UNISEC-Global The 3rd Virtual Meeting

November 14, 2020 22:00-00:00
(Standard Japan time GMT +9)

The following report prepared by UNISEC-Global Secretariat
November 18, 2020
Japan

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1.   Welcome and Opening remarks
Rei KAWASHIMA, UNISEC-Global.

With a warm welcome Rei KAWASHIMA opened the third online UNISEC-Global meeting by reminding us that every cloud has a silver lining and that every difficult situation may have an advantage. We were reminded that we should try to find and nurture good seeds, such as coming together for UNISEC-Global virtual meetings as our unique ideas are important, making our activities more efficient and effective!

Pictured: KAWASHIMA, Rei "Let's make this meeting fruitful, meaningful, and enjoyable!"

Highlights:
-   UNISEC-Global aims to build a world where university students can come participate in practical space projects.
-   Every country therefore needs to spend resources for space. Who should pay?
-   Virtual meeting outline:
    -   Professor Kuwahara - 20 yrs in small sat field
    -   Professor Sir Martin Sweeting 50 years experience
    -   Breakout discussion
    -   Regional report: UNISEC-Bangladesh (Raihana Shams Islam Antara)
    -   AI solutions (Moataz Abdelazim)
-   Moderation by George MAEDA, Kyutech.

2.   Presentation "My 20-year journey with micro/nano satellites"

Toshinori KUWAHARA, UNISEC-Japan, Tohoku University.

KUWAHARA-san is an Associate Professor Department of Aerospace Engineering at Tohoku University and the Chairperson for UNISEC-Japan. His career has been centred around research and development of micro and nanosatellites.

Highlights:
- He was born 1981 and attended Kyushu University in 2000 under Prof. T. Yasaka.
- In 2003 he was a student in Kyushu and participated in Cansat2003. He enjoyed the hands-on training so much that he brought Cansat2003 to Nevada (USA) for rocket experiments. Unfortunately the structure failed against launch vibration, the parachute didn't deploy and the satellite crashed.
- He made tethered microsatellites analysing structure and thermal characteristics. There was no sufficient material in bookstores so he used the UNISEC community for expertise.
- Member of the iQPS spinoff company for earth observation (https://i-qps.net/).
- Finished his masters and moved to Stuttgart, Germany.
- As a doctoral student he developed a 120kg class Earth observation microsatellite called Flying Laptop (FLP).
- In 2010 he moved back to Japan and has worked on many projects since, including RISESAT(2019 launch).
- The camera on RISESAT can take two pictures at a time - allowing tuning of the wavelength with a 30 ms exposure time. It requires pointing the satellite at a target. By changing the combination of colours it can make true colour, or false colour images to see vegetation.
- Recent increased focus on developing UNISEC Academy - encouraging best practices and competitions.

Microsatellite Development as Master Student

"QTEX" - Kyushu University

- World first CubeSats were developed by Japanese Universities and launched in 2003.
- Unlike other Universities, Kyushu University was focusing on the development of 50-kg-class tethered microsatellite.
- Again, it was the best training for learning satellite design, development, and AIT, as well as various bus system and mission payload technologies.

World-first CubeSat X-IV
© University of Tokyo

Springs

Structure Clamp band Mechanism Communication

Tethered Satellite QTEX
Kyushu University
(50kg)

Thermal C&DH Attitude Payload/Camera

2020/11/14 Toshinori Kuwahara, UNISEC Global Meeting #3 5

During the Doctoral Study, I met with...

