

3rd Kibo Robot Programming Challenge

Kibo-RPC Overview

Kibo on the International Space Station (ISS)



Iss066e081311©NASA

1. **Microgravity**

Gravity about 1/1,000,000 to 1/10,000 of that on Earth

2. **High Vacuum**

Vacuum pressure of 10 billionths of that on Earth

3. **Space Radiation**

Galactic cosmic rays, solar particle rays, particle rays from the Van Allen Belt, and many other cosmic rays.

4. **Wide View for Earth Observation**

Orbiting the Earth in about 90 minutes and fly over various parts of the Earth.

5. **High Solar Energy**

Without the influence of the atmosphere, receives high solar energy.

6. **Closed Environment**

Astronauts live in a closed environment.



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The 3rd Kibo-RPC

Game Story:

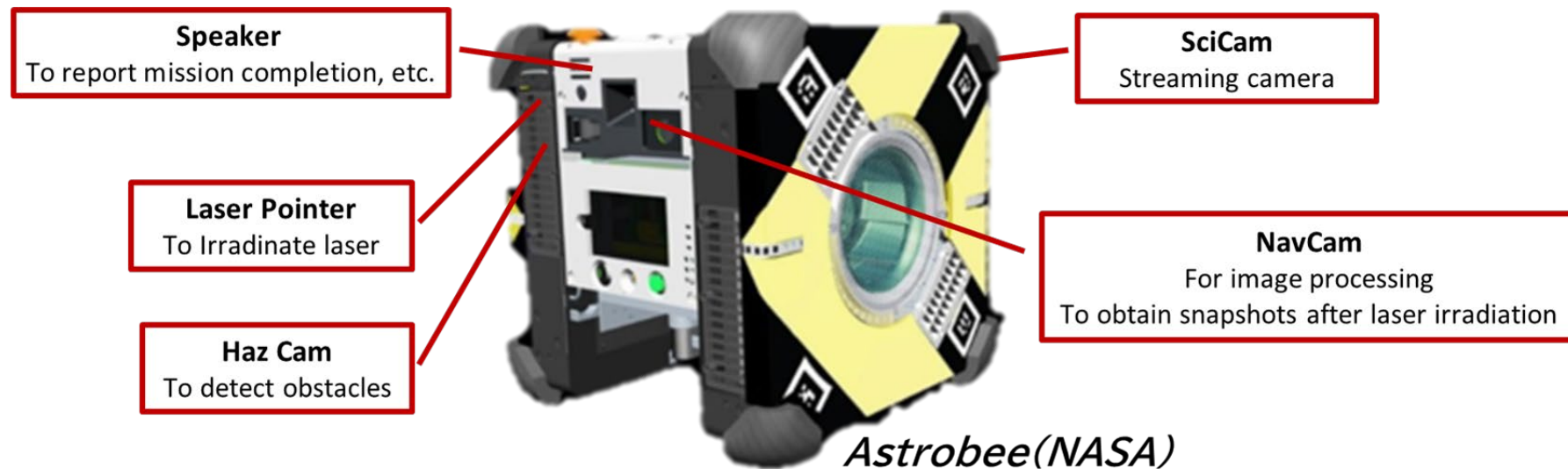
In 2021, a recurring air leak was repaired by talented Asian student programmers.

It seemed that the crisis had been successfully resolved...

