UNISEC-Global The 66th Virtual Meeting

March 21st, 2026, 22:00-24:00
(Standard Japan time GMT +9)

The following report was prepared by UNISEC-Global Secretariat
March 28, 2026
Japan

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1 Introduction to PreMIC10 “Orbit Change Without Using a Propulsion System”

Shinichi Nakasuka, The University of Tokyo

Prof. Shinichi Nakasuka was born in Osaka in 1961. After graduating from the Department of Aeronautics and Astronautics at the University of Tokyo in 1983, and receiving a Ph.D. in Aeronautics in 1988, he joined a computer manufacturer and became involved in research around Artificial Intelligence and automated manufacturing. In 1990, he became a lecturer at the University of Tokyo, then subsequently an assistant professor of the Research Center for Advanced Science and Technology, University of Tokyo, and a visiting research fellow in the United States. He has been a professor at the Department of Aeronautics and Astronautics since 2004. His research fields are space engineering and intelligence for space systems.

Pictured: Prof. Nakasuka during his presentation

Highlights:

- There are so many debris in space right now
- So, to consider this the mission statement for MIC10 is as follows
    - To ensure sustainability, avoidance of collision with satellites is expected to be critical
    - In Europe, there are discussions to not permit launch of satellite
    - Prohibit that is unable to maneuver away from collisions
    - On the other hand, primary method of debris avoidance is challenging because
        - Difficult to equip satellite with appropriate propulsion system
        - Precise attitude control is also required to direct thrust in the desired direction
    - Hence, MIC10 invites proposals for alternative methods/devices that enable orbital change
- Evaluation criteria for MIC10 are as follows
    - First, the concept of device will be evaluated
    - Then, the magnitude and direction of force the device can generate
    - All of which should be submitted as a model in software form
    - The software will be tested in a simulator prepared by the organizers
    - Where the orbital deviation and ability to restore the orbit will be visualized
    - Finally, the team with the most effective results will win
- Assumptions of participant’s Satellite
    - Size: 50 cm x 50 cm x 50 cm
    - Mass: 50 kg
    - Three axis stabilizations with pointing accuracy of 1 degree
    - Proposed device must be less that 20% of total satellite size and mass

    - And it should operate with a maximum power of 20W
    - Orbit should be Sun Synchronous, specifically
        - Altitude 628 km
        - Inclination 97.9 degree
        - Circular orbit
    - Usual communication between 1 ground station and SSO satellite
- Primary evaluation criteria
    - Orbital deviation after 48 hours in km from original orbit
    - For which the coordinate system should be defined as follows
        - Z-axis: Toward the center of the Earth
        - X-axis: Along the direction of orbital motion
        - Y-axis: Normal to orbital plane
    - Must present calculation indicating how far and in which direction the orbit can be shifted
    - And after debris avoidance how close can the satellite return to original orbit
- Design documents required for participation
    - Device concept, physics principle by which force is generated
    - Detailed calculations and detailed device design
    - Integration with satellite and ground command operation strategy
    - Emphasis will be placed on force generation principle and calculation methodology
    - Design of satellite bus itself will not be evaluated
    - **Participants must also submit the software**
    - For which details will be announced later
- Overall Judgement will be based on qualitative and quantitative
    - **Quantitative performance**
        - Amount of deviation
        - Degree of recovery
    - **Qualitative factors**
        - Novelty of device concept
        - Feasibility
        - Compatibility with given satellite size
        - Validity of force calculation
        - Effectiveness of the post avoidance recovery strategy
- Process and Timeline of MIC10 is as follows
    - Application Submission **Deadline: June 18, 2026**
    - Notification of Finalist: September 3, 2026
    - Software submission by End of September
    - Final presentation will be held in Taiwan: November 9, 2026

Debris Approach and Post-Avoidance Recovery

- Debris Approach Assumption:
    - It is assumed that information is received indicating that your satellite has entered a collision trajectory with other object that will result in impact in X = 48 hours.
    - The approaching object is assumed to have no orbital maneuvering capability.

- After shifting the orbit to avoid debris, participants must propose methods or ideas for:
    - Returning to the original orbit; or
    - If full restoration is not possible, recover at least the altitude as close as possible to the original altitude (in order to extend orbital lifetime before reentry.)

Pictured: Prof, Nakasuka presenting the assumptions for MCI10

Q&A Session:

UNISEC Participant: *What information can we send to the simulator for simulations?*

Prof. Shinichi Nakasuka: You should make functions with x,y,z and t, t being time, and then calculate the force towards x,y,z axis. Basically, submit the force as a function of time in the three directions to the simulator.

