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A UNIQUE EDUCATIONAL PROGRAM USING A ROBOT IN ORBIT WITH INTERNATIONAL COOPERATION: KIBO ROBOT PROGRAMMING CHALLENGE

Abstract

The Kibo Robot Programming Challenge (Kibo-RPC) is a unique educational competition in which students solve various problems by programming the free-flying robots (NASA's Astrobee and JAXA's Int-Ball) in the International Space Station (ISS). It also allows any students in Asia who are interested in this competition to participate without any age requirements. JAXA hosts this program in cooperation with NASA. In the past two years, the participating countries has increased from 7 to 11 countries and territories from Asia/Pacific region. Participants of this program will have the chance to learn cutting-edge methodologies and hone their skills in science, technology, engineering, mathematics (STEM), teamwork, creativity, and will learn to develop innovative minds through this unique program. It is designed to provide opportunities for bright students to work with professional scientists and engineers; aiming to inspire and encourage students to develop their own educational and professional goals to a higher level. Since this program is open to students who can access the internet and PC, it also contributes to the 4th goal of SDGs - Quality Education. One of the attractions of this program is that students have the opportunity to build codes on moving Astrobee dynamically in orbit. Students are required to create a code using Android package (APK) to move Astrobee in a simulated environment to compete in the Preliminary Round in their own countries. The selected winning teams will then compete in the Final Round to move Astrobee in the real environment in orbit using the same APK. This program allows students in any age range to participate. The youngest student who enrolled in this program was 9 years old, and the oldest student was 28. The top bell curve for the participants' age range is 14 – 16 years old. The winning teams in both 1st and 2nd Kibo-RPC are in this age range. Despite the many unexpected problems that happened on both student programs and organizer sides, such as simulation program problems, programming skill problems, Astrobee sound system issues, etc., all groups involved learned many valuable lessons. The winning team displayed impressive intellectual ability: even though they had never previously learned to code in Java they still managed to win the competition, impressively by learning the coding language on-the-fly. Because of its rewarding educational effects, JAXA extends its participants worldwide, and NASA has announced to join the 3rd Kibo-RPC in 2022.