UNISEC-Global The 6th Virtual Meeting

February 20, 2021 22:00-00:00
(Standard Japan time GMT +9)

The following report prepared by UNISEC-Global Secretariat
February 22, 2021.
Japan

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1. Welcome and Opening remarks

Shinichi Nakasuka, the University of Tokyo

Professor Nakasuka graduated from the Graduate School of Univ. of Tokyo, Doctor Course in 1988, and got Ph.D. in Aeronautics. He joined IBM Research in 1988, joined Univ. of Tokyo in 1990 as a lecturer, and has been an Associate Professor of Dept. of Aeronautics and Astronautics since 1993. His research fields include space systems design and operation, navigation, guidance and control, small satellites, autonomy and intelligence for space systems, space robotics and machine learning.

Pictured: Professor Shinichi Nakasuka, the University of Tokyo.
"芸は身を助く- Art brings bread" *How capability brings income.*

Highlights:

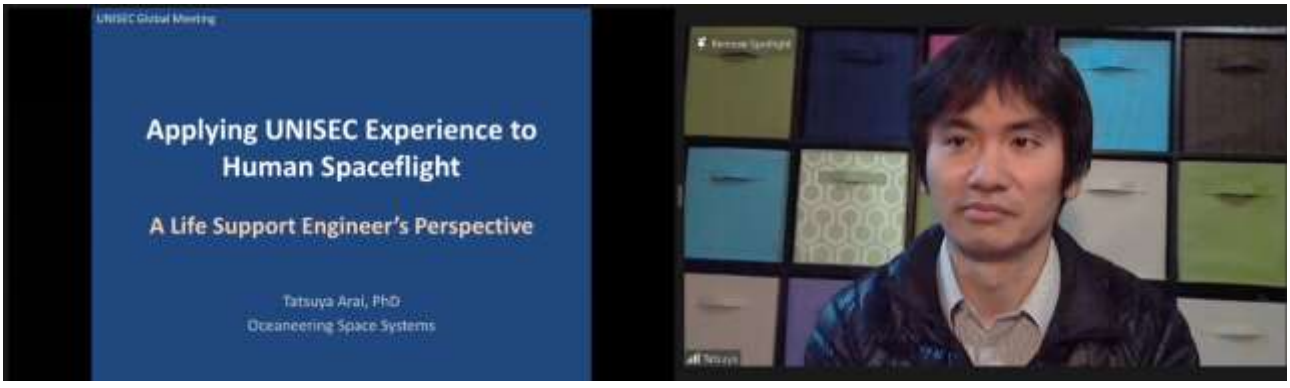
- Introduction to the inception of the Comeback Competition ARLISS.
- CanSat released from rocket to return to a target point autonomously.
- University of Tokyo won the competition with a return distance of 650 meters.
- Many people started their space technology career in projects such as ARLISS.
- Introduction to Dr. Arai who wanted to study space suits.
- Crossover and synergy between skills/fields can provide increased capability such as that of Dr. Arai who designed the UNISEC logo.
- Synergy between fields enables space to make large contributions to other fields.

Pictured: Professor Shinichi Nakasuka introduces the history of the ARLISS project with U-Tokyo as the winners.

2. Presentation "Applying UNISEC Experience to Human Spaceflight"

Tatsuya Arai, Oceaneering Space Systems

Tatsuya Arai is a senior staff engineer at Oceaneering Space Systems. His work includes development and testing of life support systems such as CO2 scrubbers and water recovery systems. He obtained BS and MS in Aeronautics and Astronautics from the University of Tokyo, and PhD in Aerospace Biomedical Engineering from Massachusetts Institute of Technology. He supported UNISEC activities by designing websites, posters, logos, and T-shirts.

