



July 2022  
Issue #10

DE LA SALLE UNIVERSITY

HEALTH • SAFETY • SUSTAINABILITY

# Questions





WE ASK TO

KNOW.  
ACT.  
CHANGE.

# QUESTIONS

## QUESTIONS

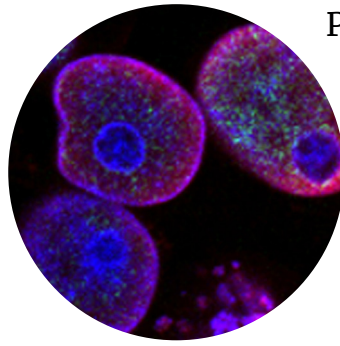
As the world steadily makes headway in the battle against the pandemic, DLSU faculty researchers contribute their own breakthroughs and new insights on health, safety, and sustainability. Through collaboration with global experts and local communities, they continue to seek alternative solutions for the improvement of the quality of life in the country and the preservation of the planet.

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**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."



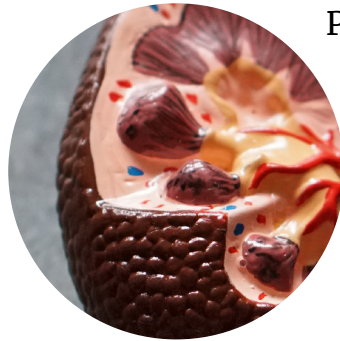


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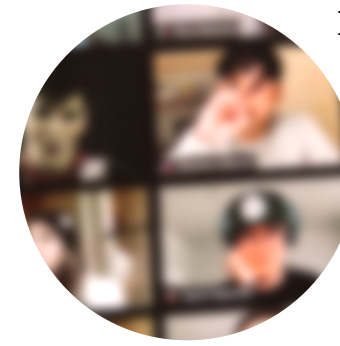


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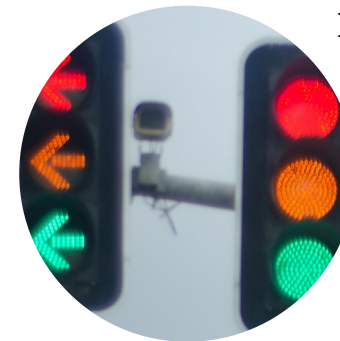


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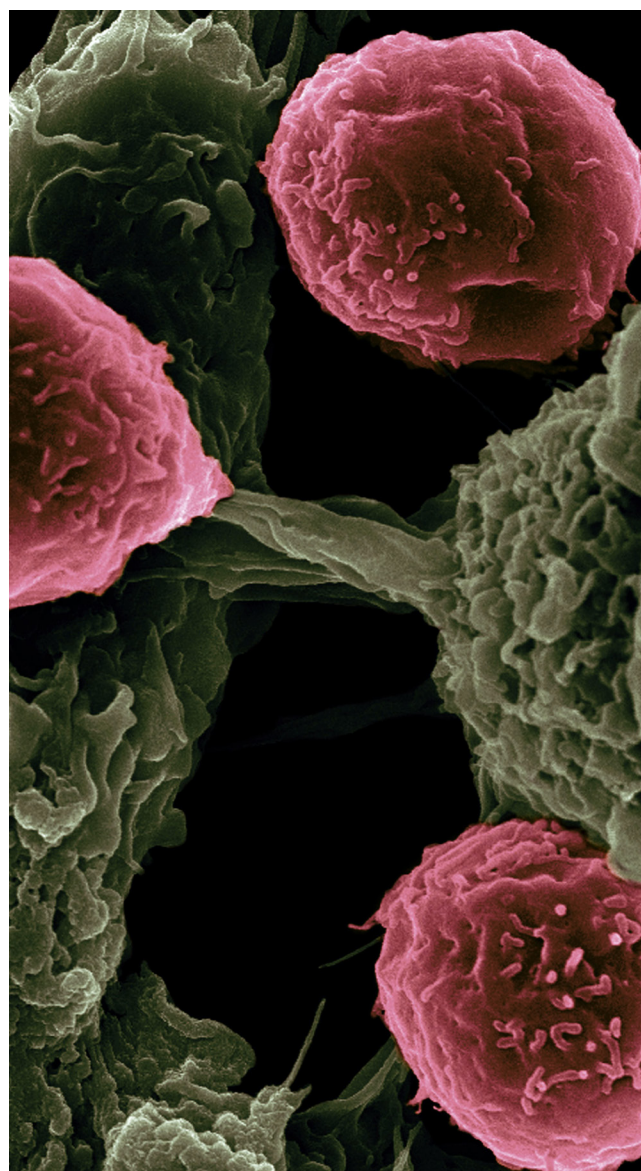
## How can we further understand cancer?

Cancer is one of the leading causes of mortality worldwide, and its incidence has steadily increased over the years, causing enormous human and economic cost and putting immense strain on our society's healthcare system. In the Philippines, based on the most recent Globocan data, there were approximately 154,000 new cancer cases and 93,000 cancer-related deaths in 2020.



# A novel approach to the development of new treatment protocols

Numerous significant breakthroughs in cancer management have been developed over the years that have vastly improved patient survival. However, cancer cell resistance to common therapeutics as well as relapse continue to pose challenges, which is why intensive research worldwide is focused on understanding novel processes critical in cancer that could lead to the development of new treatment protocols.



The upcoming study of Dr. Rafael Espiritu of the Department of Chemistry seeks to contribute new knowledge in cancer research, particularly in the investigation of three processes, namely necroptosis, ferroptosis, and pyroptosis, using metabolomics and transcriptomics in the context of colorectal cancer.

The project, titled “Investigating regulated necrotic cell death in colorectal cancer using a multi-omics approach,” has an approved P15.2-million grant from the Department of Science and Technology’s Philippine Council for Health Research and Development and will run for three years starting January 2023.

Together with Espiritu in this project are Dr. Rodolfo Sumayao, also from the Department of Chemistry, Dr. Anna Karen Laserna from the Central Instrumentation Facility of DLSU’s Laguna Campus, and Dr. Anish Shrestha of the Software Technology Department.

Helping the team with the study are Dr. Ma. Luisa Enriquez from the Department of Biology and St. Luke’s Medical Center Research & Biotechnology unit, who will ensure appropriate choice and quality of biobank samples and provide advice/assistance in handling and processing of the tissue samples; Dr. Rubi Li from the Human Cancer Biobank of St. Luke’s Medical Center, who will assess clinical features that can be associated with a particular metabolomic and transcriptomic profile; and the former postdoctoral laboratory of Espiritu, now at the University of Cologne, Germany, which will provide the necessary cell lines.

## NOT YET ADEQUATELY EXPLORED

The proposed study is a novel approach to investigating regulated necrosis in cancer—an area that has not yet been adequately explored, especially in the country. By using multi-omics techniques, the project seeks to identify previously unknown molecular actors in the context of regulated necrosis that can be exploited as novel anti-cancer targets.

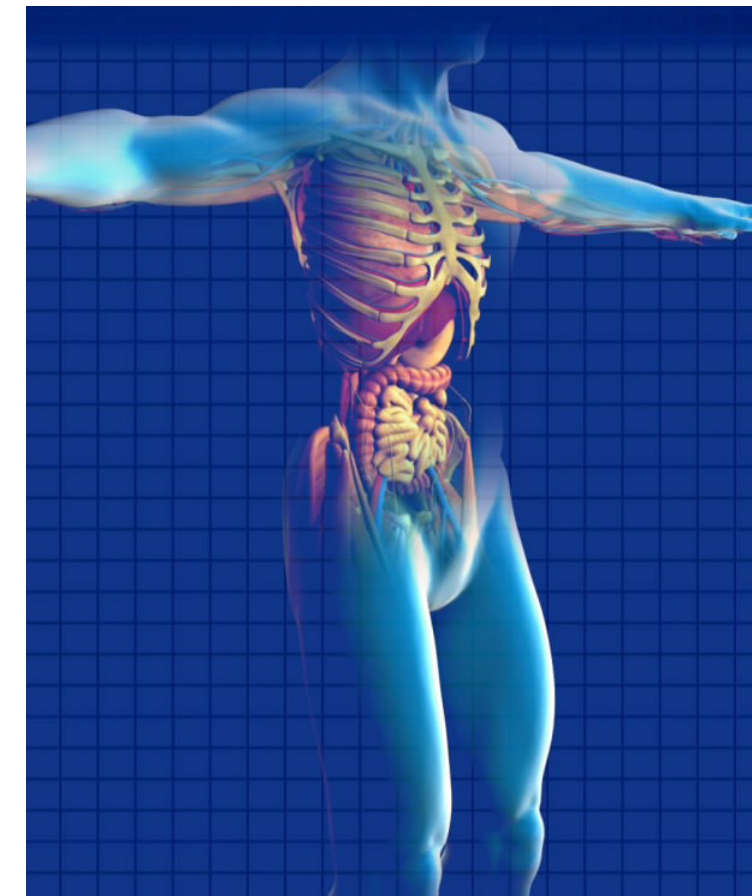
In addition, considering the possible role/s of these cell death pathways in other diseases, the scientific

expertise and experience that will be obtained from this project could be extended to gain meaningful mechanistic insights on other diseases.

“These are all promising opportunities that could place the research team, and the Philippines in general, in a very good position to make significant contributions in this rapidly developing field of study that is undoubtedly still in its infancy,” shares Espiritu.

Once done, the project will pave the way for a more robust applicability of regulated necrosis in clinical colorectal cancer samples in the country. This will also serve as a basis for or to complement wider population studies in the future and identify biomarkers that could be developed for general use.

Moreover, a potential clinical utility is on its possible use in cancer precision/personalized medicine, e.g. clinicians could request omics analysis to get insights on patient treatment response in the context of these novel pathways and make reasonable prognosis.