Prof. Tetsuo Yasaka Prof. Sir Martin Sweeting

T. Kuwahara (Tohoku Univ. Japan)

IAC 2007 @ Hyderabad, India

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UNISEC Japan Starts Playing a Role in Mission Assurance

- UNISEC Academy -

Satellites Born From UNISEC Activities

T. Kuwahara (Tohoku Univ. Ja...

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Tohoku University Satellite Missions

SPRITE-SAT (2009)
RISING-2 (2014)
S&F Network
DIWATA-1 (2016)
DIWATA-2 (2018)

✓ Earth Obs.
Nano-satellites
✓ Earth Obs.
✓ Spectrum Obs.
RISESAT (2019)
RAIKO (2012)
✓ IR Obs.
ALE-1 (2019)
FREEDOM (2017)
✓ Wide Obs.
IHI-SAT (2019~)
ALE-2 (2019)

T. Kuwahara (Tohoku Univ. Japan)

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3. Introduction of breakout discussion

Sir Martin Sweeting, SSTL and Surrey Space Centre.

"Why do developing countries need to spend time/money on developing space activities?"

"Space for All"

SURREY

Martin Sweeting (Surrey, UK)

Prof. Sir Martin Sweeting OBE FRS FREng

Executive Chairman, Surrey Satellite Technology Ltd
Chairman, Surrey Space Centre
Director, National Hub for Space Robotics

UNISEC GLOBAL November 2020

"These are key elements for any nation, whether they be developed or developing." - Sir Martin Sweeting.

Highlights:

- Satellites are no longer just academic interest.
- Space is now an essential infrastructure for all economies, managing timing and position, environment, and communications.
- Many applications among all sectors of space.
- In the 1960's only the Soviet Union and the US had access, within 20 years it was still only the most affluent nations.
- The emergence of small sats in the 2000's brought space in the reach of all nations.

4. Breakout discussion and sharing.

Moderators: George MAEDA, Kyutech; Nate Taylor, UNISEC-Global.
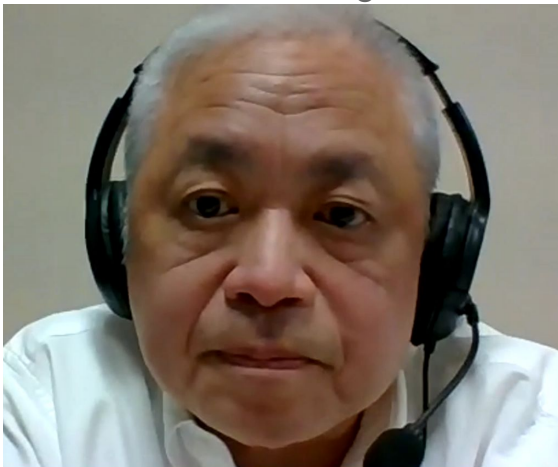
UNISEC-Global The 3rd Virtual Meeting Breakout Discussion

Time: *25 minutes*
Tasks:
I. Set the leader

II. Discuss *"Why do emerging nations need to spend time/money on developing space activities?"*

Examples (can share screen):
a. Create a pro/con list.
b. Use the 'Whiteboard" to make a drawing (take screenshots to share).
c. Think of questions to ask Sir Martin.

Leader shares what you discussed once breakout room closes - (1 min)

Pictured: MAEDA, George moderating the virtual meeting and breakout session.

"Being the strict moderator that I am, it is now 10 pm and we need to get underway!"
- MAEDA, George.

"If you don't normally lead a group - please consider volunteering. Your group will thank you for it!" - Nate Taylor.

<u>Highlights:</u>
- 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.
- Sir Martin assigned rooms to assist the discussion.

<u>Summary of breakout group discussions</u>

Group	Speaker	Summary
Room 1	Ana	Each country has different needs, and planning should be done according to their needs. It should not be a linear model. All considerations from emerging countries including education and investment need to be considered. Engaging in space activities will reduce dependence on other countries.
Room 2	Farzana	In Myanmar the young generation is involved in satellites. Further development is needed regarding the use of funds, laws, and restrictions including space debris management. Sir Martin joined our group and discussed the critical role governments play in identifying the importance of space assets.
Room 3	Kuwahara-san	Advantages for emerging nations are broad and include monitoring the land and long term activity. Space applications improve the standard of our lives in several areas. Big spacecraft are expensive but use of micro and nanosatellites provide useful and affordable systems.
Room 4	Kuhamba	Satellites should address the needs of people. Zimbabwe needs agricultural management resources but there are challenges such as photo quality. Custom made satellites help deliver appropriate solutions and access is now affordable. Focus should be placed on training emerging engineers. Internet connectivity in emerging nations has been challenging. Government should help drive the agenda with investment and regulations to open up collaboration from other nations for capacity building. Public space awareness will increase including understanding of involvement.
Room 5	Hari	Enables capacity building. Nepal does not have large satellites with the first satellite launched last year(NepaliSat-1). It brings a sense of national pride and enables knowledge transfer to the younger