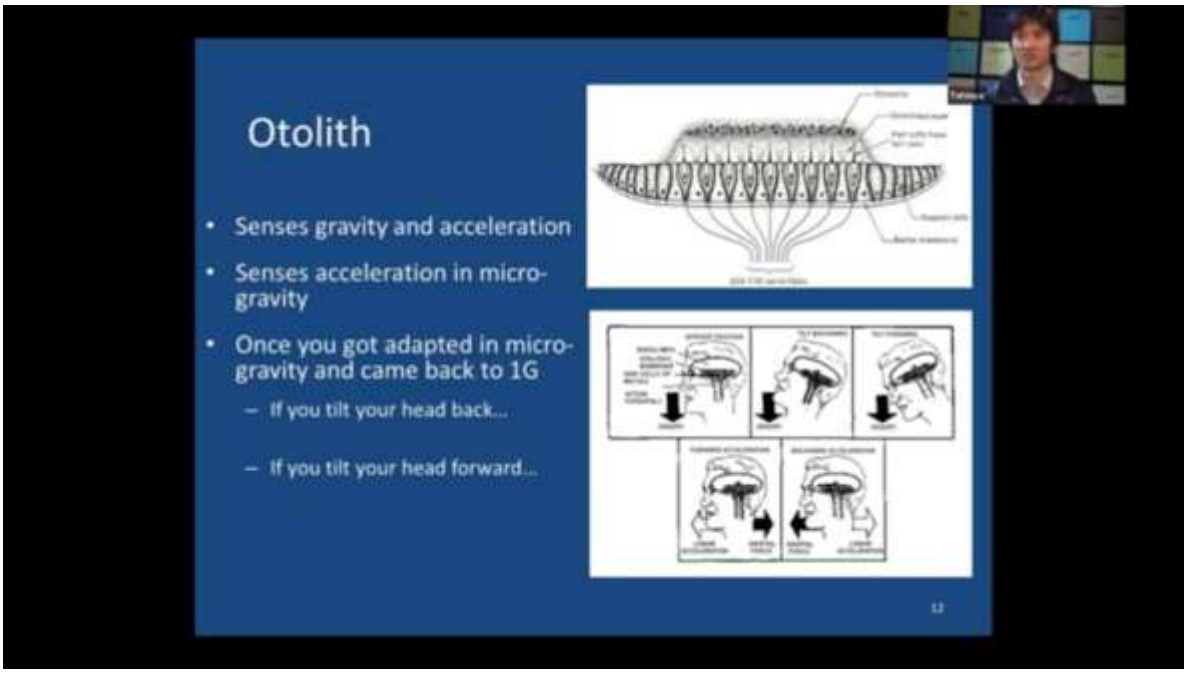


Pictured: Dr. Tatsuya Arai a life support engineer at Oceaneering Space Systems introduces his talk about applying UNISEC experience to human spaceflight (acquisition of transferrable skills).

Highlights:

- BS and MS in Aeronautics and Astronautics in Prof. Machida's Lab.
- Part of CubeSat teamwork in junior year, interested in space, arts, and drawing.
- Completed PhD ijn Aerospace Biomedical Engineering at Massachusetts Institute of Technology (MIT) USA.
- Worked in Biomedical company to design medical devices for shoulder/hip and knee repair.
- For entry into job/academia: Hands-on experience to stand out and be unique in the selection process, build professional network is important.
- Engineering life support considerations: Space vacuum heat cycle, micro gravity, harsh environment. Environmental control and life support systems (ECLSS)
- Humans produce many bi-products: hair, dead skin cells and ammonia - requires continuous cleaning.
- Different space suit classifications: Intravehicular vs. extravehicular (work inside a vacuum)
- EV space suits are mainly different in the legs. Current space suit are not designed to walk around. Artemis space suit includes ball bearing joints to assist walking on the moon.
- Basic requirements are the same (oxygen, carbon dioxide remove temperature and humidity, mobility).
- Requirements for life support engineering: Data acquisition via Labview and Matlab; wiring; engineering (tests sensors actuators); concise communication (engineering diary)
- Skills from satellites are transferable. In Dr. Arai's case they transferred into biomedical engineering and then spacesuits.
- Process of bioengineering involves reverse engineering the human body to receive data.
- In space astronauts experience fluid shift, plasma volume loss, and increased rate of urinating within the first few days.
- It's amazing that humans evolved through 1G (gravity) but within 2 days of microgravity environment they adapt to zero/micro gravity.
- When returning to earth experiments are done to test the performance of astronauts and understand the effects of human spaceflight e.g. when the head is tilted back, experience of flying forward (takes 1 week to correct).
- For student: Look for immersive hand-on experience rather than getting hands on skills.
- UNISEC logo: represents satellites and rocket faring (bring all the ideas together).

Q&A
Charleston: How to test material degradation and selection of materials.
A: Brookhaven National Lab in NY can produce cosmic rays for testing radiation exposure. Rocket exposure thermal profile - actuator from rocket nozzle need thermal curtain or blanket.



Pictured: Dr. Arai explains the biology of human sense of acceleration and gravity and how astronauts are disorientated when returning to earth with altered input signals from the otolith.