## APPLYING THE APPROACH TO OTHER DISEASES

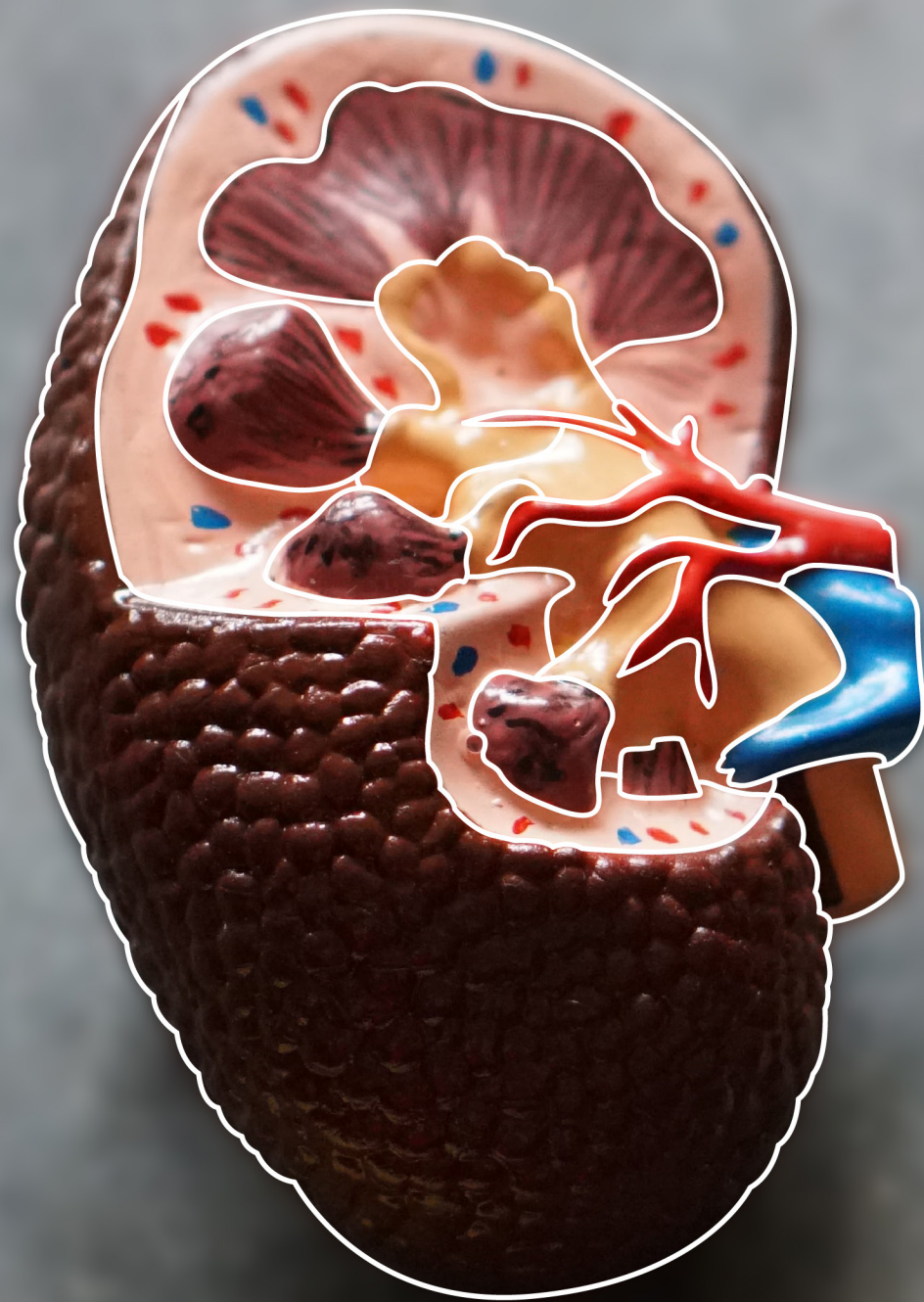
With the future in sight, the researchers envision that the project’s data will be the basis for undertaking a larger multi-omics study of colorectal cancer tissue samples from the country’s biobanks. This could result in the identification of Filipino-specific colorectal cancer signature and putative biomarker/s within the framework of exploiting these pathways for chemotherapeutic purposes.

“We are also looking at extending the multi-omics experimental approach and bioinformatics pipeline that will be developed in this work to other suitable cancer cell line/s and their corresponding clinical samples, particularly breast cancer,” Espiritu explains.

“In addition, there is also a big potential to apply this approach to other pathological conditions or diseases where these pathways could have a role, as with neurodegenerative diseases, cardiovascular diseases, and viral and bacterial infections.”

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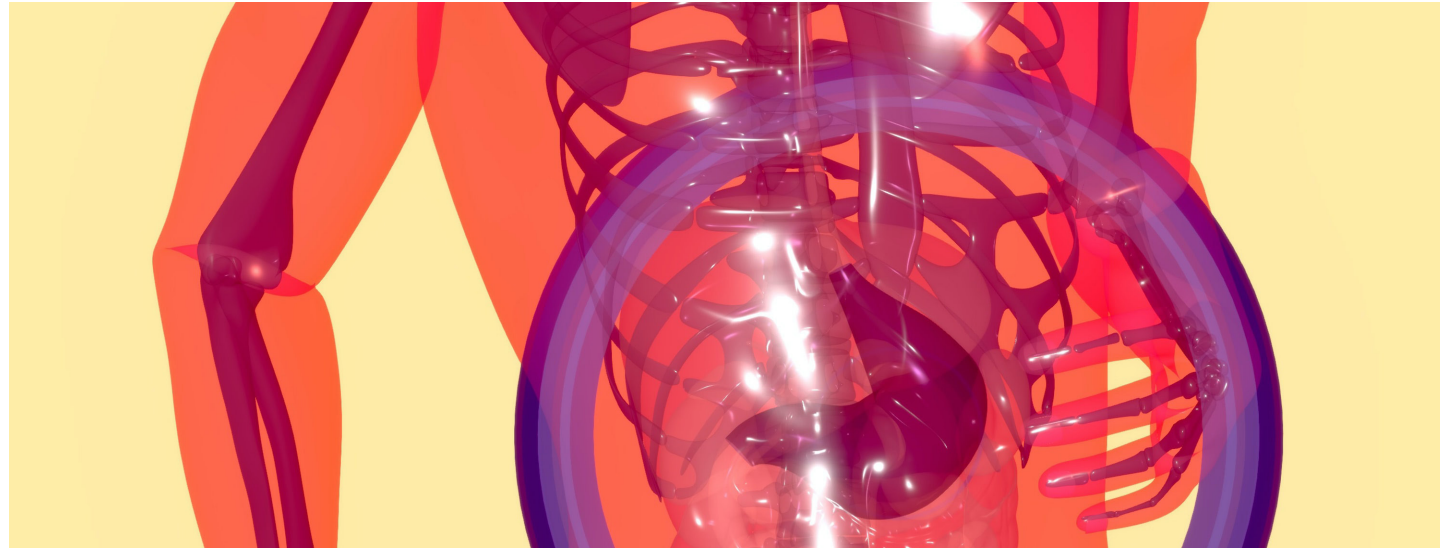
## How can a **damaged kidney** be saved?

The concept of tissue engineering has been steadily gaining ground over the past 30 years, but in the Philippines, it seems unfamiliar to many and is still in its infancy. Tissue engineering involves a multidisciplinary exploration towards health recovery, with researchers seeking ways to repair or regenerate tissues, or substitute damaged organs.



# A multi-faceted approach to addressing kidney shortage

At De La Salle University, a faculty team at the Biomaterials and Tissue Engineering Laboratory (BiMaTEL) is spearheading research in this field. With initial support from the Commission on Higher Education (CHED) - Discovery-Applied Research and Extension for Trans/Interdisciplinary Opportunities (DARE TO) Research Grant, the group was able to embark on a multifaceted approach to address the pressing issue of kidney shortage in the country.



“We envision robust research and development on bioengineered kidneys to help improve the lives of thousands of Filipinos suffering from kidney-related diseases,” BiMaTEL head and Department of Chemical Engineering (ChE) Full Professor Dr. Nathaniel Dugos says. A report from the *American Journal of Kidney Diseases* notes the prevalence of the problem in the Philippines: over the past decade, dialysis increased by an estimated 400%; chronic kidney disease is now the 10th leading cause of mortality in the country.

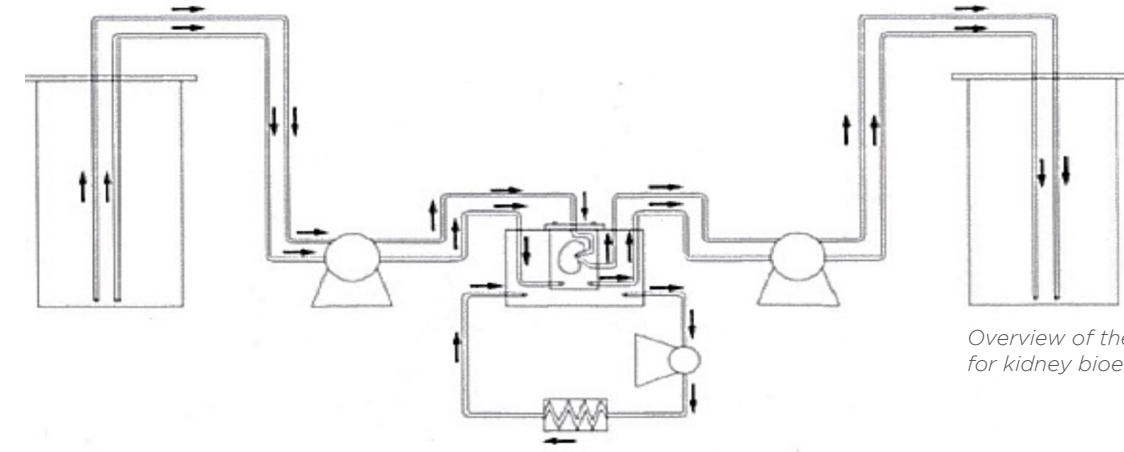
He points out that while dialysis and kidney transplantation are recognized as the best available treatments for kidney failure, getting such remains a major challenge. “Dialysis cannot replace the homeostatic and endocrine functions of the kidney while for transplantation, patients must tolerate the immunosuppressive medications for life to prevent organ rejection.”

“Another major problem is the shortage of compatible donor organs, which has spawned desperate measures such as the illegal kidney

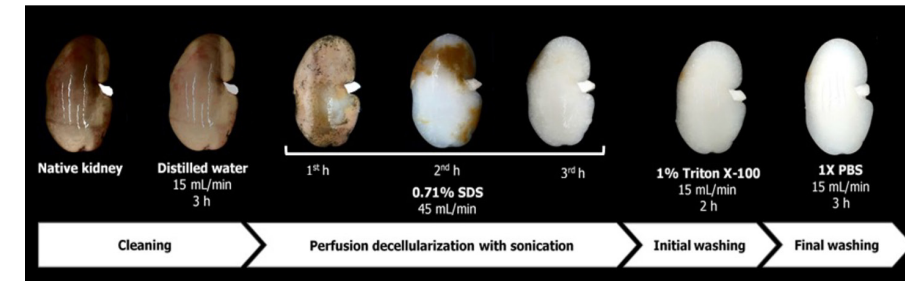
trade. With our research, we hope we can help our people, especially the vulnerable ones who are prey to organ trafficking,” he adds.