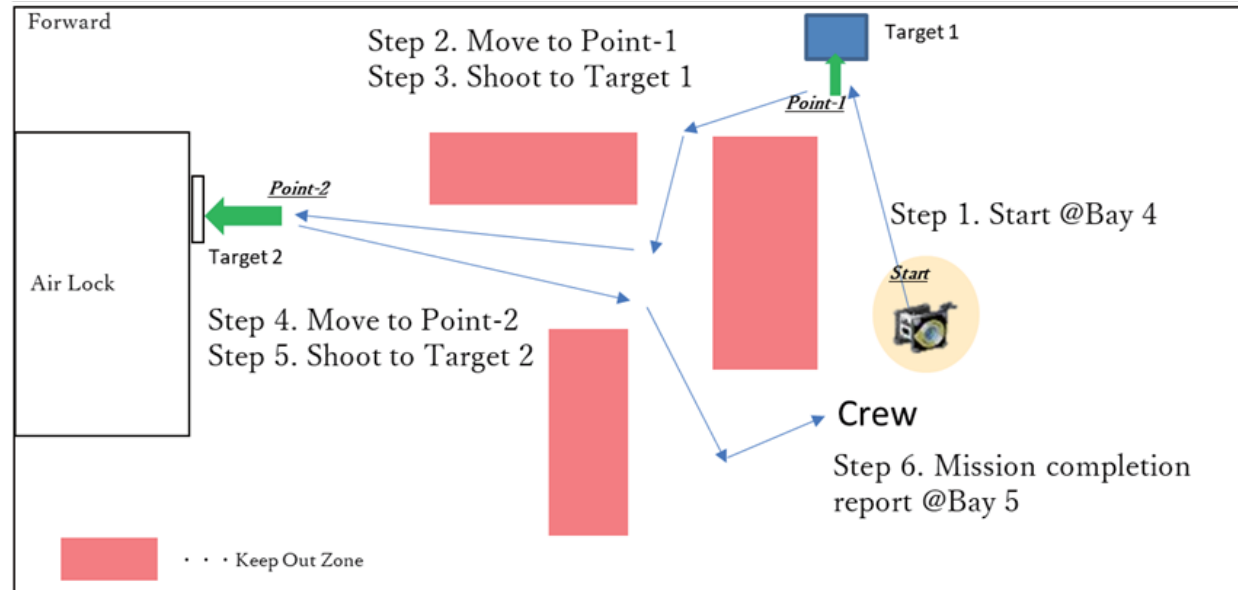
However, due to the recent increase in space debris, the ISS was hit by a group of debris in 2022.

As a result, the air leak repaired in 2021 recurred, and a new sign of air leak was also detected.

Student programmers, save the ISS from these crises!



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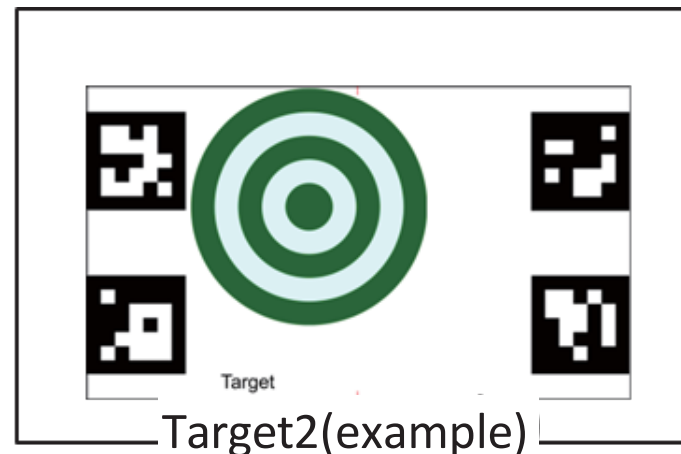
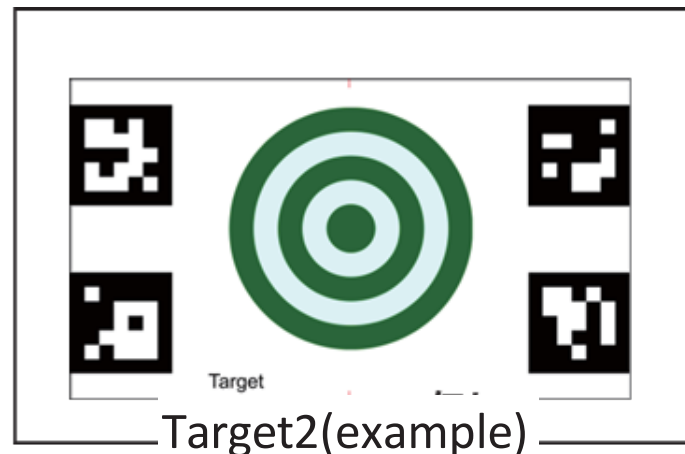
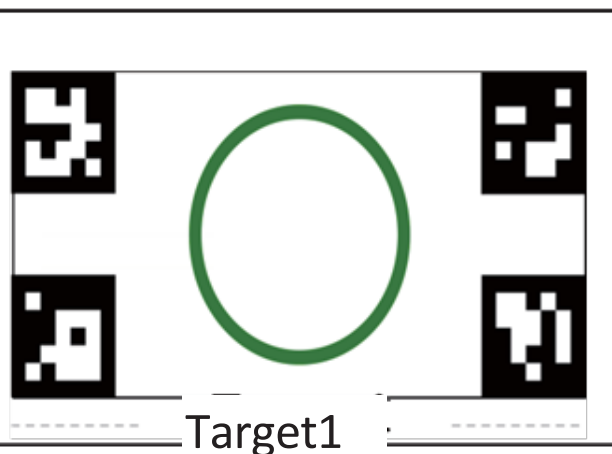


