UNISEC-Global The 49th Virtual Meeting

October 19th, 2024, 22:00-24:00
(Standard Japan time GMT +9)

The following report was prepared by UNISEC-Global Secretariat
October 23, 2024
Japan

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1 Opening Remarks

Prof. Mohammed Khalil Ibrahim, EGYPT-JAPAN University of Science and Technology

Prof. Ibrahim is the Professor and Chairman at Aerospace Engineering Department of Space Engineering at Cairo University, Egypt. He is also a CLTP1 Graduate. He received his B.Sc. and M.Sc. in Aerospace Engineering from Cairo University in 1991 and 1996, respectively, and his Ph.D. from Nagoya University, Japan, in 2002.

He has taught at Cairo University (Egypt), Zewail University of Science and Technology (Egypt), Nagoya University (Japan), Nihon University (Japan), King Fahd University of Petroleum and Minerals (Kingdom of Saudi Arabia) and Rabat International University, (Morocco).

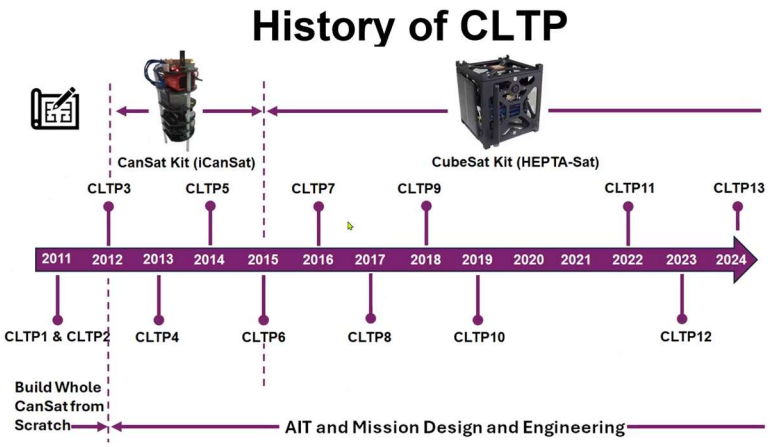
During 2002 and 2003, he worked as Research Engineer at Takasago R&D Center, Mitsubishi Heavy Industries, Ltd., Hyogo, Japan. He has published more than 50 articles in international journals and conferences. Dr. Ibrahim's research interests include Nano-satellite Development, Computational Fluid Dynamics (CFD), Experimental Fluid Dynamics (EFD), Aeroacoustics, Flow Induced Sound and Vibration, and Flight Dynamics. He is senior member of JSASS, JSME, AIAA, and UNISEC.

Pictured: Prof. Ibrahim while giving the opening remarks

Highlights:

- Extended greetings
- Was the CLTP1 Participant, CLTP2 Observer, CLTP7 Participant, and CLTP8 TA
- CLTP – CubeSat/CanSat Leader Training Program
    - Intended Learning Outcomes
        - To give full cycle experience of CubeSat/CanSat development
        - Develop a payload system
        - Exchange knowledge with people from various backgrounds
        - Disseminate CubeSat knowledge to their local community
    - History of CLTP Kits
        - CLTP 1-2: Built CanSat from Scratch
        - CLTP 3-7: iCanSat (AIT and payload)
        - CLTP 8 onwards: HEPTA-Sat (AIT and payload)
    - Has a diverse alumni body
        - 143 graduates from 57 countries
        - Over 11 managers
    - Lessons learned

    - Educational kits are crucial for teaching satellite engineering in short time
    - Payload system is very important and should receive more focus
- Future prospective is to localize HEPTA-Sat training
- CLTP graduates can also collaborate to develop a flight model



Pictured: Prof. Ibrahim describing the history of CLTP

2 Presentation on CLTP13 Experience (1)

Dr. Sarbagya Buddhacharya, Khwopa Engineering College

Dr. Sarbagya Buddhacharya is currently a senior lecturer at Khwopa Engineering College. He received his Master's degree in Telecommunications Engineering from Asian Institute of Technology and his doctorate degree in Electrical and Computer Engineering from Bangkok University.

Dr. Buddhacharya worked as an assistant VAS Engineer in NCELL Pvt Ltd, a leading mobile operator in Nepal, from 2010-2011; as a Lab Supervisor in Asian Institute of Technology from 2011-2013; and as the Senior Engineer & Engineering Specialist in THAICOM from 2019 to 2022. His research interests include Communication, Multi-carrier modulation, Wavelet Packet Modulation, and Signal Processing.

