coordinating with local government units as well as the Department of Public Works and Highways for engineering works such as bridges, skyways, and flyovers. They have also recently offered support to San Sebastian Church, a heritage site.

Peradilla notes that with the project, regulatory agencies can formulate research-based policies on structural engineering. He adds that the team intends to make the meSHM available to structural firms due to its portability and mobility.

Furthermore, he underscores the major advantage of the project, i.e, it is far less expensive than the industry-grade accelerometers being required in the current system. As a low cost alternative, the meSHM project indeed paves the way for a more viable structural health monitoring system in the country, underscoring the capabilities of Internet of Things, wireless mesh networks, and artificial intelligence.

Can Filipino students be good at Math?

A team of researchers used a wide range of machine learning approaches to identify the personal and contextual factors that differentiated the lowest-performing students from other Filipino students in mathematics, both in public and private schools.

Machine learning for analyzing PISA data

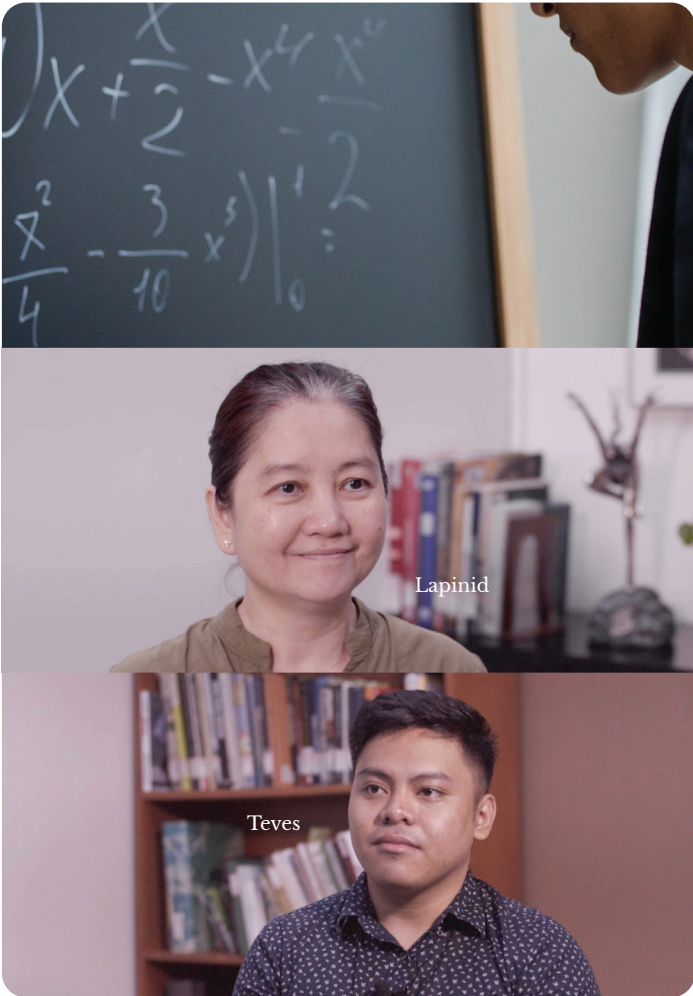
In the 62nd International Math Olympiad held in April this year, all six members of Team Philippines won a medal in one of the most prestigious mathematics competitions in the world. The country ranked 23rd out of 107 countries, a big leap from three years ago when the PHL delegation placed 43rd overall.

While this is good news, the same cannot be said about the overall situation of students’ mathematics proficiency in the country. The results of the Programme for International Student Assessment (PISA) in 2018 highlighted the overall state of Filipino students in math: The Philippines was second to the last in the subject among the countries that participated in the large-scale assessment.

According to the said study, 54.6% of Filipinos aged 15-16 years old scored below the lowest proficiency level. This showed that Filipino students have inadequate skills in mathematics compared to the same age group in other countries.

Against this backdrop, faculty members from the Br. Andrew Gonzalez FSC College of Education (BAG CED) and the Dr. Andrew L. Tan Data Science Institute (ALTDSI) formed a research team that aimed to identify the personal and contextual factors that differentiated the lowest-performing students from other Filipino students in mathematics, both in public and private schools.