		generation.
Room 6	Burak	Created a pro/con list. More pros than cons. Pros: Balancing expenditure, reduced cost of space systems, customised services, capacity building, development and enhancement in engineering, spinoffs, planetary understanding. Cons: Time and research and development. Convincing investment
Room 7	Prastuti	Issues: Investment problem - lack of resources Benefits: improve overall standards for the whole country. Help utilise creativity and productivity. Share and take ideas from people globally.
Room 8	George	Main benefit is to improve communication support service and reduce the expense of buying from other countries. Increase sustainability.
Room 9	Myat	Priority is the development of space activity to prevent climate changes i.e. flooding - difficult to develop and convince investment. There is a lack of knowledge.
Room 10	Moataz	Less barriers and more benefits. Tackle issues like deforestation. Help to increase capacity building and space policy, along with STEM education.
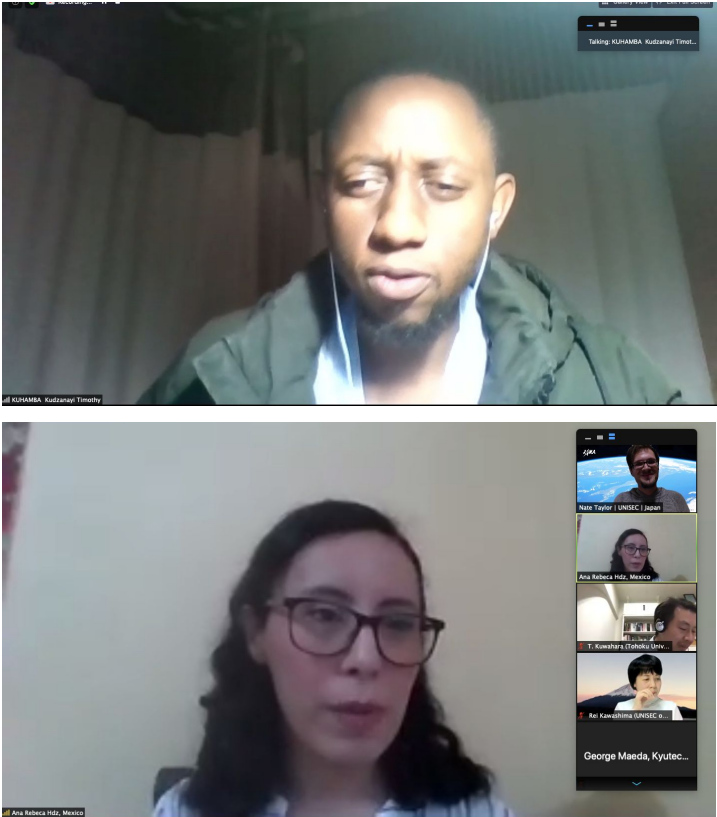
Pictured: Timothy Kuhamba (top) and Ana Rebeca Hernández Maldonado (bottom) sharing their breakout room discussion with the meeting.

5.   Q&A with Sir Martin, based on 50-year experience with small satellites.

Sir Martin Sweeting, SSTL and Surrey Space Centre.

Sir Martin Sweeting answered some pre-delivered questions in this candid Q&A session.

Pictured: Sir Martin Sweeting addressing the virtual meeting and answering questions.

Highlights:
- Big challenge is in achieving launch.
- Microelectronic technology is moving rapidly.
- Selection of off-the-shelf products for the space operation environment is critical.
- Return on investment for space applications is high.