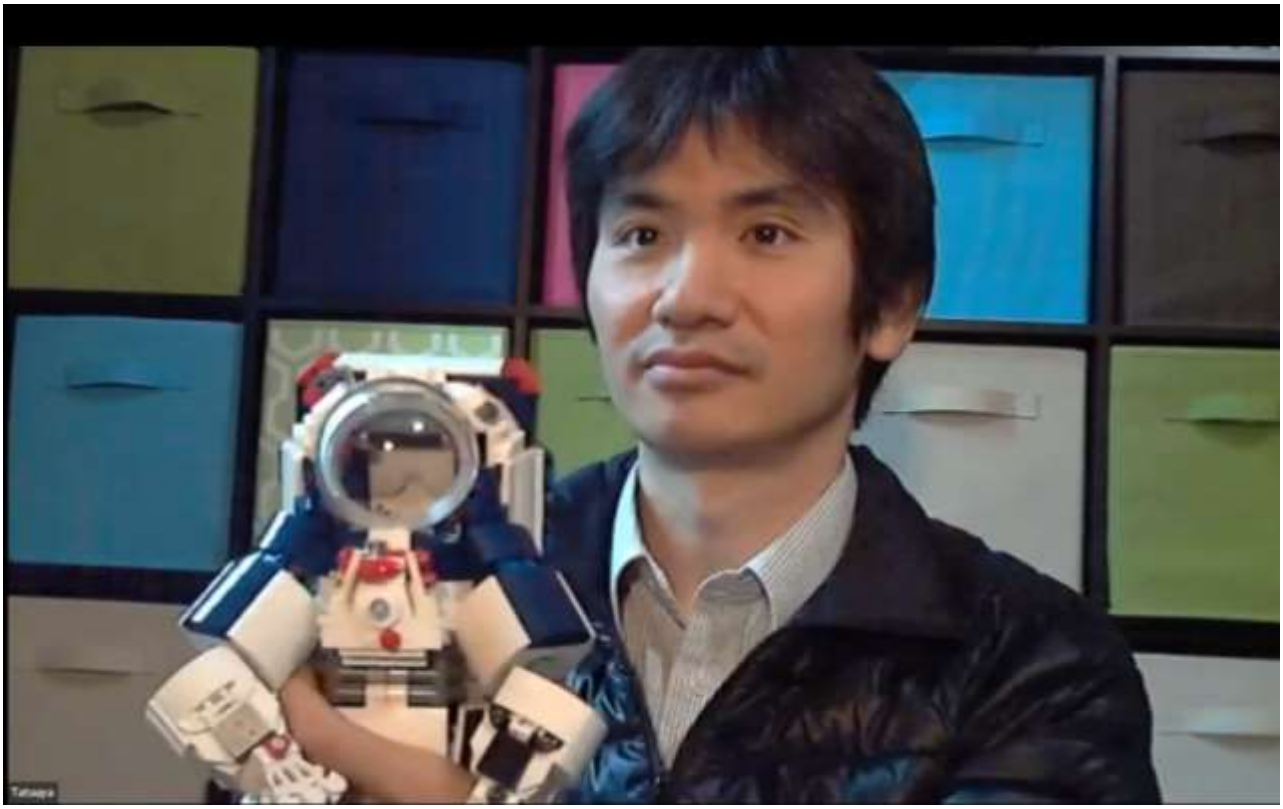
Special message from Dr. Arai:

Thank you for the opportunity to present my hands-on experience starting from UNISEC. I had a great time sharing my first-hand experience and hope I emphasized enough for current students that your experience at UNISEC will be a great asset for your later career.

Please let me know if you have any questions, and I'm happy to answer them via UNISEC-Global Office.

Personally, as a former web designer of the UNISEC websites, I recognized many faces from the days when I made the UNISEC/MIC/CLTP POC web pages. It was a great honor to see you all in person virtually. I also learned the struggle of the current remote learning all over the world, and hope the discussion continues to take actions and make future engineers' academic life as fruitful as it can be.
Also, congratulations on the successful launch of BIRD4!

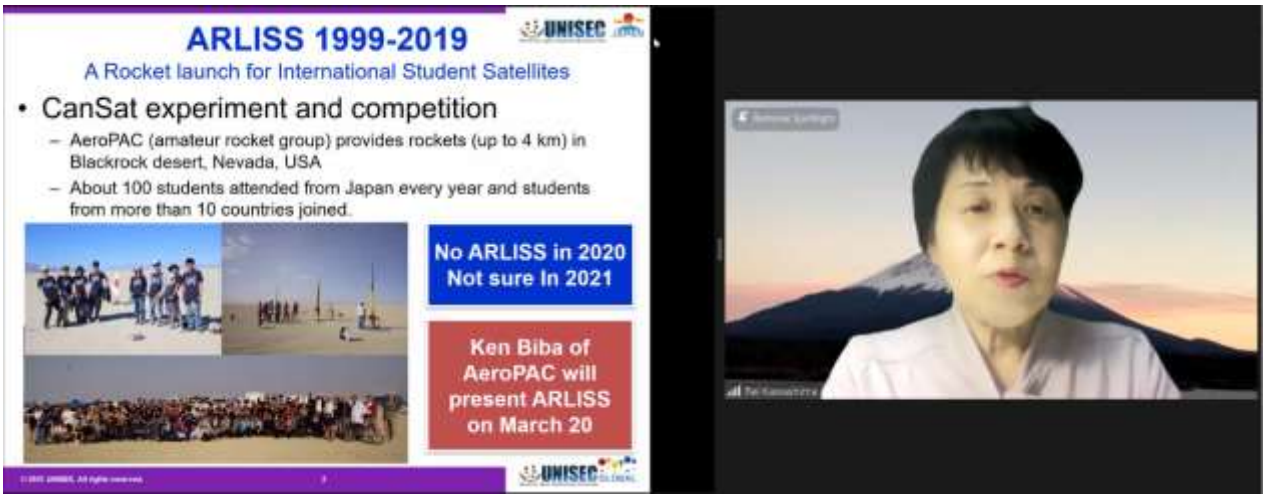
Last but not least, if you have already voted for my "legonaut", thank you very much! If you are interested in supporting my lego projects, please visit the project page below and support the projects:
https://ideas.lego.com/profile/spacemanship/
Let me know if you come up with your own project, and I will support yours, too!