The research was one in a series of collaborative DLSU studies that sought to mine invaluable insights from the PISA data. For this study, BAG CED Department of Science Education faculty member Dr. Minie Rose Lapinid was the first proponent, together with ALTDSI Executive Director Dr. Macario Cordel II, ALTDSI researchers Jude Michael Teves, Sashmir Yap, and Unisse Chua. They were led by Department of Psychology Distinguished Professor and Academician Dr. Allan B.I. Bernardo. This research was supported by the Angelo King Institute for Economic and Business Studies.



Bernardo and the team’s other PISA-related research projects include a study on reading, with BAG CED Associate Dean Dr. Rochelle Irene Lucas as the first proponent, and a study on science, with Department of Psychology faculty member Dr. Marissa Calleja serving as the first proponent.

Lapinid shared that the team first identified which of the many variables in the PISA survey could be considered factors in mathematics performance.

They used a wide range of machine learning approaches to analyze the PISA data from separate questionnaires for students and schools. Through the machine learning approach, they were able to note factors such as the student level and the role of family, as well as the teaching approach and other school characteristics. They discovered the complex, interrelated factors that related to the level of performance of math learners.

“The best model that we got was Random Forest, which is a combination of many decision trees. It basically looks at the wisdom of the crowd and we were able to get a score of 80%. This means that in a profile of the student, there is 80% certainty that the student will perform well or not,” Teves explained.

In both private and public schools, results showed that there were three variables that relate to poor performance in mathematics: low number of cell phones with internet access, low expectations of finishing a vocational degree, and low parental occupations. This meant that apart from the lack of educational gadgets and poor connectivity—which were usually identified with underachievers—Filipino students showed a low expectation of finishing postsecondary vocational education.

Moreover, poor performers from public and private schools who both have parents with low-status occupations have different occupational

aspirations. Private school students seek better occupations versus those from public schools.

“Aspiring higher occupation goals among the poor-performing private school students may probably mean they want to study in college over finishing a vocational course, while public school students with lower occupational aspirations may mean they are less optimistic about finishing a vocational course, much less earning a college degree,” the research team noted.

The research team gave the following policy recommendations: Early identification of students at risk and mitigation of likelihood of failure; sustain and intensify the efforts of LGUs and private sector in providing devices and of telecom companies in expanding access, affordability, and speedy internet connectivity in remote areas; and development of school-based interventions to assist students to plan school and life goals and targeting higher-status occupations.

They also stressed the importance of upskilling and reskilling math teachers to be able to work effectively with students who are at risk of failing and to impart the value of the subject to help attain their career aspirations. Educational institutions should also maintain the engagement of parents to monitor learning behaviors at home, keep the active participation of students in school activities, impress the value of persistence in dealing with difficult subjects, and appreciation of children’s higher education and career goals.

Lastly, the authors impressed the need to review pertinent practices and policies in the basic education system such as structure and density of the curriculum as well as time allocation per subject, assessment, retention, and promotion systems, teachers’ workload and class sizes, and teachers’ performance appraisal and incentive system. These recommendations were published in the AKI Policy Brief.

Lapinid emphasized the need to have a collective will for Filipino students not just to do well in the next PISA survey but also to improve in learning Math, as well as other subjects. “Students should strive, parents should be involved, administrators should be proactive, and policies should be in place to serve as guidelines.”

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How can BPOs support the mental health of their employees?

A research collaboration by the University of Glasgow and De La Salle University offers a system mapping approach to study the mental health and well-being of contact center agents in the country.



System mapping approach to explore mental health issues at work

A report by the IT and Business Process Association of the Philippines (IBPAP) reveals that in a survey of their industry, 83% of the respondents expressed optimism that revenue growth of Business Process Outsourcing (BPO) for 2023 is expected to beat the 2022 record. Even with forecasts of a global recession, BPOs in the country find the future a period of more opportunities and expansion.



A major contributor behind the growth of this industry are contact centers, which are third-party customer service providers. For these contact centers, enjoying the benefits of expansion also entails having to deal with stresses at work. It is in support of this growing sector that DLSU and the University of Glasgow entered into a research partnership to look into co-producing a workplace intervention informed by the systems approach to address the mental health and well-being of its employees.

The research is entitled Katawag Project – a reference to the Filipino words *kaibigan*, *kasama* meaning friend, companion and *tawag* meaning call. Combining these words makes Katawag, that means to be in a call together. Funded by the United Kingdom’s Medical Research Council and spearheaded by Prof. Kirstin Mitchell of the School of Health and Wellbeing from the University of Glasgow, the local team behind the project is composed of DLSU Department of Psychology faculty member Dr. Maria Guadalupe Salanga as country lead and Dr. Niño Jose Mateo of the Department of Counseling and Educational Psychology as co-investigator.

