CONFERENCE PROCEEDINGS

AI HORIZONS PH '24

Conference on AI-Powered Research and Innovation

October 24-25, 2024
UP Bonifacio Global City | Virtual Conference Platform

AI HORIZONS PH 2024

Conference on AI-Powered Research and Innovation

October 24- 25, 2024

University of the Philippines, BGC Campus &
Exclusive Streaming

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Conference on AI-Powered Research and Innovation

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Onsite and Online Delegates

Keynote Speakers

Enrico C. Paringit, PhD
Executive Director, Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD), Department of Science and Technology

Joel Joseph Marciano, Jr., PhD
Director-General, Philippine Space Agency

Czar Jakiri S. Sarmiento, PhD
Deputy Executive Director, National Engineering Center, College of Engineering, UP Diliman

Atty. Angelo A. Jimenez
President, University of the Philippines

Usec. Glenn Matthew Baggao
Undersecretary for Public Health Services Cluster, Department of Health

Keynote Speakers

Antonio Miguel L. Dans, MD
Professor Emeritus, College of Medicine, University of the Philippines Manila; Academician, National Academy of Science and Technology

Case Study Presenters

Maria Victoria Ortega-Espaldon, PhD
UP Scientist 1 and Professor 12, School of Environmental Science and Management, UP Los Baños

Homer Pantua, DVM, PhD
BioAssets, Inc. & Adjunct Faculty, Institute of Biological Sciences, UP Los Baños

Laura David, PhD
Professor and Director, The Marine Science Institute, UP Diliman

Elmer Dadios, PhD
Full Professor, De La Salle University

Lowell Sy
Precision Path Technologies, Inc.

Giovanni Tapang, PhD
Dean, College of Science, UP Diliman

Romeo Gabriel Solis
Professorial Lecturer, UP Diliman

Maria Mercedes Rodrigo, PhD
Professor, Ateneo Laboratory for the Learning Sciences, Ateneo de Manila University

May Lim, PhD
Professor, National Institute of Physics, UP Diliman

Franz De Leon, PhD
Director, Advanced Science and Technology Institute

Case Study Presenters

Roel Ocampo, PhD
Project Leader, Engineering Research Development for Technology (ERDT), UP Diliman

Lea Bronuela-Ambrosio, PhD
PAVE Project Leader, National Institute of Civil Engineering, UP Diliman

Felicitas Lacbawan, MD
Executive Director, Philippine Genome Center, UP System

Johanna Patricia Canal, MD
Vice Chancellor for Administration and Finance (Professor of Radiology), UP Manila and Philippine General Hospital

Nathaniel Orillaza, Jr., MD
Associate Professor in Orthopedics, UP Manila and Philippine General Hospital

Iris Thiele Isip Tan, MD
Professor 12, Medical Informatics Unit, College of Medicine, UP Manila

Sustainable Development Goals (SDGs) covered

UP Flagship Programs (FP) covered

- FP1: Academic Excellence in Teaching, Research, Innovation, and Creative Work
- FP4: Open Distance e-Learning (ODeL) for National and Global Reach
- FP5: Archipelagic and Oceanic Virtual University (AOVU)
- FP6: Active and Collaborative Partnerships with SUCs, NGAs, LGUs, Private Sector, and Civil Society
- FP10: UP's Digital Transformation Program

Executive Summary

The AI Horizons PH 2024, a two-day conference, explored the transformative role of AI in revolutionizing industries and shaping the future of the Philippines. It featured discussions on AI applications in agriculture, livestock, fisheries, education, governance, materials, energy, and health.

UP President Angelo A. Jimenez opened the conference emphasizing the importance of AI-powered education and research collaborations to democratize knowledge and equip Filipinos for the digital age. Professor Gisella P. Concepcion stressed AI's role in addressing national challenges such as food security, governance, and education gaps, urging stakeholders to become "AI warriors" for responsible innovation.

The keynote address highlighted AI-driven agricultural advancements, with the Department of Agriculture (DA) leveraging AI for decision-making, emergency management, and productivity improvements. Notable innovations included precision agriculture using drones, AI-powered fishery monitoring, and robotics for automated processing. Challenges such as regulatory barriers, internet access in rural areas, and technological adoption were discussed, with recommendations for policy enhancements and farmer training.

The conference also showcased AI's role in education and governance. Secretary Juan Edgardo "Sonny" Angara outlined DepEd's efforts to modernize education through AI-powered e-learning tools, data analytics, and infrastructure investments. Similarly, Quezon City's digital transformation initiatives, such as AI-assisted emergency response, health information systems, and automated governance processes, demonstrated how AI can enhance efficiency and service delivery.

Case studies presented cutting-edge AI applications, including Fish-I for fisheries monitoring, AI-guided livestock vaccine development, and AI-driven traffic management. Experts emphasized AI's potential to revolutionize various sectors but underscored challenges such as data accessibility, interdisciplinary collaboration, and ethical considerations.

The keynote addresses and case studies highlighted the pivotal role of Artificial Intelligence (AI) in driving innovation and addressing national challenges across various sectors in the Philippines. Dr. Enrico C. Paringit emphasized the Department of Science and Technology's (DOST) commitment to AI, particularly in disaster management, green energy, and weather forecasting, with initiatives like AI-driven weather predictions for barangays. Dr. Joel Marciano explored AI's integration in space technology, enhancing applications such as flood mapping and disaster management through satellite data. Dr.

Rigoberto Advincula discussed AI's impact on advanced manufacturing and the chemical industry, particularly in the areas of 3D printing and sustainable material development. Dr. Franz De Leon presented DOST-ASTI's initiatives to democratize AI access, focusing on applications for agriculture, traffic management, and healthcare. Dr. Roel Ocampo highlighted the role of high-performance computing in AI research, exemplifying its ability to accelerate scientific breakthroughs. Dr. Lea Bronuela-Ambrosio discussed the PAVE project, which uses AI for automated road defect detection to improve road maintenance efficiency.

In the healthcare sector, AI was showcased as a transformative tool in improving decision-making, diagnostics, and patient care. Atty. Angelo A. Jimenez highlighted AI's potential to tackle national challenges, including healthcare, food security, and education, and called for the integration of AI education at all levels. Dr. Antonio Miguel L. Dans outlined AI's role in improving healthcare efficiency, particularly in rural areas, while Dr. Felicitas Lacbawan demonstrated how AI in genomics can enhance diagnostic capabilities and cancer treatment. AI's potential in radiology was further explored by Dr. Johanna Patricia Cañal, while Dr. Nathaniel Orillaza introduced "MyBestie," a telemedicine bot, to improve orthopedic care access in rural areas. Dr. Iris Thiele Isip Tan introduced "EFREN," a chatbot designed to address diabetes distress, aiming to provide culturally sensitive support for patients.

Background

AI Horizons PH 2024

The Conference on AI-Powered Research and Innovation aimed to explore and showcase the transformative potential of Artificial Intelligence across critical sectors of Philippine society and economy. This two-day event aligned prominently with three key flagship programs of the PAJ administration:

1. **Research and Innovation**

    The conference directly supports this flagship program by focusing on cutting-edge AI applications in four crucial themes: Food, Agriculture, Livestock and Fisheries; Education and Governance; Materials and Energy; and Health and Wellness. By bringing together experts, researchers, and innovators from academia, government, and industry, the conference will foster knowledge exchange and stimulate new AI-driven research initiatives. This aligns with the administration's goal of advancing the country's research capabilities and promoting innovation in key sectors.

2. **Active and Collaborative Partnerships**

    The diverse range of speakers and participants from various sectors (UP System and CUs, SUCs, HEIs, government agencies, private sector, and media) exemplifies the spirit of collaborative partnerships. The conference will serve as a platform for networking, idea-sharing, and potential collaboration among different stakeholders. This cross-sectoral approach is essential for addressing complex challenges and driving innovation through AI, supporting the administration's focus on fostering active partnerships.

3. **Digital Transformation**

    AI is a cornerstone of digital transformation, and this conference directly contributes to advancing the Philippines' digital agenda. By exploring AI applications in Education, Governance, Agriculture, Health, and other sectors, the event will showcase how digital technologies can enhance efficiency, decision-making, and service delivery across various domains. The conference will help identify opportunities and challenges in implementing AI solutions, supporting the administration's digital transformation goals.

AI Horizons PH 2024
Conference on AI-Powered Research and Innovation

CONFERENCE DAY 1

October 24, 2024

Opening Remarks

by **Atty. Angelo A. Jimenez**

President
University of the Philippines

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Maayong buntag sa ting tanan. Magandang umaga po sa ating lahat! First of all I'd like to congratulate everyone who made it physically here today, for being typhoon- or disaster-proof. This has been quite a challenging day for the rest of those typhoon-affected kababayans of ours. I realized that you are here today to create an even bigger typhoon. I'd like to thank the organizers. I must do the protocol, our Assistant Vice President for Research and Innovation, for digital transformation, Professor Peter Sy, and of course our Executive Vice President is here, who's also OIC for Public Affairs of UP right now. I'd like to acknowledge as well an inspiration, I knew nothing about innovation, except perhaps the one thing I learned as a lawyer and as a writer of legal journal articles. Dr. Gisela Concepcion, thank you very much Ma'am for providing me what I sorely lack in terms of the science of science, and the politics of scientists. Thank you very much.

At the University of the Philippines, when I first sat, I tried to pose the big question, what is the future of learning in the digital age? Almost approaching two years in office, the question has gotten bigger. I now ask, what is the future of education in general, and bigger in a sense that I am responsible to an institution and running that and helping it fulfill its mandate. The university today no longer has a monopoly of learning, of teaching and even

of research or generating new knowledge. The University is a late medieval concept. It started in Europe, perhaps they say the University of Bologna, somebody says it's a University of Marrakesh. It doesn't matter. It just started with the idea of bringing in students to be taught in a classroom setting by an authority figure. With no interference from the King. It means they have the right to choose who the teacher is, how the teacher will teach and pick their students. It's a proto-form of academic freedom which forms the basis of the modern university today.

But let me tell you, almost half a millennium later, a conversation between a professor and a student, as told to me by the professor at the University of the Philippines, these are graduate students. He was complaining that, Mr. President, my students don't read anymore. He told them, why don't you read before coming to class? The links are there, even the hard copies are there. And one particularly bright student who was a working student and therefore didn't have much time to read, like most of us at the College of Law before in my time. So this is the digital age, and the only thing we need to know these days is where to find the answer to any question, at the time when we need to answer it. I was very worried about these exchanges because if you look at it deeper, there was a time, and I'm sure that was most in your time, still, if you are 50, sorry for that, when you have to conquer knowledge, personally, when you are supposed to be in a very old, archaic term, burn the midnight candle to learn and in the process of higher education, by the time you get your degree, whether it's undergrad, especially if it's a master, especially if it's a PhD, you have become transformed by the hard driving rigor of that strict standards of scholarship. We transformed minds.

Today, I was a little worried, because there is no more personal relationship between the scholar who wants to learn and the knowledge that he wants to learn about. So these are very profound things, and one of those things driving this particular storm in colleges, today, in universities, in educational institutions today, is AI.

Early in my term, I think six months into my term, we produced our framework for artificial intelligence, and we were the first university in the country to come out with this framework. The idea, of course, was to let it go into the public sphere, let people debate and let it evolve – as a first. Today, this is a follow up on that session because at the university, we really have decided that we are going to be engaged in a transformative enterprise, particularly in many aspects, in all aspects relevant to us on national, even [in] global life. And I wish to thank everyone from our team who are able to produce this particular activity today. Let me just cite to you a few examples. Our AI principles, we have 10, but let me just focus on several key principles, which is transparency, accountability, safety and, most importantly, meaningful human control. We want to leverage AI. It is not something that we have a choice to adapt to or not. It is transforming us already today.

There are two particular areas that I'd like to, just to give you an example, of what we're thinking early in my term. We launched the ventures for international and transformative

academia, because I came from the global labor markets before I went to the University, and of course, I did a little private litigation as a lawyer. In between, there are 10 million Filipinos, stock estimates of Filipinos in almost every part of the world today. You can find them not in the usual places that you can imagine, like the United States, Canada, Japan. You can find them in the oil fields of Kazakhstan. You can find them in the Niger Delta in Nigeria, in Siberia, even. I was thinking, if we can send online education to many of them, we can move masses of people from areas of, from jobs that are high risk into lower risk jobs, because they could qualify later if they get degrees or they get micro credentials to, for higher paying jobs. So from jobs that are high risk to jobs that are low risk, from jobs that are low paying to jobs that are high paying. And we did some calculations on scraps of paper, and I said that if we can only target just a percentage of this 10 million, we can raise remittance to the Philippines by 3 billion even dollars a year. It's already $38 billion and that could really, truly contribute to the macroeconomic stability of our country and protect us from what they call external shocks, especially if it's about currency and reserve shocks. And for what? A program could cost us practically nothing already. The marginal cost approaches zero because we already have the UPOU (UP Open University). And so these are the kinds of Aikido techniques that we are thinking about – in terms of leveraging our resources, expertise at the university, to at least advance national aspiration.

The other one we're trying to do is we are strengthening our collaborations with State Universities and colleges because it is very clear in our mandate that we must lead in setting academic standards and introducing innovations, aside from our mandate to become a truly research university, to become a regional and global university, and most importantly, to become a public service university, which is the kind the public service concept, of course, is what we are trying to highlight, at least during my term. For those who didn't know, the motto of UP is no longer honor and excellence only. It's called honor, excellence, service. The longer term is honor and excellence in the service of the nation. And that is what we are trying to do today. The reason we want to, and we are going to leverage AI, of course, when it comes to SUC collaboration, and let me share to you part of what we were thinking. In 1908 we were established as National University. The College of Medicine was established in 1906, I think. But then again, the college, the Philippine Normal University was established in 1901. At the time, they were very popular. We were the first truly public school network in the country at that time that included Los Baños. UP Los Baños, the purpose, of course, was to produce bureaucrats and leaders to man Asia's first democratic republic. Our goal was to produce leaders, and we have, in a very dominant way, we have. Just look at how our country is being led today. I will not illustrate, elucidate, but at any rate, would like to give you some figures. 13 of the 17 presidents of this country came from UP; 15 of 25 or so Senate presidents; 16 of 26 perhaps at 14 of 26 Speakers of the House; 16 of 28 chief justice system of Supreme Court; 44 of 80 national artists, 42 of 44 national scientists, eight of only nine social scientists came from this university. That's what I meant. We have produced leaders. So we wanted to do this because we wanted to democratize the university. This is the strategic intent. We want to create a University of universities. 116 years after we were founded, there are 300 SUCs

and LUCs already today, and 2,000 higher educational institutions. Of course, you will see UP being congratulated as topping the bar, topping the board, 270 top the board, bar exams, and licensure exams last year, 19 of them were number one. It's something we are proud of, but it is not something that is important to me, because we are going into the framework that we are just another university, only better.

We were not created to be just another university if you just read the law. So I was thinking that the trend now is not to provide greater access to UP, but to ensure the r standards that we are setting, and that is the reason why we're not under CHED in terms of setting our own academic standards. It is shared with other State University and colleges, so that they can be in UP without being in the University of Philippines. So that is the goal today, to spread out and completely embrace the mission of improving standards of education in the country. And that means repositioning and re-imagining ourselves still based on the law today, the strategic intent really is to truly become a research and graduate school. And if I had my way, undergrads go to UP, they will be all PhD track. They said that the number of researchers, scientists in the country today is just 170. The recommendation is per million. The recommendation is 350. It's not a fair comparison, but Singapore today has 7000 scientists and researchers per million.

There is a reason why we are being left behind, but this is today the mission of the university, and the first day asked, how many PhDs do we need to get 100%? I was given a number that I almost fell before my own chair, but we are going into that very challenging effort of producing more of you who are here today. This is the mission, but this is sharing something internal to the University of the Philippines right now. And going out today is one of our missions. And I have said this before, after trying to understand what truly this AI is all about. It is no less than a civil – civilizational change. And they keep telling people that this, we are entering a Stargate, maybe perhaps a brave new world. But come to reflect on this, how long do you think a stone age lasts? A few million years, right? Let's go to the Bronze Age. I'm trying to remember my favorite historian, Arnold Toynbee, perhaps 10, 10,000 years, and then the Iron Age, 1000 years. During these ages, your great, great, great grandfathers and grandmothers could, you could expect to live the same lives that they had, if you jump start, if you fast forward today. Well, Moore's Law computing power in Korea doubles every two years. That means 100% every year, and no longer if it is that is still relevant because of the advances in computing power, particular microchip power, they're going 3.7 nano millimeters today, my iPhone 14 is still five nano millimeters. But our children will live a different life than the life we had, we are living today, like we are living a different life from the life of our parents.

So in every generation now, we need to conquer this change. I'm looking at our students at the university, about the level of stress that they are undergoing. It is a natural stress, because many of the values that worked so well in the analog civilization no longer work in the new civilization. And I'm talking about a civilization on shift. We are living today on the cusp of great changes, the likes of it, the full form of which is changing even as we

think about it. And so this is how I view this particular activity today. It is not future proofing the university or the country. It is future-creating. If this is the future, we might as well influence it. And so today, we pick several major topics on which we then try to see where we want AI to go initially. It is not limited to this, but just for this particular conference. So it's very heartening to know that we are going to food, agriculture, livestock and fisheries, education and governance, materials and energy and health and wellness. This is what we would like to look at today. I just hope that you will find this very useful. Not only that, I just hope one thing, and this is one thing I learned, that you will develop networks today that can help push our AI development agenda forward, because at the very end of the day, this is the intent as well, to put people of similar interest from different backgrounds, and create a community, not just of learning, but of practice today. So thank you very much. And welcome to our BGC campus. I hope that you find our accommodations quite convenient for your particular purpose.

