UNISEC-Global The 24th Virtual Meeting

August 20, 2022, 22:00-24:00
(Standard Japan time GMT +9)

The following report was prepared by UNISEC-Global Secretariat
August 20, 2022.
Japan

Table of Content

1. Opening Remarks

Paul Jason Co, UNISEC-Philippines

Paul Jason Co holds a Bachelor of Science degree in Electronics Engineering and a Master of Science degree in Electrical Engineering. He is a PhD candidate of the Department of International Development Engineering at the Tokyo Institute of Technology. He is currently an Assistant Professor at the Electrical and Electronics Engineering Institute of the University of the Philippines, Diliman. His research interests include wireless communications, radio wave propagation, and nanosatellite development. He is currently the project leader of the Space Science and Technology Proliferation through University Partnerships (STeP-UP) project, which aims to promote space technology in the Philippines through local university partnerships.

Pictured: Paul giving his opening remarks for 24th UNISEC Global Meeting

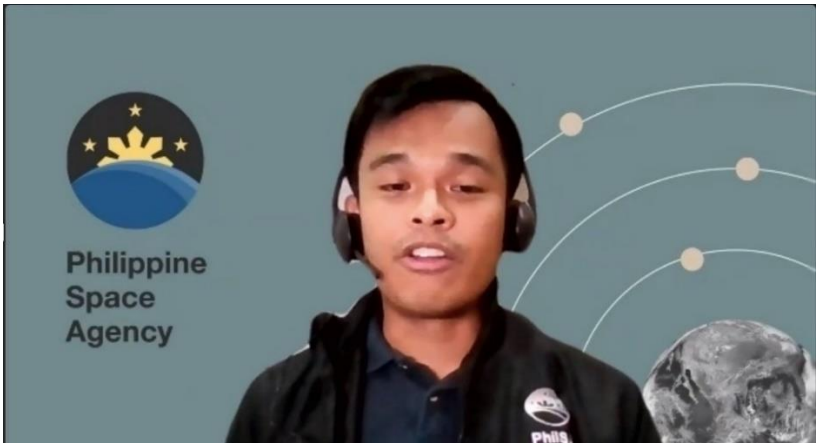
Highlights:

- Pleasure to host 24th UNISEC-Global Virtual Meeting, 2 years complete of such meeting
- Theme: Space Synergy: Opening Avenues for Academia, Industry and Local-International Partnerships
- Build space capability and space industry in Philippines
- Synergetic movement Is the strategy that the Philippines is applying
- Synergy involving government, academia and industry
- By combining the three elements, the local space industry will prosper

2. Presentation on “Philippine Small Satellites”

John Leur Labrador, Philippine Space Agency

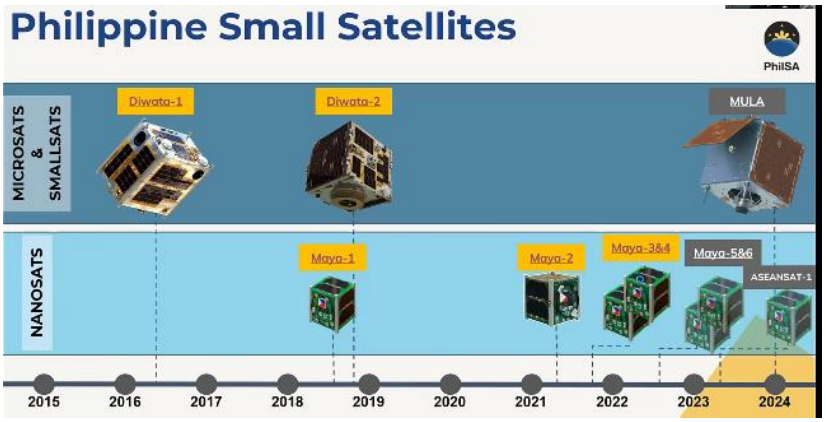
John Leur Labrador is the Chief Science Research Specialist of PhilSA's Spacecraft Mechanical and Autonomous Systems Development Division and is the Project Manager of MULA satellite project. Prior to PhilSA, he was also involved in the satellite development activities of Diwata-1 and Diwata-2 as an engineer in the STAMINA4Space Project’s PHL-50 Project and PHL-Microsat Bus development team. He has a master’s degree in Aerospace Engineering from Tohoku University and an undergraduate degree in Electronics & Communications Engineering from the UP Diliman.