The Katawag project employed a systems mapping approach to study the influence of workplace demands on an employee’s health and wellbeing. This approach allows the team to better understand the contributors and effects of key mental health and wellbeing

issues faced by contact center employees.

For the research, the proponents collaborated with three work sites of two BPO companies. The collaboration involved mapping workshops that led to co-piloting an intervention

to address issues that surfaced during said workshops. The goal of the research team was to work with the contact centers, together with its agents, supervisors, and managers in co-developing an intervention that captures the unique system of the organization.

Among the top concerns of the BPO workers were stress, anxiety, and sleep, which were linked to pressure to meet targets, irregular working hours, and heavy workload. Salanga emphasized the importance of supporting mental health and wellbeing in the workplace, as she pointed out the bigger benefit of making employees “engaged, productive, and happy.”

The Katawag team identified interconnecting factors that allow for a better understanding of the needs of contact center employees. The maps they developed also identified leverage points, one of which was the crucial role that team leaders and supervisors play in the health and wellbeing of the agents. This led to the co-production and pilot-test of a health and well-being coaching session with three groups of supervisors.

For the next steps of the Katawag Project, the proponents aim to expand their scope and engage more BPO companies as they seek to establish the efficacy of the coaching sessions that were pilot-tested in the initial phase.

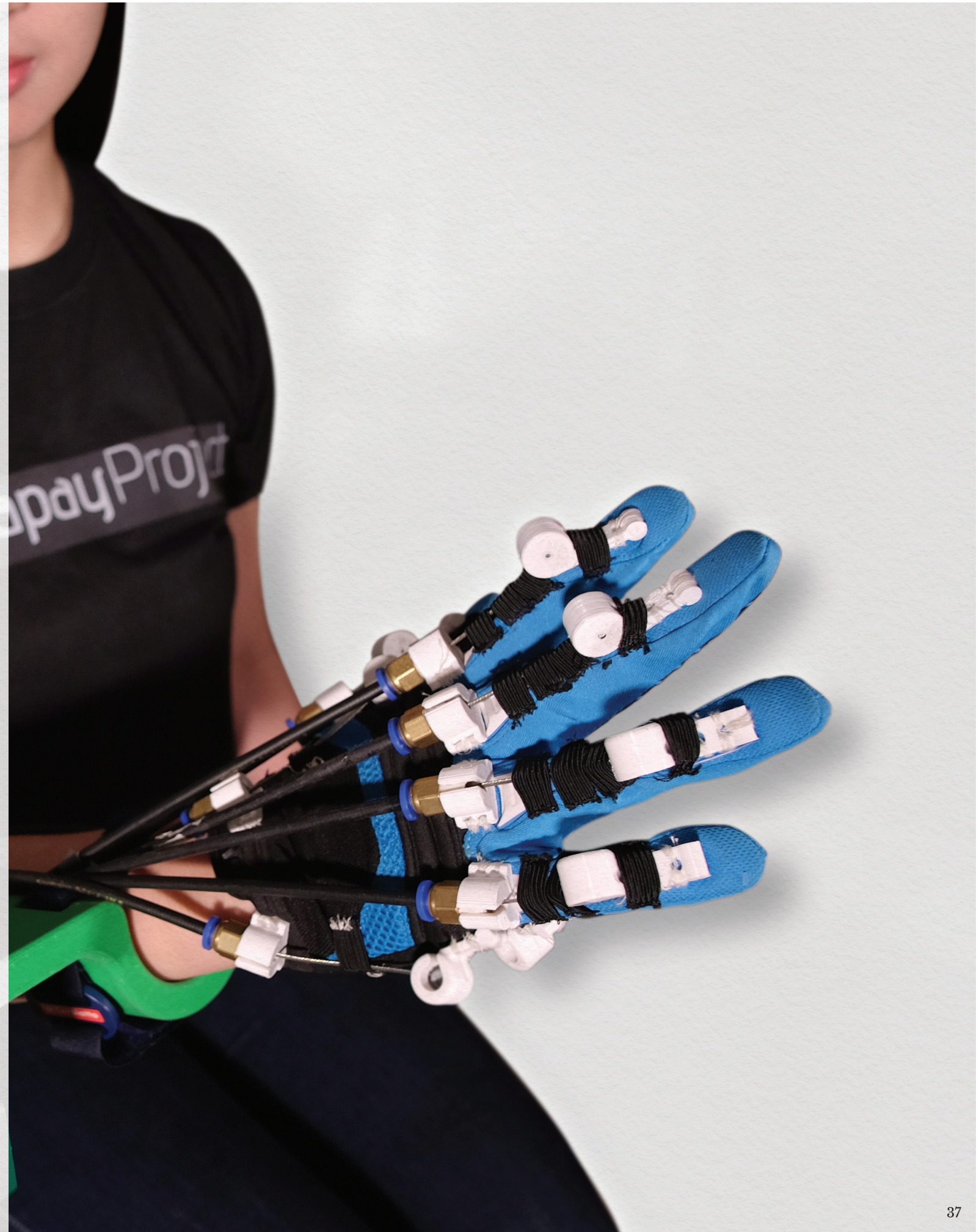


The Katawag team was featured in a seminar series hosted by DLSU’s Social Development Research Center during its 44th anniversary celebration last April.

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How can biomedical inventions reach more Filipinos?

The Project CAPACITÁ under the DLSU Institute of Biomedical Engineering and Health Technologies seeks to develop skills and knowledge on the effective commercialization of inventions that can benefit more people, especially the poor and marginalized.



Towards the commercialization of biomedical devices and health technologies

Since De La Salle University offered the country’s first biomedical engineering program in AY 2003-2004, it has successfully bagged four patent inventions from the Intellectual Property Office - Philippines and one International Patent from Singapore in the field of biomedical research, with a number of pending applications for projects developed under the DLSU Institute of Biomedical Engineering and Health Technologies (DLSU IBEHT).