Background and Rationale of AI Horizons PH 2024

by **Professor Gisella P. Concepcion**

Professor Emeritus

UP Special Adviser to the President for Research and Innovation, UP System

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Ladies and gentlemen, with all protocols observed, greetings to our inspiring leader, President Jimenez, a great and profound philosopher. To our special guests and all of you gathered here today, both in person and online—indeed, this is an auspicious occasion to hear one another out on the great powers of AI to transform our lives for the better, as individuals, as communities, and as a nation.

We had been forewarned years ago about how a brain the size of this hall can quicken, sharpen, and enlighten us humans through its limitless data processing and computing powers. This is the era of AI. There is no turning back, and there is no better time to embrace AI and harness its powers for good than now—especially with the existential problems we face, such as the food and learning poverty of our youth, the highest energy costs to our industries, the massive depletion of our valuable natural materials, the highest cost of healthcare in this part of the world, and still too few models of good governance at the national, regional, and local levels in the country.

These are the challenges we chose to address with AI in this first UP-led AI conference. Await the second UP AI conference next year, where we will tackle yet another set of challenges.

The ambiance of this meeting is cool, relaxed, upbeat, positive, and optimistic—not too formal, to better open us up, uninhibit ourselves, and share our mind flares with one another, as several outstanding AI researchers from academe, government, and industry will do today and tomorrow. Make no mistake—we mean serious business.

To continue our constructive discussions beyond the conference, we are calling on all serious stakeholders and interested parties to sign up and join our four online FDGs on the four themes scheduled in November and December. We promised the President a report on implementable, on-the-ground action plans as our output. He will use it to lead and champion AI-powered research and innovation in the country.

With your cooperation, we can do it. We will deliver. We could call ourselves AI warriors, as our dedicated young AI conference team members do. Thank you, AI warriors!

As you walked towards this hall, you were probably surprised to see two huge, scary-looking drones. UP has partnered with the Philippine drone company Path Precision Technologies to empower these drones with AI for agriculture and environmental management. As you can see, we are for real.

So stay with us. Stay the course. We are in for exciting times. Let us look far and wide to our AI horizons. AI offers us limitless possibilities—free from the limits of time, space, and climate change. As we prove in our conference today, AI is ours for the taking.

Engineer Tito Aliga, UP Earth Executive Director says, "Let artificial intelligence improve our natural human intelligence."

Thank you. Salamat po.

AI Horizons PH 2024
Conference on AI-Powered Research and Innovation

PLENARY 1

AI IN FOOD, AGRICULTURE, LIVESTOCK AND FISHERIES

Conference Day 1 | October 24, 2024

KEYNOTE ADDRESS
AI on Agriculture

by **Allan Q. Umali**
Undersecretary for Administration
Department of Agriculture (DA)

Delivered by **Honorio Flameño**
Director
Information and Communications Technology Service

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Director Flameño shared that in response to President Ferdinand Marcos, Jr. 's call for the data-driven system to optimize agricultural production and market readiness, the DA focused on enhancing the agri-fishery sector, through accessible digital technologies and advanced tools. By integrating these technologies, DA aims to empower the farmers and stakeholders to make informed data-driven decisions, manage emergencies efficiently, and improve day-to-day operation.

DA explores innovations in three areas: (1) Enhanced data and monitoring systems that can improve real-time insights in various aspect of agricultural operations to improve process tracking, resource monitoring and decision making based on concrete evidence; (2) Agricultural digital transformation through clustering which involved using digital technologies to streamline processes, optimize resource allocation and foster a

more effective and efficient ecosystem; and (3) Advanced technologies such as digital agronomy, AI and weather intelligence, to innovate crop management practices and enhance overall agricultural inefficiencies. AI by way of drones is enabling research precision farming by optimizing crop monitoring and resource management to an AI driven livestock management system that enhances animal health and productivity in aquaculture and fisheries.

Lastly, DA believes that by working hand in hand, Filipinos can harness the power of innovation like AI to address the challenges facing the agricultural sector and create a sustainable solution that will ensure full security and economic growth for our country.

CASE STUDY

Fish-I for Fisheries Biodiversity, Aquaculture, and Fisheries Capture

by **Laura T. David, PhD**

Professor and Director
Marine Science Institute, University of the Philippines, Diliman

Professor Laura T. David, in her presentation, explained that for food security, the higher the biodiversity, the higher the resilience of a certain environment. She underscored the importance of identifying the species present in a given area, along with assessing fish populations and their sizes. Knowing this would help determine the presence of fish in a certain place, and whether or not it is okay to harvest from that place. The problem, however, is that there are only about 30 marine experts in the country, and they will have to be able to dive on a daily basis to know the number of fishes in the entire country.

Professor David detailed the capabilities of Fish-I, a semi-automated fish census system that they developed. She emphasized how this innovative tool not only identifies marine species but also provides automated population counts and biomass estimations, offering comprehensive data for ecological studies.

Contrary to expectation, the team of Professor David found that the fish experts actually welcomed Fish-I because they will be able to devote their time in analyzing the data, instead of having to dive. The Local Government Units (LGUs) were also excited to have this tool because without Fish-I they would have to hire experts to actually measure what they have. With Fish-I, the LGUs can do the fish monitoring on their own and just submit the data to the team of Dr. David, who will process the data and will provide the LGUs with the analysis in about two to three weeks' time.

While the users welcomed Fish-I, the business part was quite a challenge because of the procurement processes at the LGUs. It's quite difficult for a private startup company to actually bid for the LGUs. Another drawback is that the LGUs prefer a product that they can hold on to. That's why Fish-I developed derivative products such as the Fish-Light and Fish-Pro, which allow users to go diving, get the data, put the SD card directly into this black box, and get the data themselves.

Dr. David reported significant industry interest in Fish-I, with inquiries coming from diverse sectors, including private companies operating oil depots and refineries. Notably, these inquiries extend beyond national borders, reaching the Middle East, driven by growing public demand for companies to demonstrate minimal environmental impact on local biodiversity. Mariculture offers a potential market, but the high density of farmed fish requires counting methods different from those used for wild stocks.

Dr. David highlighted different transformative solutions that AI can offer for the marine environment. These include: supporting the seaweed industry, advancing blue energy, measuring blue carbon to assist local governments, increasing transport safety through route optimization, and strengthening national security through maritime surveillance. She emphasized how Fish-I not only does fish monitoring, but ultimately aims to provide smart solutions for all Philippine seas.

CASE STUDY
Path Precisions Technology Drones

by **Lowell Sy**
President
Precision Path Technologies, Inc.

Mr. Lowell Sy, in his discussion, talked about the features of modern drones. Unlike in the past when drones were merely used to capture photos and are controlled manually, drones these days are more advanced and can now be flown on a pre-set path and do research. Drones have evolved into a self-operating device, capable of avoiding collision and gathering data with high-value pictures. Instead of using satellites to gather images, drones now provide a more flexible and precise alternative.

Mr. Sy discussed drone application in agriculture, which he said, is something new in the Philippines, although it has been used in other Asian countries like Vietnam and Thailand. Precision Path Technologies, Inc. was tapped by the current Marcos administration to utilize AI-integrated drones for precision agriculture. In collaboration with UP Los Baños and geodetic computer science in UP Diliman, Precision Path Tech has been doing a study to increase rice yields by 25%. Their company was given a

10-hectare land where they can do tests for agriculture. The data gathered are being analyzed by the experts from UP.

Traditionally, farms in the country adopt a spray-and-spread farming, where they spray pesticides and fertilizer, without really determining how much of it the rice fields really need. This resulted in an over spray of pesticides and fertilizers. Drones can be programmed to follow a preset spraying path, reducing the application time from three days in traditional farming to just six to eight minutes per hectare. In their study conducted in the greenhouse provided by UPLB, they induced sickness in plants and utilized drones to collect data. The AI-powered drones facilitated the identification of plant diseases, while university experts contributed to evaluating the effects.

Mr. Sy proceeded with discussing some of the challenges in drones, such as: e (1) regulation that requires their company to adhere to the regulations of Civil Aviation Authority of the Philippines (CAAP), including acquiring a drone license and a drone school to train people; the (2) battery life is another problem for drones because a larger battery is required for a longer flight, and a larger battery will also require a bigger drone. Depending on the load, the average agricultural drone ranges from 30 kilos to 50 kilos. A could carry 50 kilos of pesticides or fertilizers. The other challenge is (3) Data processing where bigger data requires bigger memory, so Path Precision uses cloud for their database; also (4) Security is a problem because the internet can be used only when working on a shorter distance, but a Global Positioning System (GPS) is needed for longer distance. With that, there's a need to secure their lines, pictures, and data. Lastly, (5) hardware integration now with the AI because there's a need to adapt AI with cameras, and lidars for mapping, serving infrared, multispectral and so on and integrating these needed collaborations.

Mr. Sy also discussed other drone applications and potential market expansion. Precision Path Technologies was also involved in swarm coordination, commonly used for drone shows. They had planned to conduct a drone show in the Philippines ahead of the upcoming election; however the negotiation was unsuccessful. Mr. Sy added that in a drone show, one drone costs around $800 to $1000 US dollars per drone, and there needs to be 1000 drones to have a very nice show.

Aside from precision agriculture which comprises 80% to 90% of drone market share, drones are also used in infrastructure inspection. This involves pipelines, solar, farm fields, windmill inspection, bridges, buildings. Another application of drones is in search and rescue using infrared night vision. Precision Path Tech plans to expand into delivery service, where they could be in competition with Grab or Angkas, this service might render delivery drivers obsolete. They may also venture into environmental monitoring wherein they would use sensors to monitor pollution; other ventures include smart cities which are basically cameras and AI; also mining and exploration.

CASE STUDY

Transforming Agricultural Machineries with AI and Robotics

by **Professor Elmer Dadios**

Professor
De La Salle University

Professor Elmer Dadios, in his discussion, pointed out the fact that the Philippines has been doing AI and robotics since over three decades ago, in the early 90s. However, the major role of AI and robotics was highlighted during this 4th industrial revolution. But even as far back as twenty years ago, Dr. Dadios and his students at the De La Salle University (DLSU) were already into AI and robotics. He said that the problem lies in creating high value products out of this agricultural industry.

Professor Dadios discussed some of the AI and robotics projects that his team has done in the past, and showcased how recently applied innovations improved agriculture, aquatic processes, and production of high value food products.

Here are some research and development projects that Professor Dadios' students have engaged in:

1. Automation of the coco sugar processing machine. The team developed a robotic steering arm to enhance the processing of coco sugar, a high-value export product known for its anti-diabetic properties.The project was funded by USAID-Stride and was intended for use by the farmers' cooperative in Ragay. They later developed a small scale version because the first design was intended to process fifty liters of cocoa;
2. Automated machine selecting system, a machine that classifies mangoes based on quality. The machine can rotate the mango to classify the presence of defects. Philmec commercialized the machine where the user has an option to raise the level of accuracy if they want it to be 5% or 10%;
3. Tuna sorting machine, inspired by one of his students, was from a canning factory in Zamboanga. The primary challenge was to efficiently sort tuna based on size and freshness. In response, the team developed a machine that automatically classifies tuna, improving processing speed and quality control;
4. Feeding Fish Machine that detects fish behavior and prompts to signal feeding time. . The problem was in giving food to the fish because if they are overfed chances are the feeds will pollute the water and the feeds will be wasted. And if the fishes are under-fed, the fish will not achieve its maximum growth. The idea here is the integration of robotics and AI. There's an AI that will determine the behavior of the fish, and there's a robot system that will activate the fin of the fish, so feeds are dispensed only when the fishes are hungry.

After showing examples of AI applications in agriculture, production of high value food products, and in aquaculture, Professor Dadios gave some recommendations to sustainably transform the country's agriculture using AI:
1. Introduce and strengthen the internet connections in our rural and agricultural areas;
2. Educate and capacitate the farmers in the use of new technology;
3. Review institute's strategies and effectiveness in giving grants to the farmers and there must be a proper audit on this;
4. Encourage the farmers to acquire highly specialized equipment, like drones and other high technology communication systems;
5. Collaborate and connect with Higher Educational Institutions, so the cooperatives and farmers are empowered;
6. Allow farmers and cooperatives freely access to data from Philippine Space Agency;
7. Crop insurance should be implemented and taken seriously.

CASE STUDY

AI-Guided Approach to Livestock Vaccine Design and Development

by **Dr. Homer Pantua**

Professor
Institute of Biological Sciences in UP Los Baños

Dr. Homer Padua presented how an AI guided approach can be used in vaccine research and in monitoring virus evolution. He discussed what they have done on animal pathogen genomics and proposed some Machine Learning Guided Approach (MLGA) to vaccine research and monitoring of the virus evolution. Initially, Dr. Pantua introduced the BioAssets Corporation, a 100% Filipino-owned company pioneering in life science, and was established by scientists and veterinarians to contribute to the advancement of food security and the general welfare of the country. BioAssets advocates for a sustainable and self-sufficient animal industry and a thriving life science sector that will contribute to ensuring an adequate and safe food supply.

BioAssets' goal is to establish a comprehensive and unified approach to address the threat of infectious diseases in the animal industry. One of their focused areas is bringing the diagnostics to the point of need for surveillance and rapid response; another is on precision diagnostics, specifically pathogen genomics to support precision medicine initiative. This information is important for diagnostics and vaccine research.

Dr. Pantua presented the case of their research on African Swine Virus (ASF). The ASF is caused by a large, highly complex virus with a large, double stranded DNA genome that encodes for a great number of proteins and polypeptides. The virus has 24 known genotypes with Gene type-2 as the dominant circulating strains worldwide. ASF clinical signs range from weakness, hemorrhage to sudden death. ASF has devastated the swine industry, a 200-billion peso industry, largest among the animal industry and second to rice. The ASF has caused a significant decline in production that also resulted in soaring pork prices.

Besides the absence of widely accepted safe and effective vaccines, here are some of the gaps in research needs in the ASF field. There is a need to have optimized and harmonized protocols, such as for sample collection, sequencing, bioinformatics workflows and data documentation. There's also a need to generate whole genome sequences as a basis for further studies and also perform discovery and evolutionary analysis.

A research team member, Andy Montecillo, a PhD student, established a streamlined and globally accepted protocol and generated the first locally sequenced and assembled ASF virus whole genome, which serves as a baseline for many ASF virus genomics in the future. Montecillo also generated a small but significant molecular epidemiological data by generating whole genome sequence analysis from ASF outbreaks in several provinces in the Philippines. While BioAssets found that the circulating ASF virus strain in the Philippines is still genotype 2, based on the representative samples from different provinces, they have observed evidence of multiple mutations, suggesting that the virus is evolving either temporarily or geographically. The company also uses this information

for evidence and science-based analysis of the origin of the strains from one outbreak to the other.

Given that ASF virus genomics still need further studies and it needs more input in the form of whole genome sequences, BioAssets recommends Machine Learning Guided Applications that can help support vaccine research and also help in making careful analysis of the virus origin and evolution. From a vaccine development-centric point of view, there's a need for machine learning to generate data that will guide in identifying a vaccine candidate. With massive data input, BioAssets can develop a machine learning fitness- based method that can analyze identity changes, site pathogenicity and immunogenicity, as well as mutation trajectory. This data will allow the scientists to rapidly and objectively identify a good vaccine candidate – and this becomes significantly important in the case of the Philippines, where there's that need to differentiate the field and vaccine strains during and after the vaccine rollout.

Through machine learning, BioAssets researchers are able to generate information which can generate applications that will help achieve outcomes, such as protection, prevention, mitigation and productivity. This bolsters the researchers' ability to study the discovery evolution and the diversity of viruses, to anticipate and possibly intervene and prevent viral diseases outbreaks. The team, however, are not artificial intelligence experts, and they hope that the AI Horizon event will open collaborations that will help in their pursuit to develop machine learning applications against infectious diseases in the animal industry.

Lastly, Dr. Pantua expressed gratitude over their collaborators, particularly to Andrew Montecillo and Russell Santos from the Institute of Biological Sciences in UPLB, their team at BioAssets and their collaborator from Central Mindanao University, their funding agency, the DOST, particularly the Philippine Council for Agriculture and Aquatic Resources and Natural Research and Development (PCAARRD).

PANEL DISCUSSION
AI in Food Security

Panelists:	Mr. Lowell Sy
	Professor Elmer Dadios
	Professor Laura David
Moderator:	Dr. Gisella Concepcion

Panel Discussion for the morning session of Day 1, moderated by Dr. Gisella Concepcion and the panelist from L-R, Mr. Lowell Sy, Professor Elmer Dadios, and Professor Laura David.

Question: *How the AI powered technologies that you're developing or have developed will impact on our workforce and the employment of more Filipinos?*

Professor David shared that contrary to the common fear that AI will lead to job loss, fish experts actually embrace the Fish-I technology because it allows them to focus more on analysis rather than manual tasks. Additionally, this innovation has sparked greater interest among students in fish research, with many pursuing PhDs due to the availability of data for study.

Mr. Sy offered a different perspective, particularly regarding AI's application in agriculture. He stressed the need for a proof of concept, specifically in laboratory settings, rather than small-scale trials. For example, an agricultural drone from Precision Path Technologies costs nearly 2 million pesos. Mr. Sy emphasized the importance of providing training through their drone school and collaborations with farmers' families, such as their sons or nephews, to create a solid proof of concept. The company aims to increase crop yield by 25% through precision farming, which they consider the main goal of their AI-driven initiatives.

Question: *I want to ask you about the three kinds of high value products that you talked about. This is the coconut sap, then the mango and then, of course your aquaculture. So because you may have industry takers at this time, do you already have the cost to benefit from ROI computations for each of these, are they, you know, feasible? Are they viable?*

Professor Dadios explained that for the coconut sap machine, their research team already had a specific taker in mind. They approached a cooperative to demonstrate that their product is both doable and economical so it is crucial to have an end-user identified early on. However, a significant challenge arose from the low number of farmers interested in becoming coconut sap gatherers. As a result, they had to adjust the machine to process only three to four liters of sap, instead of the originally intended fifty liters.