Pictured: John presenting about the progress of PhilSA's small satellite program

Highlights:

- Typhoon Haiyan was the strongest typhoon recorded in recent memory in Philippines
- Aftermath of the typhoon, the damage was immense with 16 million people affected
- Government spent significant amount to procure satellite images and information
- Philippines is the 4th most disaster-prone country and lies in the pacific ring of fire
- Preparation for future important as weather activities becoming severe
- Funded by Department of Science and Technology (DOST) to launch remote sensing satellite
- After 2016 Diwata-1 satellite project, now there are 10-12 space assets in space
- 1U MAYA nanosatellites through BIRDS and STeP-UP program
- Diwata-1 was 52kg LEO satellite, deployed on April 27, 2016 with Tohuku and Hokkaido Uni
- Multispectral imager which can change optical wavelength, worked until April 2020
- Diwata-2 October 29, 2018 was launched directly into orbit SSO around 600km
- Six payloads with two new payloads with Enhanced Resolution Camera (ERC)
- Another one is Amateur Radio Unit (ARU) which was built completely in Philippines
- Capability and capacity building through 1U MAYA projects in collaboration with Kyutech
- MAYA 1, 2 done through BIRDS-2 and BIRDS-4 projects respectively
- MAYA 3, 4 done in Philippines, final tests done in Japan and launched to ISS
- MAYA 5,6 in Flight Model, launch stated for 2023 (using SS again)
- ASEANSAT-1 being developed in collaboration with Thailand and Malaysia
- Multispectral Unit for Land Assessment (MULA) is the latest micro-satellite
- Under development, 130 kg aimed to be launched on SSO in around 600km
- 5m GSD but much larger swath than Diwata-1
- Surrey Space Technology Limited (SSTL) collaboration, Filipino engineers involved
- Larger picture is that Philippines receive license to produce satellites in the country later



Pictured: Philippines has a host of nano and microsatellites launched into space

3. Presentation on “Shaping the World through a Cube: The Journey of UPHSD in the ASEANSAT Project”

Lorena Ilagan, University of Perpetual Help System-DALTA

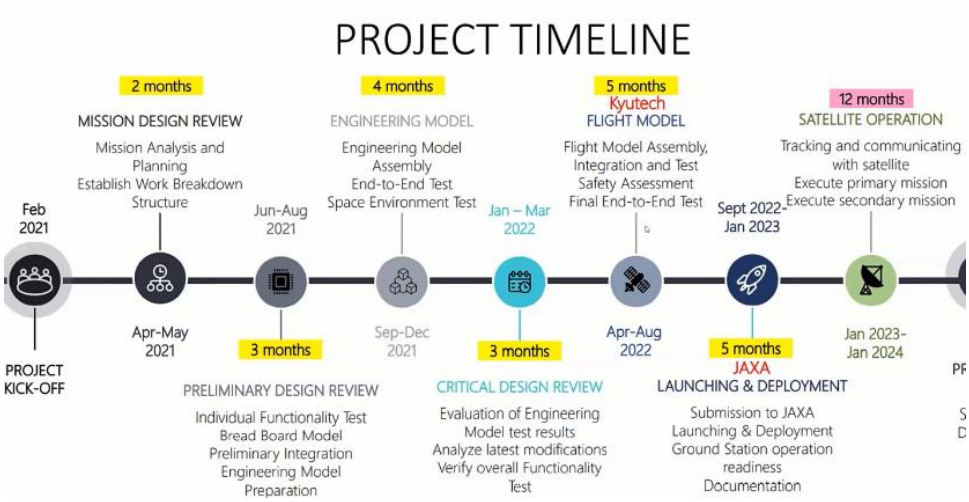
Lorena Ilagan has practiced engineering as an electronics engineer for more than 20 years specializing in the field of communications engineering, machine learning, engineering education, and project management. She finished her BS in Electronics and Communications Engineering at Mapua Institute of Technology and MS in Electronics Engineering at De La Salle University Manila. She is a candidate for graduation also at De La Salle University Manila taking PhD in Electronics Engineering and currently taking a Post-Doctoral Degree on Electrical Engineering at Universiti Technologi Mara in Malaysia specializing in Satellite Engineering.