Pre-delivered questions:

Q1: What are the next steps in the RemoveDebris project? Do you plan to take this project to a greater scale?

A1: *New satellites should not have risk of fragmentation or a minimised risk. We need to be able to launch into a decay orbit or employ orbit reduction (sails, propulsion) techniques to safely remove end-of-life satellites from orbit. We also need to focus on techniques to remove debris from orbit directly, but these are more challenging.*

Q2: In the last 5 years ago, Myanmar Aerospace Engineering University (MAEU) , Myanmar hold seminar on the development of small satellite technology by Prof .Sir Martin Sweeting, with the delegation of Surrey Satellite Technology (SSTL), UK.   I would like to know about the following question: How to prepare and implement the development of national space plan of Myanmar ? and   Research and sustainable development of small satellite technology and applications for

Myanmar?

A2: *Cansat programs or similar anable space capability growth within a limited budget, however, you need a funding program for long term sustainability. University course work can integrate satellite projects as part of core teaching. Otherwise, capability will disappear without sustainable investment. Investment now can stimulate the next generation of engineers and provide greater economic and societal benefits.*

Q3: Thank you Prof Sweeting for your presence for today. What are your advices for young engineers who are coming in this small satellite technology by highlighting challenges and opportunities.   Thank you!"

A3: *To engage industries into understanding space projects and build a base of support. It is difficult to do but if you are determined and can work with others, you can achieve it.*

Question from the audience:
Q4: (Meshack Kinyua) : What role does the commercial sector play for emerging nations seeking access to space?
A5: *To start, the commercial sector can enable services that are provisioned via space. These services require minimum capital expenditure. Once capacity has been built, the commercial sector can participate in the supply chain, manufacturing parts as the satellite environment changes. These later activities are capital intensive and cannot be undertaken as a first step.*

6.   Regional Report: Bangladesh chapter

Raihana Shams Islam Antara, BRAC University,
UNISEC-Bangladesh

Highlights:
- Established in 2014 Brac university and Bangladesh University of Engineering and Technology.
- First satellite launched in 2017, plus a GEO satellite from government also
- First mission idea contest in 2019 - 41 teams applied - 8 finalists
- 2020 Satellite expedition (virtual) contest (sustainable development goals, novel mission) any professional from any university.
- Virtual environment game / learning app developed.

7.   Corporate presentation: a.i. solutions

Moataz Abdelazim

Highlights:
- US based 500 employees
- Working with NASA over 25 years
- Freeflyer software: Design flight dynamic software (used by ISS for collision avoidance for

the last 7 yrs)
- University program for free to university students including guides and tutorials. Can help develop courses for orbital mechanics.
- Hosting a conference (online) for 5 days.
- Testimonial from Victor Mukungungugwa using the Freeflyer software.

Point of Contact for "a.I. Solutions": Moataz Abdelazim
Website: https: //ai-solutions.com/freeflyer/freeflyer-university/
E-mail: Moataz.abdelazim@ai-solutions.com

8.   New local chapter acknowledgement: UNISEC-Nepal

Rei KAWASHIMA, UNISEC-Global.

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Highlights:
- New regional chapter UNISEC-Nepal.
- Acceptance from Abhas representing UNISEC Nepal.

Pictured: KAWSHIMA, Rei (left) and Abhas Maskey (right) at the announcement of UNISEC-Nepal.