Question: *Can you tell us, in general, what's the status of the AI and drone industry in the Philippines, and how would you address the issue of us being a leader in Asia?*

While Mr. Sy didn't mean to offend, he thinks that the Philippines being a leader in drone and AI in Asia, is next to negligible because by AI in drone, this refers to drone solutions and the country is not there, yet. There are a lot of things to be done, such as understanding drones, understanding the instruments, transferring data into solutions and all these require certain specializations. Dr. Concepcion summed this up by saying that Sy wanted to emphasize the importance of smart education and hands-on training, starting with our youth; that to become a leader in Asia, there's a need to invest in hands-on training.

Question: *We know that Fish-I has successfully obtained patents from many countries, so I didn't want to touch so much on intellectual property of our inventions, but I think with Fish-I, it holds the distinction of having an international patent. Can you share lessons learned from that process? And you also mentioned several possible derivative products from the original fish AI? Are there further research in terms of other applications?*

Dr. David answered that what they have learned is that there's no such thing as a single patent, that patent requirements vary from each country. In the case of Fish-I, they targeted Japan and Australia initially. But later learned that once a research or any part of it is shared publicly, it will no longer qualify for a patent in that country. This made them turn to Brazil, Mexico, Indonesia, US and the Philippines. The first to grant them a patent was the United States, so Fish-I has five patents now from the countries mentioned. As for other product derivatives, their team is also now looking at the deeper seas of the Philippine coral reefs, with another project with DOST, the Deep Fish Project, where they will look at the deep fish population. But this will not necessarily be Fish-I because there might be a need for acoustics because the presence of pelagic fish might be too far that acoustics may be required.

Question: *Do we already have a regulatory body for drone operations in the Philippines that is truly recognized by the government?*

Mr. Sy answered, yes, there is the Civil Aviation Authority of the Philippines (CAAP), which provides a set of rules, for instance in determining where one can fly and not allowed to fly. CAAP has guidelines for qualification and they require certificates that one indeed has passed from a drone school.

Question: *How is the industry, farmers, business owners, etc, reacting to the research? Are they hopeful, reluctant, etc.?*

Prof. Dadios reported that their stakeholders were appreciative of their product; that there's a good potential in this field to help the country and the people.

There was another question for Prof. David: How did you train the AI model on, in Fish-I?

Prof. David explained that as a marine scientist, she had to learn how a machine thinks. As a computer scientist, Prof. Naval had to learn how to cross training. They had to do collaborative training because that's the only way to train the AI. One has to appreciate himself/herself, or appreciate it (AI), so that one can translate it in a language that the machine (AI) can understand. It's like training an intelligent child to identify stuff.

Question: *How is AI being utilized to optimize crop yields and reduce waste in agricultural practices, and what innovative strides can we expect to see in this area in the next few years?*

Mr. Sy answered that the only thing that he can tell is that much about AI he learned from Dr. Pros (Prospero Naval, Jr., PhD). The way he understands it is that there's a need to gather the data, and devices, such as lidars are also needed, and once the data are

available, it will be sent to the AI team to do the algorithm. And there's a GPU which can process the data faster than the regular CPUs. The science experts can do the job.

Dr. Dadios added to Sy's response that aside from the use of AI to increase the yield, vertical farming is one application that's very promising. In the farms they developed from the University of Arizona they showed that at any season they can have a crop, whether it is rainy, dry or typhoon, because they controlled the environment. AI systems are needed in controlling the environment, for instance controlling the nutrients, temperature, light. It was successful.

Question: *Since you've already outlined your AI play, how far are you in forming that team, and how far are you from getting to a cost benefit proposition for a use case, very specific. And how does that look right now? Are you reducing prices by 10x or are you increasing productivity by 30 times?* (For context, Mr. Serafica said that for most of the teams that they have been forming, which even in the National Academy of Science, the teams were transdisciplinary in composition and composed of five members).

Mr. Sy said that the case of Precision Path is different in the sense that they involved the government right in the beginning. They approached the Department of Agriculture, experts from the UP, and they have been requesting for six months now to have their office space in UP Los Baños. He also went to speak to Speaker of the House of Representatives Martin (Romualdez), and he was endorsed to Congressman Zaldy Co. The government is now putting up a budget to train six state universities on flying drones. In terms of percentage, Mr. Sy could say around 60% or 70% of his dream, meaning to say they are now working on his budget.

Prof. Dadios agreed that it is important to talk with the government. Dadios' team approached PNP-EOD K9 Group while they developed the bump disposal robot which is now ready for commercialization. Prof. David said that while working on patenting their product, a lot of their time was used up on doing the business side of things. She wishes that there's a way for the University to be doing all the business side of things, so they can focus on the technical development side

AI Horizons PH 2024
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PLENARY 2

AI IN EDUCATION
AND GOVERNANCE

Conference Day 1 | October 24, 2024

KEYNOTE ADDRESS

AI *in Education*

by **Hon. Juan Edgardo "Sonny" Angara**

Secretary
Department of Education

Secretary Sonny Angara opened that the Department of Education (DepEd) is the biggest department in the country with 1.05 million employees, 860,000 teachers, over some 45,000 schools across the archipelago, educating 25 million learners throughout the 17 regions.

In his discussion, Sec. Angara acknowledged the challenges faced by the Philippine education system, including resource gaps and the impact of the pandemic on learning which necessitates having to fix the 5.5 years that the students are behind in terms of learning. He said that there's a need to work double time to recover those lost years and the goal is not to advance the students alone, but to get them, at very least, at the right level.

The Secretary emphasized the need to future-proof the education system by addressing present challenges and improving infrastructure. This includes procuring 2 million

textbooks and adding 165,000 classrooms to prevent double and triple shifting of classes.

The Secretary cited that in responding to President Marcos' order to bridge the digital gap, DepEd, starts with securing the basics, and that involves a form of artificial intelligence. With this, DepEd has applied the concept of a computer lab into a cart filled with laptops and other gadgets that can be moved from room to room. DepEd plans to procure and place some 47,000 e-learning carts with 40 plus computers in each cart to save classroom space. They also proposed a Php 12.5 billion budget to achieve this vision to all schools and connect 2,000 schools to the electricity grid. Some 40,000 schools also need an upgrade in electricity. Secretary Angara was also aware of the fact that AI needs good power, good bandwidth, that DepEd would have to ensure that these systems can handle the technology of the future.

The Secretary pointed out, "*There's no point giving them laptops if they don't have the electricity.*" He also underscored the importance of information- that information, like time and budget, is another resource of government agencies. For thai reason, their technical team in DepEd analyzes and polished the data before disseminating them. They believe that instead of asking: "*where are we now*?" seeing the data allows them to in depth ask, "*why are we this way*?" They are convinced that those who come up with the answers to *why*, are ready - ready to manage a bigger allocation, ready to procure bigger programs and ready to face questions from their constituents, and ready to purchase more tailor-made technology. The Secretary said that artificial intelligence plays that role. Data empowers not just them at DepEd, but all the people who have access to them, including parents and the public.

The Secretary mentioned that part of DepEd's role is to open the traditional department to the public and modernize its systems, and part of this move is by collaborating with organizations that can help DepEd achieve this vision. DepEd partnered with Khan Academy, I Am Code, and Canva - leaders in innovative and creative education solutions. For DepEd, thinking differently means evolving technologically.

After making a headway into the basics, DepEd's dream, under his leadership, is to pilot these classrooms of the future. They need to show proof of concept in key areas under an able field office that could sustain that vision. They don't know what that looks like exactly, but perhaps that's the beauty of it, because working together, they could develop that vision, collectively. A student from Sulu could meet another student from Santa Rosa, facilitated by a teacher in Sorsogon. Maybe teacher Janet of Isabela is talking to teacher Ariel of Bohol, sharing tips and tools for the next day's science class, all in an easy to access, easy to use platform.

In his parting words, the Secretary said that they cannot promise that these classrooms can be seen in every part of the country after they leave office, but what the President and his team can promise is that they started building those classrooms today.

KEYNOTE ADDRESS
AI in Governance

by **Michael Victor Alimurung**

City Administrator, Quezon City

on behalf of **Hon. Ma. Josefina "Joy" G. Belmonte**

Mayor, Quezon City

Mr. Alimurung started his discussion by depicting what typical governance looks like, in the context of failures that comes with a long running perception that government is slow, maybe lazy, antiquated. Translating this to the Philippine experience, governance will likely prompt particular images most people are all familiar with: long lines outside offices, rows of people hunched over printed forms, office personnel who could be irritable and rude; and online, this often comes in the poorly designed websites that are either difficult to navigate, slow to load, or require particularly outdated browsers to open.

And to show that the Philippines is not alone in this typical governance situation, Mr. Alimurung cited Jennifer Pahlka, the former US Deputy Chief Technology Officer, who

pointed out that government at all levels has limped into the digital age, offering online services that can feel even more cumbersome than the paperwork that preceded them, and widening the gap between the policy outcomes that's intend and what actually achieved.

Mr. Alimurung started off the story on QC's digital journey when Mayor Joy Belmonte took office in 2019, when she laid her agenda covering five major thrusts: human and social services, economic development, environment and climate change, infrastructure and institutional development. When Mayor Joy (as the mayor was often referred to) took office, very few things were in digital form in the QC office. But this turned out to be a blessing because it made them ask what else is possible.

Under Mayor Joy's leadership, QC was determined to instill two important experiences: (1) The ease of accessing services of the city government, wherever you may be, which the COVID pandemic accelerated because at that point there really was no choice; and (2) The culture of good governance, transparency and accountability. In both these aspects, QC's decision to embrace modern technology made a world of difference today.

Mr. Alimurung clarified that digitalization is not the same as AI because digitalization is something that one needs in the first place. And AI will not function without data. When they started five years ago, everybody wanted to propose AI systems, and their response was: "*I would love to AI, but I have no data to AI with.*"

In QC today, they now actually do have the data. And these last five years, Mr. Alimurung discussed some of their digital and AI initiatives as follows:

QC has developed a comprehensive digital ecosystem with 25 online platforms supporting 145 different services to meet a wide range of needs, from business transactions to social services. To enhance accessibility, QC has implemented a single sign-on system, allowing users to access all city services with just one username and password. Whether you're a business owner securing permits, an entrepreneur applying for assistance, an indigent resident availing of subsidies, or a student borrowing library books, the city aims to bring as many services online as possible.

System / Project	Description
Q-Citizen ID	Tracks the type and frequency of services availed by residents to improve service delivery.

Health Information System	Integrates 66 health centers across 91 facilities, streamlining referrals and enabling real-time tracking of health trends. AI helps flag emerging illness patterns by analyzing online consultations.
Platform Services	QC operates 25 online platforms offering 145 digital services covering business, social, and other transactions. Users need only one username and password to access all city services. The system is designed to be user-friendly—whether for business owners securing permits, entrepreneurs applying for assistance, indigent residents availing subsidies, or students borrowing books. QC aims to move all eligible services online.
Q-Citizen ID (Extended)	Helps determine the types and frequency of services availed by residents.
Health Information System (Extended)	Connects 66 health centers across 91 facilities, making referrals to other facilities easier. AI can flag emerging illnesses by detecting common consultation patterns.
Birth Registration Online	The first of its kind in the Philippines, this system is integrated into all QC hospitals and birthing facilities. It has significantly reduced delayed registrations of newborns.
Unified Gender and Development (GAD) Data	Provides information on cases of violence against women and children (VAWC).
Helpline 9122	Handles emergency calls for assistance, services, traffic issues, complaints, and inquiries. It is linked to all key response units—including the Quezon City Police District, Bureau of Fire Protection, medical responders, traffic management, and barangay response teams—ensuring quick response times.
Project Aurora	QC's Aurora Centralized CCTV Network currently connects over 1,000 cameras, with a fiber-optic system spanning 200+ km for real-time viewing and large-capacity storage. The city plans to install 3,000 more cameras and integrate 60,000 others from government offices, security agencies, businesses, and barangays.
I Rise Up	QC's multi-hazard early warning system supports the Disaster Risk Reduction and Management Office by providing real-time data and weather predictions to prepare for severe weather events.

Mr. Alimurung explained that the AI part is something that looks like this, wherein they no longer ask their client to present their electronic or official receipt, which now has been renamed invoice, because the systems talk to each other.

He illustrated AI as this "*When you actually make a payment at Quezon City's Treasury office, the payment is online, and the business permit system actually reads the system, therefore, no more fake receipts. It automatically tells us that this person is a payer and it's already been paid, nothing to show. This is where artificial intelligence has come in.*"

Mr. Alimurung shared that Quezon City was cited as the Most Digitalized City in the Philippines, and very recently the Philippine Chamber of Commerce and Industry once again honored QC as the Most Business Friendly City. He emphasized that digitization is crucial in creating such an environment.

While QC's been leveraging AI to support city government in policy making, guiding industry and tourism plans, urban planning and economic development strategies, QC is also looking at AI to help identify trends and patterns across business locations in the city. The ultimate aspiration of the is to become a city that promotes a just and equitable society where each citizen can live with dignity and self-respect.

CASE STUDY

AI Education: Shaping the Minds of Future Problem Solvers

by **Prospero Naval, Jr., PhD**

Professor
Department of Computer Science, UP Diliman

October 24-25, 2024
UP BGC | AI Horizons PH '24 Conference Platform

Professor Prospero C. Naval. Jr. provided context on the Philippines' ranking in the Global Innovation Index (GII). While many of its Asian neighbors ranked higher, the Philippines has maintained its global leadership in key areas, particularly in technology exports as percentage of total trade. This includes computers, scientific instruments, electrical machinery, and creative goods such as design, faction, and film, as well as exports of ICT services.

Prof. Naval discussed how in this world of constant change, AI stands out as one of the most powerful tools for innovation, revolutionizing the way people approach challenges,decision-making, empowering people to analyze large volumes of data, automate routine tasks, and develop new solutions that can improve quality of life.

He defined AI as a discipline concerned with the design and construction of intelligent systems that perceive, reason out, formulate a decision in an academic environment so as to achieve a set of measurable goals. These systems embody computational

structures that mimic human cognition through symbolic and non-symbolic knowledge representations that understand, learn, decide and act autonomously. Prof. Naval–acknowledged that the definition can be highly technical and rich in meaning–one that perhaps, only a few, particularly their students, would grasp. However, he emphasized that decoding such complexities is what aim to decode in the AI program.

Many of these words in the definition are associated with the sub fields of AI: neuroscience, computer vision, logic, natural language processing (NLP), machine learning, reinforcement learning, and robotics are among the many branches of AI. AI has extensive applications from agriculture to healthcare, education, transport, politics and even entertainment.

Prof. Naval explained that given the fact that there is no field of human endeavor that is not touched by artificial intelligence, they can leverage AI to solve the challenges that are facing our country. As AI technologies continue to evolve and get integrated into the society, having an AI-savvy workforce who have the needed skills and knowledge become essential for maintaining competitiveness in the global market. There's a need to prepare Filipino students for this.

Prof. Naval moved on to introduce the two-year old Graduate Program in AI which was rolled out in August 2022 and had its first batch of four student graduates last July this year. The program offers a Master of Engineering in Artificial Intelligence, a two-year professional master's degree program focused on deploying AI solutions to any domain and requires only a capstone project. Then a PhD in AI, a three to four-year research doctoral degree program that's focused on developing novel AI systems and solutions and requires a dissertation and several publications. Both degrees are handled by a team of 16 faculty members coming from the different colleges of different departments of the College of Engineering. Of the 142 students that are accepted in the program, 98 are currently enrolled. The program provides the students with solid fundamentals in AI that will enable them to catch up, regardless of how fast the changes are happening.

To be accepted into the Master of Engineering in AI program, the student must have at least a bachelor's degree and knowledge of calculus, statistics, linear algebra, and must also know at least one programming language. Graduates of this course are prepared for a career in industry and government by providing practical knowledge and experience in deploying AI systems, in domains such as agriculture, commerce, education and so on.

PhD in AI is meant for the following: AI industry practitioners who want to specialize in the deployment of SOTA systems, or state of the art systems, researchers who want to extend the AI, AI body of knowledge, and craft new algorithms. Or academics who want to specialize in AI education and conduct AI research with their students. PhD students study advanced topics such as, such as learning theory, machine learning for sequential data and reinforcement learning. Prof. Naval invited the participants who wants to learn

more about the UP Masters Engineering in AI and PhD program to send him an email or visit their Facebook or website.

CASE STUDY

Versatile Instrumentation System for Science and Research

by **Giovanni Tapang, PhD**

Dean
College of Science, UP Diliman

AI Horizons PH 2024
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October 24-25, 2024
UP BGC | AI Horizons PH '24 Conference Platform

While listening to Secretary Angara's message earlier, Dean Giovanni Tapang was reminded of their objective when they were making the Versatile Instrumentation System for Science Education and Research (VISSER). VISSER was started as a project in 2012 with the goal of putting modern laboratories in every school and college in the country. The research team wanted to bridge the learning gap in science because the College of Science is the end-user of those who are produced by the whole educational system.

In his presentation, Dean Tapang showed that 35% of high schools in the Philippines don't have modern laboratories, while 33% have no access to modern digital tools for teaching science.

VISSER went through a lot of testing before it was rolled out in 2023. This portable, battery-powered handheld device comes with a laboratory manual, compatible with a

K- 12 system from grades seven to ten, junior high, senior high, and the other tracks as well.

Dean Tapang described the VISSER as a plug and play system, where one can just plug the sensors, and run it as a data logger. The device allows the students to measure data, do the experiments, and do structured experiments. There are 67 total experiments in the manual, but there are 100 plus more that can be done, and can be accessible by the end users.