Target (draft)

1. Move Astrobee to Point 1 and illuminate the center of the Target 1 with Astrobee's laser.
2. Move Astrobee to near Point 2 and read AR tags around Target 2.
3. Analyze the position/orientation of the target from information obtained from the AR tags.
4. Adjust Astrobee's position/orientation and illuminate the center of the target with Astrobee's laser.
5. Finally, report completion of the mission to a crew member.

You have only 5 minutes (TBD)!

Your score is calculated based on the accuracy of laser pointing and the elapses time.



Target 2 will randomly change its location in simulator.

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Schedule

Preliminary Rounds will be held between
June 28th and July 12th, 2022.
Check with your country's POC for the date.



Final Round

Around Mid to End of
September 2022

Preliminary Round

Program Development

A program for the Preliminary
Round must be submitted by
June 27th, 2022.

Registration

Due: May 16th, 2022 11:59pm
(your local time)

Receive ID and Password

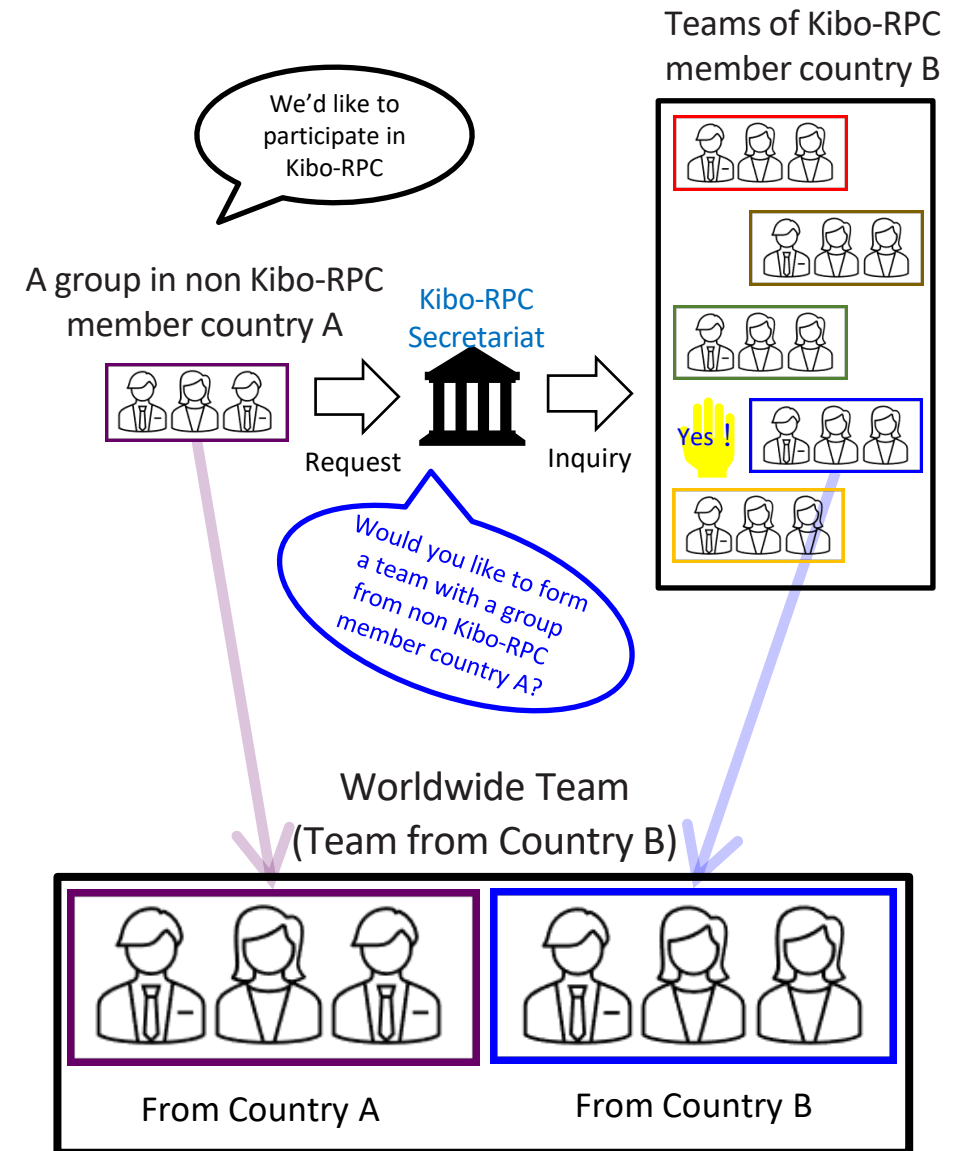
Note: The schedule may change due to unexpected reasons.