Early this year, the group celebrated their first patent: a whole kidney bioengineering approach titled, “Method and system of organ decellularization using ultrasonic bath.” It allows the quick generation of whole kidney ECM (extracellular matrix) scaffolds from an animal organ such as porcine kidney, thereby minimizing chemical usage and retaining its structural integrity.

The setup, which utilizes the synergy of chemical perfusion and sonication to improve the decellularization of whole kidneys for easier removal, is a breakthrough in their ongoing efforts to develop potential kidney replacements. Dugos reveals that BiMaTEL was able to generate “an acellular kidney tissue with preserved ECM components only within two hours”—quite short compared to the long processing period that goes on from days to weeks under existing protocols.



Overview of the patented protocol for kidney bioengineering.



Kidney bioengineering protocol developed by the team.



BiMaTEL also explores other additive manufacturing technologies such as 3D bioprinting (left) and electrospinning to develop potential tissue replacements.

## A MULTITUDE OF APPLICATIONS

Together with his team, Dugos expresses hope that the system they invented (“one of the most noteworthy outputs of BiMaTEL because through this, we have shown that we are capable of producing world-class research”) would jumpstart further research patents.

Aside from focusing on transplantation, they are looking at the development and characterization of biomaterials that can be used in various applications such as 3D bioprinting, 3D cell culture, and a drug delivery system. These biomaterials will be designed depending on the type of treatment for a particular patient.

In partnership with the National Kidney and Transplant Institute (NKTi), they are moving towards clinical trials and ultimately, the actual

application of their work in renal therapy. Dugos shares that BiMaTEL also aims to develop biomaterials intended for the repair and reconstruction of other tissues such as skin, blood vessels, heart, and lungs. “Through our work, we hope to establish a positive recognition, trust, and support from the public towards tissue engineering. That is something that we can work and excel on.”

### ABOUT THE TEAM

The team behind the BiMaTEL patent is composed of Prof. Nathaniel Dugos (lead inventor) and co-inventors Say Sreypich (Chemical Engineering or ChE), Dr. Custer Deocaris (Biology), Dr. Susan Roces (ChE), Dr. Lawrence Belo (ChE), Dr. Cynthia Madrazo (ChE), Joseph Rey Sta. Agueda (Manufacturing Engineering and Management), Tosha Mae Manalastas (ChE), and John Martin Mondragon (Biology).

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# Can Citizen Science save our coral reefs?

To the unfamiliar, “Citizen Science” may sound like a superhero in an animated movie. It is actually a technical concept in research referring to the practice of involving the public (non-scientists) in data gathering as part of a collaborative project with professional scientists.





# Coastal community engagement in coral reef monitoring

Citizen Science is part of the latest efforts of the marine scientists at the DLSU Br. Alfred Shields FSC Ocean Research Center in their fight to save the country's coral reefs. Led by their director, University Fellow Dr. Wilfredo Licuanan, and working around pandemic restrictions, the team used the best of their WFH tools, such as meeting apps, social media, and digital manuals, to equip locals in coastal communities with data gathering skills critical to coral reef monitoring.

## CORAL COVERS UNDER THREAT

The Philippines, along with Australia and Indonesia, makes up the Coral Triangle, which waters possess the concentration of the world's coral reefs. Communities naturally developed near these bountiful waters and have remained dependent on marine life supported by the coral reefs. Apart from food and livelihood, communities also benefit from coral reefs as self-regenerating breakwaters, providing protection from storm surges, tsunamis, and sea-level rise.

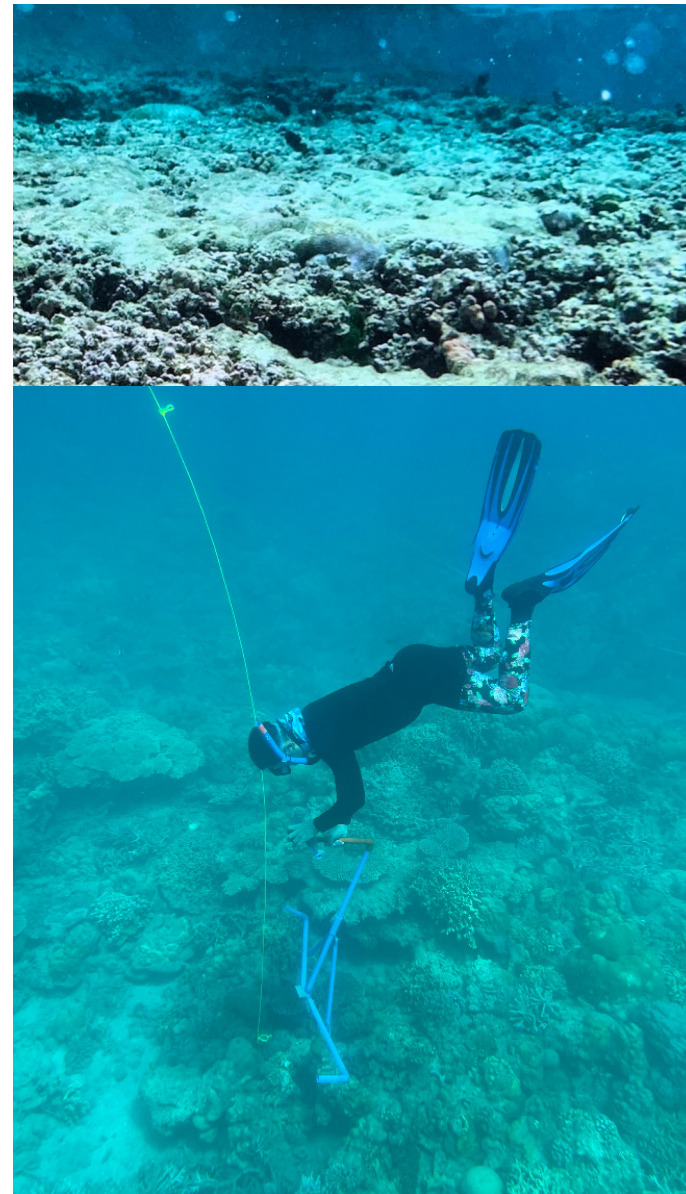
Over the years, human activities and climate change have taken a destructive toll on coral reefs. Coral covers, the area occupied by live coral reefs, remain under threat from rising sea temperatures, illegal fishing practices, overfishing, and pollution in coastal waters. The Philippines and Indonesia are among the top sources of plastic pollutants in the area.

The most palpable effects on humans have been devastating. Sharp declines in fish populations and marine biodiversity shut down livelihoods, while frequent storm surges cost lives and property. These effects demonstrate how even the world's richest resource can be finite and its destruction catastrophic to human life.

In a recent article by National Geographic journalist Kennedy Warne, scientists projected that by 2050 more than 90 percent of the Coral Triangle's reefs will be critically threatened by climate impacts.

They predict that "mass bleaching events, a phenomenon that signals critical endangerment of coral reefs, which used to happen once every

few decades, soon may happen every year, as the concentration of atmospheric carbon dioxide continues to increase. What rising sea temperatures don't kill, acidification will. Reefs will reach a tipping point where the carbonate coral structure starts to dissolve faster than it can be formed. When that happens, they will begin to disintegrate. The most diverse ecosystem in the ocean—a planetary feature for 240 million years—will start to disappear."



## CITIZEN SCIENCE IN REEF MONITORING

One of the scientists interviewed by Warne was Licuanan. But while the latter agrees that the effects of climate change to oceans and coral reefs are inevitable, he thinks that they can be slowed down. He believes that efficient reef cover monitoring will enable scientists to focus and intervene where and when needed.

In his recent article in ASEANFocus "Citizen Science for Monitoring Coral Reefs," Licuanan argues that current efforts by the scientific community in reef monitoring may not be enough: "Traditionally, status reports from scientists are limited to information about changes in the health of coral reefs only after such changes have occurred. Management requires real-time information on the state of reefs, which could only be derived from detailed monitoring of the same reefs over time."

He believes that Citizen Science can provide the multiplier effect needed to maximize the impact of the reef monitoring work of a small number of marine scientists.



## ALWAN METHODS

Using Zoom, YouTube, and a set of video training materials, his team embarked on a series of online training sessions to teach coastal residents how to gather information for a more time-sensitive approach to marine conservation.

The training sessions, delivered in the vernacular, refer to Alwan (Filipino for "to comfort") Methods for an outline of the basic approaches to data gathering. With these, marine scientists and their trainees are expected to deliver "critically required actionable information" for the alleviation of endangered corals.

Data gathering requires actual diving in seas, although the surveying techniques are

taught online, in compliance with pandemic restrictions. Trainees are taught what to look for when monitoring coral reefs; how to spot indications of decline or improvement. For example, observing the presence of Butterflyfish is a good indicator of coral reef health, while the increased presence of a kind of starfish can mean a decline. Alwan Methods also provide more rote technical training such as how to mark areas that were surveyed and how to properly logged of gathered data.

The training sessions also cover the medicinal applications of sea resources, such as venom from cone snails used in treating epilepsy.

For Licuanan, the primary goal of Citizen Science may be the efficient and timely data gathering in aid of reef monitoring efforts. In the training sessions, however, marine scientists would also touch on the significance of the community aspect involved. It is not lost on them that Citizen Science can have a more impactful and lasting effect beyond the research skills it imparts. It involves stakeholders in a way that they are able to understand their roles in the delicate ecosystem of coral reefs and can be part of a lasting solution.