VISSERS were deployed and are already being used in Leyte, Pasig, Guimaras, Ilocos Sur, and Marikina. Every time they deliver, they also train the teacher, so they will not just keep the device in the cabinet, because these are really intended to be used. During the pandemic, it was deployed in Zamboanga del Sur, Occidental Mindoro, Leyte and UP Integrated School. Today, VISSER has been deployed in NCR, Luzon, Visayas and Mindanao, with additional 60 more units to come by year end. This innovation not only teaches the people, the students to do science, to measure, to make analysis, but VISSER can also already train them with AI.
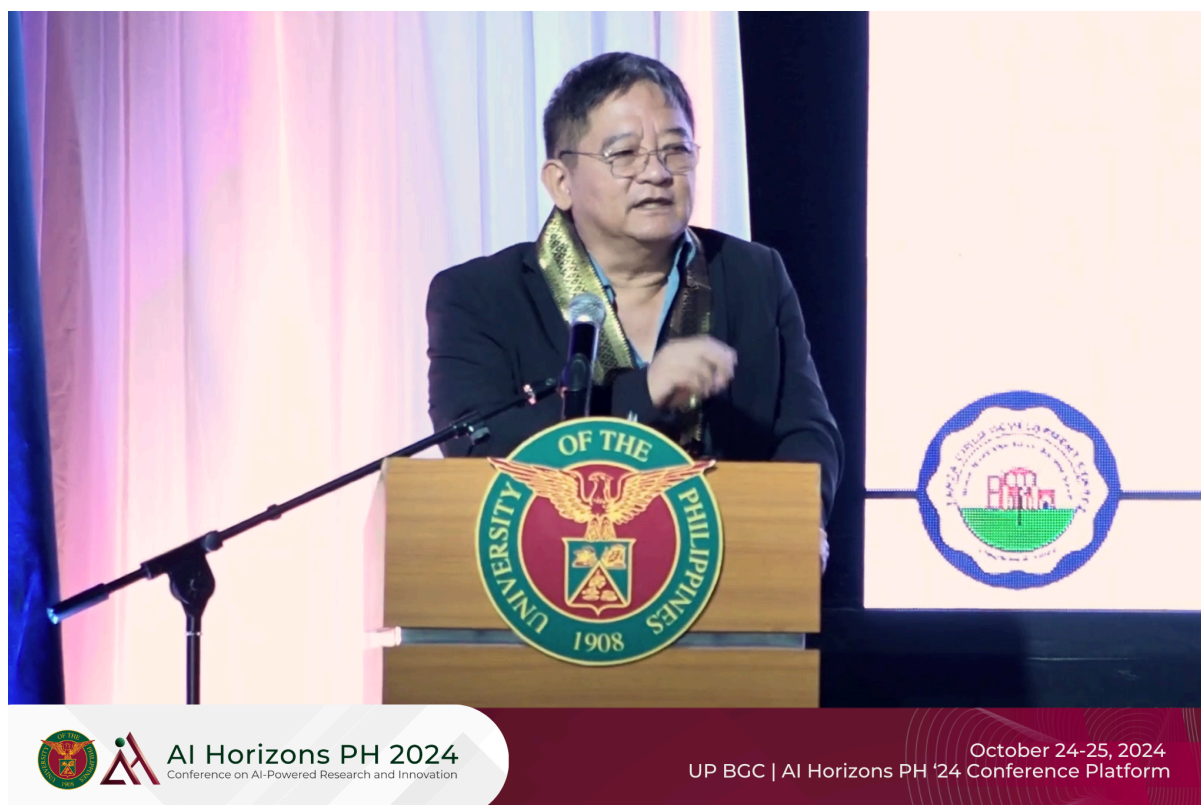
Lastly, Dean Tapang showed along with him, the other pioneers are Dr. Rommel Gomez, Prof. Nelio Altoveros, and the collaborators are Dr. Imee Su-Martinez, Dr. Ranzivelle Roxas-Villanueva, Dr. Gay Jane Perez, and Dr. Sonia Jacinto.

CASE STUDY
Robotics Program of the Tanza Child Development Centre (TCDC)

by **Romeo Gabriel Solis**

Co-founder, Tanza Child Development Centre,
Professorial Lecturer, UP Diliman

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Professor Romeo Gabriel Solis shared the beginning of Tanza Child Development Center (TCDC), recalling how his parents, who were both doctors from UP, his father was a lecturer in law, medicine, and public health, founded the school. TCDC began as a preschool in 1989, then added the elementary in 1991, high school in 1998 and senior high school in 2016. On his part, Prof. Solis took an early retirement in 1998 and his wife who was then the principal, was looking for a teacher in technology and home economics, learned that her driver was formerly a teacher who taught electronic for 18 years and was also from the Advanced Science and Technology Institute, so he became a teacher in electronics.

TCDC have 171 students, and most of these are recipients of the government's ESC (education service contracting) program. Prof. Solis explained that the goal of the school's robotics program is to develop creativity because this is one of the skills needed

in the future, in the fourth industrial revolution. This is working with robotics, TCDC emphasizes the 4C's and 1G – they want to develop creativity, collaboration skills, communication skills, critical thinking skills, and grit, which is actually passion and perseverance.

Prof. Solis recounted how he worked on updating the curriculum of TCDC, developing it in such a way that would allow students more hands-on training in doing the projects. The third year level students, at the time before K-12, had basic electronics and they were doing the wiring of ICs. In his presentation, Prof. Solis showed the early robotics activities of Technology Home Economics for 3rd and 4th year high school students involved basic electronics, microprocessors, robotics, and Christmas light projects. Prof. Solis shared an anecdote, an incident when he asked the students not to make a Christmas light project and the students complained because they wanted to do the project. He was glad that the students enjoyed making those projects.

The professor believes, citing Seymour Papert, "that the role of the teacher is to create the conditions for invention, rather than provide ready-made knowledge." And with this, at the time when the cost of a PC was expensive, they developed a robot even without the PC. Prof. Solis brought sample robots that are programmed using tiles or chips, which they plugged in and the students can program independently. They made a prototype robot in 2006 and they began producing them in 2012.

Robotics and STEM events are important to the students. It helps the school structure their robotics program, and since the students like to perform, this provides them an avenue. Some of the events are My Robot's Got Talent '10, RoboCon '20, RoboFest '23 at SM Tanza, which the students really enjoyed.

Prof. Solis showed some of the robotics projects developed by their students, some of which even won an award. These are the Cupcake Decorator, Angklung, E-fan, Wheelchair, Whiteboard marker refiller, Adobot, and Churros-making device. The students also tried to make a Pares-making robot, but then the 2020 pandemic set in and they were not able to complete it. Prof. Solis advised that students like to perform, and they should take advantage of this because this also builds community awareness.
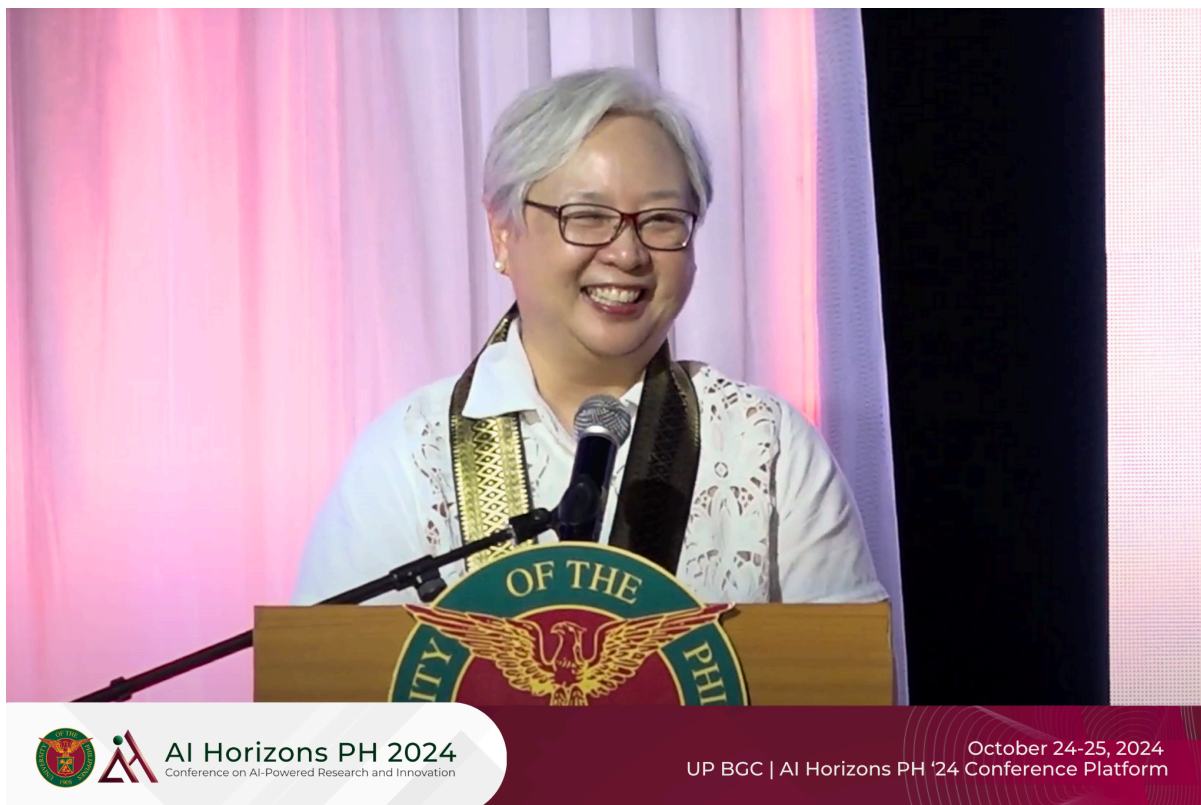
CASE STUDY

AI *in Education*

by **Maria Mercedes T. Rodrigo, PhD**

Professor

Ateneo Laboratory for the Learning Sciences, Ateneo de Manila University

October 24-25, 2024
UP BGC | AI Horizons PH '24 Conference Platform

Professor Maria Mercedes Rodrigo opened her presentation by naming the two projects on learning their team worked on, one is What-If Hypothetical Impact in Minecraft (WHIMC) and the other is CausalImpact Analysis of Canvas Data. Among the researchers involved in WHIMC are Jonathan Casano, Christine Tablatin, Maricel Esclamado, and Domonique Manahan. The approach they used was learning analytics, which is an application of machine learning to educational data. Prof. Rodrigo said both projects are special to her since both were conducted during the pandemic. They worked with the University of Illinois-Urbana Champaign on this project, with Chad Lane and Jeff Ginger.

To have a better grasp of what WHIMC is all about, Prof. Rodrigo explained that WHIMC is a set of Minecraft worlds that simulate hypothetical versions of earth, for instance, what if the earth had no moon, or how would the absence of the moon affect the plant life, the animal life, and so on. These are some of the questions that the WHIMC team would ask and try to answer, in consultation with NASA scientists. The answers were not made up. The answers were derived in consultation with scientists, who would then

build Minecraft-based representations of these worlds, under these changed circumstances. The idea was to take students on a virtual field trip so that they could make observations and try to draw causal relationships between these changes in circumstances. Originally, this 2020 project, which was funded by DOST, was supposed to be for the public schools, but when the pandemic happened, the research team had to work with a private school in Mindanao and two private schools in Manila.

Prof. Rodrigo discussed the effects of WHIMC in terms of students' STEM interest and engagements:
- STEM interest generally increased;
- High performers were not affected by boredom nor frustration;
- No changes in STEM interest of low performers who were bored or frustrated;
- Social play occurred outside of class time;
- PH performance was poorer than UP performance;
- Open-ended activities were more challenging even for PH high performers.

The WHIMC's conclusion is that there is potential for the use of highly interactive educational games to engage learners and boost their interest in STEM. However, there's a need to scaffold the low performers, and there's a need for data collection instruments in our environment to track things like this and analyze performance.

After discussing WHIMC, Prof. Rodrigo discussed the other project, the CausalImpact Analysis, which determined two things: to what extent was student participation was affected by typhoons Goni and Vamco; and was student participation able to return to pre-typhoon levels, or did the typhoons dampen participation for the rest of the post typhoon period? Afterwards, she explained that in the pre-intervention data, causal impact builds a model using the pre-intervention data and then tries to predict (so the dotted line is the prediction) what would have happened to the system if the intervention never occurred. And then it computes for the difference between the actual data and the prediction of the model; tries to compute whether the difference between the actual and the counterfactual is significant.

The findings from this research show that the student participation decreased as a whole. Participation in graded activities was not significantly different from predicted behavior and students continue to comply.

The Professor summed up the conclusion to the CausalImpact study as the Pygmalion effect of teacher expectations. She said, "*It seems like if we continue to demand a lot of our students, then they will rise to the occasion, and but the other reflection here is Matthew, the what's called the Matthew effect, which refers to cumulative advantage. Those who have quite a lot already will continue to do well. Those who are disadvantaged will be further disadvantaged.*"

CASE STUDY

AI in Traffic and Road System

by **May T. Lim, PhD**

Professor
UP National Institute of Physics

Prof. May Lim started off by flashing the source of funding for the two research where she got some of the data for her traffic discussion: One was from the DOST - National Academy of Science and Technology (NAST), a research on traffic data collection and analysis, which allowed them to explore small sensors or IoT; and the other is a research funded by CHED-PICARI: Data Analytics for Research and Education (DARE), a research which allowed them to engage in collaborative work and this one's related to governance.

Prof. Lim was advised by Prof. Naval not to show the equations in her presentations, but she said she deliberately retained the figures. She showed several models, one of these is the "Extracting trip statistics from passive RFID detection and active vehicle location." Another is the "What movement information can we extrapolate from RFID detection data from four detectors in General Santos City?" The answers are Dwell Time and Average Speed. Prof. Lim also cited the use of ML (OpenVINO) to identify pedestrian

tracks to classify the sidewalks. Also shown was the model to "Describe the end-to-end commuting experience: we turn acceleration, temperature and relative humidity data into a comfort index score."

After some time spent on studying the data, the team were getting a sense that traffic volume is crucial, as the MMDA kept saying. Essentially, to solve the traffic, there's really a need to decrease vehicle density. There's no going around it, the Professor warned. The only real solution is to reduce the number of vehicles on the road, while expanding and enhancing mass transit systems.

With the various models and measures taken from the traffic situations in Quezon City and General Santos City, the bottom line, according to Prof. Lim, is that situations can be described through measurements.

Through extensive research, data analysis, and modeling, one key insight emerged: building data-driven models comes significant with challenges. These include lack of available data (e.g., raw data from JUCA, WB studies); non-machine-readable formats (such as maps in PDFs or unstructured route data), and unusable third-party obfuscated data. Prof. Lim said that data needs to be findable, accessible, interoperable, and usable.

Despite the numerous models, the Professor believes that there remains many open (research) questions if the traffic is treated as a complex system (requiring interdisciplinary work):
- Motivations (incentives and disincentives)
- Institutions and institutional memory
- Design and unintended consequences
- Procurement and technical specifications
- Engineering and education

In the end, Prof. Lim wants the audience to remember that: *We have to keep asking the right questions*; *We can measure the effectiveness of proposed solutions*; *We need to have a livable city.*

PANEL DISCUSSION
AI in Education and Governance

Panelists: Giovanni Tapang, PhD
Prospero Naval, Jr., PhD
May T. Lim, PhD
Romeo Gabriel Solis

Moderator: Professor Maria Mercedes Rodrigo, PhD
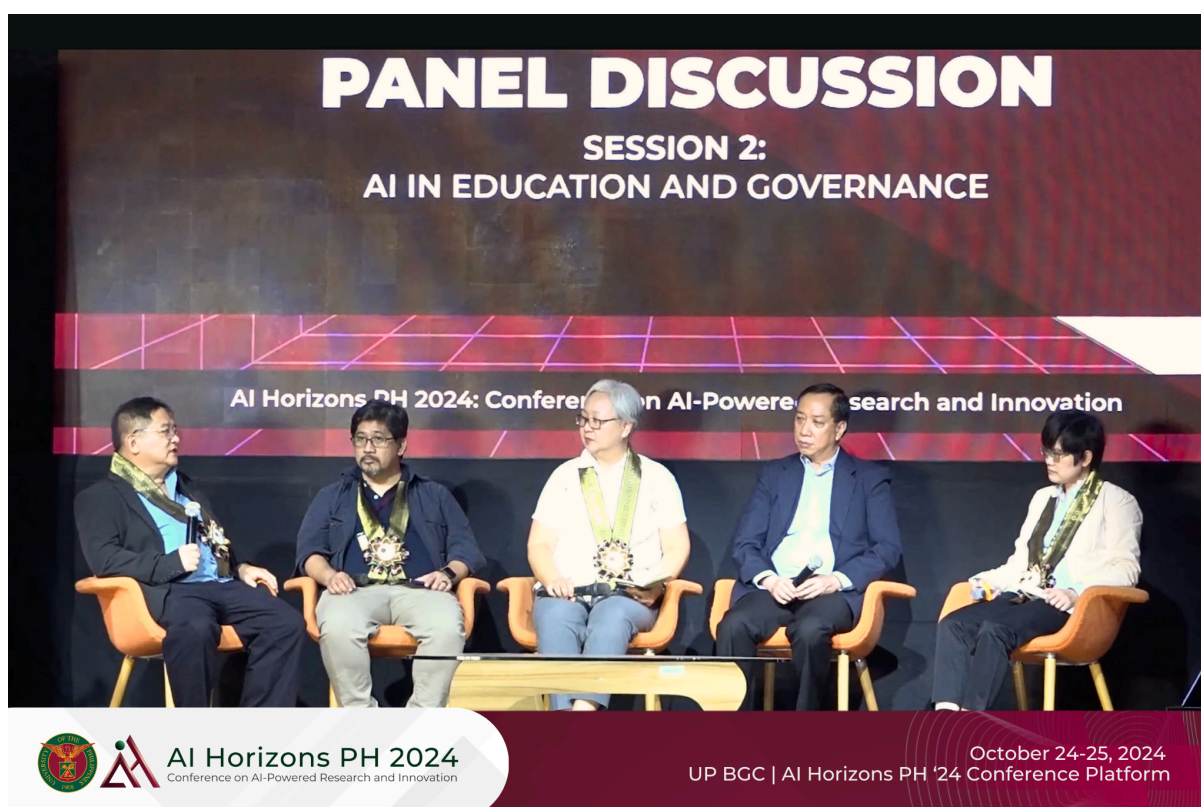
During the open forum, the first question Dr. Rodrigo asked each of the speakers:

Question: *What do they think of the social contract between themselves, their institutions, and the public that they serve?*

The first to answer was Dr. Tapang who said that the contact is not just UP but that it's everybody's job to address all of the problems. It's about convincing the whole hierarchy of people who decide on education or any other topic that is discussed at this forum, usable. Dr. Tapang believes that it's not really just AI, but bringing in technology or bringing innovative solutions.