Pictured: Lorena Ilagan presenting the satellite development work currently being done at UPHSD

Highlights:

- ASEANSat is an example of theme of this meeting “Synergy” at national/international level
- University of Perpetual Help System-DALTA (UPHSD) participating in ASEANSat
- Led by UiTM, Malaysia and in collaboration with KMUTNB, Thailand
- 1U CubeSat focused on hands-on assembly and integration
- Involved in On-Board Computer (OBC), Ground Sensor Terminal (GST) and Store and Forward
- Projected to be launched in May 2023, started at March 2020
- Team members from UPHSD
    - Edison Mojic as Configuration Manager
    - Dr. Ilagan looking after Philippines GST
    - Marcelo Santos looking after Philippines Ground Station (GS)
- Satellite Operation Software for nanosatellites created by UPHSD inhouse for GS
- Image gallery for images that will be captured by ASEANSat during its future lifespan
- Creating data decoding, administrative and data inventory tools
- QFH antennas developed for Kyutech’s KITSUNE satellite to communicate with GST
- Develop laboratory developed for antenna design, manufacturing and testing
- Aerospace Engineering major now available at UPHSD, curriculum evolved from aeronautics
- Courses include space instrumentation, air and space transport economics, materials
- Digitech curriculum to focus on domains of
    - Productivity tools, ICT, Programming & Multimedia, Innovation & Technopreneur-ship
    - Curriculum for high school students and below
    - STEM space activities through DOST funding, will also include GS operation

- UPHSD hopes to be an important member of UNISEC-Philippines
- UNISEC has enabled universities like UPHSD to participate in satellite activities
- PERPSAT-1 GS funded by DOST is being developed by the UPHSD for satellite data collection
- Applying for permits to operate satellites through the GS
- ASEANSat operation expected from Jan 2023-24, some delays because of COVID-19
- Considerations have been made for sustainability of the project
- Underwater GST going to be developed for LoRa based satellite through DOST funding



Pictured: Project timeline for ASEANSat scheduled to be launched in 2022/23

4. Presentation on "Towards the Development of Satellite Payloads in the Philippines"

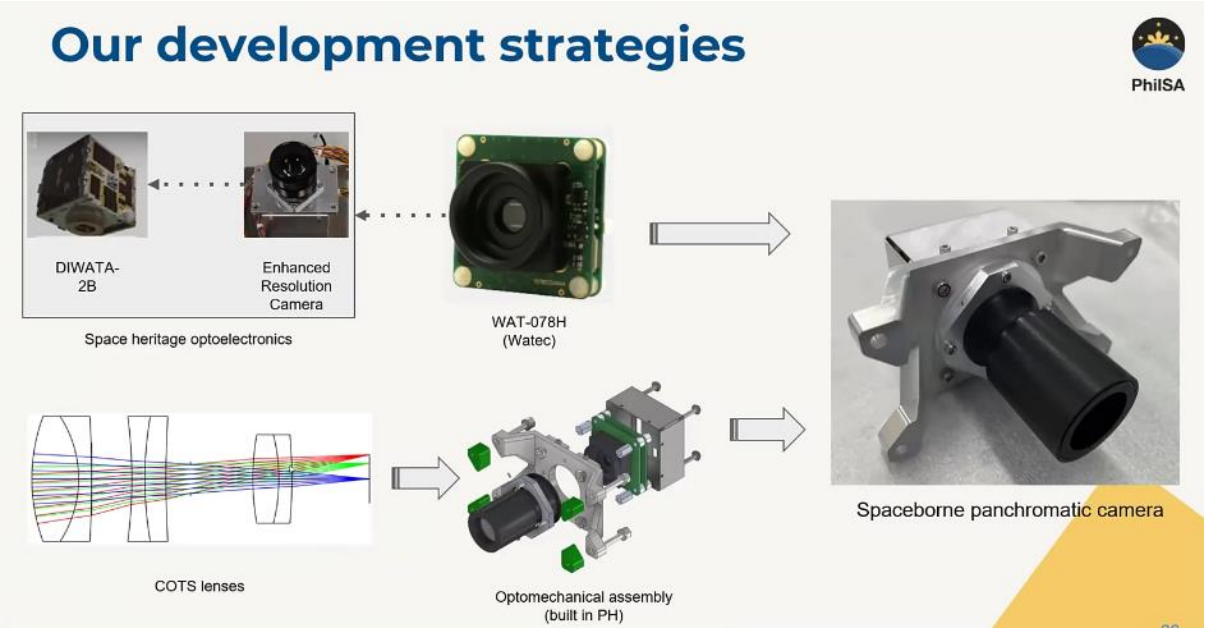
Paul Leonard Atchong Hilario, Philippine Space Agency