Today, the Center continues to pursue trailblazing research, with grants from the DOST-Science for Change Program (DOST-S4CP) for three major projects under the Neuro Robotics Technology (NeuRoTech) Program launched in 2022, funded by the DOST Philippine Council for Health Research and Development (DOST PCHRD) for another three major research projects in their initial stages.

For DLSU IBEHT founding director Dr. Nilo Bugtai, the Center’s achievements and continuing work, such as the development of exoskeletons for the rehabilitation of stroke and injury victims, reflect the shared commitment of the University and faculty to reach developing areas in the country, where affordable medical devices and facilities are limited.

“Our mission is to help accelerate the development of biomedical devices and health technologies by providing state-of-the-art facilities and services to research universities and institutions and enabling them to transform their ideas into market-ready products,” Bugtai says. “We also seek to develop reliable, safe, easy-to-use, accessible and affordable biomedical devices

through research done by Filipinos for Filipinos towards healthier Filipinos.” It is with this commitment that DLSU IBEHT has pursued the DOST PCHRD-funded Capacity Building for Researchers, Inventors, and Technology Transfer Personnel in Commercializing Biomedical Devices and Health Technologies, better known as the Project CAPACITÁ.

Under the direction of Atty. Christopher Cruz, who concurrently heads the DLSU Intellectual Property Office (DIPO), the Project CAPACITÁ has enabled and equipped researchers, inventors, and technology transfer personnel with the necessary skills and knowledge to effectively commercialize biomedical devices and health technologies in the Philippines.

“There are many programs existing right now on commercializing technologies, but I think that there is no project yet focusing on commercializing biomedical and health technologies. This project is unique because it will dig deeper into the issues and concerns peculiar to this industry,” Cruz says.

One of the challenges in commercializing biomedical and health technologies in the country are the stringent requirements of registering a product. “Commercializing is difficult enough—what more if you were to commercialize biomedical or health technologies, which require FDA approval and other government regulatory requirements?” he points out. He notes how the layers of complexity and time-consuming process contribute to the challenge of bringing a biomedical device or health technology to the market.



According to Cruz, the Project CAPACITÁ which ran on its initial phase from 2020 to 2022 focused on providing an overview of commercialization with no special emphasis on technology. During this period, the project team was able to work with 12 universities, orienting them about the goals of CAPACITÁ. DLSU with these HEIs eventually entered into a Memorandum of Agreement as they commonly sought to engage in and promote the commercialization of biomedical

devices and health technologies in the country.