In response to the same questions, Dr. Naval admitted that initially, when they formed a group deciding on whether or not to have a data science program on AI, he asked himself whether or not to get involved. But four years later it became very clear to them that they did the right thing. Otherwise there wouldn't be a graduate program offering AI. When GPT came out in 2022, Prof. Naval described it as akin to a Sputnik moment, realizing that there's really a need to do it. AI Horizon PH 2024 Conference is actually the start of this whole endeavor of creating a society that is based on artificial intelligence, taking advantage, harnessing AI to improve our human condition, and this is their social contract.

Dr. Lim's response to the question on social contract is that her being also part of UP, the national university, mandated to fulfill its mandate for social good, and working on research on traffic, one of the interesting problems in the Philippines, and actually seeing the effects of not solving it, and since things are falling into place, might as well fulfill this social contract.

On his part, Prof. Solis firmly believes that each one should be doing something for the education and he also believes that there's no mistake in AI, and in fact might have been better if it was started earlier. There's a need to have foresight and start to think of things now.

Dr. Rodrigo's next question was on leapfrogging:

Question: *Do you think that it is, do you, does the panel think that such a leapfrogging can happen? Do you think that there are steps or intervening steps before we can, you know, necessary steps that we have to go through before we can get to the desired state of things? (Dr. Rodrigo was referring to the possibility of AI as something that can leapfrog us, propel us ahead)*

For this question, Dr. Lim volunteered to answer first and she believes that AI is just another tool that allows one to accelerate things, organize data faster. When one talks about AI, one actually talks about machine learning as well and Dr. Lim honestly pointed out the main idea that *"It still boils down to – are you asking the right questions? Because if you were asking the wrong questions, no amount of AI would solve things for you. And so it just makes things a bit faster. But it doesn't mean it's gonna leapfrog if your framework is in the wrong place as well."*

For Dr. Naval, these major changes in technology actually require extensive resources that need a lot of money because even if all the best people are put together, there's no resources for equipment, so it will be difficult to get things done. With AI, however, that is not the case. With AI, the only requirement is good AI training and some computation resources. He cited Dr. Dadios where he showed in his presentation that there's a lot

that can be done even with simple resources. Furthermore, he added that there's no need for those advanced GPUs nowadays. However, there's that tendency to go big because of the big data. But some of the basic problems were solved even without this expensive supercomputer in AI. He believes that AI is an equalizer for all. In the case of the Philippines, there's about 30 years to fix this and this is the golden opportunity because the country has a huge population base and pool of very creative people. All that's needed is to take advantage of this so the country can propel.

Contrary to the others' view, Dr. Tapang disagreed on leapfrogging AI given the country's readiness because to leapfrog means one is starting from something, and knows where it is jumping to, and that is actually what is lacking in the country.Dr. Tapang believes that the Philippines does not have a direction where it wants to go. Even if the AI tools are available, but there is no clear industrial policy, and even supposing there is, leapfrogging would also presuppose that there's a base capacity, human resources, computational resources, etcetera. He mentioned the late Dr. Posadas, who actually advocated on this even in the 1980s, clarified then that to do that leapfrogging, one must know where it's starting and where it wants to jump on to. Dr. Tapang agreed, though, that there are things that the country can do, such as simple electronics, AI. Things are not as hard as it was 20 years ago, so it's easy right now and accessible. That would enable the country to do a lot of other things, but there's a need to be realistic about where the country is starting, and where it intends to go.

On the issue of leapfrogging, Prof. Solis expressed his observation while he was in government, that they were looking for industrial policies, but what happened was that the resources were spent on selection. He believes that it might be better if one would just dictate and proceed in succeeding in that area.

Question: There was an online question asking if SUCs can serve the information requirements of LGUs on agriculture and aquaculture for policy making, so that LGUs do not have to acquire equipment.

Dr. Tapang said that this can be done, citing the UP data commons as an example which could be used and leveraged by LGUs with proper coordination. He added that the QC government is actually working with the UP Data Commons to host some of their data, and that's just a start. This can be replicated with more LGUs and LGUs would have to be as open as QC to their data and other UP intellectual capacity as well.

The last input to the discussion was from the forum participant, Cora Claudio, an engineer and economist who used to teach at the College of Engineering. Ms. Claudio offered to help link the developers of instrumentation and robotics innovation with the Science Foundation since she sits on the board. And the instrument will gather exposure because it will be exhibited by the Foundation. Dr. Claudio also mentioned

some personal experiences that lead her to suggest some improvements over how UP is selecting their faculty, and other suggestions. She recounted her son's experience with UP while he was studying, when the professor gave him a grade of 2.0, which prompted him to shift to the College of Business. Dr. Claudio also offered her expertise, saying she would be happy to work with the team to render assistance.

Synthesis

Delivered by **Gisela P. Concepcion, PhD**

Professor Emeritus
UP Special Adviser to the President for Research and Innovation, UP System

Dr. Concepcion expressed appreciation for the speakers and discussants who remained and promised a very succinct and general synthesis of Session One, on AI in Food Security, Agriculture, Livestock and Fisheries.

She observed that the participants were moved by the dedication of the researchers who incorporated AI in their respective studies. AI proved how it can invigorate agriculture, advance research in livestock vaccine, and inject precision and provide revolutionary solutions to traditional farming techniques and practices.

AI has also contributed to the efficient solution to fisheries and aquaculture monitoring and automation. Through AI, food systems have become more sustainable and environmental conservation more achievable. Filipino experts take the lead in capitalizing on the AI driven developments that proved impactful in the areas of agricultural and aquaculture.

In Session 2: AI in Education and Governance, AI proved itself useful as it continues to assist the 21st century learners, despite the COVID 19 pandemic. Studies have shown how AI powered platforms helped facilitate remote and customized learning. Research has also shown how AI could be tapped to understand even complex problems like traffic and how it can elevate the level of efficiency in operations, and decision making strategies, from e-governance to automation of public services. AI succeeded in bridging the gap so that various sectors and systems can work efficiently. Lastly, Dr. Concepcion also expressed her appreciation to the documenters for their work that contributed to the synthesis of the sessions.

Closing Remarks

Delivered by **Leo Cubillan, MD**
Vice President for Academic Affairs
UP System

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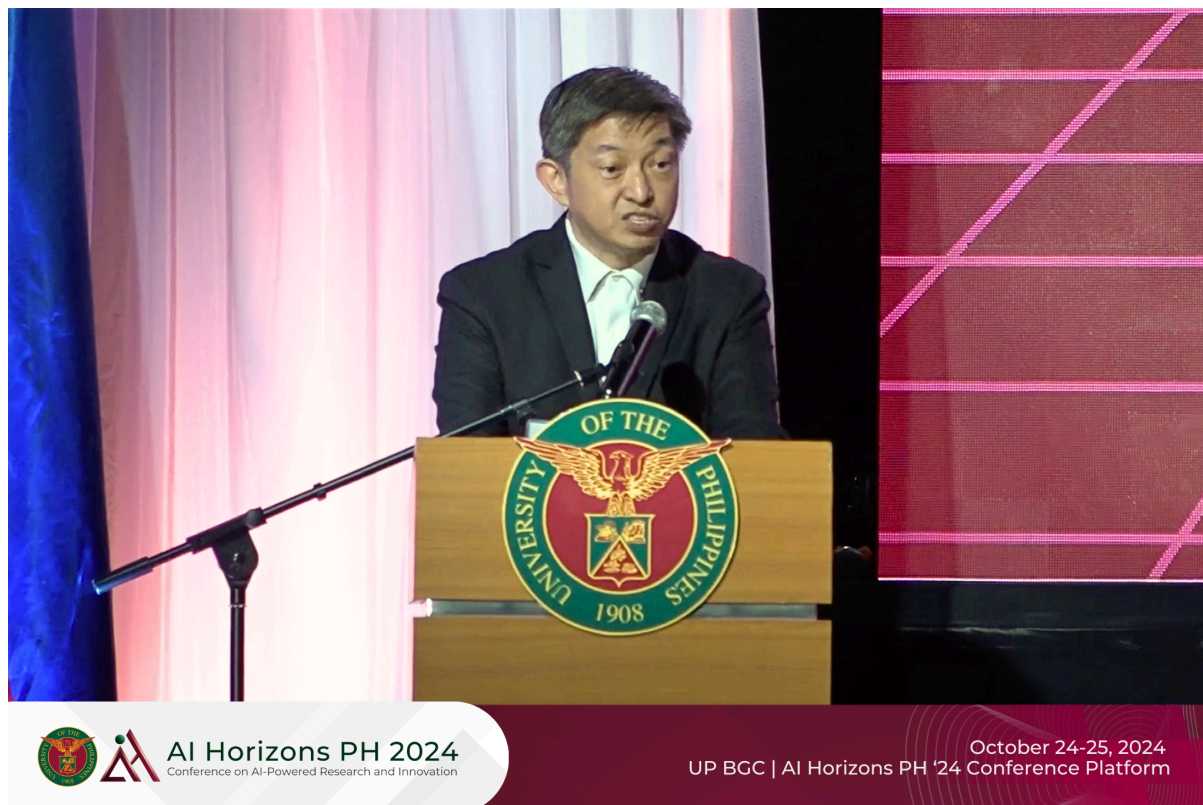
Thank you, magandang hapon sa lahat. I'd like to acknowledge Honorable Sonny Angara, Dr. Prospero Naval, Jr., Dean Giovanni Tapang, Professor Romeo Gabriel Solis, Professor Maria Rodrigo and Professor May Lim. Before we close, Day 1 of the AI Horizons PH 2024 conference, we would like to extend our deepest thanks to everyone who contributed to making this event a success: the organizing team, our insightful speakers and all participants, both in person and online. I believe we have 2000 registrants here. Your engagement has enriched today's discussions, making this conversation on AI future in the Philippines truly impactful.

As we close Day 1, we are reminded of the transformative power of innovation, research and adaptability in shaping our future. If you recall the 2024 just recently Nobel Prize in Physics, it was awarded to John Hopfield and Geoffrey Hinton. Highlights, I mean, this award highlights the growing importance of interdisciplinary collaboration, where fields like in this case, physics, neuroscience and computer science converge to solve some of the world's most pressing challenges. Their work has laid the foundation for AI technologies

that are already revolutionizing industries worldwide. And in this, in today's case studies, the whole day we had the AI guided livestock vaccine development, the Fish-I system for fisheries biodiversity to automated agriculture machinery and precision drone technology, I think that's the one on display when I came in here, demonstrate the incredible potential of this technology in addressing the Philippines most urgent needs. It was presented like programs like SARAI are rethinking agriculture, while AI is reshaping education to create the future problem solvers. These innovations, whether it be in traffic management or child development, offer real solutions to the challenges faced by the rural and underserved communities. So this will potentially drive the growth of our country. Although it's worldwide, but, in a way, the most it will benefit would be those that have marginalized economies. But as we have seen, AI is not just about technology, it is about the people behind it.

The theme of this conference, fostering collaboration across academia, government and industry, reminds us that no single entity can unlock the full potential of this technology. It takes collective effort, shared knowledge and cross sector partnership to truly transform society. AI is often called the new electricity. You've heard that, no, it's the new electricity because of its ability to disrupt how we actually live and work. However, its true power lies in how we use it, not as a replacement for human intelligence, but as an augmentation of it. So in this context, maybe we can say that AI may not really be just an artificial intelligence, but it could be an augmented intelligence for these purposes, enabling us to be more creative, productive and innovative.

Augmented intelligence can actually narrow the performance gaps, break down barriers, whether it's linguistic, educational or experiential, and empower those traditionally left behind, like, as I mentioned earlier, especially in emerging economies in the Philippines. So in a way, it will, even if we have our GIDA areas, even those in Metro Manila, if we apply the technology to them, then they could benefit from it more. So we could equalize the services across the different areas. For those uncertain about adopting AI, let's remember how education has adapted to new technologies. Initially resisted, calculators later became essential tools in classrooms. So AI is no different. It can revolutionize education, fostering creativity and critical thinking and I, and this reminds me, I visited a lab where an AI driven chemist robot achieved in two months what would have taken human researchers several hundreds of years. I think they said 2000 years. They synthesize a catalyst for oxygen production for Mars. So they looked at the available chemicals on Mars and tried to recreate, and they were able to do it in two months. So this shows AI's incredible potential to accelerate scientific discovery.

At its core, AI is a tool for progress, enhancing human capacity, not replacing it. Today, we've seen how AI and education can empower both students and teachers, creating new opportunities for learning. In health, which we'll discuss tomorrow, and agriculture, AI has the power to close gaps, and we have many AI applications here in PGH, for example. And

as I mentioned earlier, it is really important between the urban and rural areas. It will narrow the gap between those with access to resources and those without. This impact is not just technological change, it is societal transformation.

To harness AI's full potential, institutions must develop their own tools and frameworks. Universities as hubs of innovation have a critical role to play. Institutions like University of Michigan and University of California Irvine have developed their own AI models to address privacy and intellectual property concerns. The University of the Philippines is poised to follow suit. I think Professor Naval is already working on that, ensuring responsible and trustful AI solutions tailored to local challenges. This is really essentially how you put a sandbox into an LLM model. We can put a UP data on it and harness what we have, without giving out the information to the rest of the world. Although there are, we share, there are published materials that we share, but there are some items that are within at the same time, government policy must align with global best practices. Singapore's AI governance framework, which emphasizes transparency, fairness, and human-centric solutions, offers a strong model. While the Philippines has adopted the ASEAN guide on AI governance and ethics, much more should be done.

A comprehensive national policy should address ethical AI use across all sectors, with universities playing a key role in shaping these frameworks. As we move forward, let's remember that innovation requires both boldness and responsibility. AI holds great promise, but it is up to us to guide its use for the greater good. Each of us, students, researchers, policy makers and industry leaders has a role to play in shaping the future of AI in the Philippines. Let's leave here today inspired to continue these discussions, build new partnerships and push the boundaries of what AI can achieve, not just for the sake of technology, but for the betterment of society. Together, we can turn these ideas into actions and make a meaningful impact on the Philippines growth, as we always try to target. We want the Philippines to be one of the top economies by 2050. Thank you and see you tomorrow for the Day 2 of the conference.

AI Horizons PH 2024
Conference on AI-Powered Research and Innovation

CONFERENCE DAY 2

October 25, 2024

Opening Remarks

Delivered by **Czar Jakiri S. Sarmiento, PhD**
Deputy Executive Director
National Engineering Center, College of Engineering, UP Diliman

On behalf of our National Engineering Centers, Executive Director and UP Diliman College of Engineering Dean, Dr. Maria Antonia N. Tanchuling, isang mabagyong araw po sa ating lahat. A couple of months ago, coming from a very productive collab trip from UPLB, some of our faculty members in the UPLB College of Engineering had dinner in one of the popular places in Los Banos, and I was seated beside our conference chair, Dr. Pros Naval, and our Associate Dean for Engineering, Dr. Roel Ocampo, who will also be sharing a talk later, if I remember it correctly, as we sat down for dinner, a conversation turned to dieting. You know, of all the conversation topics that we can have for dinner. We thought about dieting. We've got a plate full of good food in front of us, and we thought about dieting. And as we sat down for dinner, Dr Pros mentioned AI powered apps, you know, that can counter calories just by taking a photo of your food.

So naturally, I was intrigued, but also a bit skeptical, but maybe it's just my denial. You know, AI powered apps can actually tell me what's bad for me, especially with the things that I'm eating, but how could an app accurately assess a meal just from a photo. Doc Pros with his characteristic enthusiasm, broke it down. He explained how AI analyzes not just

the image, but also the context, identifying the ingredients where you are, estimating the portion sizes and factoring in how food was prepared. So it's incredible to think that something as complex as Nutritional Science could be simplified into an app that anyone can use. The story really highlights how AI is becoming an integral part of our daily lives. We're seeing it everywhere, from voice activated assistance, to help us manage our daily tasks to AI powered recommendation systems in our entertainment platforms that curate content specifically for our tastes.

Even in healthcare, AI is assisting in diagnosing diseases, analyzing medical images and personalizing treatment plans. In finance, AI is helping detect fraudulent transactions in real time and offering personalized banking experiences. These are just a few examples of how AI is seamlessly becoming embedded in our everyday routines, often without us noticing.

What's remarkable is that AI is not just a tool for tech experts anymore. It is becoming a part of everyone's toolkit. On a personal note, my own research focuses on geospatial AI for Smart Cities. We are working to build the foundations of geodatabases that will prepare and empower the urban and regional areas for data driven decision making and governance. This work is crucial as cities and regions move towards smarter systems. It's all part of the gates that we are trying to open for the future.

It started with a dream. Ang ating motibasyon bilang mga siyentipiko para sa Bayan, sa puso na lahat ng ito ay ang ating misyong na bumuo ng mas magandang kinabukasan para sa ating mga lungsod, at kanayunan. Now reflecting on Day 1, we saw how AI is not just for specialists anymore is transforming sectors like agriculture, governance, education and healthcare. These innovations are empowering people, making advanced technology accessible in ways we couldn't have imagined just a few years ago. But as we embrace AI's potential, it is equally important to invest in the capacity of our universities and colleges.