9.   Announcements and Closing

<u>Highlights:</u>
- GOM Space new silver corporate member.
- Other corporate members are welcome to apply.
- Dec 12 Sat 10 pm UNISEC-Global 3rd meeting.
- Updated Terms of use for UNISEC-Global Logo.
- Increase presence on social networks.
- Lawrence Reeves: Canada announced high school cansat competition - feeds into university cubesat competition
- UNISEC will provide a full textbook
- Pain Oo: 1st Year electronic engineering student - How can we become a UNISEC member? A local chapter requires two or more universities to become members (Zwe Thiha, Myat Maung Myanmar). Download application form and fill out. Need a professor responsible and a student representative. Send it to Rei. It will go to the committee for approval.
- Original intention for 100 local chapters by end of 2020 - currently 21 chapters. Goal by the end of 2030 is all countries participating in student space activities.
- Mansur Celebi (Turkey) - Community is growing. Companies supporting UNISEC is good to see. Suggestions regarding members for are part of space agencies. Can we bring space agencies in to guide students or companies?
- Final comment by KAWASHIMA Rei: Appreciates the participation of everyone as it enables organization of better activities to do more together.
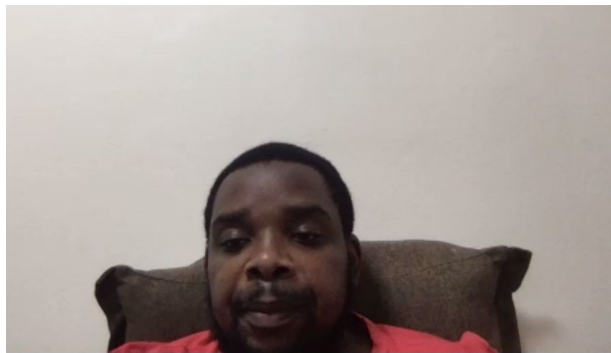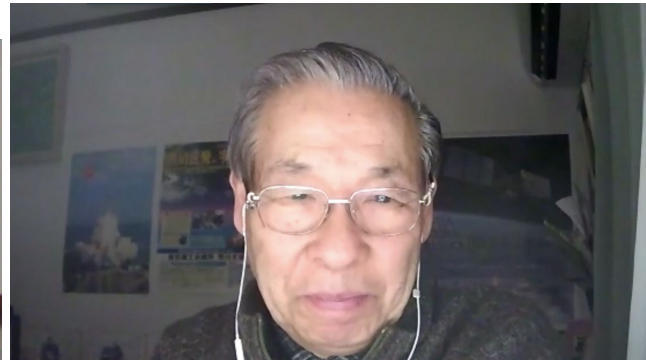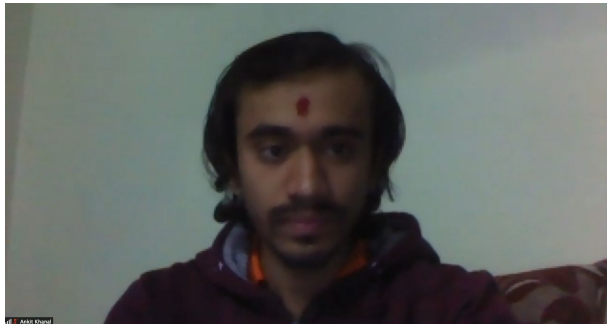
Pictured: KAWASHIMA, Rei (top-right), Ankit Khanal (middle-left), SHIMADA, Kazuo (middle-right), Lawrence Reeves (middle-left), Victor Mukungunugwa (middle-right), Mansur Celebi (bottom-left), Myat Yamone Maung (bottom-right).

10. Participant Statistics

**155** registered participants from **40** countries participated in the 2nd Virtual UNISEC-Global Meeting.

1)	Argentina	21)	Malaysia
2)	Australia	22)	Mexico
3)	Bangladesh	23)	Myanmar
4)	Buenos Aires	24)	Nepal
5)	Bulgaria	25)	Panama
6)	Cambodia	26)	Paraguay
7)	Canada	27)	Peru
8)	Chile	28)	Philippines
9)	Colombia	29)	Rwanda
10)	Egypt	30)	San Salvador
11)	England	31)	South Africa
12)	Ethiopia	32)	Spain
13)	France	33)	Sudan
14)	Germany	34)	Sweden
15)	Guatemala	35)	Switzerland
16)	Honduras	36)	Taiwan
17)	India	37)	Tunisia
18)	Indonesia	38)	Turkey
19)	Italy	39)	USA
20)	Japan	40)	Zimbabwe