Pictured: Dr. Arai's NASA Artemis Spacesuit submitted to the LEGO idea contest (vote for it!).

3. UNISEC Hands-on training

KAWSHIMA Rei, UNISEC-Global.



"What is needed should be considered with innovative, imaginative spirits" KAWASHIMA Rei

Highlights:

- ARLISS has been running from 1999-2019 and is an acronym for "A Rocket Launch for International Student Satellites".
- AeroPAC (amateur rocket group) provides rockets (up to 4 km) in Blackrock desert, Nevada, USA for ARLISS with approximately 100 students attended from Japan and students form more than 10 countries/regions joining.
- No ARLISS in 2020 and 2021 is unsure. Ken Biba or AeroPAC will present ARLISS on March 20 Virtual UNIGLO meeting.
- CanSat Experiment in Asagiri plateau in Shizuoka took place in December 2020 using balloons for launch instead of rocket.
- CanSat Leader Training Program (CLTP) is training for professors/instructors to learn how to conduct CanSat (or HEPTA-Sat) training by experience launched October 2010 and offered annually.
- CLTP graduates number 96 participants from 46 countries/regions.
- Two educational kits have been developed (HEPTA-Sat and i-CanSat).
- CanSat textbook can be downloaded free here: (English)
- HEPTA-Sat Lite (simple kit) is being developed with an online course.

Pictured: UNISEC-Global Guiding Principles highlighting number 9 to use imaginative and innovative ways of achieving the maximum result using available personnel, technical and financial capabilities, even if they are limited.

4. Breakout discussion and sharing.

Moderators: George MAEDA, Kyutech; Nate Taylor, UNISEC-Global.

Pictured: The topic subject for the breakout session regarding hands-on training.

Highlights:
- Entire meeting is divided into 10 breakout rooms (about 4-5 people in each room).
- Participants discuss the above agenda for 20 minutes.
- Representatives of each room make a 1 min summary to the entire meeting.

Summary of breakout group discussions

Group	Speaker	Comments
Room 1	Tatsuya	Good and bad - Class setting score progress with presentations (evaluations). Kits should be available. Leading TA to help teach.
Room 2	Daniel	Examples: Should be good kit (HEPTA) available to learners. Train multiple people (divide into groups of reasonable size). Common design tool. Teaching groups simultaneously.
Room 3	Hoda	Pros/cons - hard to monitor lower standards. Studying only theoretical is hard - limited practical hands-on components. Having recordings of lectures and contact with professors outside of class Limiting number of people via shifts and using simple tools.
Room 4	Ana	A good hands-on: constant assistance and monitoring. Correct equipment, tools, knowledge and share with experienced people. Bad: Internet connectivity issues, location, constantly sharing (simulations). Platform and readiness level do not need technical skills as much.
Room 5	Mark	Good: access to tools and equipment. Bad: No opportunity to do actual work. Importance of breakout sessions with hardware and equipment. Need: Balance between access to online and equipment. Toolkits shipped if cheap enough. Online learning sites. Take turns and availability is difficult. Use simulations and online lecturers.
Room 6	Chalawat	Should be designed according to audience. Bad; complicated and boring or not time realistic. Need: Provide technical support. Hold online or collaboration-based activities. Internet has allowed larger number.

Other comments

From Kuang－Han Ke [Gran Systems, TWN] to Everyone: 11:24 PM
With the good COVID situation in Taiwan, we can possibly offer partnership from our labs with the tools and equipment to show how engineers can have enough ppl interactions through some meetings software, etc.

From Ang YiYong to Everyone: 11:28 PM
For your reference, a virtual emulator called TinkerCAD might be a good online tool for (virtual)hands-on training.