These institutions play a critical role in offering advanced degrees that will accelerate industrialization and strengthen our research capacity in today's rapidly evolving world.

We need to empower our Philippine universities to not only produce graduates, but to cultivate a new generation of AI researchers, engineers and innovators who can address the complex challenges of sustainable development by expanding Research Programs, improving facilities and fostering collaborative partnerships with the industry. Academia can be a driving force in ensuring that AI technologies are used for the greater good, advancing industries, improving governance and addressing societal needs.

This investment in higher education is crucial if we are to stay competitive globally and to ensure that Philippines contributes to this AI Revolution by empowering more young minds to pursue research and development in AI and related fields, we are not just preparing them for the workforce, we are equipping them to solve some of our country's most pressing problems.

With the right support and resources, our universities can be key players in driving sustainable development and inclusive growth as we look ahead today too, I'm particularly excited to continue our discussions with our esteemed speakers, some of whom I've had the privilege of working with at UP, In addition to Doctor Ocampo, we are joined by Dr. Paringit and Dr. Marciano, who will be sharing their insights on AI roles in emerging technologies and space. We're also fortunate to President Jimenez and Chancellor Vistan, both of whom are steadfast supporters of the College of Engineering initiative to collaborate with the SUCs in offering advanced engineering problems, programs. And of course, we look forward to learning from all our other distinguished and respected speakers throughout the day. Maraming maraming salamat po. And I hope you enjoy today's sessions.

AI Horizons PH 2024
Conference on AI-Powered Research and Innovation

PLENARY 3

AI IN MATERIALS AND ENERGY

Conference Day 2 | October 25, 2024

KEYNOTE ADDRESS

AI in Materials and Energy

by **Enrico C. Paringit, PhD**
Executive Director
Philippine Council for Industry, Energy, and Emerging Technology Research and Development (PCIEERD),
Department of Science and Technology

October 24-25, 2024
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Dr. Paringit opened the session by discussing the ongoing efforts of the Department of Science and Technology (DOST) in supporting Artificial Intelligence (AI) initiatives in the Philippines. He explained that AI, which has traditionally been considered an emerging technology, is now increasingly being recognized as a critical area for development. He emphasized that AI is supported by DOST-PCIEERD as a key emerging technology and outlined its growing applications in various sectors.

Key initiatives include optimizing green energy systems, precision-level weather forecasting, and deploying AI-based platforms for disaster risk reduction, which aim to provide barangay-specific weather predictions across the Philippines. The DOST envisions a future of precision-driven solutions, moving away from one-size-fits-all approaches, and leveraging AI to unlock opportunities in data-intensive fields. Dr.

Paringit emphasized the transformative potential of AI in shaping tailored and effective applications for diverse industries.

Dr. Enrico Paringit discussed theDOST's active role in fostering AI advancements across multiple sectors, including energy, materials, and disaster management. A prominent initiative that he highlighted was a project utilizing AI for precise weather forecasting. Thisaims to enhance disaster preparedness and response capabilities of 42,000 barangays in the country.

Dr. Paringit noted significant progress in government digitalization, with DOST urging both local government units (LGUs) and national agencies to make their data available for analysis. This access to data could empower localized problem-solving and unlock new opportunities, advancing governance at various levels.

Expanding AI's reach, DOST is promoting its application in areas like mining, metallurgy, and nutrition. Dr. Paringit emphasized the potential of cross-referencing data on nutrition with demographic and educational statistics to uncover links between nutrition and academic performance. DOST's Food and Nutrition Research Institute, in particular, is being encouraged to take a data-driven approach in these efforts.

The AI research and development board, guided by a strategic AI roadmap, oversees these initiatives. DOST recently funded 88 research projects, nearly half of which incorporate AI, representing an investment of approximately ₱935 million. Dr. Paringit's address underscored DOST's commitment to advancing AI-driven solutions that address both local and national challenges, ensuring a sustainable and innovation-driven future for the Philippines.

CASE STUDY

Role of AI in Space Technology

by **Joel Joseph Marciano, PhD**

Director-General
Philippine Space Agency

October 24-25, 2024
UP BGC | AI Horizons PH '24 Conference Platform

"The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it." - Mark Weiser, CTO of Xerox Palo Alto Research Center

Space technology, Dr. Joel Joseph Marciano emphasized, often works quietly in the background—integral yet unnoticed in daily life. He illustrated this with examples such as navigation apps, global internet data transmission, and weather forecasting, all of which rely heavily on satellite technology. He underscored that the sudden loss of satellites would significantly disrupt the global economy and daily life.

The global space economy, currently valued at $500 billion, is projected to triple by 2035. This economy includes both "upstream" (satellites, rockets, spaceports) and "downstream" (earth observation, telecommunications) activities. He highlighted that

the Philippines has made notable strides in this economy, partly due to contributions from small satellite technologies.

The Republic Act No. 11363 or the Philippine Space Act established a formal space policy, outlining six key development areas: hazard management, climate studies, national security, R&D, international cooperation, and space industry growth.

Dr. Marciano introduced the "Space Value Chain," a framework for assessing the maturity of space ecosystem components, from satellite ownership to data application. AI enhances this value chain by helping process and analyze vast datasets, identifying actionable insights, and enabling greater data accessibility.

He also shared some ongoing projects by PhilSA:

- PhilSA has used AI to produce over 30,000 maps, supporting efforts in areas like disaster management, maritime awareness, and agriculture. Through an in-house AI model, PhilSA produces timely flood maps that are essential for emergency response. The AI model has drastically reduced processing times, enabling responders to act faster.

- With AI, PhilSA has accelerated nationwide mangrove mapping, essential for coastal protection. By partnering with the Department of Environment and Natural Resources, PhilSA encourages public involvement to validate and refine these maps.

- Recognizing the importance of cross-sector collaboration, PhilSA has established partnerships with agencies like the Coast Guard, Civil Defense, and Department of Agriculture, which use satellite data for operational decisions and environmental protection.

Looking ahead, Dr. Marciano discussed plans to explore Earth observation foundation models, integrating diverse satellite data to produce adaptable insights across various geographies. Another promising area is onboard AI processing in satellites, which would optimize data collection by filtering out cloudy images and helping satellites navigate based on star maps.

Dr. Marciano encouraged the Philippine industry to draw inspiration from international startups that combine AI and Earth observation. This approach could enable the Philippines to advance its space capabilities while also contributing valuable ground-based data.

Dr. Marciano closed by expressing PhilSA's commitment to fostering public-private partnerships and supporting emerging startups to enrich the Philippine space

ecosystem. Through these efforts, PhilSA aims to build an integrated, AI-enhanced space value chain that generates substantial socio-economic benefits for the country

CASE STUDY

Advanced Manufacturing and Chemical Industries

by **Rigoberto Advincula, PhD,.**
Governor's Chair Professor
Tickle College of Engineering, University of Tennessee

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Dr. Rigoberto Advincula presented a compelling session on the impact of AI and machine learning on advanced manufacturing and chemical industries. His talk emphasized the importance of digital transformation in fields like nuclear energy, polymer research, and additive manufacturing. He highlighted the pivotal role AI will play in Philippine industries, including energy, supply chain management, and advanced manufacturing, as well as the broader importance of adopting AI and machine learning tools for accelerated scientific research.

Dr. Advincula shared insights into Oak Ridge National Laboratory's pioneering work in

nuclear energy, polymers, and nano-materials, noting Tennessee's status as a significant hub for nuclear energy research. He highlighted additive manufacturing (3D printing) as a transformative method in industry, allowing for customized, high-performance materials, such as polymers and metals, with diverse applications in automotive, biomedical, aerospace, and military sectors.

Machine learning is revolutionizing chemical research and manufacturing processes, with applications in creating sustainable, high-strength materials at record speeds. Dr. Advincula's work on autonomic chemistry integrates AI to optimize complex chemical synthesis processes, aiming for efficiency by automating traditionally trial-and-error-intensive experiments. The goal, he noted, is to reduce reliance on human intervention while maintaining precision in material synthesis.

Dr. Advincula described the power of 3D printing in reviving older manufacturing capabilities. For instance, Oak Ridge National Lab's 3D-printed World War II Jeep demonstrates how digital manufacturing can bring historical artifacts and industrial tools back to life. In the Philippines, he has contributed to establishing the Advanced Manufacturing Center (AMCen)- DOST, a premier national center for 3D printing research, encouraging the use of this technology for local innovation in sectors such as automotive, military, and consumer goods.

Dr. Advincula noted that AI is transforming traditional fields such as energy extraction, where machine learning enhances risk analysis and optimizes resource efficiency, notably in renewable energy sectors like geothermal. The role of AI in nuclear energy, a field rapidly gaining traction globally, was also underscored. Nuclear energy, he suggested, may help power the extensive data needs of future AI applications.

He also addressed the evolving role of human expertise in AI-driven fields, stressing that AI and machine learning will complement rather than replace STEM professionals. He called for enhanced AI training for scientists and engineers, emphasizing the importance of developing data mining and analysis skills to keep pace with technological advancements. His prediction: AI-driven tools and methods will shorten research and development cycles, potentially reducing the need for large graduate student cohorts, though not eliminating the need for specialized scientific expertise.

Dr. Advincula has actively facilitated collaboration and training between U.S. research institutions and the Philippines, supporting Filipino students, professors, and scientists in developing expertise in AI, materials science, and additive manufacturing. His work with the Philippine Department of Science and Technology (DOST) and as part of various science and technology programs has helped to foster innovation and technopreneurship in the Philippines.

Dr. Advincula concluded by encouraging the Philippines to integrate AI and machine learning across various industries to drive local solutions and competitive advantages. He envisions a future where Filipino engineers and scientists play a central role in the global AI landscape, using tools like 3D printing and AI-driven materials research to bring Philippine manufacturing and research sectors to new heights

CASE STUDY

AI Initiatives of DOST-ASTI

By **Franz De Leon, PhD.**

Director
Department of Science and Technology-Advanced Science and Technology Institute

Dr. Franz de Leon, Director of the Advanced Science and Technology Institute (ASTI) of the Department of Science and Technology (DOST), presented DOST-ASTI's initiatives for democratizing AI in the Philippines.

Dr. De Leon highlighted DOST-ASTI's efforts to overcome barriers to AI adoption, particularly for smaller institutions, through four key strategies: upgrading computational infrastructure, developing AI applications for pressing national issues,

creating reusable AI models, and fostering collaborations across sectors. He also showcased several notable projects that demonstrate DOST-ASTI's commitment to making AI more accessible and beneficial for various industries and communities throughout the country.

DOST-ASTI's strategies address these obstacles to AI through improved infrastructure, relevant applications, model reusability, and collaborations. The key initiatives of DOST-ASTI include:

1. Enhancing the scientific community's AI capabilities through upgrading computational resources and fostering international research networks. This investment addresses the high costs and technical barriers that hinder AI adoption in research.

2. Prioritizing pressing issues where AI can make a tangible impact, such as disaster risk management, agriculture, and smart city development. This targeted approach aims to produce meaningful solutions for national priorities.

3. Pre-trained, modular AI models. DOST-ASTI enables diverse sectors to leverage AI without needing to start from scratch. This strategy aims to reduce costs and technical challenges for researchers and institutions.

4. Bridging the gap between AI research and its practical applications through collaborations with government bodies, industries, and educational institutions bridge the gap between AI research and its practical applications. These partnerships enhance resource sharing and foster a collaborative environment for AI growth.

Dr. De Leon then gave an overview of DOST-ASTI's diverse portfolio of its AI projects aimed to leverage artificial intelligence for national development.

In agriculture, DOST-ASTI pioneers two significant initiatives. The AI for Census of Agriculture and Fisheries (AI for CAF) project, in collaboration with the Philippine Statistics Authority, automates aquaculture monitoring using satellite imagery and AI. This innovation reduces manual efforts while providing more accurate data for policy-making. Complementing this is the ROAMER (Robot for Optimized and Autonomous Mission Enhancement Response) project, an autonomous vehicle that monitors banana plantations for diseases, offering real-time data to help farmers control crop disease spread.

Urban development is another focus area, with the Traffic Management AI project. This AI-integrated system dynamically adjusts yellow traffic light timing based on real-time vehicle movement, enhancing road safety in urban areas.

In healthcare, DOST-ASTI is running a pilot project in Olongapo City that uses machine learning and GIS to identify optimal hospital locations, aiming to improve healthcare access in underserved regions

To address language barriers, DOST-ASTI is advancing language technology through the Itanong Project, a large language model (LLM) tailored for the Philippines. Currently supporting Tagalog and Cebuano, with plans to expand to other local languages, this initiative aims to improve AI accessibility across diverse Filipino linguistic communities.

In line with its strategy of promoting model reusability, DOST-ASTI developed the Decentralized Intelligent Model Exchange Repository (DIMER), a platform allowing institutions to access pre-trained AI models, thereby encouraging broader AI use in smaller institutions and local governments. This approach enables diverse sectors to leverage AI without needing to start from scratch, reducing costs and technical challenges for researchers and institutions.

DOST-ASTI regularly conducts training sessions throughout the Philippines to build AI capacity across the country. These workshops educate students and faculty on AI fundamentals, and support the development of AI researchers.

On the international stage, DOST-ASTI has been actively engaged in promoting ethical AI practices. The institute participates in ASEAN forums, contributing to important discussions on AI governance and exploring potential partnerships with organizations such as AI Singapore. Recently, DOST-ASTI played a significant role in ASEAN-China negotiations, emphasizing its position in advancing digital policy discussions on AI, big data, and blockchain technologies.

CASE STUDY
High Performance Computing for AI

by **Roel Ocampo**, *PhD*,
Project Leader
Engineering Research Development for Technology (ERDT), UP Diliman

October 24-25, 2024
UP BGC | AI Horizons PH '24 Conference Platform

Dr. Roel Ocampo, Project Leader at the Engineering Research Development for Technology (ERDT) at UP Diliman, shared an insightful case study on high-performance computing (HPC) for AI, discussing both the technical and strategic dimensions of establishing scalable infrastructure in an academic setting.

Dr. Ocampo recounted the journey of creating a robust HPC infrastructure at UP Diliman, beginning with a single computing rack donated by UP ERDFI and expanded through additional resources sourced from past projects. By consolidating and repurposing "leftover" computing assets from various college projects, UP's College of Engineering transformed a modest beginning into a comprehensive facility now comprising 14 computing racks and 11 clusters.

Highlighting the rise of data-driven research, Dr. Ocampo underscored the importance of embracing the "fourth paradigm of science," where empirical and theoretical methods now integrate data-rich e-science, reliant on HPC resources. This infrastructure serves

as a bridge, enabling researchers to perform complex simulations and analysis across diverse fields, such as AI, quantum computing, and other computational-heavy domains.

Dr. Ocampo emphasized that effective HPC goes beyond hardware; concerns user-oriented services. He introduced the "E-Science as a Service in Engineering" (ESE) team, which ensures that infrastructure translates into practical support for researchers, with engineers actively assisting with software compilation, workflow optimization, and resource allocation.

UP's HPC resources have yielded tangible research advancements, allowing students and faculty to run complex simulations and model training at a much faster pace. As an example, a collaboration with the Philippine Nuclear Research Institute (PNRI) reduced a critical 30-hour simulation to just 1.72 hours using 960 cores, exemplifying how HPC enhances scientific productivity.

Dr. Ocampo acknowledged the need for broader collaboration across institutions, advocating for a "community of practice and engagement" to share computing power and expertise. This cooperative model envisions interlinking clusters nationwide, allowing researchers to tap into idle resources and scale research efforts more efficiently.

He concluded with a call for capacity building, emphasizing the importance of skilled personnel, not only in research but also in infrastructure management. This "superstructure" of knowledge and technical capability is essential for fostering a sustainable, scalable AI and HPC ecosystem in the Philippines.

Dr. Ocampo underscored the importance of prioritizing people, services, and a collaborative approach to elevate HPC capabilities across institutions. He thanked the audience and stakeholders, ending with an invitation for ongoing cooperation to further the nation's HPC and AI research goals.

CASE STUDY

AI in Transportation

by **Lea Bronuela-Ambrosio, PhD**
PAVE Project Leader
National Institute of Civil Engineering, UP Diliman

AI Horizons PH 2024
Conference on AI-Powered Research and Innovation
October 24-25, 2024
UP BGC | AI Horizons PH '24 Conference Platform

Dr. Lea Bronuela-Ambrosio presented an innovative case study on the Prototype Automated Visual Survey Equipment (PAVE), a tool designed to enhance road maintenance in the Philippines through automated detection of road defects. Funded by the DOST and developed in collaboration with the Department of Public Works and Highways (DPWH), UP Diliman's Institute of Civil Engineering, and the Computer Science Department, the project aims to address challenges in traditional, labor-intensive road inspections.

With the country's expanding road infrastructure, there is a critical need for efficient and systematic road maintenance. Current manual inspections, performed by local surveyors, are time-intensive, potentially hazardous, and can produce subjective data on road conditions. Most local governments rely on reactive measures and citizen reports for road defect information, which limits data quality and responsiveness.

The PAVE project introduces a prototype automated inspection system that collects video footage of roads via cameras mounted on a detachable hardware setup. This hardware is designed to be compatible with standard pickup trucks commonly used in road surveys. The captured footage is processed by AI-based software to analyze, identify, and categorize road defects.

The technical design is as follows:

- Hardware: The hardware consists of cameras focused on the road surface, capable of collecting footage at speeds of 40-80 km/h. This setup allows for efficient data collection without the need for surveyors to walk along the road.

- Software: The AI software translates the video into images and identifies defects based on DPWH standards. Users can manually verify and adjust defect identification to improve accuracy, which currently ranges between 67% and 75%.