UNISEC Participant: *Can the professor name some software for simulation?*

Prof. Shinichi Nakasuka: So, I have not decided which software to use. But maybe this can be done even with Excel or make a C simulator by ourselves which can accommodate your software. So, either C software or Excel.

2 Presentation on "Space for a Better Earth – How Space Innovation Drives our Sustainable Future"

Satoru Kurosu, Cross Space & Sustainability, LLC

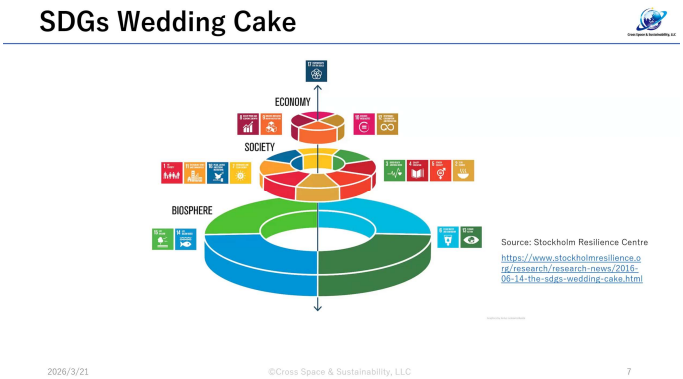
Satoru Kurosu is the Founder of Space Business Development Office, Yokogawa Electric Corporation where he has contributed for the past 40 years. He is also the advisory board member of UNISEC-Global and a supporter of CROSS U (Open Innovation Platform for The Space Business). He is currently the CEO Of Cross Space and Sustainability, LLC, and Director of Japan Marketing Academy. He recently authored a book, titled "Research and Intellectual Property Strategies for Winning as a Latecomer: How to Explain and Persuade Management," published by the Japan Technical Information Association. He was responsible for a chapter on, "Approaches and Success Stories of Companies Entering the Market as Latecomers," specifically section 6, "Entry into and Future Outlook of Space related Business Utilizing Our Own Technology."

Pictured: Mr. Kurosu during his presentation

Highlights:

- Dr. James Hansen, a former director of NASA's Goddard Institute for Space Studies
- Research on Venus showed that the planet once had water
- Became extremely hot due to CO2 driven greenhouse effect
- He warned that a similar mechanism could drive global warming on Earth
- An American writer, Mr. Frank White, wrote a book called "The Overview Effect"
    - After interviewing more than 50 astronauts
    - He says these astronauts say almost the same thing about earth
    - One that Earth is beautiful
    - And that the atmosphere of Earth looks very thin

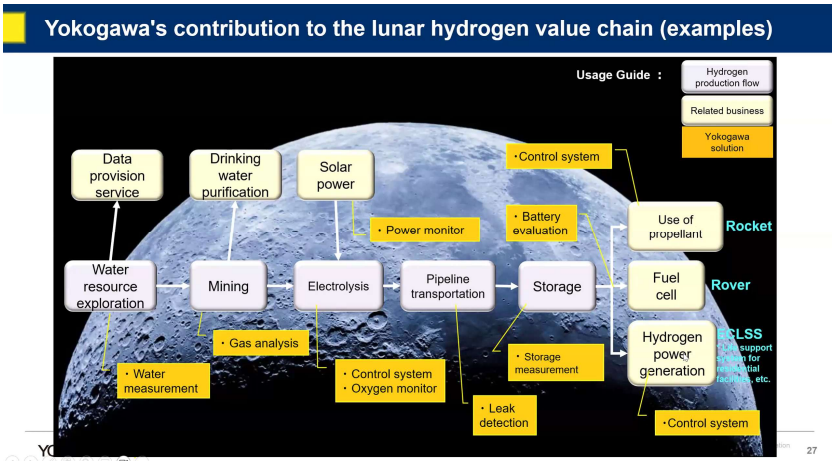
        - The fact that almost 8 billion people and a bunch of animals live here
        - We need to protect the environments with this thin atmosphere
        - This is what almost all astronauts feel after seeing earth from outer space
- This shows the value of space
- Space has extreme environment, microgravity, high vacuum, extreme low temperatures
        - And so, on which is hard to obtain in Earth
    - Limit breakthrough
        - Using this new perspective, we can create new solutions
        - Without assuming common sense of Earth
- So, should go out to space and bring the benefits back to Earth
- Some examples of how Yokogawa is doing these are as follows
- Remote Sensing
    - Yokogawa is working with other companies to create a solution
    - **Using satellite and ground sensor data**
    - They also work with a mining company in America and satellite company for monitoring
    - Mines create a toxic waste which is kept in a tearing dam
    - This dam can break and damage nearby human life
    - **So, using outer space satellite monitoring Yokogawa is finding a solution for this**
    - Yokogawa is a process automation company
    - They have a lot of sensors and are good in data handling from ground
    - Recently for water leak detection in Thailand
    - Yokogawa by combining sensing data on the ground with satellite data,
    - And AI analysis leak locations can be estimated
    - This is still under development working together with JAXA
- Microgravity experiments in ISS
    - Yokogawa supplied confocal scanner to ISS Kibo module
    - This scanner is integrated to the COSMIC
    - COSMIC is Confocal space microscope
    - This scanner creates a 3D image of a cell without damaging the cell
    - It is useful for various experiments like
        - Space Organogenesis experiment
            - Developing a technology for three-dimensional organs using iPS cells
            - On ground due to gravity this would be very challenging
        - Cell Gravisensing experiment
            - Clarify the mechanism by which cells are sensitive to gravity
            - And lead to muscular atrophy and bone loss
- Circular Economy Model in Space
    - Yokogawa is in charge of some mission in the moon
    - Like to develop the control platform for systems
    - Moon can be a unique testbed for developing sustainable technology for us
    - Because there is no nature, no fossil energy, and so on
    - To bring something to the moon, it cost about 1 million dollars per kilo
    - So, one should recycle and reuse as much as possible
    - Hence if a model can be created on the moon, it will be an ideal model to be copied on Earth