Aside from these academic partners, the CAPACITÁ team also conducted an immersion program with the help of industry partners, allowing CAPACITÁ participants to gain firsthand experience and insights into the commercialization process of biomedical devices and health technologies in real-world settings. According to Cruz, leading Philippine pharmaceutical company

Unilab contributed significantly to the success of the project.

“The next step after capacitating the researchers and tech transfer officers is to focus on the technology themselves. CAPACITÁ Phase 1 is more on giving a general idea about commercialization... CAPACITÁ Phase 2, if approved, will focus more on customer discovery—more on how to attract the market to invest into startups and spin offs of technology,” Cruz shares.



Where does my coffee come from?

A team of faculty and students from the Department of Chemistry, together with the DLSU Food and Water Institute, conducts a research project under the Food Authenticity and Traceability Program of the DOST-PCIEERD, to ensure that local products are properly authenticated to boost local farming.

Profiling the country's coffee and cacao products

Showcasing the best of coffee products from the Robusta beans of Ilocos Sur to the Arabica beans of Bukidnon and Davao del Sur, the three-day Philippine Coffee Expo 2023 held in June at the World Trade Center in Pasay City cast the spotlight on the coffee varieties unique to some regions of the country.



More than 6,700 industry players and enthusiasts gathered for the Expo activities, which included plenary sessions, a trade fair, exhibits, and competitions, to experience the wide range of exciting local products and to check the great potentials of the growing coffee and cacao industries.

For a team of researchers from De La Salle University, the event was an opportunity to share their study, which stands to benefit not just the local farmers and producers but also the coffee and cacao-loving consumers.

Conducted under the Food Authenticity and Traceability Program funded by the Department of Science and Technology's Philippine Council for Industry, Energy, and Emerging Technology Research and Development, the La Salle study involves the "fingerprinting" or profiling of the country's cacao and coffee beans.

"As you can see in this expo, there is an emerging market for single-origin coffee and cacao, a market which is focused on the geographic origin of the products," Dr. Emmanuel Garcia, faculty member of the DLSU Department of Chemistry and head of the research team, noted.

He explained that for the research, which is scheduled to be completed at the end of 2023, the team uses "stabilize isotope analysis and multi-elemental profiling" with the help of the Philippine Nuclear Research Institute. Simply put, the process allows one to identify the characteristics of the cacao and coffee beans, which have often become distinct to a place

because of factors like soil, weather conditions, farming methods, or production processes.

"For example, if you want to check whether the coffee that you're drinking is really from Sagada, you need to have scientific evidence. Our team provides that scientific evidence," he said.



Garcia pointed out the importance of the research in the face of unscrupulous businesses that mislabel their products. With the traceability and profiling project, producers and farmers can easily access information such as the consumption, sales, or availability of their goods. "It will be easier, too, to identify producers making false claims about their own products," he added.

Nearing the final stage of their two-year project, the DLSU team has created a map leading to internet-accessible data of the coffee and cacao samples they have gathered from different regions. They also anticipate more samples to be profiled with the public's growing understanding and appreciation of the scientific way of proving the origin of these products.

Garcia emphasized another important aspect of the profiling project, that is, its being a cost-efficient tool that can prove invaluable for farmers and producers.





“In a symposium I attended recently, it was noted that consumers are willing to pay 30% more than the previous price of a coffee just because the product is guaranteed or certified as authentic,” he shared. With that kind of interest, if not demand, for authentication by the discerning market, the profiling project comes quite handy.

He pointed out that by the team’s conservative estimate, it would take just about 5,000 pesos or less to profile a sample and get an authentication stamp for an entire lot of production. Such cost efficiency is meant to support local farmers as they strive to become more competitive in terms of improving the quality of their products and as they seek to protect the reputation of their brands.



Looking ahead, Garcia shared that DLSU’s Food and Water Institute, in partnership with the Philippine Coffee Guild where he is currently the chairperson, is having discussions with various regional offices of government agencies such as the Department of Trade and Industry, Department of Agriculture, and Department of Science and Technology. They are also coordinating with the Intellectual Property Office of the Philippines to help promote innovation and protect the local producers.

“Geographical identification of agricultural products is a major thrust of the IPO. What we offer is a scientific tool that makes it very doable. This is going to be very helpful and this is possible because we have a strong partnership with the industry,” he said.



Are we ready to be the next creative hub?

Various stakeholders from the government and the private sector push for the development of the creative and cultural industries through data-driven policies and programs.