Dr. Paul Leonard Atchong Hilario, or Atchong obtained his Bachelor's degree in Applied Physics, and Master's and Doctoral degrees in Physics from the University of the Philippines. His fields of interest include instrumentation Physics, optical science, and optical engineering. For his postdoctoral stint, he worked on testing the electro-optic payloads of DIWATA-2 at Hokkaido University in Japan. He also worked on developing the electro-optic payloads for future Philippine small satellites under OPTIKAL and ASP projects, both under the STAMINA4Space (S4S) Program. Currently, he works as Space Science and Technology Applications Researcher of the Spacecraft Payload and Communications Systems Development Division under the Philippine Space Agency.

Pictured: Dr. Hilario outlines how Philippines is working towards inhouse payload manufacturing

Highlights:

- DIWATA-1 was the first satellite of Philippines and was designed for earth observation
- Payloads enable satellite to do its mission and varies from satellite to satellite
- DIWATA payloads are essentially cameras and recorded visible (VIS), UV and IR spectrum
- Designed to capture spatial and spectral information of the earth
- Different wavelengths of light are absorbed or emitted, can be analyzed for useful information
- Payload design and development started in Sep 2014 through the Sakura Science Plan
- Highlight is the mission planning part, creating requirements and designing payload
- Gap was on the satellite payload development in the Philippines
- Project OPTIKAL through national and international collaboration, road map creation
- Taking strengths of each organization and placing them together
    - Institute of Physics, good at optical science
    - UP-Geodetic Engineering, good at geoinformatics
    - Hokkaido University, good at payload design and testing
- Primary payload, fabrication in Japan, sciences/design in Philippines
- Stakeholder requirements, mission definition and technical specifications in Philippines
- Secondary payload partnered with local industry in Philippines
- Communication with industry is critical because industry is very good at manufacturing
- Challenges: mature in optical science but no optical design companies locally
- Optical engineering learned through online courses
- Monochromatic (Push broom) and Panchromatic cameras manufactured/assembled locally
- Lesson is that industry is profit generating, so the products must scale
- Lessons in that procurement process needs to be updated and accelerated
- Multispectral Unit for Land Assessment (MULA) is earth observation satellite
    - 9-band multispectral imager
    - Automatic Identification System – (AIS)
    - Automatic Dependent Surveillance – Broadcast (ADS-B)
- Development of payload is a collaborative process
- For the Philippines
    - Payloads were being built completely abroad
    - Challenge is to work with the local industry and towards self-sufficiency



Pictured: Using flight proven hardware alongside optomechanical hardware and assembly built in Philippines

5. Presentation on “PhilSA’s Initiatives for Knowhow Sharing and Capacity Building”

Adrian C. Salces, Philippine Space Agency

Dr. Adrian C. Salces currently works as a Supervising Science Research Specialist of the Philippine Space Agency (PhilSA)’s Spacecraft Payload and Communications Systems Development Division, where he is involved in the agency’s small satellite development projects. He obtained his Doctor of Philosophy in Engineering (Space Engineering) degree from the Kyushu Institute of Technology (Kyutech), Japan in 2020. While studying at Kyutech, he was part of the multinational BIRDS-2 CubeSat project team that collaboratively designed, developed, launched, and operated the respective CubeSats of the participating countries, namely the Philippines, Bhutan, and Malaysia. Prior to Kyutech, he completed his Bachelor of Science in Electronics and Communications Engineering (2013) and Master of Science in Electrical Engineering (2016) at the University of the Philippines-Diliman.