Pictured: 17 SDGs categorized into 3 layers

    - To create an environment for humans in space, we need a circulation model
    - That is optimal in Reuse and Recycle

- This model can contribute to solve challenges on Earth
- So, Yokogawa has been working on two things
    - Energy based on hydrogen extraction from lunar water
    - And Ecosystem for circular economy on moon
- Space has new values beyond Earth
- Hence, space enabled solutions can help in achieving the SDGs



Pictured: Yokogawa-san's reuse, recycle plan

Q&A Session:

UNISEC Participant: *How do you see the modular satellites in the sense of sustainability or circular economy?*

Mr. Satoru Kurosu: So, you mean life extension of satellite in orbit. Yeah, one of the studies we have been doing is utilizing lunar propellent production on the moon. There are several factors considered here one being mobility on the moon, but we are thinking to refill the satellite from the moon itself. So, we can extend the life of satellites, this study is undergoing.

UNISEC Participant: *Have you thought about what to do with packaging and boxes for all the equipment you will be bringing? And humans will generate disposable material. So, any plan to be considered for how to handle that?*

Mr. Satoru Kurosu: Yeah, depending on the mission duration, it's very costly to bring everything to the moon. So, we need to recycle everything we bring to the moon, and this type of study is ongoing. Packing material in a compact manner is possible but again, duration is short and everything we bring from earth make sense to have efficient packing.

UNISEC Participant: *Have you calculated how many resources are required in order to create the self-sustaining lunar stations? And what is required for them to achieve net zero resource utilization?*

Mr. Satoru Kurosu: Yeah, we haven't calculated exactly, but I saw the number like 1 month or 1 and half month, if this is beyond that, it makes sense to have a circulation and not to bring everything from Earth.

UNISEC Participant: *What are your plans for enhancing 3R machinery for space conditions? And what will be the challenges in doing so?*

Mr. Satoru Kurosu: If I were to talk about the space condition, there are a lot of considerations to be made. We are now talking about a fast infrastructure plant, which is a lunar propellent plant and to make it we need to design products and the control system for the lunar use and changing the paths for radiation proof. This is all the technical requirement but 3R itself is the common technology on Earth. I don't see that we need to change for outer space. But as I said the space environment is harsh and incase of electric products, we need to change a lot of parts for radiation-proof.

UNISEC Participant: *What is the timeline for return of investment you consider in your space circular economy model?*

Mr. Satoru Kurosu: It is very hard to tell. But last year we did a survey on how we can start and present it in a symposium. This study tells us we can have a return of investment within 3 to 5 years. I am talking about the first one and after this is made, we can blow up.