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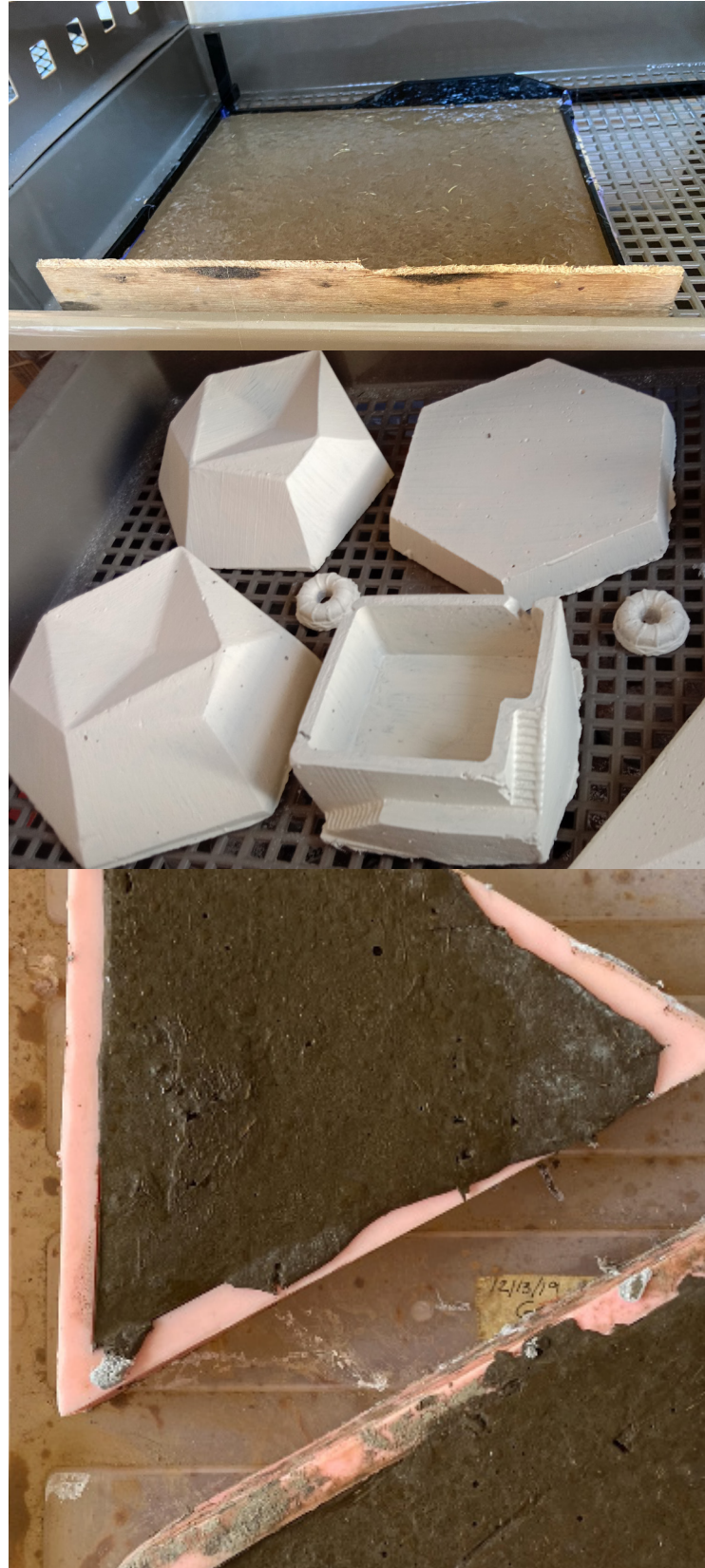
# What can help sustain the construction industry?

In early 2022, a team from De La Salle University's Geopolymers & Advanced Materials Engineering Research for Sustainability (GAMERS Lab) was granted a patent by the Intellectual Property Office of the Philippines. Their project, which focuses on a method for chemically treating plant cellulose fibers, marks a milestone in their continuing efforts to develop geopolymers.



## Eco-friendly substitute to conventional cement

Compositionally inorganic and considered stable materials, geopolymers are an eco-friendly and cost-effective substitute to conventional cement. Various studies have shown that these have approximately 80% lower greenhouse gas emissions than that of ordinary cement.



For the GAMERS Lab, geopolymers offer a sustainable solution to the challenge of building the local construction industry. Their first patent helps set on solid ground their vision of tapping natural and abundant materials that can be used for construction; for the country, it contributes to the bigger pursuit of creating sustainable cities and communities.

Lead inventor and Department of Chemical Engineering Full Professor Dr. Michael Angelo Promentilla, who is also the prime mover behind the GAMERS Lab, shares that the team's current project is called GMATriCS (Geopolymer and Alkali-Activated Material Technology as Eco-innovative Composite Products). The study on potential commercial translation of a previous research project funded by the Philippine Council for Industry, Energy, and Emerging Technology Research and Development (PCIEERD) of the Department of Science and Technology (DOST), GMATriCS aims to develop a marketable product based on geopolymer technology. It also seeks to identify the appropriate market segments for their prototype and assess its growth potential.

The team previously worked on materials like coal fly ash, mine waste, and biomass ash—all abundant and locally available. Under the DLSU Innovation Grant that they received in 2019, they designed and developed a geopolymer-based composite board, which is being tested for both indoor and outdoor applications, such as insulated walls, external and internal walls, and insulation for ceilings, floors, and doors.

## REUSING, RECYCLING, AND UPCYCLING MATERIALS

GMATriCS Product Development Lead Ithan Dollente underscores the importance of pushing for the development of geopolymer technology as he notes how greenhouse gas emissions contribute to global warming and climate change. Citing TheWorldCounts, an international project created to raise awareness on important global challenges, he shares that “as of 2022, we need 1.8 planet Earths to provide resources and absorb the waste that we are producing.” The report further notes that the environmental footprint, or the measure of human demand on the Earth's ecosystem, shows that humanity has used up a third of nature's resources.

“Our overuse of resources means that we are borrowing from future generations,” he says. For the GMATriCS project team, a crucial response to this global challenge is to pursue research and projects that underscore a circular economy framework.

“This is the core of the GMATriCS project. Rather than the traditional linear economy where building materials are made with a product line mindset, we aim to shift the process to a circle production framework by reusing, recycling, and upcycling materials to the furthest extent possible,” Dollente explains.

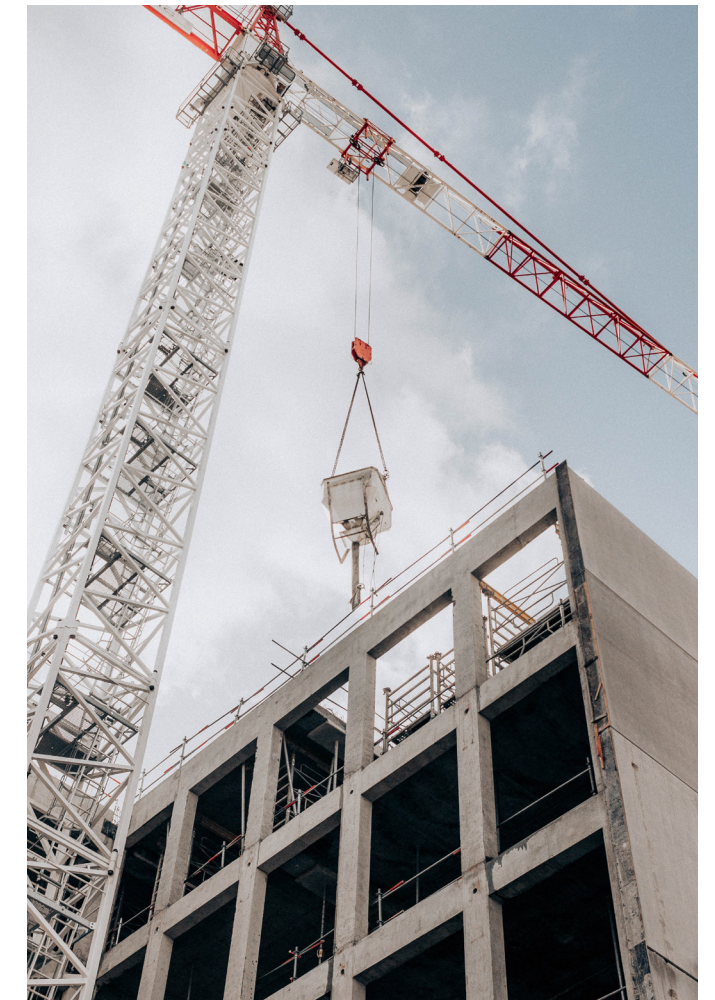
Funded by DOST-PCIEERD, the GMATriCS project envisions a system that is both restorative and regenerative to the Earth. The team's work entails tapping locally available waste as raw materials and processing these to create eco-friendly composite boards.

The team acknowledges that the commercial adoption of geopolymer technology is still low. With a market that is just beginning to be environmentally aware, its acceptance remains short-term. To gain ground in the construction industry, the DLSU researchers look at producing niche products as their commercial entry strategy.

Noting how the market warms up to new technology by seeing and interacting with niche products, they have started collaborations with both local and international partners to take

it to the next stage of commercialization. As they stress the importance of sustainability, their objective is to make their geopolymer product more popular and more acceptable than the ordinary Portland cement that is currently dominating the market. Their complex work involves designing and testing to ensure the product's desirability, feasibility, and viability in the local construction industry.

For Prof. Promentilla, the GAMERS Lab is a haven for innovative ideas, an enabling green technology for social enterprise. With more patent applications in the pipeline, they are working their way to addressing the gap in the development of a circular economy, particularly in the building and construction industry as well as other allied sectors such as coal-fired power and mining. By creating products that will not further burden the planet, they pay their share to climate change action and bring hope for the future generation.



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# Is all fair in the gig economy?

In recent years, the world has seen the rise of new forms of doing and getting work with the emergence of digital labor platforms where service transactions are facilitated via platforms or apps. However, numerous studies have documented that platform workers are at risk because of a lack of employment laws that would protect them from unfair labor practices such as receiving basic decent work protections and benefits.





# The human costs of technologically-organized work

As part of a global effort in better understanding the conditions of digital platform workers, a group of researchers led by Dr. Cheryll Ruth Soriano, Vice Chair of the Department of Communication of the College of Liberal Arts, looked into the working conditions of Filipino workers in the country's growing gig economy. The study includes gig work platforms catering to local demand for food, transportation, and general service delivery such as Grab, FoodPanda, and Lalamove that are hiring Filipino workers at an increasing pace, especially with the work displacements during the pandemic.



The project is funded and conducted in partnership with the Fairwork global network, which developed the fair work principles in consultation with the International Labor Organization, workers associations, and research institutions.

Guided by Fairwork's five pillars of fair work standards for the gig economy (Fair Pay, Fair Conditions, Fair Contracts, Fair Management, and Fair Representation), the research project examined in a comparative perspective the working conditions of nine platforms operating in the Philippines that included ride hailing (car and motorcycle taxi), food and service delivery, and logistics.

In a span of one year, the study assessed whether platforms operating in the Philippines facilitated fairer labor arrangements for workers along with the global and local conditions and labor regimes that give rise to them and that surround their future viability.

The gig economy functions on an on-demand service arrangement and categorizes workers not as employees but as partners, service contractors, freelancers, or as mere users of platform apps.

This unclear labor category makes gig workers unable to receive basic decent work protections and benefits as well as collectively bargain for better working conditions.

Soriano shares that their initial findings show that while the Philippine gig economy continues to grow and attract workers whose livelihoods depend on platforms, the absence of clear regulatory standards for the gig economy in the country translates to less than fair working conditions for many of them. She notes that the provision of social support and safeguards is not yet a standard embedded in how gig work operates, resulting in unequal conditions.

Beyond understanding the current situation, the Fairwork Philippines research also aims to exert pressure upon platforms to enact pro-worker policy changes, and offers pathways or effective regulation. Their endeavor will also move towards creating better awareness towards the human costs of technologically-organized work so that this can instigate public commitment and demand for fairer work in the gig economy as well provide crucial information to workers to help them formulate their demands.