Pictured: Dr. Salces outlining programs currently being implemented by PhilSA

Highlights:

- Republic Ac 11363 “Philippine Space Act” signed by the President on 8th Aug, 2019
    - Act that paved the way for space utilization, development and Space Agency
- Strategic directions of PhilSA based on “SPACE”
    - **S**pur scientific growth
    - **P**romote improved public acess and resource sharing
    - **A**ccelerate the transfer and diffusion of space technology and knowhow
    - **C**reate a unified strategy
    - **E**nhance official representation and contribution in space community
- PhilSA vision is to bridge, uplift and empower country’s peaceful uses of outer space
- PhilSA mission is create and add value in space for and from Filipinos for the world
- Flagship project B3iS: continue to develop Philippine satellites as part of national infrastructure
- Flagship project Space Data Mobilization Project: to use space data for all sectors
- Flagship project Human Capital Development: Scholarships, curriculum development and industry/government capacity building

Pictured: Shows PhilSA's key development areas from hazard mitigation to space education

- ISKUELA: Inclusive SSTA (Science and Technology Applications) Know-how Utilization, Exchange and Localization
- ISKUELA project includes ACCESS, ECRADLE, INDUS3US, FLP, NNESTS, Asi@connect SKIAP+
- ACCESS: Advancing Core Competencies and Expertise in Space Studies
    - Continue nanosatellite research and in the process train students locally
    - Opportunity for Filipinos pursue higher degrees through satellite project experience
    - STEP-Up Scholars from the MAYA Project, mentors from previous generation
    - Hands-on CubeSat project through a Project Based Learning (PBL)
- ACCESS NanoSat Project Kickoff on Sep 2022 and deployment planned for Aug 2024
- B3iS-ECRADLE: Expanding CubeSat Research and Development Effors in Philippine Univ.
    - Promote the expansion of nanosatellite R&D and education
    - CubeSat Design and Development Web Series to members for UNISEC-Philippine
    - Sharing technical know-how to universities based on experience
    - Localized mission idea contest, three winning universities will be involved up to MDR
- B3iS-INDUS3US Project: Integrated Development of a Unified Standard 3U System
    - Objective #1: Guide local companies to build 3U CubeSat
    - Objective #2: Philippine space technology standards/handbooks
    - CubeSat design workshop along with UNISEC-Philippine universities
    - Bi-directional learning between PhilSA and industry
- B3iS-FLP Integration Project: Flexible Leo Platform Integration Project
    - Better testing platform for previously designed systems
    - Training platform for institutions and industries testing phases of space technology
- NNESTS Project: Nationwide Network for Educational Satellite Terrestrial Stations
    - Deploy amateur radio kits in 20-30 high school through competition to promote STEM
    - Training materials provided, easy setup and learn about communications
- SIKAP+ Project: Space Infrastructure, Knowhow and Applications Acceleration through Promotion and Training
- Asi@Connect provides high-speed internet for research and education collaboration
- EU Funding of Euro 149,356 and the duration is from 1st April 2022-31st March 2023
- SIKAP+ aims to bring satellite operators and remote sensing scientists together
- Includes Ground Station Administrative Training, Satellite Data Processing Training and Advance Situational Awareness Training

6. Q&A Session

Hosted by Ericka Picar, UNISEC-Philippines

Denzel Allen Mallorca: *Why do the operation of Maya 3 & 4 lasted for less than a year when Diwata 1 had lasted for 4 years?*
George Maeda: *Because of the mass, Maya-1, 2, 3, 4 weighed only 1.3kg and Diwata weighs 50kg. At the same altitude, a heavy satellite stays up longer.*
Adrian Salces: *The size of the satellite matters but between Maya-1 and succeeding satellite, Maya-1 stayed two years in orbit while the others stayed for less than a year.*