Pictured: Dr. Buddhacharya during his presentation

Highlights:

- Concept of "CanSat" given by Prof. Bob Twiggs, Stanford University, 1998
- CLTP Training was given by Dr. Masahiko Yamazaki

    - Hepta-Sat creator and Assistant Prof. at Nihon University
- Nepal has been actively participating in former years
- Found out about CLTP from alumni committee and Antarikchya Pratishthan Nepal
- Antarikchya Pratisthan Nepal translates as Space Foundation Nepal
- CLTP13: 10 participants from 7 countries
    - Virtual program started from a month prior to physical arrival
        - Includes online lectures, quizzes and briefings
    - Physical program for about two weeks and includes
        - hands-on components training
        - mission design
        - mission implementation and assembly
        - teaching practice to professionals
    - Received comprehensive training guide books
    - Phase 1: hands-on training (Aug 20-22)
        - Understood components, tested and assembled them
        - Creating and understanding sub-systems and systems
    - Phase 2: Mission Design & Implementation (Aug 23-26)
        - 10 participants divided into 5 pairs
        - Worked with Dr. Amila on 'Space Debris Detection'
        - Went on local market visit for component acquisition
        - Got the eligibility to be the trainer after success in mission design
    - Phase 3: Training (Aug 28 – 29)
        - Provided training to various students from Japanese Universities
    - Great cultural exchange opportunity
    - Takeaways from program are
        - Time management
        - Productivity
        - In-depth satellite knowledge
- The learning benefits ongoing projects in his college and home country (Nepal) such as
    - Establishing Ground Station in Khwopa Engineering College
    - National CubeSat Projects - MUNAL & Slippers2Sat

Pictured: Dr. Buddhacharya sharing his learning experiences from CLTP13

3 Presentation on CLTP13 Experience (2)

Dr. Amila Akagic, University of Sarajevo

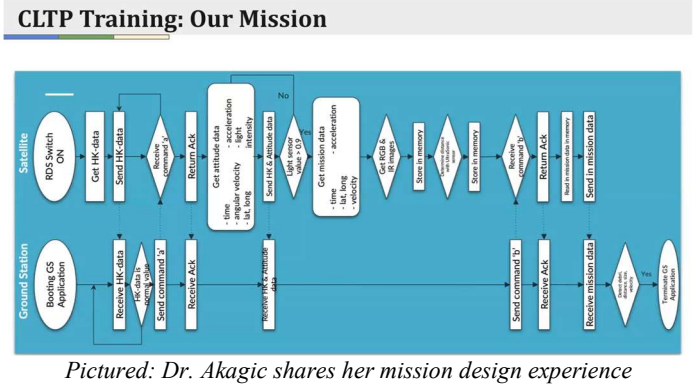
Dr. Amila Akagic is the Associate Professor at the Faculty of Electrical Engineering, University of Sarajevo, Bosnia & Herzegovina. She received her Bachelor's and Master's Degrees from the University of Sarajevo in Electrical Engineering within Computer Science and Informatics Department in 2006 and 2009 respectively.

In the academic year 2007/2008, she received Fulbright Visiting Architectures Lab at University California, Riverside as a Junior Researcher. In 2010, she joined the Amano Lab and spent 3.5 years in Tokyo, where she completed her Ph.D. studies at Keio University in 2013. Her areas of experties include Signal Processing, Computer Architecture and AI.

Pictured: Dr. Akagic during her presentation

Highlights:

- Was introduced to CLTP by the alumni of Bosnia and Herzegovina
- 4 participants from Bosnia and Herzegovina
- Program was well-organized, and no trouble in navigation was felt
- Aug 19th – Briefing and Introduction to CLTP
    - Self-introduction
    - Team building
    - Nihon University Tour
    - Social events and trying out different food
- Aug 20th – Learning/Application from guide books
    - Learnt components assembly and applications
    - Participated in creative activities like going around the university and mapping it
- Learnt further components uses and assembly by Aug 22nd
- Aug 23rd - Mission Design
    - Problem Identification
        - Space debris is a long-term threat to space missions
        - Hepta-Sat didn't have enough capacity for image processing
    - Missions
        - (1) Detecting space debris and finding its size, location and velocities
        - (2) Sending this data to Ground Station for further processing
    - For dataset training, created dataset using black chart paper and pebbles to mimic debris
    - Performed binary inversion for image processing
    - Used ultra-sonic sensor to detect the distance of debris
- Had limited budget to procure sensors, so was an economic-learning experience
- Toured the Akihabara city to search for the sensors
- Aug 25th- self-study day
- Enjoyed meeting and sharing experiences with international participants