Soriano emphasizes that “as the Philippines moves towards the Fourth Industrial Revolution, hailing ‘digital opportunities’ as pathways to national development, entrepreneurship, and employment, it is crucial that we safeguard important protections for these workers. Without fully assessing the conditions of gig work against minimum standards of decent work, we may be creating many jobs for Filipinos but under conditions that are unjust and inhumane.”

## GIG ECONOMY SITUATION IN THE PHILIPPINES

Results highlights according to Fairwork's 5 pillars of fair work standards

### FAIR PAY

In the gig economy, workers shoulder the core costs of labor from onboarding, to the vehicle and mobile device, to internet connectivity, to gasoline, and maintenance costs. The research project reports one concerning insight that many gig workers are unable to earn even the basic local minimum wage after factoring the costs that they shoulder to perform work-related tasks.

### FAIR CONDITIONS

In the nine platforms examined, some protect workers from risks that arise on their jobs but many others can do better in providing protection mechanisms. The research notes the good practice of the inclusion of safety training and emergency buttons embedded in the app, provision of accident insurance, some form of COVID-19 response, and protection from app miscalculations, scams and fake bookings, and other forms of support to mitigate task specific risks. However, platforms operating in the Philippines do not provide sick pay which is an important safety net to safeguard workers in cases of inability to work due to illness or an accident.

### FAIR CONTACTS

There is a need for many platforms operating in the Philippines to improve in exhibiting a basic level of fairness in their contracts. Some have clear and accessible terms and conditions, while others have difficult-to-understand contracts that were also not communicated well to workers. Some work agreements also allow platforms to implement changes that were not necessarily announced clearly to workers within a reasonable timeframe but can have implications to pay or working conditions. Many platforms also carried unfair terms that excluded liability on the part of the platform.

## FAIR MANAGEMENT

There is a need for the platforms to institute effective communication mechanisms for workers to advance appeals or concerns as well as publicly articulate non-discrimination policies.

## FAIR REPRESENTATION

In the Philippine gig economy, there is still much that could be done to improve conditions in terms of organization and recognition of collective bodies that can for example facilitate worker concerns or negotiate for more decent work standards.

Brokering Labor in the Platform Economy, the Fairwork Philippines project joins a global network which has released fair work scores for South Africa, India, Indonesia, and Germany, among others. These reports as well as the research methodology can be viewed at <https://fairwork>.

Collaborations and Partnerships  
University of Oxford / Fairwork Global Network

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Prof. Cheryll Ruth Soriano - De La Salle University  
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Partner Investigators:  
Prof. Virgel C. Bingham - University of the Philippines  
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Dr. Pamela Custodio - University of the Philippines Los Baños

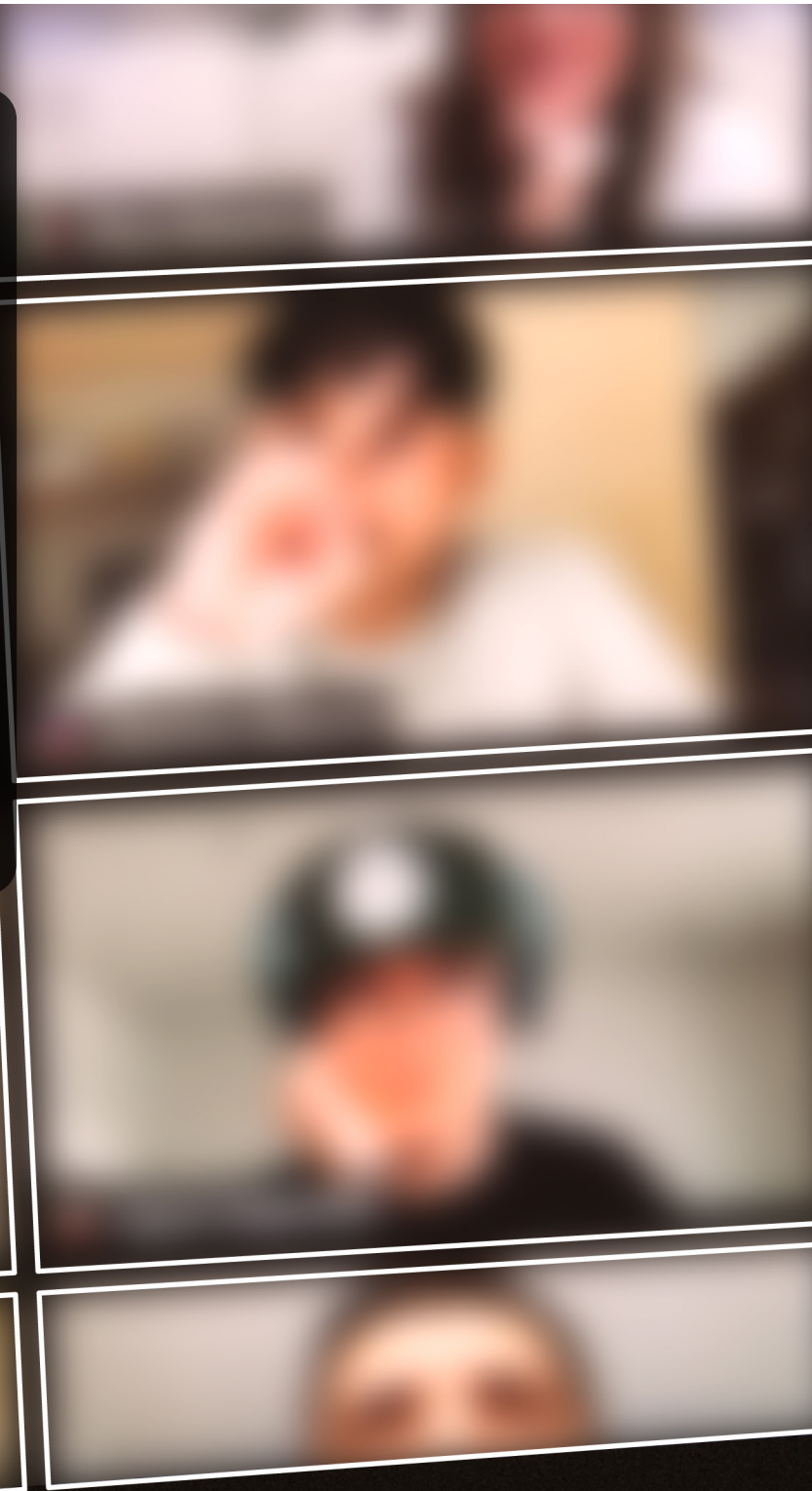
Research Associates:  
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(from August 2021-April 2022)

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# What can event organizers learn from **virtual academic conferences**?

With or without another pandemic, the local academic community is showing signs that the shift to online mode for major events, such as virtual academic conferences (VACs), will be the norm post COVID-19.





## Sustaining interest in virtual academic events

For DLSU Department of Marketing and Advertising Associate Professor and Philippine Academy of Management President Dr. Reynaldo Bautista, Jr., this shift serves as an interesting topic for the marketing sector and event organizers, as it raises a lot of opportunities if managed with a strong sense of engagement and a vision of sustainability.



Bautista recently embarked on a study that aims to find out the factors that influence individuals to sign up for VACs as well as the key elements that give them satisfaction and encouragement to participate in future VACs, if these would be staged by the same organizers.

In his research, he surveyed respondents who have attended at least one VAC to determine the intrinsic and extrinsic motivational factors that influence potential participants, as well as their satisfaction level. He also looked into the organizers' reputation as a factor, with previous studies noting that a good reputation played a key role in maintaining healthy relationships and connections with attendees (Jung and Seock, 2016) and that there exists a reciprocal link between customer satisfaction and loyalty.

His work was a further exploration of a new alternative platform for the invaluable exchange of knowledge and information among scholars regarding developments in their respective areas of discipline. It also made reference to recent studies, such as by Godovykh and Hahm (2020),

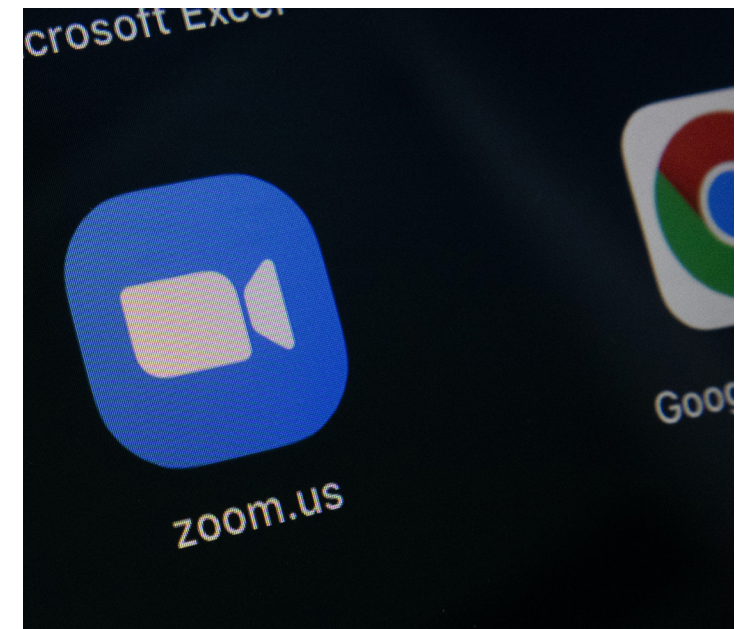
where it was noted that end-of-conference peak experiences show the strongest influence on loyalty, positive excitement levels at the beginning of a conference lead to satisfaction, and peak of experience determines the highest level of positive excitement.

Bautista likewise looked into the quality of experience in an academic setting, which another study had viewed as similar to that in a business conference. The positive feedback regarding the VAC hinges upon the realism feature of the environment, the course design, and how engaging the activities are (Bulu, 2012). Positive word of mouth (Sidavas and Jindal, 2017) and the consumers ranking the brand (Kotler and Keller, 2016) also influence the inclination of the target audience.



By partnering with other credible organizations, aligning the coverage of topics with the interest of their target audience, and creating a seamless and professional delivery of the program, organizers of virtual academic events offer an educational and entertaining experience to participants, Bautista said. For event organizers, the study is a boost to their efforts to encourage members of the academic community to sustain knowledge generation as they meet in virtual setups and undertake collaborative projects.

In his study, Bautista concluded that the reputation of the organization has a significant positive relationship to satisfaction. In terms of quality of lecture, the study also confirmed that the applicability, appropriateness, and content have a direct effect on attendee satisfaction. This satisfaction positively influences both the intent to attend another VAC by the organizer and the creation of positive word of mouth.



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# How can schools be **inclusive learning spaces**?