Daniel Kasonde: *What was the average cost of equipment in used to create a cubesat?*
Lorena Ilagan: *For ASEANSat-1, there are three countries involved here, each of us are participating in financial accountability of around 40,000 USD (total 120,000 USD). That is not just for equipment but also for the launching the satellite. That covers everything. All of the travel costs are included.*
Paul Jason Co: *Cost for Maya satellites were 2-3 million Pesos or same as what Ilagan said but for the equipment, depends on what you want to do. For some of the facilities we were able to acquire from the PHL-MicroSat is upto 10s of millions of Pesos or 100s of thousands of USD. That is why we encourage others who are interested to make use of the facilities that we have.*

Tumamao Red: *Good evening everyone, may I ask what local companies in the Philippines are involve in the fabrication and manufacturing of the components of the satellite?*
Paul Leonard Atchong Hilario: *Payloads and bus systems have different cost. Different companies are involved. For the payload, we have three components in optics, optomechanics and electronics. For optics, we actually chose a commercial off the shelf lens from a catalogue of lenses. For optomechanics, we used IMAS in the Philippines for the electronics, we had Pythos Technologies for board manufacturing and ESI Labs for developing of the firmware of the FPGA camera.*

George Maeda: *Is there a famous space startup company right now?*
Paul Leonard Atchong Hilario: *Not yet. We go to companies that do close to what we want (space-adjacent), and these are from the traditional manufacturing sector with prior experience.*
John Leur Labrador: *If you look at the top sectors of export, it is electronics for us. We have a lot of companies in the Philippines doing electronics and electronic products but they supply to the global market. Some of those are applicable to automotives, applicable to aviation and there supporting mechanical industries serving machining applications. Those are the companies we are targeting right now. As Dr. Hilario mentioned, we work with space adjacent companies. We believe that, with just a slight push, they can also make products that will work in space. That is one of the main goals of partnerships that Dr. Salces mentioned earlier.*

Charleston Ambatali: *Good evening, Mr. Hilario. Thank you for the presentation. Aside from remote observation payloads, are there also plans to develop payloads for other satellite applications?*
Paul Leonard Atchong Hilario: *It's a very difficult questions, there are plans for it, I think. Philippines is moving towards maturity towards remote sensing satellites. PhilSA is a young organization. To be able to move towards payloads apart remote sensing will take time but yes, we are heading towards that direction.*

Tumamao Red: *Will there be a summer program or Internships for undergraduate in space technologies here in the Philippines?*
Lorena Ilagan: *For the case of University of Perpetual Health, certification programs are coming and are actually on their way and as Dr. Salces had just mentioned, STePs based projects that we are*

developing can involve interns. All of these are still in the conceptualization stage, but we hope to deploy them in the coming years.
John Leur Labrador: *There will be for PhilSA in the future. We just concluded a month-long internship for Philippines high school. They did some activities related to space tech with PhilSA engineers. I don't see why we can't extend that to other graduate students in the future as well.*

How do you steer the satellite in space and also is there some kind of propulsion system integrated in the MULA satellite?
John Leur Labrador: *In terms of how do you move the satellite, we actually refer to that as the satellite's attitude and therefore we use the Attitude Determination and Control System (ADCS) of MULA will consist of five units. Reaction wheels that is used to move the satellite using the law of conservation of momentum. For the course attitude control, we often use Magnetic Torquers (MTQ), they move based on their interaction with the earth's magnetic field. Those are the two main drivers that control the satellite's orientation. In terms of having the propulsion system, yes, MULA will have a propulsion system like Diwata-1,2. I think it is a luxury because we have more weight, we have more mass right now that we can fit into MULA, MULA is a bit bigger, actually twice the size of DIWATA-1,2. We can use propulsion system to improve image captures or to dodge incoming debris.*

Matthew Emmanuel Alabado: *Hello! I am just curious since Philippines are developing satellites, will Philippines also develop rockets so we can launch our homegrown satellites on our own land?*
Paul Leonard Atchong Hilario: *Launching rockets is not a far-fetched idea. Perhaps we could do so based on geography. Philippines is in a very good location for rocket launching because the country is quite near the equator. Our east coast is mostly open water. In terms of geography, we have that advantage. We can think about that in the near future. This being said, developing rockets is not easy. We have to establish a spaceport, we have to abide regulations since some of the parts need to be exported/imported. It's not easy to launch rockets. But yes, we can expect that sometime in the future.*