Cultural Statistics Mapping and Roadmapping

Taking stock of the lessons from the COVID-19 pandemic, a significant initiative that answers the call to support the creative and cultural industries is the Cultural Statistics Mapping and Roadmapping, led by De La Salle University and funded by the National Commission for Culture and the Arts. This groundbreaking project aims to provide comprehensive insights into four key sectors: visual arts, performances and celebrations, gastronomy, and cultural heritage.

DLSU Culture and Arts Director and project leader Glorife Samodio shares that prior to this project, there was a lack of comprehensive data in the Philippines on the size, contribution, and employment figures of these cultural sectors.

With this, the project laid out five main objectives: (1) formulate operational definitions for the sectors, (2) provide estimates on registered establishments, added value, and employment, (3) map establishments based on their role in the creative value chain, (4) develop a primary data gathering instrument for measuring informal establishments, and (5) create a data-driven roadmap for recovery and growth in collaboration with stakeholders.



Adopting industry frameworks from the United Nations Educational, Scientific and Cultural Organization, United Nations Conference on Trade and Development, World Intellectual Property Organization, and local counterparts to measure industry size and economic activity, the project successfully established operational definitions of the cultural sectors, provided estimates on key statistics based on available national-level data, and mapped establishments according to their role in the value chain. Through collaborative roadmapping workshops, sector-specific directions were formulated to drive



recovery and growth strategies. The research team also proposed a data gathering instrument to capture information from informal establishments, recognizing the significance of micro-businesses and freelancers. They emphasized the importance of consistent data collection, stakeholder collaboration, and regular collection of cultural statistics by government agencies to facilitate future projections and trend analysis.

Key Findings and Recommendations

Overall, the project recommendations stressed government support, collaboration, education, training, and innovation as essential elements in revitalizing the cultural sectors, supporting artists and workers, and preserving Philippine cultural heritage.

Performance and Celebrations Domain

The study broadened its scope to include various artistic expressions and recommended improving data collection through collaboration and training, while recognizing the informal economy's key activities and occupations.

Visual Arts Sector

Initiatives to bridge career gaps for artists were proposed, such as integrating arts into the school curriculum and providing training on financing and marketing. It also suggested addressing challenges related to raw materials and establishing arts councils for better monitoring and action.

Gastronomy Domain

The study highlighted the connection between culinary tourism and heritage and recommended developing the agricultural sector, strengthening the food supply and tourism value chain, and preserving culinary heritage through research, education, and innovation.

Heritage Sector

Defined the sector across various perspectives and identified six subsectors and emphasized the importance of reporting on the industry's structure and performance. It acknowledged the strength of the Heritage Law of 2009 in preserving cultural heritage.

DLSU leads PHL’s research productivity in 2023

Two professors from De La Salle University are included in Research.com’s 2023 rankings of the best scientists in the world based on D-index (discipline-filtered h-index).

Prof. Raymond Tan and Prof. Anthony SF Chiu, both University Fellows and Distinguished Full Professors of the Departments of Chemical Engineering and of Industrial and Systems Engineering, respectively, are the only scientists from the Philippines in their respective disciplines.

Tan is listed in the subject area of Engineering and Technology, ranking 1,043 in the world. Chiu, on the other hand, is listed in Social Sciences and Humanities, ranking 3,518 in the world. They also both appeared in the 2022 edition of the list. That same year, DLSU was the top-ranked university in the country.

According to Tan, “The presence of a handful of local researchers in this list shows the potential for Philippine

research to be truly world-class. However, our country is also badly underrepresented compared to other nations in a similar developmental stage, which underscores the need for our universities to ramp up efforts to develop globally competitive scientists.”

For more information, visit: <https://research.com/scientists-rankings/engineering-and-technology> and <https://research.com/scientists-rankings/social-sciences-and-humanities>



DLSU faculty recognized in 2023 NAST Awards

Several De La Salle University faculty members received recognition in the 2023 National Academy of Science and Technology (NAST) Awards.

The most notable award went to University Fellow Dr. Elmer Dadios, who was bestowed the title NAST Academician. Filipino scientists elected as Academicians have made exemplary contributions to science and technology and have advanced its cause in the country.