3rd Kibo Robot Programming Challenge

Worldwide Teams

1. What is a Worldwide Team?

When a group of students from a non Kibo-RPC member countries wishes to enter the Kibo-RPC, the Secretariat will mediate so that a worldwide team, or a joint team with a team from a Kibo-RPC member country, is formed. If the worldwide team wins the Preliminary Round in a Kibo-RPC member country, they will represent this Kibo-RPC member country in the Final Round.



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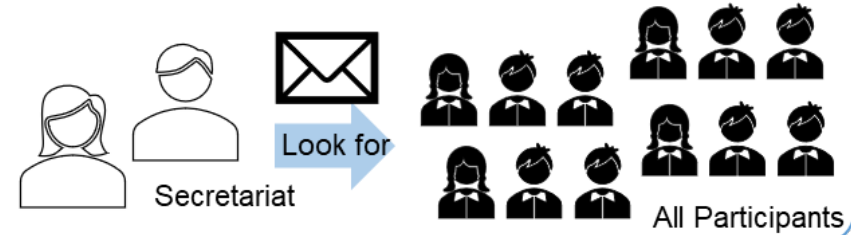
1. Apply

A team from non-Kibo-RPC country/region (Team α) apply for Kibo-RPC from non-Kibo-RPC member form.



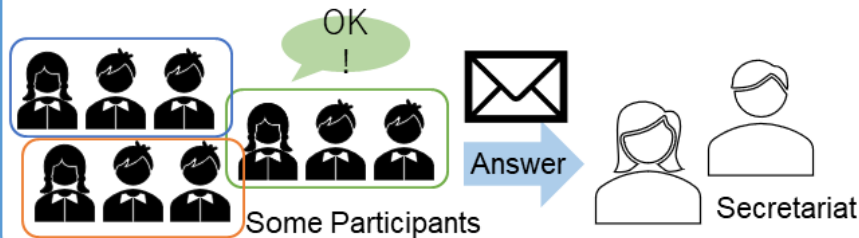
2. Look for teams by Secretariat

Secretariat look for teams which kindly welcome non-Kibo-RPC team.



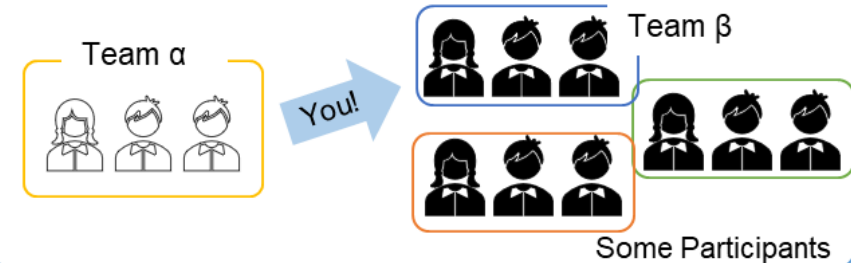
3. Answer from some teams

Some teams which can welcome them e-mail to Secretariat.