From Hoda Awny to Everyone: 11:30 PM
Another thing we discussed in Room 5: It is important to prepare good documentation, lectures, safety procedures and deliver them to trainees (maybe virtually) to make sure hands-on is done efficiently , Students show good problem solving skills and output in a Good Hands-on Training. Thank You

5. Regional Report: UNISEC Turkey

Alim Rustem Aslam, Istanbul Technological University

Prof. Dr. Aslan graduated as an Aeronautical Engineer from the ITU Department of Aeronautical Engineering in 1983. He received his MSc degree from the same department in 1985. Then, he completed the Diploma Course of the von Karman Institute for Fluid Dynamics (Belgium). He received his Ph.D. from the same institute (aeronautics and aerospace department) together with Universite Libre de Bruxelles in 1991. Prof. Aslan has authored/ co-authored over two hundred and sixty technical publications (full-length papers, book chapters). He is currently the Manager of Space Systems Design and Test Lab. where many nanosatellites developed since 2007, in addition to other various duties and is currently teaching Spacecraft System Design at ITU and Air Force Academy.

Pictured: Alim Rustem Aslam introduces the activities of UNISEC Turkey.

Highlights:

- UNISEC Turkey established 2011 and will soon become a legal entity (association).
- UNISEC Turkey is involved in many activities including CLTP, MIC, APIS High School CanSat competition, and TEKNOFEST.
- 6 CubeSats already launched with 3 additional projects underway: (SharjahSat-1, Aselat, Ubakusat 2018, BeEaglesat 2017, Havelsat 2017, Turksat-3USAT 2013, iTUpSAT-1, 2009).
- Aim to keep activities multidisciplinary, international and multi-institutional.
- TurkSat launches during TEKNOFEST CanSat competition.
- AIAA Space Design Contest 2021: Mars Ice Core sample return.
- National Space Prgram, Turkish Space Agency announced including Moon mission and regional

positional and timing system.

- Plan for 2021 and beyond to include:
    - Register UNISEC TR as an association society
    - Close collaboration with TUA
    - 11th NanoSatellite Symposium in Turkey , 2022
    - RAST 2023 in ISTANBUL
    - Continue CubeSat projects Dept . of Meterology
    - Support to Regional Space Projects
    - Support to schools and other educational institutions (space technology seminars).

Pictured: One of the rocket launches as part of the TEKNOFEST CanSat competition for TurkSat.

6. Corporate presentation: Mitsubishi Electric Corporation

Hiroshi Koyama, Executive Fellow, Space Systems

Dr. Hiroshi KOYAMA is currently a Fellow of Electronic Systems Group at Mitsubishi Electric Corporation ("MELCO"). In March 1987, he joined MELCO as Chief Engineer for Rendezvous and Docking System of Engineering Satellite-VII & H-II Transfer Vehicle(HTV) in Kamakura Works. Since then, he has worked on various satellite projects including Earth Observation Satellites.
In April 2013, he was appointed to Deputy General Manager of Space Systems Division. From April 2015, he was appointed to Executive Fellow & CTO of Electronic Systems Group and assigned to his present position in April 2019.

Pictured: An overview of MELCO given as an introduction to the company by Hiroshi Koyama.

"The top satellite manufacturing company in Japan"

Highlights:

- Focus on new directions and developments at MELCO.
- MELCO relationship with UNISEC activities since MIC competition in 2011.
- Started space business from 1976 top satellite manufacturing company in Japan with over 500 satellite system contracts and over 70 prime contracts.
- Space business organized into four categories: Communication, Navigation, Earth observation, Space Exploration.
- New in Navigation: QZSS GNSS complimentary improves positioning availability and accuracy providing cm accuracy using CLAS system (application for automated driving).
- New in Earth Observation: Data from optical satellites and Synthetic Aperture Radar (SAR) to produce future new business and solutions for disaster and maritime awareness.
- New in SmallSat: New developments in high-resolution constellation satellites.
- MELCO would like to make international cooperative activities in New Solutions.

Pictured: An overview of MELCO history in space business which commenced in 1976 (top) and the new some of the new developments in Earth Observation at MELCO.

Point of Contact for Mitsubishi Electric Corporation:
Hiroshi Koyama – Executive Fellow, Space Systems
Website: http://www.mitsubishielectric.com/bu/space/

7. New member acknowledgment, Announcements and Closing

Rei Kawashima, UNISEC-Global

Pictured: Kawashima-san invites the UNISEC-Global community to make any announcements and opens informal discussions.

Highlights:

- Please contact the UNISEC-Global secretariat (KAWASHIMA Rei) if you wish to establish a new local chapter. Requirements for a new chapter:
    - 2 or more participating universities.
    - Professor and student involvement.
    - Fill out the university application and local chapter application from: http://www.unisec-global.org/localchapters.html
- New chapter member Kathmandu Engineering College; Professor Dipen Manandhar; Shiv Narayan Kunwar (Student representative).
- New Point of Contact – Mr. Daniel Odido (Aeronautical Engineer - Kenya) developing a nanosatellite and excited to join the UNISEC community.
- New Corporate Silver member: Teaching Science and Technology Inc (TSTI).
- Next Virtual Meeting will be held on March 20th 10 PM (JST) and feature Ken Biba (AeroPAC), local chapter presentations from UNISEC-India and UNISEC-Thailand, and corporate presentation from Jerry Seller (TSTI).
- MIC7 Lectures: Deep Space Science and Exploration with nano/micro satellites
  (sponsored by the University of Tokyo) **Next: Feb 25, March 1, 4, 21:00-22:30 (JST)**
  Registration: http://www.spacemic.net/lecture.html
  Abstract due: July 7, 2021.
- UNISEC will join planning and organizing the working group of the higher education at APRSAF 2021 (held in Vietnam).
- STSC-UNCOPOUS April 19 2021.
- BIRDS-5 Project underway and BIRDS-4 project launched: VIDEO LINK

Pictured: Derrick (left) and Fahd (right) update us on the BIRDS-5 project and the BIRDS-4 launch.