Other faculty awardees are:



Dadios



Aruta



Concepcion



Tantengco



Laguna



Gue



Garabiles

Outstanding Young Scientist Award

Dr. John Jamir Benzon Aruta
Department of Psychology

Dr. Ronnie Concepcion II
Department of Manufacturing Engineering and Management

Dr. Ourlad Alzeus Tantengco
Department of Biology

The Outstanding Young Scientist (OYS) Awards are given to young Filipino scientists below the age of 40 years who have made significant contributions to science and technology.

NAST Talent Search for Young Scientists

Third place
Dr. Ann Franchesca Laguna
Department of Computer Technology

Special Citation winner
Dr. Ivan Henderson Gue
Department of Mechanical Engineering

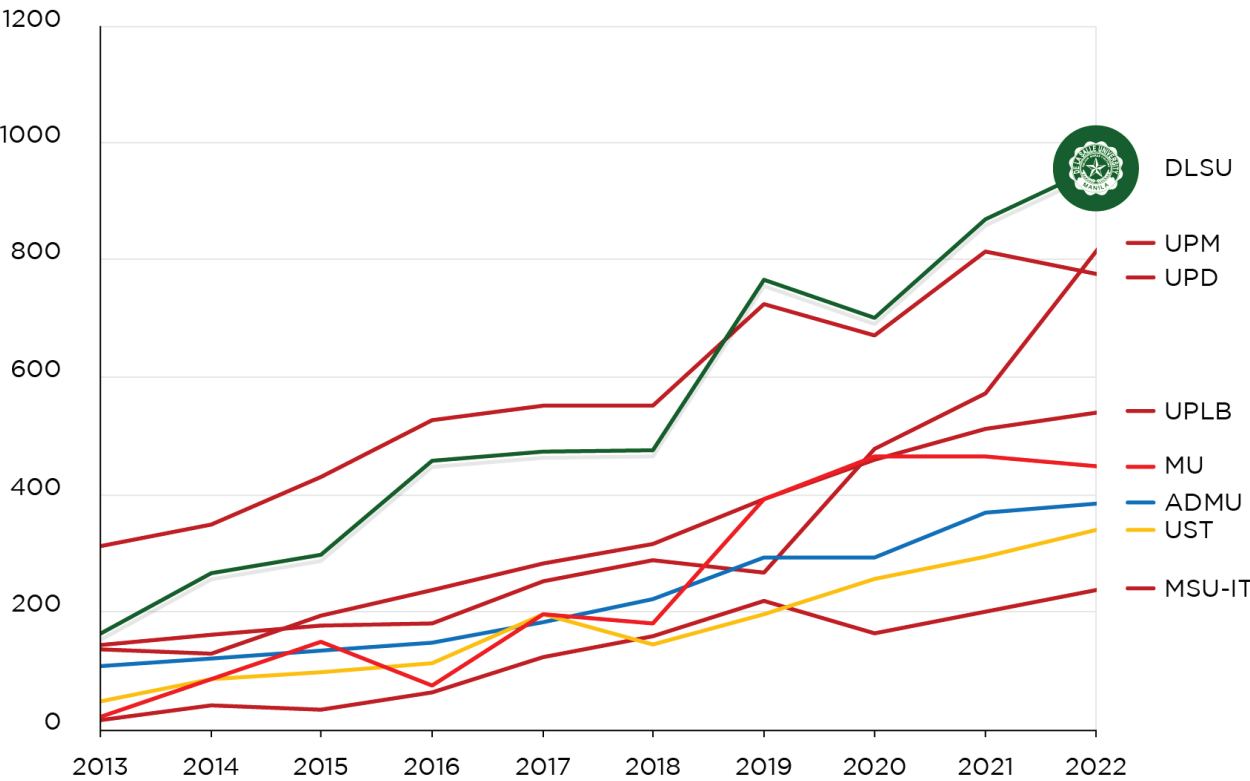
The National Talent Search for Young Scientists is a project of NAST to encourage young people to pursue a career in science.

NAST Outstanding Scientific Paper

Dr. Melissa Garabiles
Department of Psychology
Department of Computer Technology

The Outstanding Scientific Paper (OSP) Awards given annually for papers published in Thompson Reuters or SCOPUS listed journals in the Philippines within five years preceding the award.

DLSU leads PHL’s research productivity in 2023



Based on records in Scopus database (covering publications such as journal articles, conference papers, and book chapters) as of June 2023, DLSU was the most productive research institution in the Philippines since 2019.

Scopus is the largest abstract and citation database of peer-reviewed literature: scientific journals, books, and conference proceedings.

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