Pictured: Dr. Akagic shares her mission design experience

Q/Ans:

Q: **Sakshyam Pandey: You showed space-debris testing with ultra sonic sensor, but doesn't ultrasonic sound require a particle medium, so how does the sensor work in space?**

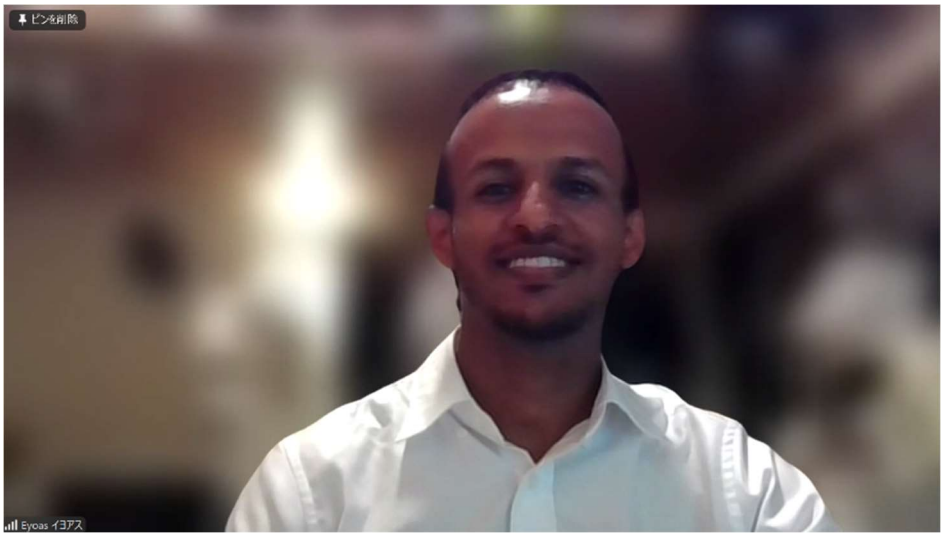
A: ***Dr. Sarbagya Buddhacharya:*** *When we were discussing on how to show this concept, this mission, when we did it in a very short time. We had to decide and design it within one day, and implement it the next day. This is not the actual mission that we are supposed to deliver in the space. This mission is supposed to show the prototype and the proof of concept. So, to answer your question, we used ultrasonic sensor because it was available in the lab. Another reason is that the sensor was compatible with the on-board computer (OBC) that we had. Actually, I didn't show the presentation slide of our project where I had the answer to this question. The sensors that we use, we actually check whether they are compatible in terms of voltage supply, pin configuration, and in terms of connection and interface. So, the ultrasonic sensor which we chose was compatible with all this, thus we chose this sensor. Although this may not be implemented in space. So, the first reason was compatibility, and another reason was that we just had to show the proof of concept. And of-course, for the actual implementation, we will obviously have a time of more than two days. So, we can have that level of equipment that we can actually use.*

4 Presentation on CLTP13 Experience (3)

Dr. Eyoas Ergetu Areda, Kyushu Institute of Technology

Dr. Eyoas Ergetu Areda is a satellite system engineer and a postdoctoral researcher at Kyushu Institute of Technology (Kyutech). He earned both his Master's and Ph.D. degrees from the Kyutech. His Master's degree is in Aeronautical/Aerospace Engineering, and he completed his Ph.D. in Aerospace, Aeronautical, and Astronautical/Space Engineering. His expertise extends to mechanical design, satellite development, and Assembly, Integration, and Testing (AIT).

At the Ethiopian Space Science and Technology Institute (ESSTI), He managed several development projects that contributed to astronomical research. His tenure at Kyutech included working on multiple nanosatellite projects and contributing to the construction of structures and subsystems. He is committed to utilizing his knowledge and skills to address real-world challenges and innovate within the space industry.