Linguistic heterogeneity is a central issue in the Philippine educational setting. This may be a reflection of the cultural diversity with the country's more than 110 Indigenous groups, with more than 170 languages being spoken as first languages. However, only two of these-English and Filipino-are officially recognized.





# Training for Science teachers

In 2009, the country changed its language policy which obliged schools to use regional languages as languages of instruction. However, this is true only for the first three years of primary school, after which the education will be conducted in English and Filipino. Moreover, only 19 languages were selected as languages of instruction.



This implies that most students still learn science in a foreign language, mostly in English. Learning science content and a foreign language at the same time is very difficult because the scientific language in science class is a challenge on its own since it is very different from everyday language.

In addition, many teachers are not proficient in English, and there is a lack of adequate teaching materials. This linguistic heterogeneity and the underlying cultural diversity constitute major challenges for science teaching in the Philippines.

Educating Science Teachers for All (ESTA) offers to address this issue. ESTA is an Erasmus+ project that aims to improve the level of competencies in HEIs in partner countries by professionalization and development of university science teacher educators regarding diversity in science classes (focus on language and culture).

ESTA is an international cooperation of eight universities, namely the Ludwigsburg University of Education in Germany, University of Limerick in Ireland, Ilia State University and Telavi State University in Georgia; University of Sarajevo and University of Mostar in Bosnia and Herzegovina; and De La Salle University (DLSU) and Philippine Normal University.

At DLSU, the ESTA project is led by Department of Science Education Professor Dr. Lydia Roleda.

Her team is composed of faculty with different areas of specialization: fellow DSE faculty Dr. Minie Rose Lapinid, Dr. Abdul Jhariel Osman of the Department of Educational Leadership and Management, Dr. Rochelle Irene Lucas of the Department of English and Applied Linguistics, and Vice President for Lasallian Mission Fritzie Ian De Vera.

“We conduct teacher training through webinars/workshops and lectures on inclusivity in the science classroom by employing innovative teaching approaches such as Content and Language Integrated Learning (CLIL), and the use of technology,” says Roleda who also coordinates activities between DLSU and other partner institutions in the consortium.

Training materials and modules on teaching science, cultural diversity CLIL are made available to science and math teachers. The project also provides learning equipment gadgets such as tablets and virtual reality (VR) tools and science activity kits to enrich the learning experience of their students as lessons are integrated with technology.

The researchers are cognizant of the importance of diversity and technology in teaching science. “Through this project, we would like to investigate ways to create a classroom that promotes and values diversity so students with different

backgrounds and needs will have an equal chance to succeed and thrive in an increasingly diverse society,” states Roleda.

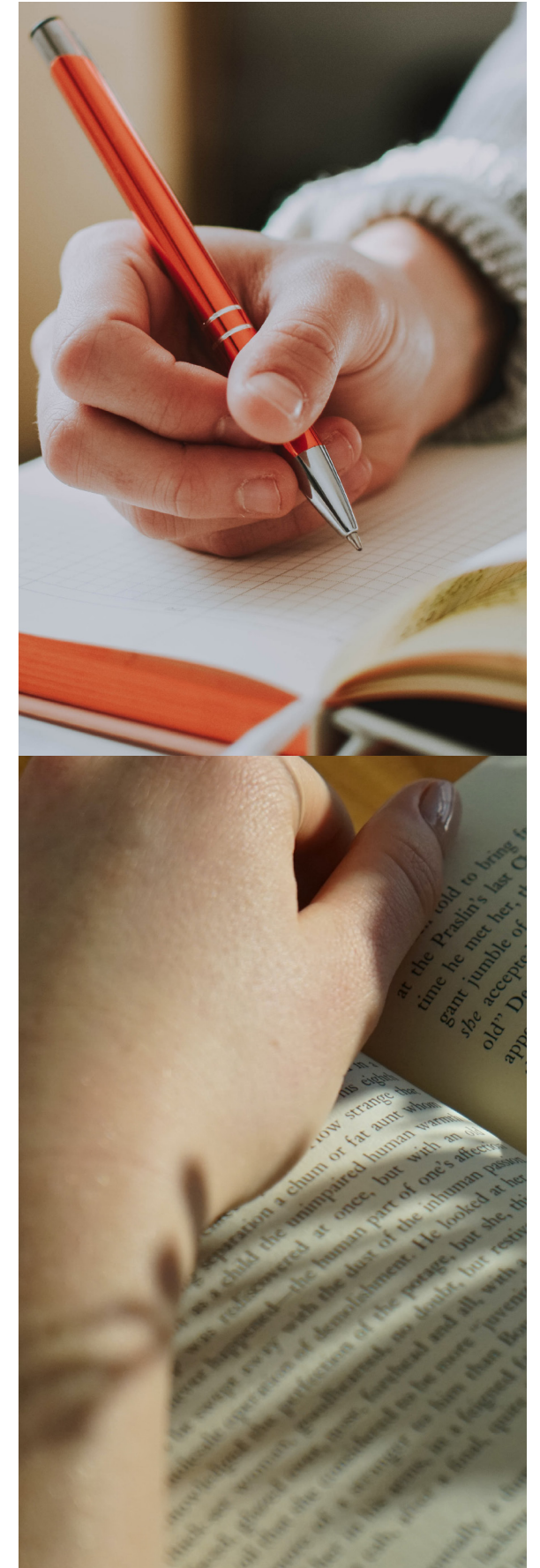
She adds that they will explore various approaches to enhance teaching science with technological integration. The research project utilizes computers, VR, iPads, and educational apps to stir students’ interest in science and keep them active and engaged in science lessons and activities regardless of their perspectives, cultures, and backgrounds. “The use of technologies provides many opportunities for teachers and students to learn science concepts and make new discoveries in an inclusive classroom environment.”

The current research benefits basic education science teachers in the development of their pedagogical practices in their courses. They will be guided and informed by various concepts on teaching methodology in science, cultural diversity, and the use of language as it is integrated with the subject content.

As Lasallian educators, the team also integrates the Principles of Lasallian education as it centers on the learner and considers the uniqueness of the individual in the teaching and learning process. Since the project highlights the importance of inclusive education by recognizing diversity in the classroom, the training will develop awareness and deeper understanding among teachers teaching any subject.

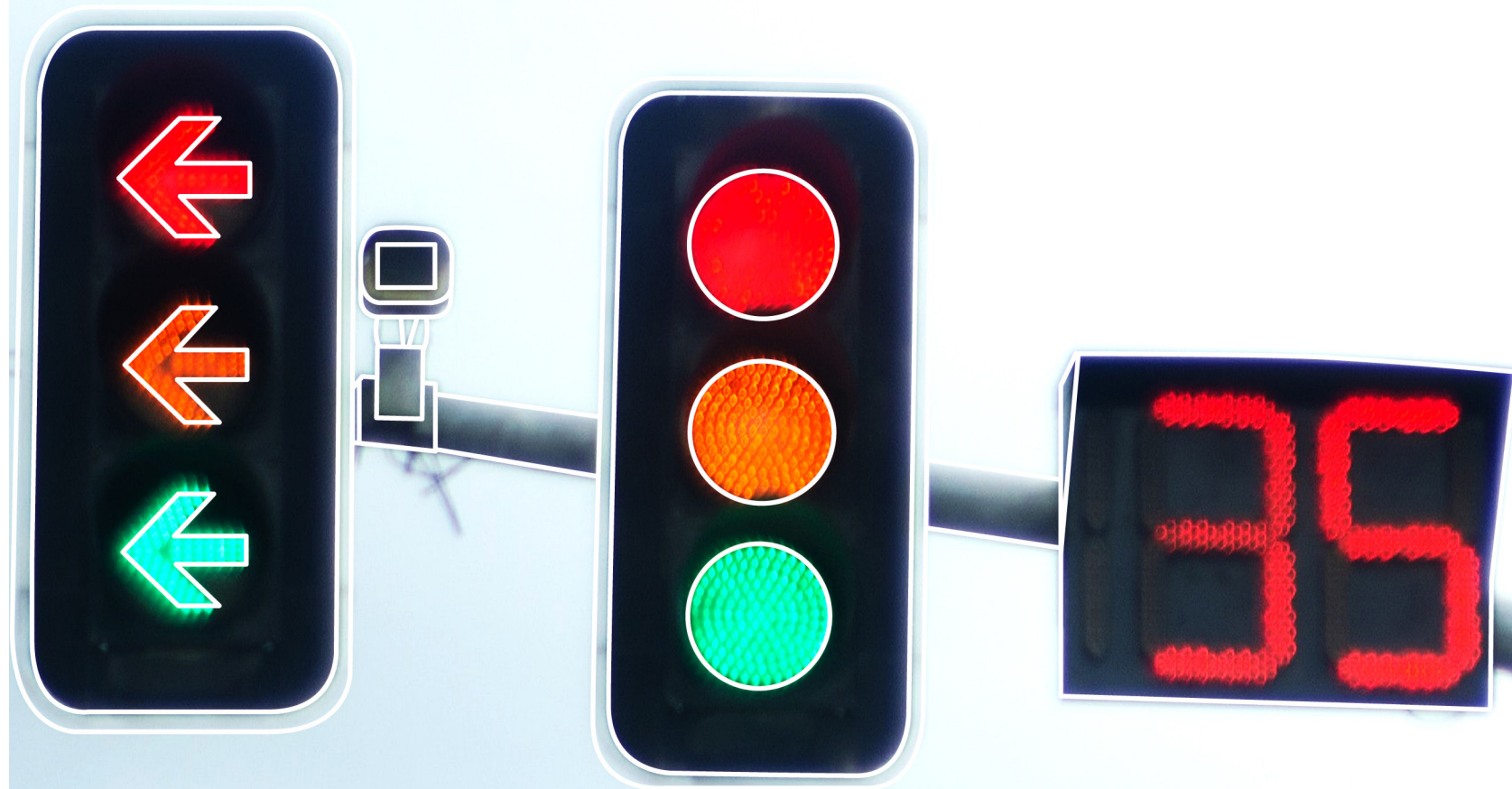
The capacity building has two phases. The first phase involves the training of the Brother Andrew Gonzalez FSC College of Education (BAG CED) graduate students who are science teachers. In the second phase, the proponents will train teachers (not limited to science) from affiliated institutions such as schools from De La Salle Philippines and the Operation Big Brother Program of BAG CED.

At the end of the project, the proponents hope to effectively train teachers to develop culturally responsive teaching strategies, lessons, and learning materials that will allow students to learn science and empathize with people from different backgrounds. “It is the goal of the researchers for teachers to be advocates of inclusive education thus initiating an inclusive environment in the classroom,” ends Roleda.



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## Can this traffic system fast-track our country's progress?