Charleston Ambatali: *In terms of capacity building, is there a roadmap that was conceptualized /visualized to achieve the mission and vision of PhilSA's mandate?*
Paul Leonard Atchong Hilario: *We have technology roadmaps, science roadmaps and space technology roadmaps, there's also the legal side. There are mandates for each of them, the most visible of course is the satellite development side because that where we are starting from. But most notably, there are other aspects of roadmaps as well.*
John Leur Labrador: *I don't seem to remember each and everyone of those but it's basically space science, capacitating the local industry, education, space policy included as well. We have all of these areas that are in progress right now. The initial stage of space policy in Philippines was basically sending out students studying outside and then coming back while sharing what they learnt. Now that we have PhilSA, the roadmap will be more structured and we will be more directed in terms of filling out the need in the country not only in space science technology applications, but also in the downstream parts of space policy and all the legal matters that correspond to areas covered by PhilSA.*
Adrian Slaces: *There is a provision that the first five years of PhilSA will be used to focus on trying to transition or institutionalizing the accomplishments, infrastructure and other funded projects in PhilSA. This would allow PhilSA to perform mandates on its own or in collaboration with institutions. There is a framework that PhilSA has developed to govern missions of PhilSA.*

Adel Parungao: *Hi! How do you decide on the mission of our Philippine satellites?*
John Leur Labrador: *Typically, close to the mission are the payload engineers. The question is how do we identify mission in a very scientific manner. What we do is that we find these particular gaps in the needs of the satellite and we try to communicate with the end users, understand their needs. As a role of a satellite engineer, we have to translate in such a way that it is practical, measurable and verifiable. we talk to people and we talk to a lot of people.*

7. Announcement and Acknowledgement

Rei Kawashima, UNISEC-Global

Pictured: Kawashima-san giving the closing remarks

- **New Local POC**
  - UNISEC-Zambia POC: **Dr. Fred Joe Nambia** from The University of Zambia

- **11th Nano-satellite Symposium**
  - Early Bird Registration: September 15, 2022
  - Full Paper Submission: October 3, 2022
  - Presentation: October 17, 18, 19 (morning)
  - Pre-MIC 8 workshop during the event
  - Official website: http://nanosat11th.itu.edu.tr/index.php

- **Pre-MIC 8**
  - Notification: August 31, 2022
  - Presentation at workshop (not contest), October 19, 2022
  - Official website: http://spacemic.net/

- **8th UNISEC-Global Meeting**
  - Local chapter registration for presentation: September 5, 2022
  - UNIGLO opening: October 19, 2022
  - Local chapter presentation and breakout session: October 20, 2022
  - Local chapter empowerment workshop: October 21, 2022
  - Official website: http://www.unisec-global.org/meeting8.html

- **CLTP11**
  - Currently underway from August 18-31
  - Nihon University and AOTS Center in Tokyo
  - Official website: https://cltp.info/

- **Next virtual meeting:** September 17, 2022 10:00 pm – 0:00 am (JST)
  - Theme: TBD
  - Confirmed speakers: TBD
  - Host: TBD
- Seeking local chapters to host virtual meetings for **Dec 17**
- Virtual UNISEC-Global meetings take place on the third Saturday of almost every month
- **Special Lecture by Prof. Mengu Cho** on October 8, 2022 at 26th UNIGLO meeting
  - Introduction to Mission Assurance Handbook for University-base Lean Satellites

- **Future Planning**
  - 73rd IAC, Paris: September 18-22, 2022
  - 11th Nano-satellite Symposium, 8th UNISEC-Global Meeting, Pre-Workshop for the 8th Mission Idea Contest (PreMIC8: Online or in-person TBD), Turkey: October 17-21, 2022

- Details of **39th International Symposium on Remote Sensing of Environment**
  - Turkey: April 24-28, 2023
  - Oct 14, 2022 Extended Abstract Submission
  - Nov 18, 2022 Abstract Acceptance Notification
  - Dec 02, 2022 Deadline for Early Bird Registration
  - March 01, 2023 Camera Ready Version Deadline
  - Website https://isprs.org/documents/orangebook/app5.aspx https://isrse39.com