Pictured: Dr. Areda during his presentation

Highlights:

- CLTP: covers entire satellite development lifecycle from design to operations
- Satellite subsystems, design and development
    - Testing and troubleshooting
    - Assembly and Integration
    - Satellite operations
    - Effective teaching methods
- Multidisciplinary learning environment with experts from six countries in diverse fields
- Lectures in the starting of program followed by hands-on sessions
- First week – Mission design and planning
- Final week – Mission development and teaching practice
- Training Resource
    - Well designed and easy to understand teaching module
    - 1U Hepta-Sat Kit
    - Commendable equipment and training facilities
- Hands-on Training Opportunities
    - Key skills learned in programming and electronics
    - Troubleshooting and function testing
    - Debugging system errors
- Practical teaching
    - Developed and presented a complete satellite mission concept
    - Learned teaching strategies tailored for industry professionals
    - Conducted hands-on training sessions for industry professionals
- Mission Design
    - To combat desert locusts by predicting propagation speed and direction
    - Design mission scenarios, identify appropriate sensors and develop the satellite program
- Worked with diverse team perspectives and shared knowledge
- Key takeaways
    - Technical skills
        - Satellite programming using C
        - Hardware integration and testing methodologies
    - Leadership, time management, renouncement and communication
    - Practical Knowledge
        - Satellite real world applications
        - Working in limited economy and time
- Future aspiration is to transfer this knowledge and build capacity in Ethiopia
- Aim is to strengthen partnerships and connections with participants
- Great Social and Culture Sharing Experiences
    - Networking opportunities
    - Cultural Exchange Opportunities
    - Delicious Japanese Cuisines

Pictured: Dr. Areda sharing social experiences in CLTP13

5 Presentation on CLTP13 Experience (4)

Dr. Maximilien Berthet, University of Tokyo

Dr. Maximilien Berthet is an Assistant Professor at Kojiro Suzuki Laboratory, University of Tokyo, Japan. He earned his Master's degrees from University of Durham and University of Tokyo and his Ph.D. degree from the University of Tokyo. His Master's degree is in General Engineering, Aeronautics and Astronautics; he completed his Ph.D. in Aeronautics and Astronautics.

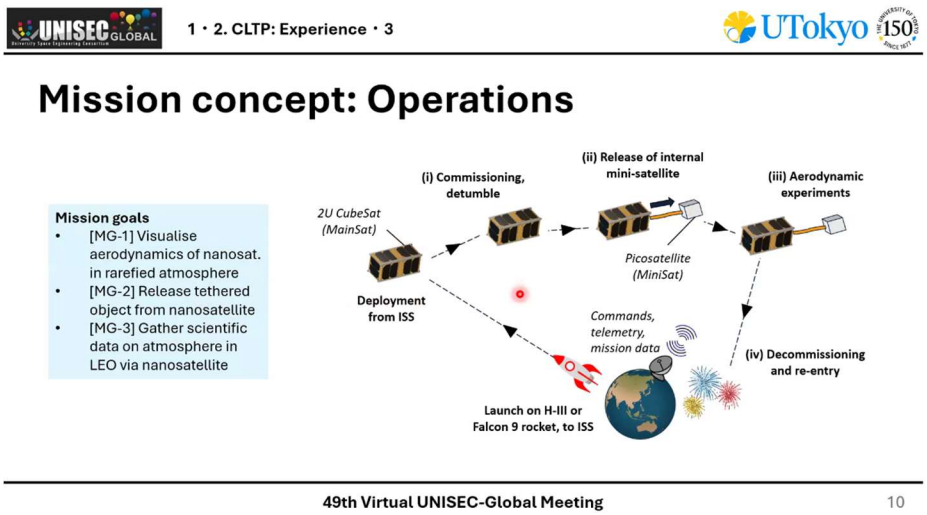
He worked as a Research Fellow from April 2022 to Oct 2022 in Japan Society for the Promotion of Science. In Nov 2022, He became the Assistant Professor of Department of Aeronautics and Astronautics. His research focus is on the dynamics of small satellites in low Earth orbit, applied to mission design for easier access to space via solar sails and drag sails. He is actively involved in research on space capacity building and the history of space development, with a focus on Southeast Asia.