As the country's mass transportation sector continues to struggle to keep pace with the demands of the growing business districts in major cities, De La Salle University faculty researchers have noted an interesting facet of the pandemic life: even as labor contracted, money poured into service deliveries and new vehicles, resulting in an all-time high of almost 5 million vehicles registered by the end of 2021.



# Smart traffic monitoring solution

The data provides a general picture of what the government and private institutions need to manage in terms of traffic and infrastructure as well as clean air. Yet even prior the pandemic, these faculty researchers from DLSU's College of Computer Studies saw the country's need to address it, and thus began to collaborate under the University's Center for Automation Research of the Advanced Research Institute for Informatics, Computing, and Networking (AdRIC).



For their flagship project, the group embarked on creating a top-performing, smart application traffic monitoring solution. Their work, which they called the TITAN Project, received support from the Department of Science and Technology Philippine Council for Industry, Energy and Emerging Technology Research and Development (DOST-PCIEERD).

Dr. Joel Ilao, AdRIC head and Computer Technology associate professor, shares that the TITAN product goes beyond the capacity of typical camera surveillance networks, as it can provide valuable insights for

its target users, mainly the local government units as well as petroleum and real estate companies.

For this complex challenge, the researchers looked at all possible factors in making the system capable of tracking, classifying, and counting vehicles, profiling speeds, and estimating air pollution level based on vehicular counts.

They set off a series of research that included the development of multiple-object tracking algorithms that can identify, for instance, vehicle colors and occlusion or blockage in vision. They studied multi-directional

vehicle flow for addressing problems presented by the camera perspective. They also introduced the capability of estimating speeds of vehicles using only video feeds from regular traffic surveillance cameras. Additionally, they created a roadside air quality estimation system as well as a web-based counter, which compared to a human encoder reveals a positive correlation.

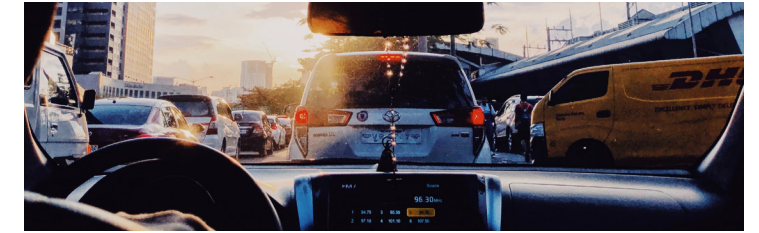
Ilao further says that the TITAN system can identify concentrations of vehicular and human activity over long periods of time. It can also process videos of various traffic road scenes under different weather conditions.

## A SUSTAINABLE CONCEPT OF MOBILITY

In 2019, the team participated in the DOST Filipinnovation Entrepreneurship Corps (FEC) and in 2022, officially launched their product TITAN Technology.

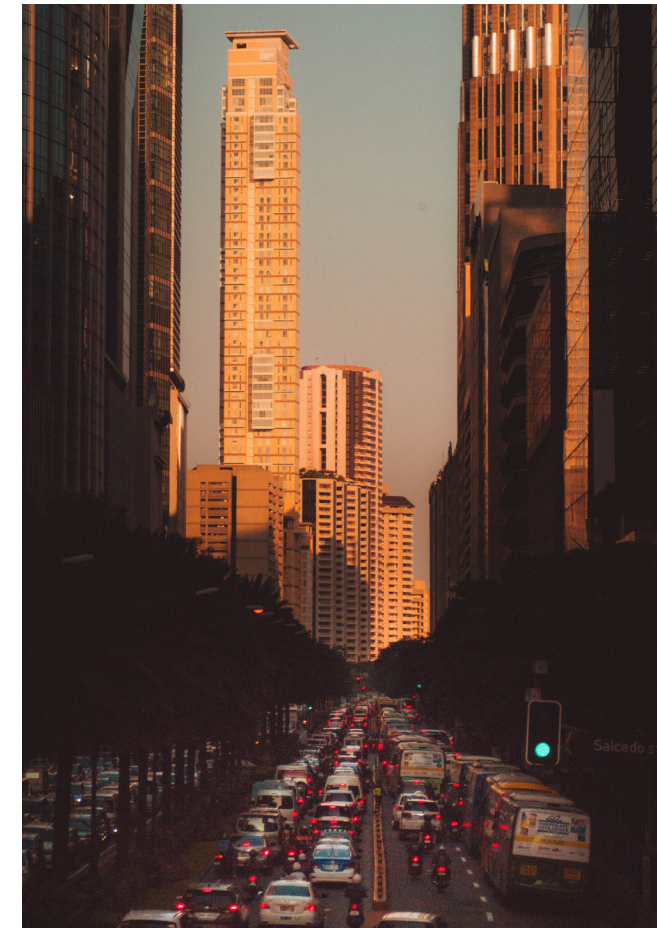
During the launch, they highlighted the advantages of camera sensors compared to manual (human) monitoring, in-pavement sensors, and sensors-installed in vehicles. These advantages include ease-of-installation, affordability, and performance in terms of coverage and accuracy.

They also pointed out that the software system performs well with relatively cheap computing hardware and a conveniently accessible intuitive web interface—an affordable solution to monitoring and managing traffic.



As project leader, Ilao completed the Leaders in Innovation Fellowship of the UK Royal Academy of Engineering in 2021. The team is currently in the process of establishing a spinoff company through a grant from the DOST Funding Assistance for Spin-off and Translation of Research in Advancing Commercialization (FASTRAC).

“There’s so much potential in artificial intelligence, which we can use to further improve the system and bring the product to LGUs, communities, and businesses. Our concept of mobility hopes to address not just the need for efficient movement of people and goods but also the need for environmental and safety policies,” Ilao says.



The TITAN project has ongoing pilot testing with various institutions such as:

1. Metropolitan Manila Development Authority
2. Makati Central Estate Association
3. The Makati Parking Authority
4. Clean Air Asia
5. Bayan ng Angono Rizal
6. Department of Transportation
7. Eastern Petroleum and J&M Properties
8. Mobile Integrated Survey (MOBILIS) Research, Inc.
9. Enrique K. Razon Jr. Logistic Institute

### ABOUT THE TEAM:

The TITAN project team is composed of College of Computer Studies members Neil Patrick Del Gallego and AdRIC head Dr. Joel Ilao; Executive Dean of the Dr. Andrew L. Tan Data Science Institute Dr. Macario Cordel II; Decision Sciences and Innovation Department's Salie Ann Siao; Czeritonnie Gail Ya-On (Software Developer), Jonathan Paul Cempron (System Administrator), Jacklyn Beredo (Software Developer), Maria Lourdes De Jesus (Business Analyst); Jeffrey Go (Software Developer); Iona Marie Mercadejas (Secretary); and Paulo Luis Lozano of the Office of DLSU Innovation and Technology.

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## Can we keep pace with our **evolving languages?**

Language is constantly evolving. In the online realm, new words emerge while old words take on new meanings. For a team of DLSU researchers, capturing this phenomenon is an important endeavor for Philippine society to better understand itself and to create a more inclusive digital media environment.



# Making language technologies more accessible

“We currently lack the means to detect new and changing word meanings, especially for our local languages. Like trends that emerge and then fade on social media, how we use words can change quickly. Old words like “himlay” or “awit” can gain new meanings, most of which are not captured by language resources like dictionaries, much less technologies like translation tools,” says Dr. Briane Paul Samson, Chair and Associate Professor of the Department of Software Technology at DLSU’s College of Computer Studies (CCS).

Samson, together with CCS Associate Dean Dr. Charibeth Cheng and Assistant Professor Unisse Chua, leads the project, “Diachronic representation and linguistic study of Filipino word senses across social and digital media contexts” or FilWordNet for short. Conducted under DLSU’s Center for Complexity and Emerging Technologies (COMET) and Center for Language Technologies (CELT), the project has received funding from the Department of Science and Technology’s Collaborative Research and Development to Leverage Philippine Economy (CRADLE) program and is being done in partnership with Philippine-based artificial intelligence (AI) company Senti Techlabs, Inc.

The team is currently developing an automated pipeline for detecting changing word senses online, including being able to distinguish the usage of words with multiple meanings.

For example, the Filipino word “basa” can refer to reading or being wet. However, automated translation software might not be able to interpret a sentence correctly without understanding the rest of the text and deriving context clues.

“These nuances may seem small, but they are actually important for developing language technologies,” shares Samson. He says that current resources for Philippine languages often lack contextual information and are too static to keep up with the rapid evolution of language use online.

To address this, the team is working on expanding the FilWordNet and transforming the lexical database into a context-aware and continuously updated digital lexicon using a combination of Natural Language Processing (NLP) and network science methods. In the field of AI, language models are built to understand spoken or written linguistic data, serving as the backbone of many familiar

applications like translation tools or automated chatbots.

## BUILDING RESOURCES FOR PHILIPPINE LANGUAGES

Nearly 80 million Filipino and Philippine English texts have been collected from various online sources, including Twitter, Reddit, news sites, wikis, online books, and even songs and video transcripts. All these texts have provided over 930 million non-unique word tokens and more than 5 million unique ones, which now fill up the project’s first major output, the Corpus of Historical Filipino and Philippine English (COHFIE).

The team then analyzed these texts through an innovative combination of NLP and network science methods. For the NLP side, they generated sense embeddings or numerical representations of a word, with more closely related meanings bearing similar values. Based on these embeddings, the language models can tag words with their part-of-speech and use contextual information to discover synsets, which are groups of essentially synonymous words.

Now on the project’s second year of implementation, the team has discovered several synsets that were not present in the original FilWordNet. For example, they found slang terms like “mare” and “mars”, and the language models also newly recognized “katotohanan” and “realidad” as synonyms. This also includes adding new words to old synsets, like introducing “okasyon” to a group that originally contained only “pagdiriwang” and “selebrasyon”.