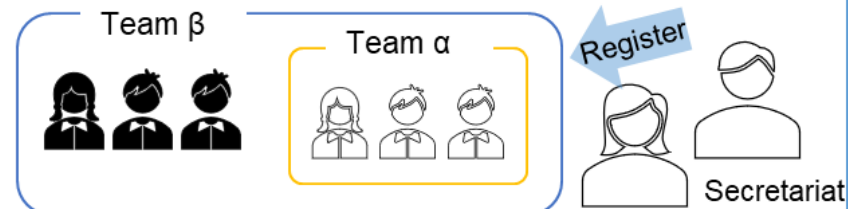
4. Select a team

Team α select a team which Team α want to join.



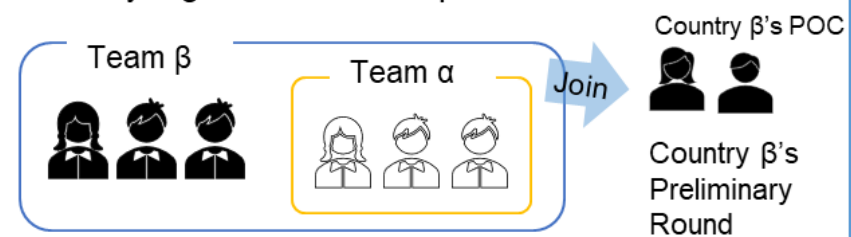
5. Matching is successful!

Team α join a team from Kibo-RPC country/region. Secretariat register them as a new team.



6. Participate Preliminary Round

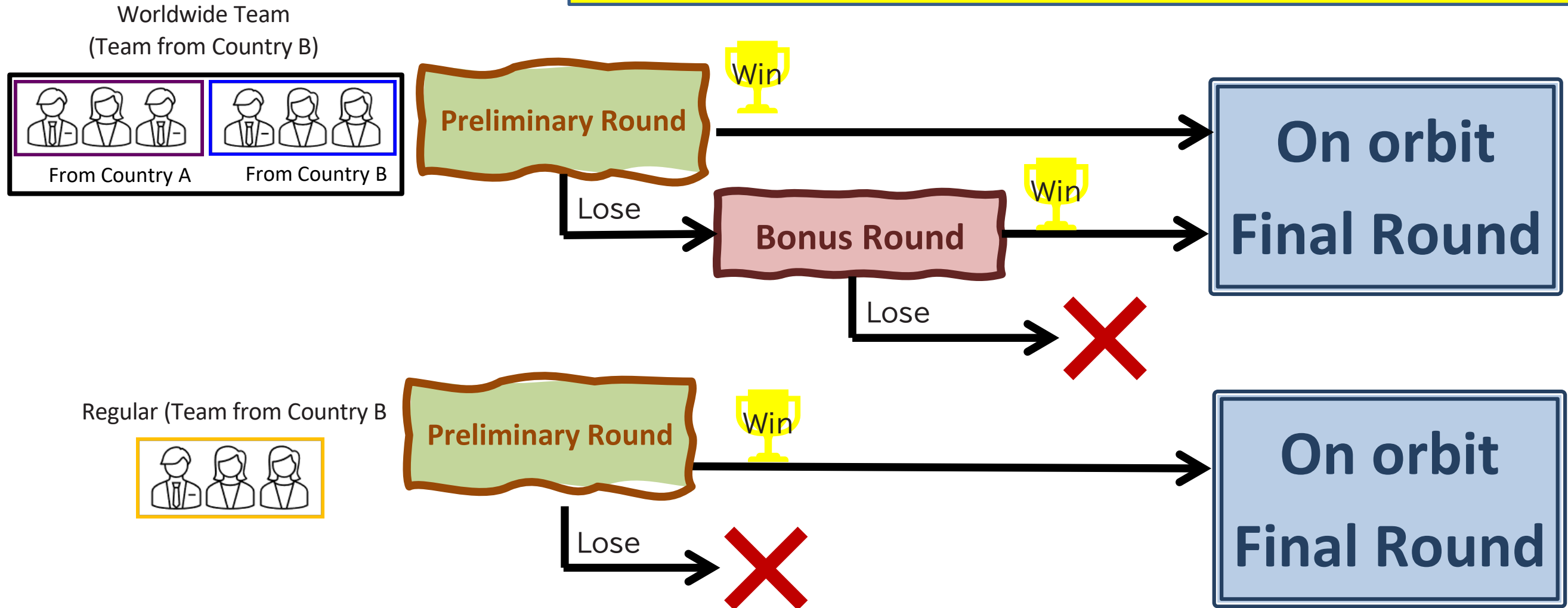
Team α take part in the Preliminary Round in country/region which Team β is involved in.