Pictured: Dr. Berthet during his presentation

Highlights:

- Mission Concept – Satellite recovery
  - Background
    - Satellite recovery from orbit is one of the biggest unsolved challenges in space
    - Small satellites are “easy to get it up, difficult to get it back”
    - To research on this, we need information on satellite aerodynamics
    - Needed for unlocking new frontiers in space industries like
      - Debris removal
      - In-Orbit Servicing
      - Entry Descent and Landing
      - Interplanetary Cargo Transfer
    - Showed a video of Artemis 1 spacecraft’s earth entry
  - Operation steps
    - Launch on H-III or Falcon-9 rocket from ISS
    - 2U cube-sat is deployed from ISS
    - Detumbling and stabilization of 2U satellite
    - Release of internal mini-satellite (pico-sat) from the 2U satellite
    - Aero-dynamic experiments with the mini-satellite
    - Decommissioning and re-entry of satellite
  - Mission Goals
    - Visualize aerodynamics of Nanosat
    - Release tethered object from nanosatellite

    - Gather scientific data on atmosphere in LEO via nanosatellite
- Experimental Results
    - Successful data reception, two satellite communication and downlink
    - Successful GPS testing
    - Hardware development
        - Successfully designed and assembled tether spool
        - Integrated motors and release mechanisms for mini satellite
- Reflection
    - Learnt time management
    - Expanded knowledges about small satellites
    - Intercultural connections and good socialization



Pictured: Dr. Berthet presenting the operations of his mission design concept

6 Presentation on TA's CLTP13 Experience

Masaki Naito, Nihon University

Mr. Masaki Naito is a senior in Nihon University. He is the Sub Project Manager, System Integrator and On-Board Computer (OBC) software developer of 6U-sized Satellite PRELUDE-Project. He has participated in Hepta-SAT Workshop in Philippines, and has participated in CLTP13.

Pictured: Mr. Naito during his presentation

Highlights:

- Roles of TAs
    - Provide support during training
    - Development of HEPTA-Sat contents: textbook, hardware and software
    - Preparation for Trainings like managing time schedules and providing assistance
- TA members belong to Yamazaki Lab
- Most TAs are involved in satellite development activities
- 13 TAs attended in CLTP13
- Before CLTP
    - Prepare HEPTA-Sat kits
    - Check operation of HEPTA-Sat
- During CLTP
    - Answer questions from participants
    - Support activities like lunch and Akihabara tour
    - Take notes and feedbacks during CLTP
- After CLTP
    - Update the kits as per feedback
- Takeaways
    - Teaching is the best way to get a firm grasp of knowledge
    - Felt the need to improve their speaking and reading English skills
    - Appreciated the opportunity to participate in culture exchange

Q/Ans:

Q: **Rei Kawashima: To CLTP participants- Are you discussing/planning to organize HEPTA-Sat Training at your university or in your country? What is the challenge or difficulties?**

A: ***Dr. Sarbagya Buddhacharya:*** *Actually, our college is interested in having such kind of trainings. But the price of the kit, it seems to be quite high. Now, I am talking with Mr. Hari, who is the former CLTP participant and he works for NAST. He is also interested in having similar kind of training in our country. It further seems like the price of the HEPTA-Sat kit is very high. It seems like a good idea to have a collaboration with him. So, we had the talk in phone but as we are having big festival in our country, we've decided to meet after that. Also, we have other institutions that are working in space engineering like Antarikchya Pratishthan Nepal, Orion Space, NAST and Khwopa Engineering College, where I am working. So, we're trying to bring them together. Let's see, if everything goes well, we are interested to have a similar training in our country. My college is quite interested. But as I mentioned, the cost seems to be out of the college budget. That's why we are searching for collaboration with other institutions.*

A: ***Dr. Eyoas Ergetu Areda:*** *Yeah, I also have a personal aspiration to conduct such kind of training in Ethiopia. At the moment we don't have those initiatives. Because I am living and working from Japan, it is not easy for me but I have some contacts, so if I have some professors in universities who are interested, I'd like to organize a training with the kit. For the kit we can try to manage sponsorships. Some people who have the money can support us and paying for the teachers. I can also personally facilitate. That's the future plan. At the moment we haven't progressed but, in the future, I am going to do something to help the Engineers in Ethiopia.*

A: ***Dr. Maximilien Berthet:*** *In universities of Tokyo, there are many opportunities to learn about CubeSats, in the Japanese universities. But I'd say for the international students the opportunities for CubeSat remains more limited. So, I hope to organize an English language training using Hepta-Sat perhaps next year. That is still under discussion. If I can get approval then I would like to organize a session especially because the distance between Nihon University and University of Tokyo is quite small, so the cost of transportation and providing materials are quite low. So, I am quite optimistic about organizing training in the next year.*

Q: **Joseph/DIT: CLPT is a wonderful and interesting program, when is the next one?**

A: ***Haruka Yasuda:*** *Yes, I think it will be going to be next year, but the schedule is not fixed yet. The applications will open towards may. So, we will announce when it is ready.*