3 Presentation on "UNISEC-Japan's approach to Long Term Sustainability of Outer Space Activities"

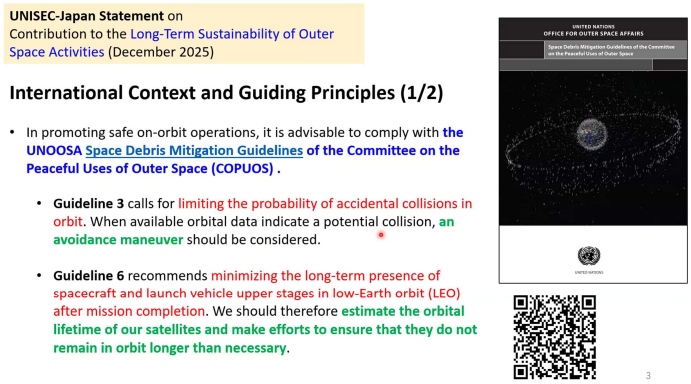
Hiraku Sakamoto, Institute of Science Tokyo

Prof. Hiraku Sakamoto received the B.S. degree in Mechanical Engineering in 1999, the M.S. degree in Aeronautics and Astronautics Engineering from The University of Tokyo, Tokyo, Japan, in 2001, and the Ph.D. degree in Aerospace Engineering Sciences from the University of Colorado Boulder, Boulder, CO, USA, in 2004. Prof. Sakamoto is a professor at the Institute of Science Tokyo, Department of Mechanical and Aerospace Engineering's Structural Dynamics Design Laboratory (SSDL). His research interests include the design and analysis of space-deployable structures and the development of small satellites. Prof. Sakamoto is the Chairperson of University Space Engineering Consortium, Japan and has won several national and international awards for his contribution in space technology.

Pictured: Prof. Sakamoto during his presentation

Highlights:

- The document of UNISEC Japan statement is available, are encouraged to read this document
- Recognizes the growing importance of ensuring the long-term sustainability of outer space activities
- The spatial density of object has become high enough that collisions between space objects
- Could trigger a cascade phenomenon
- In which each collision generates debris that increases the likelihood of further collisions
- Therefore, careful consideration of satellites for long term sustainability is important
- UNOOSA Guidelines for the long-Term Sustainability of Outer Space Activities
    - **Guideline B.1 states:**
    - Promotes providing updated contact information and sharing information on space objects
    - All satellites dev. under UNISEC affiliated programs, registered with United Nations after launch
    - **Guideline B.8 states:**
    - Encourages the trackability of space objects and implementing debris mitigation standards
    - Thereby supporting development of space programs in developing countries
    - By utilizing small satellites in a way that promotes long term sustainability
- UNISEC Japan will to share the outcomes of these four initiatives through its international activities
- Contributing to capacity building within the small satellite community
- Through these concerted efforts, UNISEC Japan aims to contribute to global advancement
- Fostering a culture of responsibility among the next generation of space engineers



Pictured: Some important guidlines from Space Debris Mitigation Guideline document

Q&A Session:

UNISEC Participant: *What does ISO 20991 include?*

Prof. Hiraku Sakamoto: So, it includes the minimum requirement for space mission for small satellites. The document is not specifically only about debris mitigation, but satellite requirements itself include some capability of debris mitigation.

UNISEC Participant: *Would you like to elaborate more on space safety engineering and the relationship with sustainability?*

Prof. Hiraku Sakamoto: Sustainability is about debris mitigation. In order to reduce the number of debris, when we build the satellite and operate a satellite, we have to consider about the space safety engineering.

UNISEC Participant: *Do you have interactions with IASS, the International Association of Space Safety?*

Prof. Hiraku Sakamoto: I have not. Kawashima-san or Yasuda-san?
Ms. Rei Kawashima: We do not have any relationship or interaction with IASS yet

UNISEC Participant: *What are your main technological challenges for long term sustainability?*

Prof. Hiraku Sakamoto: Advancing the technology, we can contribute long term sustainability, at least we do not make it worse. But right now, UNISEC satellites usually do not have post mission disposable capability, nor collision avoidance maneuver. So, as we talked about the PMD and CMD capability is the kind of technological challenge.