Pictured: Follow us on our social media pages and get involved!

Memorial for Prof. Plamen Dankov (Sofia University, Bulgaria)
It is with great sadness that we announce the passing of Prof. Plamen Dankov. Prof. Dankov served UNISEC-Global as a point of contact and MIC coordinator for many years. His team was selected as one of the finalists of the 6th Mission Idea Contest held during the 7th UNISEC-Global Meeting in Tokyo in 2019. His contributions to the UNISEC-Global community and vision are greatly appreciated and he will be sorely missed.

Pictured: In memory of Prof. Plamen Dankov (Sofia University, Bulgaria). Thank you very much for your contribution, participation, and support to UNISEC activities. We will not forget you.

8. Update on the 7th Mission Idea Contest for Deep Space Science and Exploration with micro/nano satellites Lecture series

Lectures have commenced for MIC 7. The schedule and links to videos are listed below.

Completed lectures:
Mon 02/15/21 – "New Challenges for Deep Space Exploration" Prof. Ryu Funase.
Thurs 02/18/21 - "Science Operations of Space Missions" Prof. Munetaka Ueno.

Upcoming lectures:
Thurs 02/25/21 – "Deep space exploration and micro propulsion" Prof. Hiroyuki Koizumi.
Mon 03/01/21 – "Trajectory Design for Deep Space Exploration Missions" Prof. Naoya OZAKI.
Thurs 03/04/21 – "Communication for Deep Space Mission with micro/nano Satellites" Prof. Atsushi TOMIKI.

The University of Tokyo, Institute for Open Innovation

JOIN US!

Join Lecture series: http://www.spacemic.net/lecture.html

Register at: https://tinyurl.com/MIC7-LS

Download the abstract template: http://www.spacemic.net/

Submit your abstract!

Application Submission : Deadline July 7, 2021

Note: Registration to compete in MIC7 will open soon. You can begin working on your abstract now.

UNISEC GLOBAL

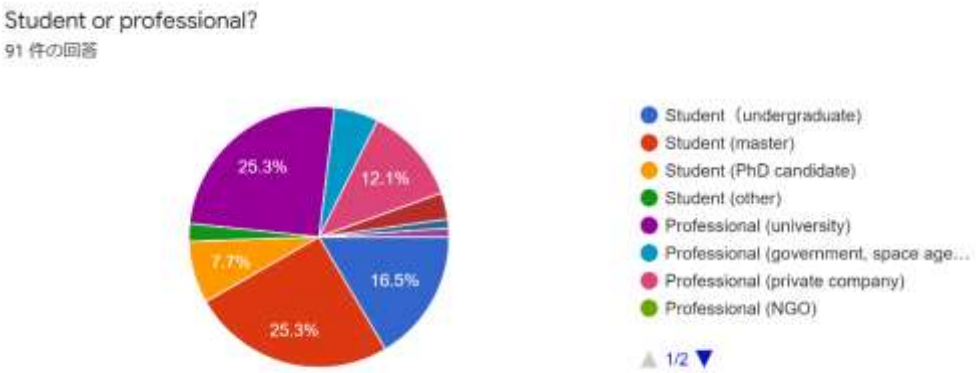
9. Participant Statistics

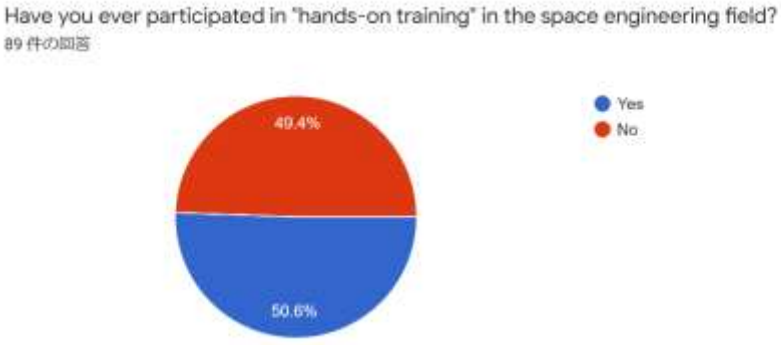
90 registered participants from **26** countries/regions participated in the 6th Virtual UNISEC-Global Meeting.