7 Announcement and Acknowledgment

Haruka Yasuda, UNISEC-Global

Pictured: Yasuda-San announcing the latest updates from UNISEC-Global

Highlights:

- **Introduction of New Point of Contact**
  - Tanzania – Joseph Wambura Matiko
  - Full bio: https://unisec-global.org/joseph.html

- **The Mission Idea Contest**
  - MIC8 book has been published in the IAA website
    - https://iaaspace.org/product/the-mic8-report/
    - Costs 10 Euro
    - Contains full papers of MIC8 finalists and the semi-finalists
  - 9th Mission Idea Contest (Preliminary Workshop)
    - Received 24 abstracts from 14 countries
    - 10 finalists were selected
    - will make an in-person presentation at Preliminary Workshop on November 27
  - Website: https://www.spacemic.net/
  - Important Dates:
    - Final Presentation: November 27, 2024 (South Africa)
  - Contact: info@spacemic.net

- **13th Nano- Satellite Symposium**
  - Date: November 25-27, 2024
  - Venue: Protea Hotel Technopark, Stellenbosch, South Africa
    - https://www0.sun.ac.za/UNISEC-SAR/nanosat13/call_for_papers/
  - Registration for 13th Nanosatellite Symposium and 10th UNISEC-Global Meeting
    - https://www0.sun.ac.za/UNISEC-SAR/nanosat13/

- **HEPTA-Sat Training in South Africa (UN Workshop)**
  - Date: November 30, 2024
  - Venue: Stellenbosch University, South Africa
  - Capacity: 40 people
  - Tuition: Free of Charge
  - Please let UNISEC-Global know if a UNISEC-Global community member wants to attend training
  - https://www.unoosa.org/oosa/en/ourwork/access2space4all/access2space4all/KiboCUBE_Academy_Webinars/onsite2024.html

- **Launch Opportunity: J-Cube**
  - Special Discounted opportunities
  - 1U, 2U, 3U, deployment from International Space Station
  - Collaborate with UNISEC-Japan's University
  - Technical support will be provided
  - Contact: info-jcube@unisec.jp , http://unisec.jp/serviceen/j-cube

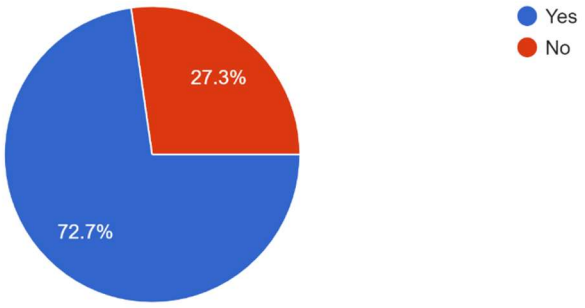
8 Participant Statistics

78 registered participants from **29** countries and regions for the 49th Virtual UNISEC-Global Meeting.

Registrants			
Country	**Registrants**	**Country**	**Registrants**
Algeria	2	Morocco	1
Argentine	2	Nepal	6
Bosnia and Herzegovina	1	Pakistan	1
Bulgaria	2	Paraguay	1
Burkina Faso	2	Peru	1
Colombia	1	Philippines	1
Cote d 'Ivoire	1	Portugal	1
Dominica Republic	1	Romania	1
Egypt	10	Taiwan	1
Germany	1	Tanzania	11
India	11	Thailand	3
Indonesia	1	Turkey	2
Italy	1	UK	1
Japan	9	USA	1
Mexico	1		

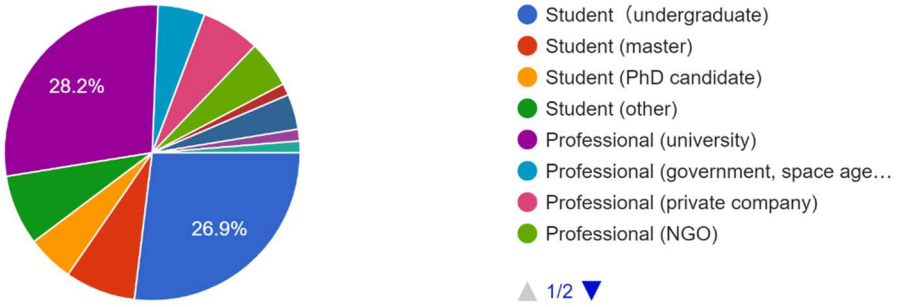
Have you participated in the UNISEC-Global Meeting previously?

77 responses



Student or professional?

78 responses



Thank you