- Output: The software generates reports detailing the location, type, severity, and dimensions of defects, providing comprehensive data for better pavement management.

The PAVE project is still refining the accuracy of defect detection. Further collaboration and testing are planned to improve its effectiveness and prepare it for large-scale deployment.

Dr. Bronuela-Ambrosio emphasized the need to advance the technology readiness of the prototype and to conduct real-world testing on actual roadways, aiming to improve the system's reliability and robustness.

PANEL DISCUSSION
AI in Material and Energy

Panelists: Enrico C. Paringit, PhD
Ariel Blanco, Dr. Eng.
Franz De Leon, PhD
Roel Ocampo, PhD
Lea Bronuela-Ambrocio, PhD

Moderator: Rigoberto Advincula, PhD

Question: *What do you think is the most important contribution in your own expertise that AI and machine learning can do to advance the Philippine economy?*

Dr. Paringit emphasized that AI and machine learning can significantly boost the Philippine economy by enhancing productivity, competitiveness, and resilience. He highlighted the need for technology-driven solutions, such as developing disaster-resilient crops and improving manufacturing efficiency. Addressing key gaps in productivity and energy efficiency will help the country thrive and succeed globally, particularly in sectors that drive economic growth.

Dr. Roel Ocampo discussed how AI and machine learning can expedite work across various fields by enabling faster and smarter solutions. He explained that while traditional science relied on physical labs, AI and computational tools offer the opportunity to leapfrog, catch up, and even get ahead through simulation, modeling, and data analysis.

Dr. De Leon focused on AI's ability to accelerate R&D, with an emphasis on its capacity to fail fast, learn from mistakes, and adapt solutions quickly, particularly in sectors like electronics and agriculture. However, he stressed the need for discussions on how stakeholders can begin adopting AI and other locally developed technologies to drive economic growth.

Dr. Ambrosio pointed out the importance of applying AI in maintaining existing infrastructure, not just in creating new projects, such as through the Pavement Management System.

Dr. Blanco discussed AI's impact on agriculture and fisheries, where it can monitor environmental factors like disease, drought, flooding, pollution, and harmful algal blooms, helping mitigate their effects.

Question: *What do you think are the key investments needed right now in order to bring much impact for AI and Machine Learning to the Philippines?*

Dr. Paringit suggested focusing on Human Resource Development. He stressed the need to equip Filipinos with AI tools that can enhance decision-making, research, and business, making AI accessible across all levels of society. He envisions AI tools that are user-friendly and can be used by everyone, whether they are researchers or ordinary citizens, to foster innovation and improve processes.

Dr. Advincula stressed the need for more homegrown AI experts and integrating AI education early in the curriculum to train future scientists and engineers.

Dr. Ocampo expanded on the necessity of infrastructure to support AI research and development. He recalls a discussion with a representative from NVIDIA, highlighting that serious investments would be a strong signal of commitment to AI development in the country. He points out that at the College of Engineering, only three high-powered AI servers exist, yet they have already enabled groundbreaking research, such as an AI algorithm integrated into a robot aboard the International Space Station. He added that with greater infrastructure investments, even more remarkable innovations could be achieved.

Dr. De Leon supported the need for capacity building, particularly in the early stages of education. She advocated for engaging youth in science and technical subjects like math

and physics from a young age. Dr. De Leon emphasized that introducing students not only to AI as users but also as contributors—whether through data collection or application development—could have a significant impact. He marveled at the intellectual abilities of children today, pointing out that early exposure to technology and science could lead to a stronger foundation for AI development in the country.

Dr. Advincula agreed, stressing the importance of early investment in AI and human resources. He shared his personal experience of hosting undergraduates in his lab, noting that equipping students with skills like Python programming and familiarity with tools like Arduino and Raspberry Pi could enhance their understanding of how these technologies intersect with science and engineering. He advocated for a focus on coding and statistics, starting as early as high school, to better prepare students for the AI-driven future.

Dr. Blanco added with an update on the CopPhil project, which aims to enhance the Philippines' infrastructure for Earth observation through AI and machine learning. Funded by the European Union and implemented in partnership with agencies like DOST, PhilSA, and the European Space Agency, the project focuses on developing monitoring services for land cover, habitat data, and environmental impacts. Dr. Blanco highlighted the expansion of these services to cover the Philippines and neighboring Southeast Asian countries, positioning the Philippines as a hub for AI-driven Earth observation. This project is also providing capacity-building opportunities at the local level, ensuring that government agencies and communities can effectively use the data generated.

Q&A Session

Question: *Most of the AI technologies we are aware of are coming from the west. (Open AI, MS) how could we also tap AI coming from China where they have shown well advanced applications?*

Dr. Blanco shared their current collaboration with China. This initiative focuses on the use of hyperspectral imaging and measurements, which are integrated with AI to assess and classify crop varieties such as rice and corn.

Dr. Advincula emphasized that both the US and China use similar AI tools, and the competition is more about who has access to the best technology at the right price. He mentioned the US's semiconductor efforts, particularly in Taiwan, and suggested that the Philippines should focus on getting access to technology efficiently and cost-effectively.

Question: *Do we have a policy in place to access and utilize open-source data from China, such as agricultural and fisheries data, that could be beneficial for the Philippines' farmlands and marine fisheries?*

Dr. Blanco explained that while China has significant capabilities in space technology and satellite data, accessing their freely available data often requires a Memorandum of Agreement. China has established the China Aerospace Science and Technology Corporation (CASC) and an AI and remote sensing application center, but due to geopolitical tensions, the Philippines may not join such initiatives directly. However, bilateral collaboration with China is still possible. Currently, the Philippines does not have concrete programs in place, but they are exploring opportunities and sending participants to regional forums organized by China for space agency dialogues.

Question: *How can AI help address power fluctuations, and could it prevent or reduce power outages brought by the inclement weather, such as the one we have right now? Have you talked with National Grid Corporation of the Philippines (NGCP) about possible partnerships for AI?*

Dr. Paringit explained that AI applications in power and grid management are being researched, particularly for small areas through the Small Power Utilities Group (SPUG). AI can help manage power distribution and quickly identify outages caused by hazards. He mentioned that collaborations with the Department of Energy and electricity cooperatives are ongoing, with AI potentially playing a role in predicting outages before storms hit. He also noted that the DOE and DOST are planning an AI Forum on Power and Energy Applications to assess capabilities and explore research on the topic.

Dr. Advincula concluded the session by emphasizing the importance of data, likening it to oil, as it represents patrimony and is essential for making quality, informed decisions in business and other sectors. He then thanked the panelists and speakers for their contributions.

CLOSING REMARKS

Remarks on Importance of AI for National Development

by **Atty. Angelo A. Jimenez**

President
University of the Philippines

October 24-25, 2024
UP BGC | AI Horizons PH '24 Conference Platform

President Jimenez discussed the transformative role of smartphones and AI in creating "cybernetic organisms," where humans now live with enhanced cognitive abilities due to technology. He emphasized the "civilizational shift" brought about by AI, suggesting that today's culture, defined by technology-enhanced human interactions, will shape future generations differently than those before.

Reflecting on his efforts to establish scientific resilience, President Jimenez shared the success of integrating Project NOAH (Nationwide Operational Assessment of Hazard) — a government hazard assessment project — into the UP Resilience Institute to preserve valuable scientific expertise. He articulated his vision for "scientific infrastructure," where science becomes deeply ingrained in Filipino consciousness, as illustrated by the everyday use of weather data by citizens.

President Jimenez underscored the importance of AI as a tool for addressing fundamental national needs, such as food security, education, governance, energy, and health. He reiterated UP's commitment to using AI to uplift underserved communities and advocated for AI-driven solutions that directly impact citizens' lives.

Integrity and honor, pillars of the UP community, were highlighted as essential values in AI development. Jimenez called for responsible use of AI, guided by ethical principles and truthful data. He referenced UP's commitment to ethics in AI, demonstrated by the institution's 100 talks on AI ethics and a dedicated AI policy.

Acknowledging UP's concentration of AI talent, Jimenez detailed the university's commitment to expanding research in AI, data science, and deep learning. He shared plans to recruit top global Filipino scientists and improve research budgets, emphasizing that UP aspires to lead in AI research that aligns with national interests.

Jimenez proposed making AI a general education course, accessible to all students, as a way of embedding AI knowledge across disciplines, from arts to sciences. He expressed hopes that AI education would foster a mindset that values scientific inquiry and innovation.

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PLENARY 4

AI IN HEALTH AND WELLNESS

Conference Day 2 | October 25, 2024

Keynote Address

by **Angelo Karagdag**
Development Management Officer, Department of Health

on behalf of **Usec. Glenn Matthew Baggao**
Undersecretary for Public Health Services Cluster, Department of Health

With high rates of cardiovascular diseases, cancer, and diabetes, AI-based tools were highlighted as crucial for early detection, tailored treatment plans, and monitoring, aiming to reduce these health burdens.

AI tools such as mental health chatbots, predictive algorithms, and telepsychiatry platforms are emerging as accessible options, helping Filipinos manage mental health issues while reducing stigma. Mental health support systems powered by AI can expand access and confidentiality, providing vital resources for approximately 3.3 million Filipinos affected by mental health challenges.

AI-driven telemedicine offers continuity of care to the nearly 10 million Filipinos working abroad, allowing them to access healthcare services regardless of their location.

AI-powered telemedicine and mobile health units were highlighted as solutions to provide care to underserved communities, addressing the 35% of Filipinos who live more than 30 minutes from a healthcare facility.

KEYNOTE ADDRESS
AI *in Clinical Decision Making*

by **Antonio Miguel L. Dans, MD**

Professor Emeritus, College of Medicine, University of the Philippines Manila
Academician, National Academy of Science and Technology

October 24-25, 2024
UP BGC | AI Horizons PH '24 Conference Platform

Dr. Antonio Dans provided a comprehensive overview of how artificial intelligence (AI) is revolutionizing healthcare, especially in medical decision-making. His talk focused on AI's current roles, a research framework, and examples of practical applications in rural settings in the Philippines.

- Diagnostics - AI's capabilities in genomics, imaging analysis (CT scans, MRIs, X-rays), and disease risk prediction.
- Decision Support - AI tools aiding healthcare providers in decision-making, helping physicians, nurses, and midwives manage patient care.
- Administration and Patient Assistance - AI assists with pandemic tracking, healthcare financing, appointment scheduling, and emergency response recommendations.

Dr. Dans introduced a structured framework for conducting and evaluating AI research

in medical decision-making, centered on three types of research questions:

- Diagnosis: Accuracy of AI in identifying diseases, such as diabetic retinopathy in retinal photographs.
- Prognosis: AI's reliability in predicting future health outcomes, for example, dementia in diabetic patients.
- Effectiveness: How well AI can improve outcomes compared to traditional approaches, illustrated by studies comparing AI-assisted support to conventional care in managing perioperative anxiety.

An impactful example was shared from rural areas in the Philippines, where AI-supported decision tools helped barangay health workers (non-professional healthcare providers) educate patients using locally understood language. The study demonstrated the feasibility and acceptability of using AI tools in resource-limited areas, even when staffed by minimally trained health workers. This work emphasizes the potential of AI to expand healthcare access and improve community-level care in remote locations.

Dr. Dans highlighted two main challenges:

- Information Overload: The vast amount of medical data, including original studies, systematic reviews, and practice guidelines, makes AI invaluable but complex in synthesizing actionable information.
- Health Information Systems (HIS): He emphasized the critical need for a universal Health Information System (HIS) in the Philippines, as mandated by the Universal Health Care (UHC) Law. Establishing this HIS is essential for effectively implementing AI on a larger scale to improve healthcare outcomes nationwide.

Dr. Dans concluded that while AI will not replace healthcare providers, it will enhance their decision-making, efficiency, and the quality of patient care. The goal is not only better health outcomes but also more accessible, cost-effective healthcare for all Filipinos. Achieving this vision begins with foundational infrastructure, including a well-integrated health information system, that will pave the way for AI-driven improvements in healthcare.

CASE STUDY
AI in Molecular Diagnostics and Genetics

by **Felicitas Lacbawan, MD**
Executive Director
Philippine Genome Center, UP System
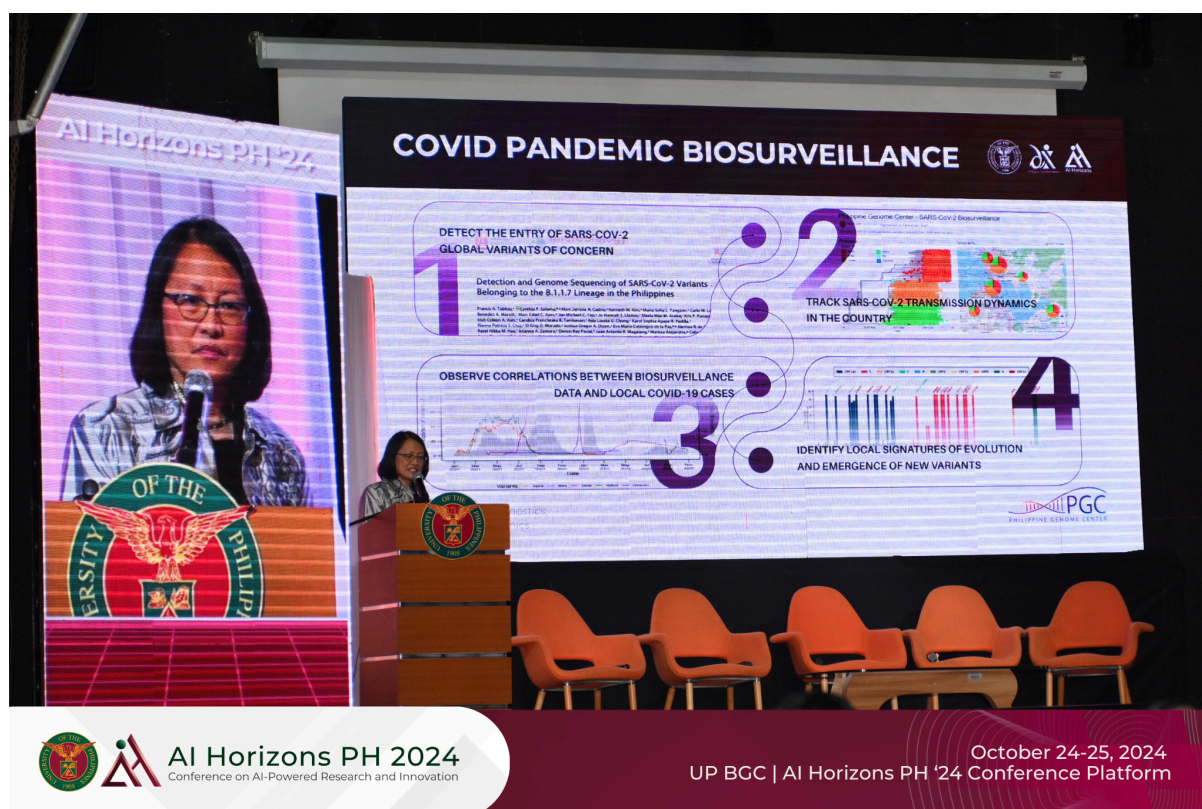
Dr. Lacbawan shared her journey from practicing in the United States for over 30 years to returning to the Philippines to join the Philippine Genome Center (PGC). She emphasized PGC's mission to advance genomic and bioinformatic applications for diagnostics, DNA forensics, and crop improvement. Since its inception in 2009, PGC has focused on research, technical services, and training to support diagnostic development across human, animal, and plant health.

The PGC played a crucial role during the COVID-19 pandemic as a national biosurveillance epicenter. It tracked the SARS-CoV-2 virus, detecting global variants of concern and contributing data to international consortiums. The center's efforts included providing the Department of Health with detailed epidemiological data, contributing to better-informed public health decisions.

Dr. Lacbawan highlighted recent government funding that enabled the establishment of a core bioinformatics facility, aiming to support both research and laboratory diagnostics. Her vision for the center includes strengthening bioinformatics and molecular diagnostics capabilities to improve accessibility of advanced diagnostics for the Philippine population.

Dr. Lacbawan explained fundamental concepts in genetics and genomics, including the role of DNA in coding proteins and how abnormalities can lead to conditions like cancer. She described how genomics has transformed cancer diagnostics, particularly through "liquid biopsies" that detect cancerous mutations in the blood. This technology, though promising, is still developing for use in early detection. She emphasized the value of personalized cancer treatment, as genomic profiling can identify mutations and guide targeted therapies.

She underscored how Next-Generation Sequencing (NGS) has revolutionized molecular diagnostics, moving from labor-intensive, low-throughput methods to efficient, high-throughput sequencing capable of processing millions of base pairs. This shift has made whole genome sequencing accessible, even allowing consumers to order tests independently. Dr. Lacbawan cautioned, however, on the ethical implications and the importance of professional oversight in interpreting genomic data, which is crucial given the complexity of human DNA and the potential discovery of incidental findings.

Dr. Lacbawan stressed the need for continued workforce development in bioinformatics and genetics within the Philippines to retain skilled professionals and make the country a competitive regional player. She envisions a future where AI, integrated with NGS, could enhance the diagnostic capabilities of genomic centers, increasing the speed, accuracy, and accessibility of genetic testing across the nation.

CASE STUDY

AI in Radiology and Cancer Treatment

by **Johanna Patricia Cañal, MD**

Vice Chancellor for Administration and Finance (Professor of Radiology)
UP Manila and Philippine General Hospital

Nasopharyngeal cancer is significant in certain regions like the Philippines, with radiotherapy being the standard treatment. Contouring tumors on CT/MRI images for precise radiation targeting is manual, time-consuming, and error-prone. Accurate contouring is critical, as over- or under-estimating tumor boundaries can harm healthy tissues or miss tumor areas. The research team developed a model using "UNet 2.5" architecture, a compromise between high-quality 2D and 3D imaging, to automate contouring for NPC. Limited to 63 annotated patient images, they increased the dataset by rotation, flipping, cropping, and other augmentation techniques. This allowed the AI to train effectively with minimal data. The AI significantly sped up contouring, reducing initial contour time from hours to five minutes. High sensitivity scores indicated reliable tumor identification, allowing the model to assist trainees by providing an accurate starting point, which they can refine.