Country/Region	Number of registrants	Country/Region	Number of registrants
Angola	1	Japan	19
Argentina	2	Kenya	2
Belgium	1	Malaysia	2
Bulgaria	3	Mexico	3
Cambodia	2	Myanmar	2
Colombia	1	Pakistan	1
Egypt	3	Peru	5
France	1	Philippines	21
Germany	1	Taiwan	1
Ghana	1	Thailand	2
Indonesia	1	Tunisia	1
İstanbul	1	Turkey	11
Italy	1	United States	1

Relationship with UNISEC	Number
CLTP graduate	4
Follower of UNIGLO SNS	21
Guest	2
ISU Alumni/Staff	2
Local Chapter member/staff	16
Local Chapter POC	9
Local Chapter Preparatory committee member and students	4
MIC participant/reviewer	5
Student	12
Other	15

10. Participant Questionnaire

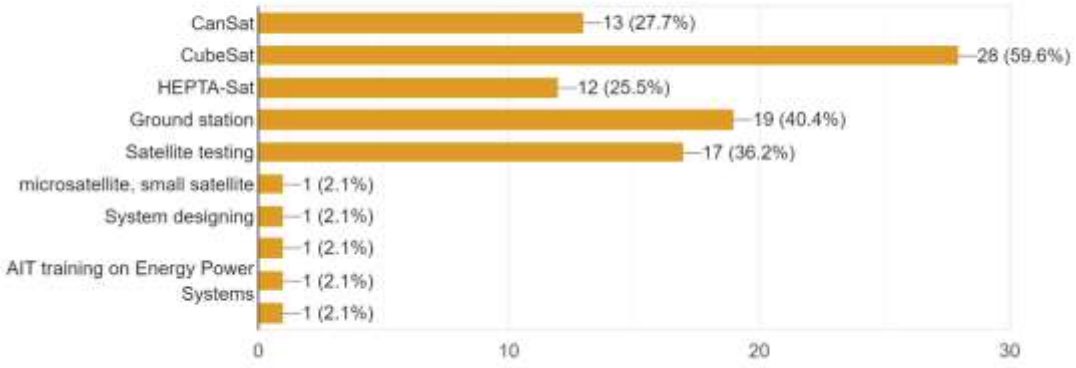




All responses to the following questions are rated from 1 – 5 where 1 represents ‘strongly disagree’ and 5 represents ‘strongly agree’.

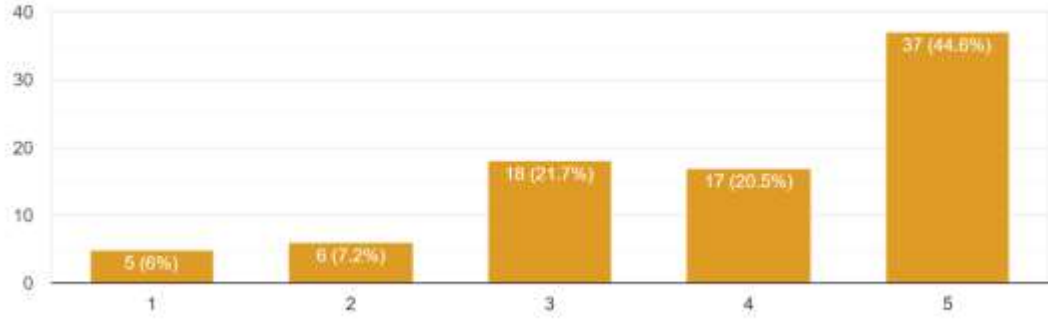
If Yes, what training have you experienced? (multiple choices allowed)

47 件の回答



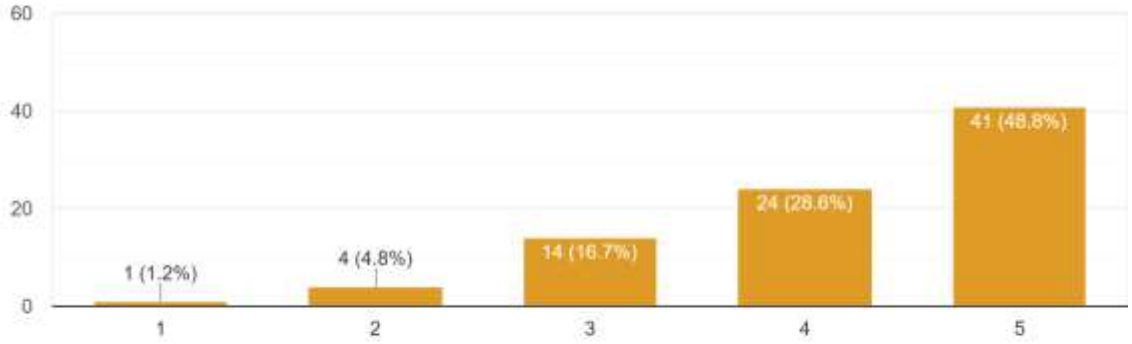
Do you want to be an instructor of hands-on training in the field of space engineering?