Relationship with UNISEC	Number
Academic or Student	12
CLTP graduate	10
Corporate Member	1
Follower of UNIGLO SNS	31
Interested	4
ISU Alumni/Staff	3
Local Chapter member/staff	53
MIC Associate (Regional Coordinator / Reviewer)	7
Participant (other)	32
UNISEC Alumni/Staff	7

UNISEC Member	7

11. Participant Questionnaire

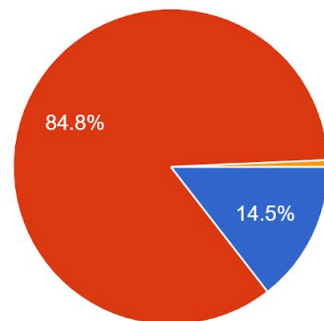### Have you ever built CanSat?
146 responses
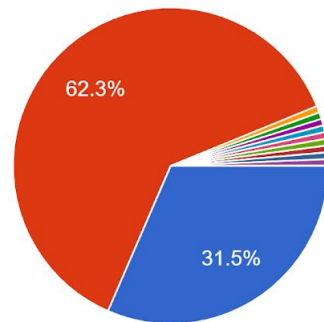
- ● Yes
- ● No
- ● Cubesat
- ● CubeSat
- ● Working on a rover project
- ● I'm currently building a CanSat
- ● Water Rocket Can Sats
- ● I Participated in a CanSat laboratory f…

▲ 1/2 ▼

62.3%
31.5%

Have you ever taken HEPTA-Sat training?
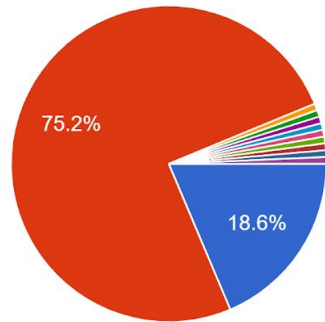145 responses

- ● Yes
- ● No
- ● One of my students participated in CLTP 10, HEPTA-Sat training program in Japan.

84.8%
14.5%

## Have you ever built a real satellite(s) that was launched into orbit?

145 responses

- ● Yes
- ● No
- ● to be launched January 2021
- ● i worked in development and operatio…
- ● Built a payload that is on the space st…
- ● I followed a training on Com sat
- ● Launch scheduled in 2021
- ● Not yet, However, I'm a member of res…

△ 1/2 ▼

75.2%
18.6%

Who should make efforts to acquire a free/affordable launch slot for university satellites?
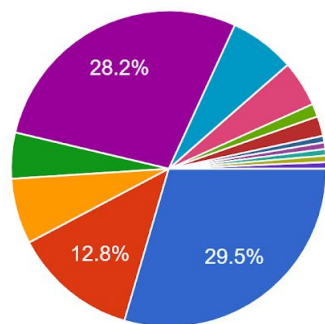
144 responses
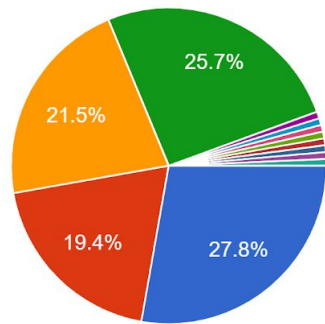
- ● Each university
- ● Local Chapter
- ● UNISEC-Global
- ● Not sure
- ● All of them should work together
- ● All of the above
- ● Everyone
- ● Each university and emerging space c…

△ 1/2 ▼

25.7%
21.5%
19.4%
27.8%

Student or professional?

149 responses

- ● Student (undergraduate)
- ● Student (master)
- ● Student (PhD candidate)
- ● Student (other)
- ● Professional (university)
- ● Professional (government, space age…
- ● Professional (private company)
- ● Professional (NGO)

△ 1/2 ▼

28.2%
12.8%
29.5%

Thank you.