Prostate cancer cases are rising, partly due to longer life expectancy. MRI is the standard for screening due to its comfort over traditional methods. The Philippines has limited MRI machines and radiologists, especially for MRI interpretation. Moreover, foreign AI models may not fit local needs due to demographic and physiological differences, as Western data may not directly apply to Filipino patients. The upcoming study aims to train a prostate cancer screening AI using local MRI data from the Philippine General Hospital, supplemented by foreign data sets. Early trials are promising, and if scaled, this model could help bridge the gap in radiologist availability and provide more consistent, accessible prostate cancer screening across the Philippines.

A significant concern within the radiology field is accountability when AI interpretations are incorrect. Radiologists face uncertainty about whether they would be liable for AI-driven misdiagnoses, creating hesitancy around adoption.

Radiologists are split on AI, with some seeing it as a threat and others as a tool for enhanced diagnostic capability. Dr. Cañal emphasized the importance of balancing the role of AI with human expertise, particularly for training purposes.

Dr. Cañal invited graduate students and researchers to work with her team on AI and radiology projects, especially given the substantial dataset available at PGH. This collaborative approach aims to further refine and develop AI applications for the Filipino healthcare setting.

CASE STUDY

Markerless Human Motion Capture Using AI in Musculoskeletal Health

by **Nathaniel Orillaza, Jr., MD**
Associate Professor in Orthopedics
UP Manila and Philippine General Hospital

Dr. Orillaza addressed the challenges Filipino patients face in accessing orthopedic care due to a low doctor-to-population ratio (1:140,845 ratio) and the concentration of specialists in metro areas. Many patients in rural areas must travel long distances for basic care, often without returning for follow-up.

Inspired by pandemic-driven needs, the team developed "MyBestie," a telemedicine bot for remote patient evaluation and monitoring. This bot allows specialists to oversee patient conditions without needing to be physically present, a vital feature in isolated and underserved regions. The bot has applications beyond COVID-19 and can act as a

virtual assistant for telemedicine, improving healthcare accessibility in areas with limited specialist availability.

The team leveraged motion-capture technology for orthopedic assessment, measuring joint range of motion (ROM) without requiring specialized gait labs. This technology, developed with UP's engineering and medical departments, provides accurate ROM measurements for diagnosing and monitoring recovery. Their innovations include marker-less detection, which is both affordable and accessible, allowing patients to benefit without the high costs typically associated with advanced motion-capture systems.

Recognizing the importance of fall detection, particularly for older patients living alone, the team developed algorithms to monitor activities like sitting, standing, and falls. Their framework proved effective on low-end devices, making it practical for widespread use. This technology could alert caregivers immediately in case of a fall, improving safety and response times.

In collaboration with UP's electrical engineering department, the team created a hands-free imaging system for the operating room. Surgeons can now manipulate MRI and CT images using hand gestures without touching the screen, which enhances efficiency, conserves PPE, and improves surgical precision, especially in delicate procedures.

Dr. Orillaza emphasized the importance of publishing and refining these technologies to keep up with rapid technological advancements. Ongoing projects include gamifying hand posture algorithms and integrating various movement-detection systems to build a comprehensive orthopedic program by 2026, with support from industry partners and government grants.

The team's ultimate goal is to make advanced orthopedic technology accessible to all Filipinos, ensuring that patients can receive expert care remotely, reducing the need for frequent specialist visits.

CASE STUDY
Chatbots for Diabetes Distress

by **Iris Thiele Isip Tan, MD**
Professor 12
Medical Informatics Unit, College of Medicine, UP Manila

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Dr. Iris Thiele Isip Tan explored the development and potential of AI chatbots to address mental wellness, particularly diabetes-related distress, which she linked to significant health risks when not managed. Dr. Tan introduced her current project, "EFREN," a more specialized Filipino chatbot focused on diabetes distress.

Dr. Tan illustrated how EFREN aims to address the unique challenges faced by diabetes patients, such as emotional burnout from continuous self-care and fear of long-term complications. EFREN's purpose is to assess diabetes distress levels in patients by using structured questionnaires like the Problem Areas in Diabetes (PAID) scale and the Diabetes Distress Scale. Each questionnaire is extensive, and Dr. Tan acknowledged that discussing emotional distress during limited clinical visits can be difficult for both patients and healthcare providers. She sees EFREN as a tool to address this gap, providing patients with a safe, always-available resource that might also simulate empathy, potentially increasing patient engagement.

EFREN's design includes a strong emphasis on careful, culturally relevant implementation. For example, Dr. Tan's team intends to adapt EFREN's language and conversational style to Filipino users, integrating local diabetes stigma and linguistic nuances. Dr. Tan also noted that while some studies have shown promising results for chatbots in reducing diabetes distress, it is essential to tailor EFREN to the local healthcare environment.

Dr. Tan concluded by addressing the AI evaluation framework her team plans to use, combining clinical effectiveness with user-centered metrics (i.e., effectiveness, efficiency, and satisfaction) from the ISO/IEC 25010 standard. This framework emphasizes not just clinical outcomes, but also factors like trust, safety, and user comfort. Dr. Tan and her interdisciplinary team continue their search for funding to make EFREN a reality, envisioning a future where AI tools supplement traditional care pathways in tackling mental wellness and chronic illness management.

PANEL DISCUSSION
AI in Health and Wellness

Panelists: Antonio Miguel L. Dans, MD
Johanna Patricia Cañal, MD
Nathaniel Orillaza, Jr., MD
Iris Thiele Isip-Tan, MD

Moderator: Felicitas Lacbawan, MD

Question: *It's been known that medicine adopts technology a decade or so more than anyone else, right? Electronic medical record (EMR) is something that should be there, but it's not still there. What is the status of EMR in the country, and what are your suggestions on how we can get there?*

Dr. Danz emphasized that the core issue preventing widespread EMR adoption is not technology but a lack of political will. While the necessary software, hardware, and connectivity infrastructure exist, there is no unified push to standardize and integrate systems. He pointed out that the fragmented systems hindered pandemic response

efforts and stressed the need for leadership that mandates compliance with standardized data structures.

Dr. Tan highlighted that interoperability remains the "holy grail" of health informatics. She underscored the existence of a Standards Catalog but noted that widespread adherence is lacking. She connected the importance of EMRs to the growing role of AI in healthcare, illustrating how clinical decision support tools rely on EMR data for predictive analytics.

Dr. Cañal addressed EMR adoption from a radiology perspective, noting that while digital imaging has advanced, the lack of standardization across hospitals creates inefficiencies. Many institutions use expensive foreign systems or develop their own proprietary solutions, leading to a lack of interoperability. He agreed that political solutions are needed to enforce standardization.

Dr. Orillaza discussed efforts from a biomedical device development standpoint, emphasizing that while awaiting political reforms, the medical technology community is ensuring that new devices align with existing standards to facilitate future integration with EMRs.

Dr. Danz closed with a call for a shift in research priorities, urging researchers to focus on influencing policy rather than just publishing findings. He argued that research should not remain in academic circles but should actively shape healthcare policies.

Dr. Lacbawan concluded by stressing the importance of change management in digital transformation. She highlighted that success could start with local government units, such as Quezon City, which has been proactive in digitalization. She suggested leveraging proof-of-concept projects to gain further support for broader implementation.

Question: *It looks like medical care, or health care in the Philippines is becoming more of a commodity than a right. Am I wrong? Or what's the discussion? Or where should we, I mean, I think AI is something that's a tool that would really help facilitate us to move an advance and for our patients.*

Dr. Cañal highlighted the severe shortages in the healthcare system, including a lack of hospitals, doctors, nurses, and resources, making it challenging to address the problem effectively. She emphasized that tackling these issues is an overwhelming task, and efforts are being made in small steps within local areas.

Dr. Orillaza expressed concern about the commercialization of healthcare, noting that innovation in medical devices often requires selling products to sustain projects, which

conflicts with the traditional approach of providing free research and services. He hopes that AI will eventually improve access and become self-sustaining, reducing the need for commercialization in healthcare.

Dr. Tan raised a cautionary point, referencing the World Health Organization's ethics guidelines on AI. She warned that while AI could democratize healthcare, there is a risk that it could lead to a divide where only the wealthy have access to human physicians, while AI becomes the standard for the rest, which she finds a troubling possibility.

Dr. Danz raised concerns about healthcare inequity, noting that if only the wealthy have access to advanced medical services, it deepens the gap between the rich and poor. He emphasized that AI, like any technology, could contribute to this inequity if it remains accessible only to the rich. He suggested that instead of constantly discovering new technologies, efforts should focus on finding new ways to implement existing knowledge to bridge the gap. He emphasized that AI should be designed with inclusivity in mind, making it accessible to everyone, particularly the underserved, to reduce inequities.

Question: *Is it possible to DataPhi patient empathy, so we can use it to train AI in healthcare?*

Dr. Tan discussed how she uses ChatGPT in her medical informatics course to simulate patient interactions. Students practice taking histories, such as asking ChatGPT to simulate an asthma patient. However, she reminded them not to ascribe human qualities to the AI, as it's not a real patient but a tool to help practice communication.

Dr. Orillaza suggested that if empathy could be defined more clearly, there might be potential for AI to replicate it, though he questioned how far this could truly mimic human empathy.

Dr. Tan also mentioned that other AI tools, like Claude, can further enhance simulations by incorporating physical cues, like a patient shifting in their seat, making it resemble a real clinic visit.

Question: *With regard to Efren, how many transactions are you expecting per month from a chatbot perspective?*

Dr. Iris Tan responded that she did not have an exact answer but would include that in future protocols.

Question: *The other observation as well is that the actual chatbot itself can be converted into sentiment or voice. If that opportunity presented itself, would you actually consider that?*

Dr. Tan confirmed that is under consideration and has discussed it with DOST.

Question: *What are your thoughts about AI that can recognize if the person is suffering from a mental disorder?*

Dr. Tan explained that while a chatbot could be used in specific cases like diabetes distress, it would be difficult for a chatbot to diagnose mental health disorders such as depression or anxiety. She emphasized that mental health assessments should remain under the purview of clinicians, with chatbots focusing on initial assessments and referrals to doctors.

Question: *Based on your findings, how likely will AI be able to detect the causes of cancer, and whether a patient is most likely to be diagnosed with cancer in the future, who would like to take that on?*

Dr. Lacbawan explained that AI can help identify certain risks, such as family history, particularly three generations of cancer history. While AI might only catch about 10% of cases, it still plays a significant role in identifying individuals who may benefit from genetic testing or awareness of their cancer risk. Dr. Lacbawan emphasized that family history is one of the best and most cost-effective ways to assess cancer predisposition and guide preventive measures.

RECAPITULATION AND NEXT STEPS FORWARD

AI Horizons PH '24 Day 2

by **Professor Gisella P. Concepcion**

Professor Emeritus
UP Special Adviser to the President for Research and Innovation, UP System

October 24-25, 2024
UP BGC | AI Horizons PH '24 Conference Platform

Prof. Gisella P. Concepcion provided a comprehensive summary of the key insights shared throughout the event and outlined the next steps for advancing AI in the Philippines.

Prof. Concepcion highlighted the collaboration between the University of the Philippines and local government units (LGUs), starting with Quezon City. This partnership aims to conduct controlled research and clinical trials to test innovative healthcare products in community settings, thereby enhancing social innovation under the university's leadership. The importance of investing in higher education was underscored as a means to stay competitive globally and to empower young minds to tackle pressing national issues through research and development in AI.

Prof. Concepcion encouraged collaboration with LGUs that are already engaged in e-governance and electronic records improvement, suggesting that starting with willing partners can facilitate success and showcase effective applications of AI.

The university plans to prioritize partnerships with cooperative LGUs, leveraging innovative services and products, including AI-driven solutions, to showcase successful implementations and expand the reach of these technologies.

Closing Remarks

by **Edgardo Carlo Lasam Vistan, II, Ll.B, LL.M.,**

Chancellor
University of the Philippines Diliman

AI Horizons PH 2024
Conference on AI-Powered Research and Innovation

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Good afternoon everyone. We're closing the conference and I think first of all, we have to again, thank all our resource persons for the insightful talks and perspectives you have given to us about your work in research and in innovation and your use or planned use of AI in the days to come.

On behalf of the UP system, we extend that gratitude to all our resource persons. Now me, as a spectator as well as part of the audience, we're very happy that the UP system is led by President Angelo Jimenez, former VP Gisela Concepcion, Dr. Naval, the Conference Chair who made this conference possible, asking our faculty, researchers and partners from the public and private sector to share with us what they've been doing using AI.

We hope that this is just the first of many conferences and exchanges on AI. As some of us are lawyers, maybe we can look at the ethics of AI in future, in future events. And I think that's a big issue we should be dealing with soon, especially with the views I will share in a few minutes.

As they say a picture paints a thousand words. I wanted a more graphic way to deliver my message. And I had this idea, a video might be better than a picture (Note: A clip from Iron Man 2 set in Tony Stark's house was played. Tony downs a green "health" drink, then checks his palladium levels—J.A.R.V.I.S. reports blood toxicity at 24% and warns that continued suit use is worsening his condition. Tony swaps out his arc-reactor core while trying to keep up appearances, setting up the film's subplot about finding a safer power source.)

You don't really maybe identify him, because he's not the same person like the actors, Robert Downey Jr and Gwyneth Paltrow Iron Man and I forget the character, yes.

But really I wanted to focus on J.A.R.V.I.S.. J.A.R.V.I.S. is the name of the Butler of the Stark family. I researched that. Well, I don't. I'm not really an Iron Man fan before the movies, but it meant J.A.R.V.I.S. is an acronym, just a rather very intelligent system. Why do I say this?

Here's where my research on technology and computing in particular [lies]. I'm doing research on cyber, and international law for one. But as I was doing that research, I came across this sociological studies on technology and society. What's on the horizon?

We're very amazed by AI now, but it will be in 10 years, I'm not sure, maybe less. It will just be another system. It will be very ubiquitous. It come in smaller packages because of Moore's Law being we pack more and more computing power in a small microchip, we double the capacity in about two years, and we'll probably forget about our amazement of AI by then, because we will be using it in our house, while our wives, our husbands, talk to us, making us do the laundry, iron the clothes, or cook, and while you are researchers, will be doing your work, maybe at the comfort of your homes.

That's the power of AI. It allows you to model earlier, some of the prototypes that Tony Stark made with J.A.R.V.I.S., where he was assessing them, and threw them away, those that he did not like. Research innovation could be as easy as that in a few years time. I think what we are doing here, and what I have seen, our researchers, our faculty, do do or are planning to do in the research, will lead us along that path. Is this good? Yes, I believe so. It increases our capacity to innovate. It increases our capacity to generate knowledge, new ideas, new inventions. I would hazard a guess in a more democratic way, in a few years, in a decade or two. Okay, so that's one.

The second is this concept of cultural adjustment. We are doing this. We organize this activity because we are reacting to the innovation that is AI, to this new thing, to this new technology, that is AI, that is us, that is our generation.

But you know, I was surprised to learn, attending a parent teacher meeting at my daughter's school, a private one. They're actually allowing my daughter to use AI in their research, and they just have this protocol to disclose the use of AI if they did use it. The cultural adjustment is already happening, even if no one legislated it, even if no one

planned it, even if no one allowed it. That's the reality, technology advances are at least in one model of sociological change or development of society.

Technology leads the way and society reacts. Of course, there are debates about that, not technological determinism, whatnot. But the point is, we see it happen all the time, and we're seeing it happen in AI. And why I bring that up is [because] digital technology accelerates this phenomenon, this interaction between technology, technological advancement, change and social adjustment, so much so that, as I shared earlier, without me knowing, without me being consulted, the school allowed my kid to use AI in homework, but then no one's complaining. I think that it was a good thing. In a few years, we will have a new generation of Filipinos, global citizens, who take AI for granted.

Okay, that's what's on the horizon. This activity, this conference, is a very good opportunity for us to see what's the state of the art right now, in so far as the use of AI in research and innovation from the academic side, from the private sector and the public sector. But I believe that as the video showed, it will be the industry that will be driving the use of AI in an innovation in R&D. Of course, the role of the academy cannot be belittled. We will be doing the research that industry will not be doing, or we will be checking on the research that industry will do.

But the point is, why it is important that we catch up, or that we be able to integrate the use of AI in our research as fast as we can, because in Science, in Research, the permutations, the combinations, the models, the prototypes, this can all be better assessed, and this can all be maybe even less expensively carried out with the use of models created by artificial intelligence, without you having to craft the hardware or do the experiment. You can all simulate this.

We can all simulate this if we have, if we are not yet doing so using, again, just another, just a rather very intelligent system, computing on Hyper Drive. And this will improve. This will be better and better and stronger and faster and more powerful in the years to come. We don't have to worry. You can create your own AI to check another one's AI. I think that's very possible, and that's what's in store.

So again, thank you to all of you who share this, this interest, this curiosity about how AI will be shaping our world in the years to come, and we hope we can gather here again soon and see what happens in the in between, between those gatherings, those meetings, those encounters, and again, share what we see.

We hope that it will be a future where progress, health care for one just jumping on the topic we had this afternoon, education, and all economic opportunities is more inclusive than what we are observing today. Again, Thank you very much for all of your time, for all the time you've given to this conference. Those here in UP BGC and in Zoom, let us know what you think, and we will be very appreciative if you can share with us ideas on how we can do another round of this conference. Thank you very much.

CONFERENCE PROCEEDINGS

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