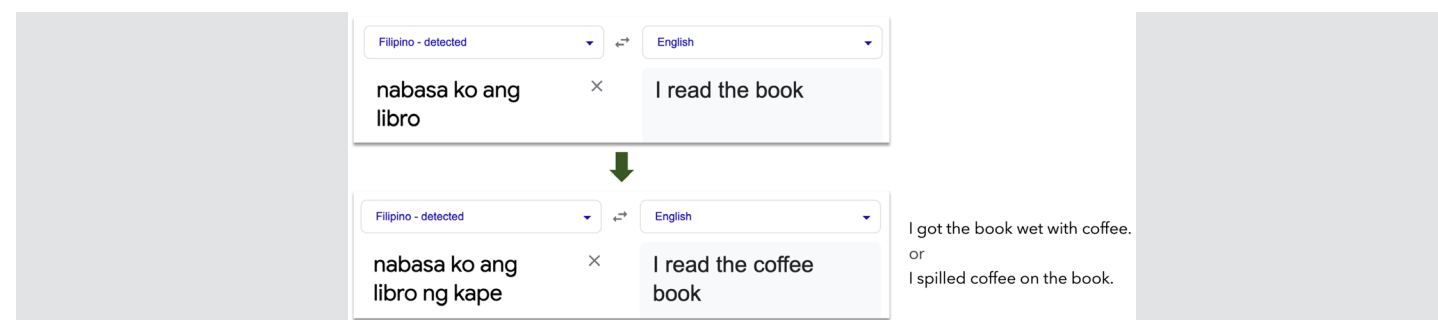
Meanwhile, the network science approach ties into another major output, the construction

of a temporal multiplex word co-occurrence network. In this network, connections are drawn between words that appear together in the same sentence. This structure enables the computer to form smaller clusters of words with related usages and distinguish the correct meaning based on these word communities.

“Think of a concept map, multiplied by several layers. Each layer represents a different source (e.g. books, news sites) or platform (e.g. Twitter, YouTube), so that we can see differences in word usage and may even pick out instances where a meaning first became popular in one platform. ... It lets us see how local languages continue to undergo development in relation to everyday interactions and socio-historical events,” Samson explains.

Excitingly, the team’s algorithms also allow for automatically detecting any kind of semantic relationship. Moving beyond synonyms and antonyms, they have identified derivations like “inom” and “inumun” and classifications or hyponymy, such as “aso” as a type of “hayop” and “biyernes” and “lunes” both being days in a week.

The new meanings are then added to the FilWordNet, alongside sample sentences, contextual information about the source and how usage trends have evolved over time. Samson and the team’s project is now in its second year of implementation. The outputs—COHFIE, FilWordNet, and the temporal network—will continue to be updated, with the possible inclusion of other Philippine languages in the future.



## SUPPORTING SOCIETY’S DIGITAL TRANSFORMATION

The team highlights how their project ties in with the United Nations Sustainable Development Goal on Industry, Innovation, and Infrastructure, with its vision to empower various industries as they undergo digital transformation.

They cite, for instance, how it can improve the industrial applications of NLP like chatbots that can be used for sales, marketing and customer service, or even for telemedicine, by serving as a mental health support or virtual companion.

Another potential application is social listening, which includes identifying sudden flares of social media activity that can provide valuable information on events such as disasters or

elections. It can likewise be used for sentiment analysis, which involves gauging how users feel about different topics.

“Our work is more foundational in focus. A lot of downstream applications can arise from our work, and we hope that we can help make local language technologies more accessible and more representative of the rich culture and diversity of our nation,” Samson concludes.

The project team is composed of project leader Dr. Briane Paul V. Samson; co-proponents Dr. Charibeth Cheng and Unisse Chua; data engineers Daryl Tumambing and Dennis Diego; research assistants Sharmaine Gaw (IV, CS-ST), Christine Deticio (IV, CS-ST), Robi Jeanne Banogon (IV, CS-ST), Danielle Kirsten Sison (IV, CS-ST), Dan John Velasco (IV, CS-ST), Bryce Anthony Ramirez (IV, CS-ST), Trisha Gail Pelagio (IV, CS-ST), and Axel Alba (IV, CS-ST); Science communication specialist Erinne Ong; and project assistant Maribeth Orolfo.

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## DLSU researchers among the Top 100 Scientists in the Philippines



De La Salle University faculty members are among the Top 100 researchers in the country, according to the 2022 AD Scientific Index (Alper-Doger Scientific Index). The Index ranks institutions based on the scientific performance and the productivity of individual scientists.

Three University Fellows are ranked in the Top 10 Philippine researchers: NAST Academician and DLSU Vice Chancellor for Research and Innovation Prof. Raymond Tan, No. 5; Prof. Anthony SF Chiu, No. 8; and NAST Academician

Prof. Allan BI Bernardo, No. 9. Other DLSU faculty on the list are Prof. Maricar Prudente, Prof. Kathleen Aviso, Prof. Consolacion Ragasa\*, Dr. Alberto Barrion, Prof. Alvin Culaba, Prof. Michael Pomentilla, Dr. Allan Soriano, Prof. Jose Alberto Reyes, Prof. Elmer Dadios, Dr. Domingo Madulid, Prof. Marites Tionggo, Prof. Renato de Castro, and Prof. Wilfredo Licuanan.

For more information on the ranking, visit: [https://www.adscientificindex.com/?country\\_code=ph](https://www.adscientificindex.com/?country_code=ph).

## Faculty members win in 2022 NAST Awards



DLSU faculty members once again took the spotlight at the 2022 National Academy of Science and Technology (NAST) Awards for their outstanding research and significant contributions to their respective fields.

From the Department of Chemical Engineering, two received The Outstanding Young Scientist (OYS) Awards, which are given to young Filipino scientists below the age of 40 years: Dr. Arnel Beltran in the field of Environmental Engineering and Dr. John Frederick Tapia in the field of Chemical Engineering.

In the National Talent Search for Young Scientists, the top prize went to Dr. Virgilio Ebajo, academic service faculty of the Central Instrumentation Facility at DLSU Laguna Campus, while the 2nd place was handed to Dr. Melchizedek Alipio of the Department of Electronics and Computer

Engineering. For the same category, special citations were received by Dr. Renann Baldovino of the Department of Manufacturing Engineering and Management and Dr. Miriam Bongo of the Department of Industrial and Systems Engineering.

Meanwhile, Prof. Aileen Orbecido of the Department of Chemical Engineering bagged a special citation for the NAST Environmental Science Award, which recognizes outstanding scientific and technological research work that contributes to environmental protection and conservation.

Two research outputs were cited as Outstanding Scientific Papers, which are given annually for papers published in Thomson Reuters or SCOPUS listed journals in the Philippines within five years preceding the award.

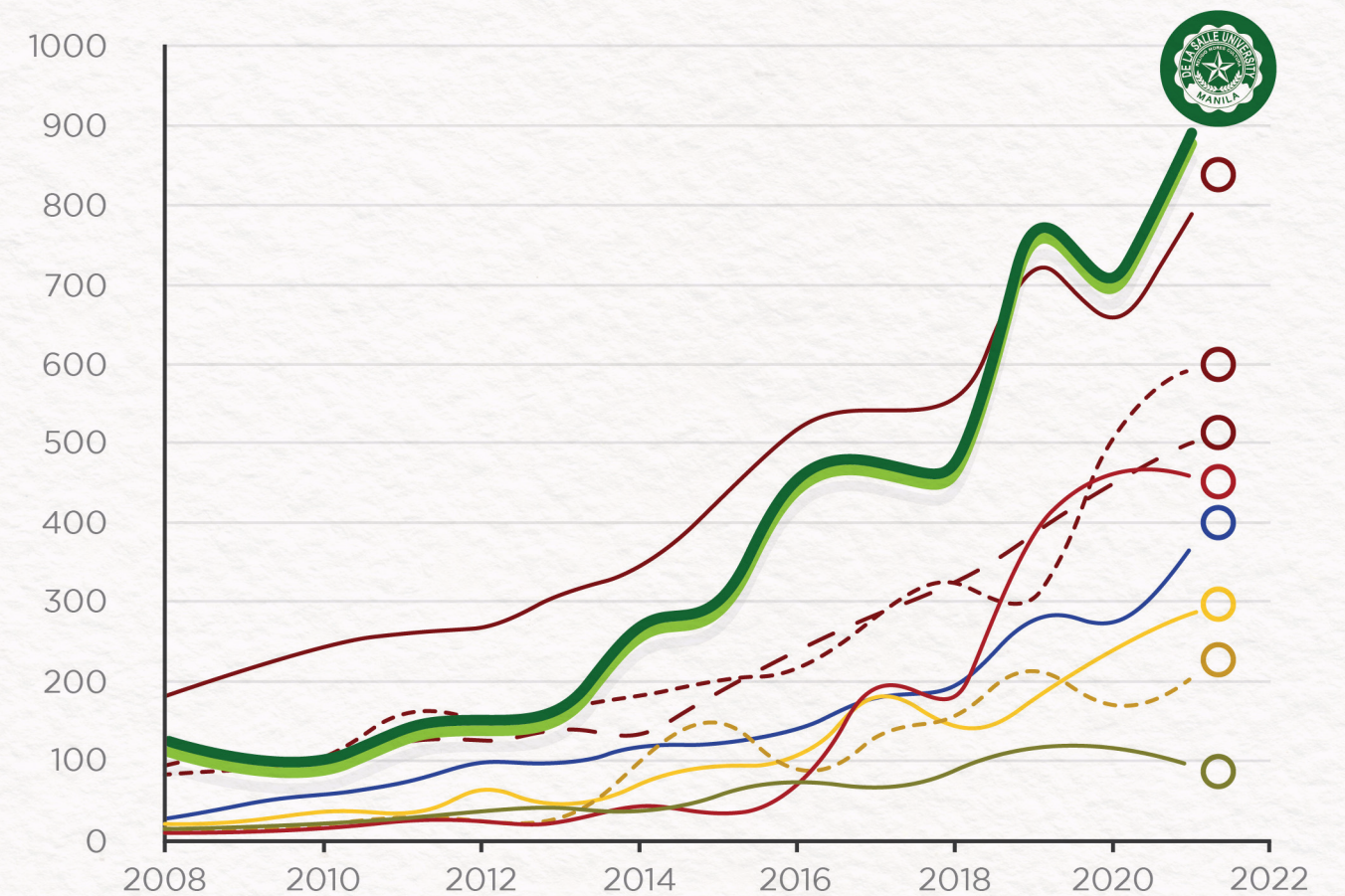
One of these is "Community of Care Amid Pandemic Inequality: The Case of Filipino Migrant Domestic Workers in the UK, Italy, and Hong Kong" (Asia-Pacific Social Science Review, 21(2), 184-201), authored by Dr. Ron Vilog of the Department of International Studies and Dr. Carlos Piosos III of the Department of Literature.

The other winning paper is "Women on Boards of Philippine Publicly Traded Firms: Does Gender Diversity Affect Corporate Risk-Taking Behavior?" (Asia-Pacific Social Science Review, 21(2), 11-30), authored by the School of Economics' Aileen Shi, Michelle Kris Ong Yiu, Angelo Louie Ricafrente, and Prof. Angelo Unite, and Prof. Michael Sullivan of University of Nevada, Las Vegas.

The NAST is the highest recognition and scientific advisory body of the Philippines under the Department of Science and Technology.

## Top Performance in Research

The country's leading higher education institution in research from 2019 to 2022



\*Production of Scopus papers by leading universities in the Philippines as of June 2022



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