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Worldwide Teams

Double Chance for the Final Round!

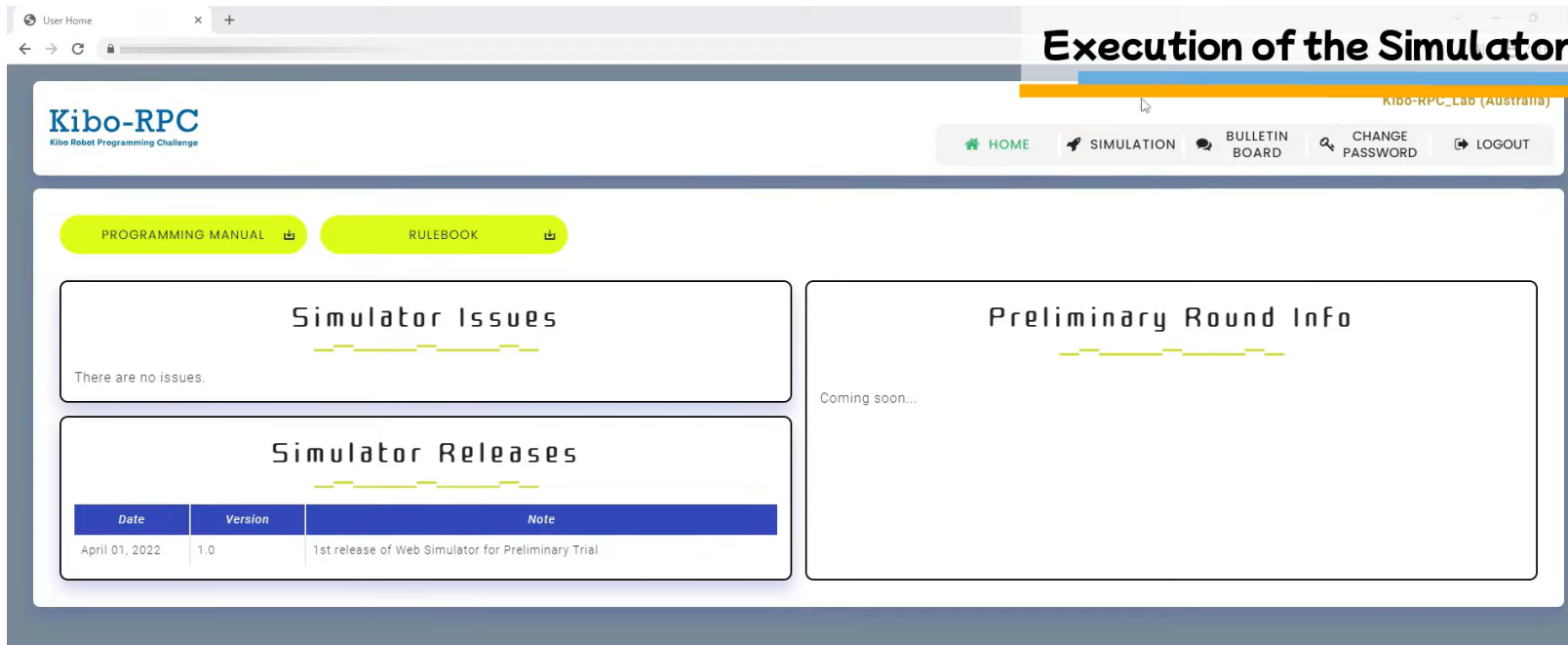


3rd Kibo Robot Programming Challenge

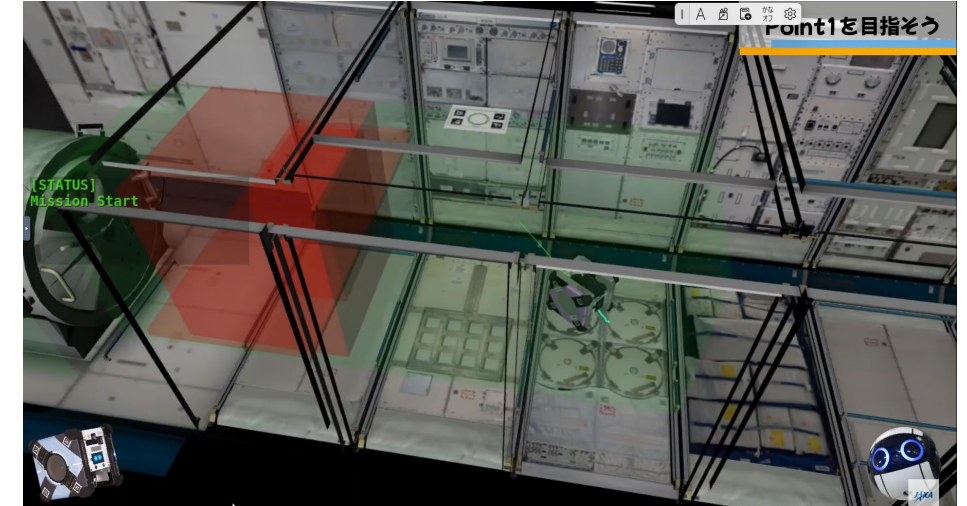
What is a Simulator ?

Released on April 5th, 2022!!

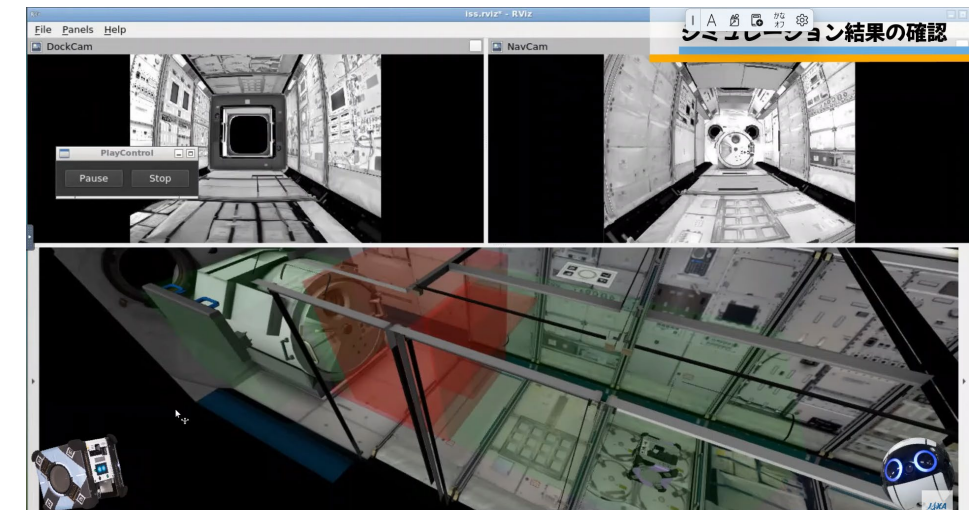
You can simulate how the APK you build will move the Astrobee in Kibo.



Once you create your account,
you can access the simulator.



Upload the APK you build and execute!!



Images taken by the DockCam and the NavCam can be simulated.

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Final Round

Date: Around Mid or End of September 2022.

Venue: Tsukuba Space Center(TKSC)

2nd Kibo-RPC Final Round Event

Event Agenda
Opening Speeches/Rules Explanation
Introduction of Participating Teams/Viewing of On-orbit Runs of All Teams
Announcement of the results/Award Ceremony and the Winning Team Interview
Social Event

※The event was streamed on YouTube.

Search “2nd Kibo-RPC Final Round YouTube”!

<https://www.youtube.com/watch?v=eDXf1ISUBmA&t=424s>



3rd Kibo Robot Programming Challenge

FAQ

Q1:Can I make a good program even if I am a beginner?

A1:Yes, you can. In the past, there were many participants who were new to programming itself and never used the Java language. You may ask your questions to participants from all over the world by using the participant bulletin board.

Q2:You recommend java, what kind of programming did you use in the last competition?

A2:The design of Astrobees requires that programs to be developed in Java language only.

Q3:What kind of program should I focus on (image processing, actuator control, etc.)?

A3:The program to be created is mainly for trajectory planning (3D coordinate and attitude calculation) and image processing. No control of the actuator system is required.