- Details of **Pre-8th Mission Idea Contest (PreMIC8)**
  - MIC8 will be held in 2023
  - In 2022, hosting regional competition is encouraged
  - Pre-MIC8 workshop will be held in Istanbul (or virtually) in October 2022
  - Mission carried by multiple satellites made of 6U CubeSat or smaller
  - No restriction on the number of satellites as long as there is logic to support that
  - Constellation with no inter-satellite link missions and formation missions with inter-satellite link both are encouraged

- Details of **J-CUBE** opportunity
  - Special (discounted) launch opportunities (1U-3U)
  - Collaboration with UNISEC-Japan's university
  - Application deadline: October 13, 2022
  - Website: http://unisec.jp/serviceen/j-cube

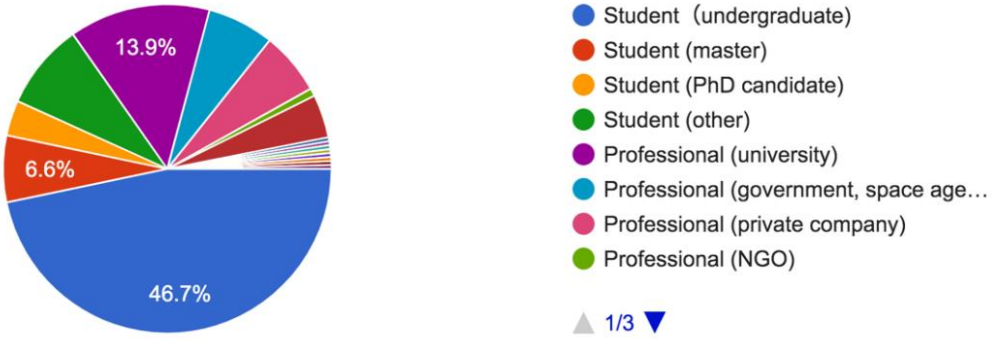
8. Participant Statistics

259 registered participants from **19** countries participated in the 24th Virtual UNISEC-Global Meeting.

Country/Region	Number of registrations	Country/Region	Number of registrations
Bangladesh	2	Rwanda	2
Bulgaria	2	South Arabia	1
Egypt	5	South Africa	1
Ghana	1	Thailand	1
India	39	Turkey	4
Japan	18	UAE	1
Pakistan	1	USA	1
Peru	2	Zimbabwe	2
Philippines	174	Zambia	1
Russia	1		

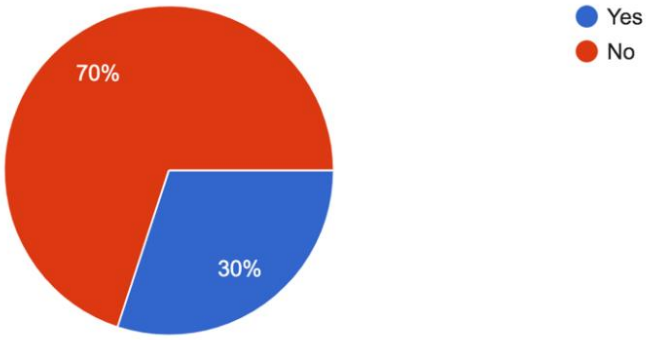
Student or professional?

259 responses



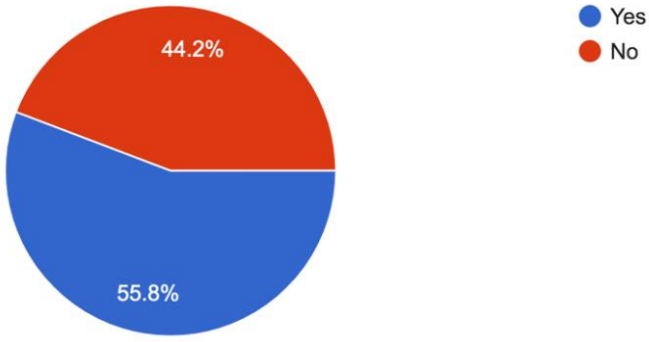
Have you participated in the UNISEC-Global Meeting previously?

253 responses



Are you familiar with the Philippines' space activities, education, and policy?

251 responses



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Thank you