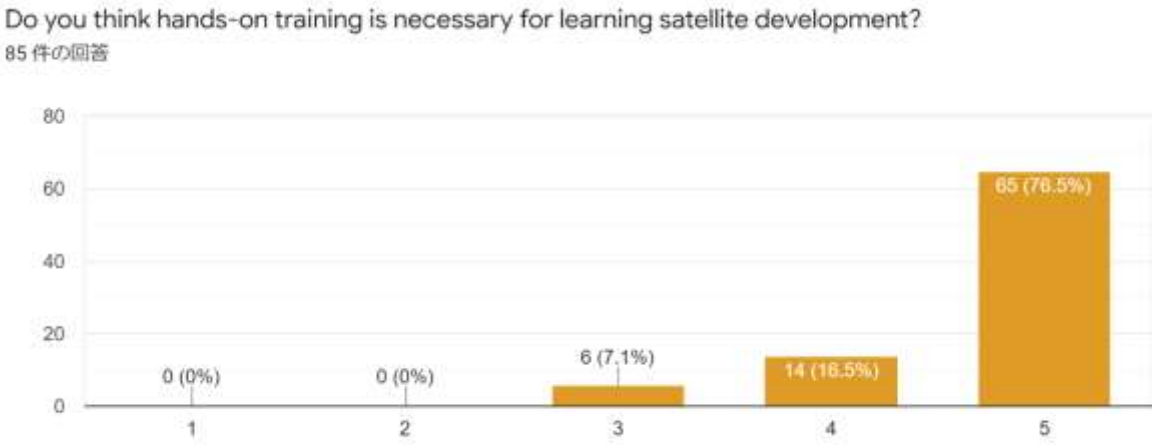
83 件の回答

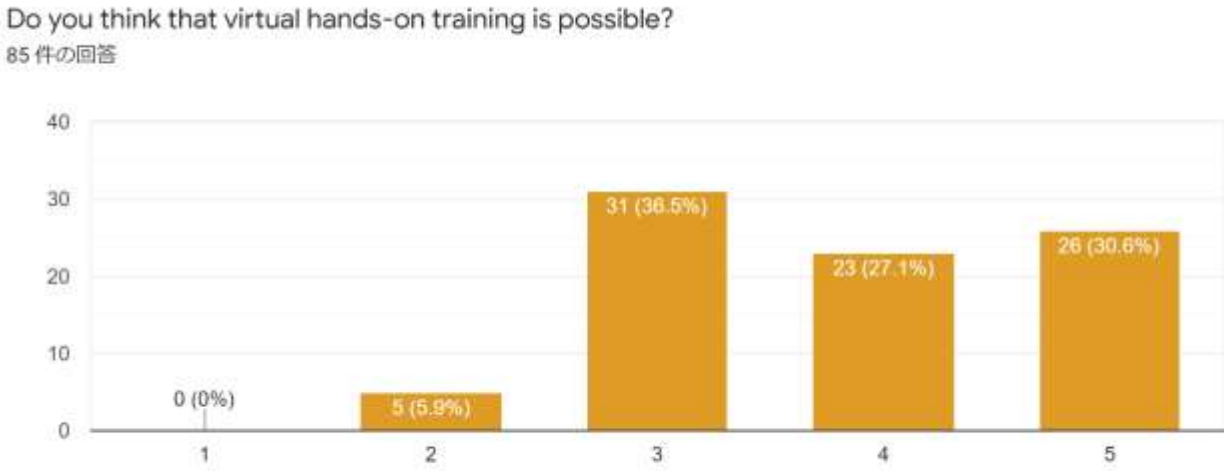


Do you think that the pandemic has influenced hands-on training in your region?

84 件の回答







Some of your ideas on how to organize hands-on training during the pandemic:

If we have the resources to make it happen, virtual reality or augmented reality is a good complimentary tool for conducting hands-on training during pandemic.

Virtual hands-on training would be practical in VR or Simulation kind of things, but it's actually hard and need lots of effort to create both kind of training mentioned.

Sure, we could use zoom platform to carry out the meeting, we could create a break out rooms in that platform and work in teams. Maybe a combination of virtual and actual hands-on training for appreciation and understanding of the theories into the actual satellite development.

Use can be made of both asynchronous and synchronous online learning. Moodle-based systems can be used for the asynchronous learning, while Zoom (or similar software) can be used for the synchronous learning. Computer Simulations can be used to demonstrate assembly of components in development of nanosatellites. The online training can be completed by organising a brief physical meeting so as to consolidate the skills learnt. This will enable the reaching of people from different geographical regions, and also enabletraining to continue during the pandemic.

Thank you.