Kibo Robot Programming Challenge - UNOOSA/JAXA Education Programs on the ISS “Kibo”

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What is Kibo?

Japanese Experiment Module “Kibo”
(meaning “hope” in Japanese)
KiboCUBE : Program based on the United Nations/Japan collaboration on 1U CubeSat Deployment from the International Space Station (ISS) Japanese Experiment Module “Kibo”.

https://www.unoosa.org/oosa/en/ourwork/access2space4all/KiboCUBE/KiboCUBE_Index.html

KiboCUBE in partnership with Japan Aerospace Exploration Agency provides the opportunity to develop a cube satellite (CubeSat) and have it deployed from the International Space Station Japanese module “Kibo”.

KiboCUBE enables access to space promoting the sustainability of future space activities.
Design and develop a 1U size CubeSat. Go through safety reviews and testing.

Bring it to JAXA.

**CubeSat deployment mission using J-SSOD**

1. The satellite install case which installs CubeSats is stowed in a soft-cushion bag for shipping. The satellite install case is launched by a cargo transfer vehicle to ISS.

2. The satellite install case is installed on the MPEP by the crew member in Japanese Experiment Module "Kibo", and then transferred from the airlock to the outside.

3. The robotic arm of "Kibo" holds the MPEP to transfer it to the release point. The satellites are deployed by a command signal sent from ground.
Background

• Japan-U.S. Open Platform Partnership Programs (JP-US OP3)
  • On December 22, 2015, the Japanese and U.S. governments agreed on a new cooperation framework for the ISS Program.
    • Japan decided to extend its participation in the ISS operations until 2024.
    • An outline of JP-US OP3 is as follows:

1. Promotion of mutual use of experiment facilities
2. Increased cooperation in the Asia-Pacific region
3. Promotion of new uses for the ISS: technology demonstration, and use of HTV and HTV-X
4. Promotion of use of effective and efficient space-related technologies

Background

• About the Kibo Robot Programming Challenge
  • The Kibo Robot Programming Challenge is an educational program.
    • Students solve various problems by programming free-flying robots (Astrobee and Int-Ball) in the International Space Station (ISS).
  • Participants will have the chance to learn cutting-edge methodologies and to hone their skills in science, technology, engineering and mathematics (STEM).
  • Expand international exchange by encouraging students to interact with other participants from around the world.
  • To expand Kibo utilization in the Asia-Pacific region, an educational program for operating robots and computer programming is being offered to students in Japan and the Asia-Pacific region.
Preliminary Round / Final Round

• Preliminary Round
  • Held in each country/region using simulator.
  • Program stability and robustness are important.
  • The winning teams will advance to the Final Round as the representatives of their own countries/regions.

• Final Round
  • Held in the ISS/Kibo module.
  • Finalists’ programs will be installed on Astrobee on-board and run on the day of the Final Round.
4th Kibo-RPC Major Update

• Established the UNOOSA international slot
  • Collaboration between the United Nations Office for Outer Space Affairs (UNOOSA)
  • This allows participation from all over the world.

• Number of participants
  • 30 countries/region have been participating.
    • includes participation from 19 countries through the UNOOSA international slot.
  • A total of over 1,685 students on 421 teams entered.
    • 3rd Kibo-RPC: 1,431 students / 351 teams

With UNOOSA, we were able to expand the participation of this program to 50 teams from 19 countries in Africa, Latin America and the Caribbeans, and Asia Pacific region.
4th Kibo-RPC Participation Results

• Age distribution
  • University students or older: approximately 50%
  • High school students: approximately 36%
  • The youngest was 9 years old.
4th Kibo-RPC Preliminary Round
4th Kibo-RPC Final Round

- Held on Oct 21, 2023
- Hybrid of on-site and on-line
- Finalist teams visited Tsukuba Space Center for the first time after COVID-19.
- 10 teams from Asia Pacific, USA, UNOOSA.

YouTube live streaming
https://www.youtube.com/watch?v=DBKVAojl0GQ
4th Kibo-RPC Workshop

- Held on Oct 21, 2023, right after Final Round.
- Closed meeting with students, JAXA staff, academia, professionals from private company, and a Japanese astronaut.
- Feedback to programming and strategy.
- International communications with participants.
5th Kibo Robot Programming Challenge Schedule (Tentative)

Please join the next Kibo-RPC from UNOOSA international slot!

Kibo-RPC Portal site:
https://jaxa.krpc.jp/ja
All documents will be available.
- Guidebook
- Rulebook
- Tutorial Videos

https://www.unoosa.org/oosa/en/ourwork/access2space4all/Kibo-RPC/Kibo-RPC_Index.html
Thank you