4 Announcement and Acknowledgment

Haruka Yasuda, UNISEC-Global

Highlights:

- **The Mission Idea Contest**
  - The 10th Mission Idea Contest Preliminary Workshop
    - **Theme: Orbit Change Without Using a Propulsion System**
    - https://www.spacemic.net/
    - **Important Dates**
    - Abstract Submission due: **June 18, 2026**
    - Notification: **September 3, 2026**
    - Software submission deadline: **End of September**
    - Presentation at PreMIC10: **November 9, 2026**
    - Contact: info@spacemic.net
  - The 9th Mission Idea Contest: to the Moon
    - Recording of final presentation is available
    - MIC9 e-book will be published soon

- **Next Venue Announcement**
  - **The 12th UNISEC-Global Meeting**
    - To be held online
    - To facilitate all POC and students from all local chapters to participate
    - Date: **November 4, 2026**
    - Details will be announced later

  - In person **POC** gathering at Antalya, Turkey in the afternoon
  - **October 4, 2026,** in conjunction with IAC (T.B.D)

  - **15th Nano Satellite Symposium to be held at Tainan, Taiwan**
    - November 9 – 11, 2026, with
    - PreMIC10 (Nov 9)
    - 2nd IoT Workshop (Nov 8)
    - 3rd Deep Space Workshop (Nov 8)

- **Nano-satellite IoT Constellation Program**
  - A new program launched by UNISEC-Global
  - Jointly design satellite bus (3-6U) with online guidance
  - Each satellite will be developed by each country with its own funding
  - Can also jointly search for international funds
  - All the satellites have the **same mission payload** to contribute to solving global problems
  - Or local problems as a constellation
  - Each country can have **one specific mission payload** for its own interest
  - Web: https://unisec-global.org/iot.html
  - **Next Step: Experiment IoT Transmission to ArkEdge Satellite**
  - For enquiry about experiment contact: iot-support@unisec-global.org
  - Contact: iot@unisec-global.org

- **CLTP15 (CanSat/ CubeSat Leader Training Program)**
  - Completed: August 18 – 28, 2026
  - Venue: Nihon University, Chiba, Japan
  - CLTP15 website: https://cltp.info/cltp15.html
  - Application deadline: April 22, 2026
  - Contact : secretariat@cltp.info

- **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
  - Website: http://unisec.jp/serviceen/j-cube

- **Next Virtual Meeting**
  - Date: April 18, 2026
  - Theme: T.B.D
  - Host: UNISEC-Global

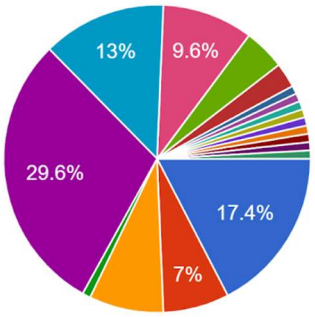
5 Participant Statistics

115 registered participants from **35** countries and regions for the 66th Virtual UNISEC-Global Meeting.

Country/Region	Registrants	Country/Region	Registrants
Argentina	1	Nepal	1
Australia	1	Netherlands	1
Belarus	1	Nigeria	25
Bulgaria	3	Paraguay	2
Burkina Faso	2	Peru	1
Burundi	1	Philippines	7
Canada	2	Rwanda	2
Chile	2	Taiwan	8
Colombia	3	Tanzania	2
Dominican Republic	1	Turkey	1
Egypt	5	Uganda	1
France	1	United Kingdom	4
Germany	1	Uruguay	1
India	11	USA	1
Iraq	1	Namibia	1
Japan	13	Mauritania	1
Jordan	2	Mexico	1
Kenya	4		

Student or professional?

115 responses

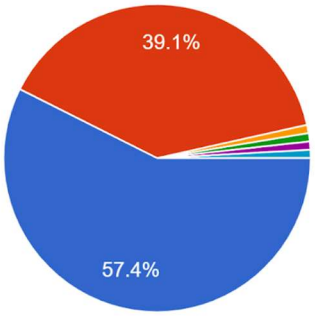


- Student（undergraduate)
- Student (master)
- Student (PhD candidate)
- Student (other)
- Professional (university)
- Professional (government, space age…
- Professional (private company)
- Professional (NGO)

1/3

Have you studied space sustainability before?

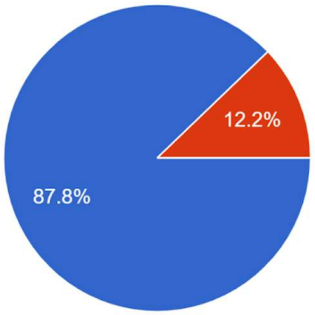
115 responses



- Yes
- No
- No, but I have participated in activities involving Space Education
- Partially
- I conducted some research on it, and I would like to go further
- Have looked into the importance of deorbiting not in use satellites to prevent clogging up of satellite space, particul…

Have you participated in the UNISEC-Global Meeting previously?

115 responses



- Yes
- No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Thank you