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DEVELOPMENT STATUS OF THE REX-J MISSION, ASTRONAUT SUPPORT ROBOT
EXPERIMENT ON THE ISS/JEM

Abstract

Extension of the operational life of the International Space Station is now decided. However most of the ISS's partners are asked from their governments to lower the operation cost while maintaining the value of the missions on the ISS. There are many tasks to be done on the space station. However, in order to improve the value of the space station per the operation cost, Space robots which will support or work instead of astronauts will be required. In the near future, construction of the solar power satellite whose size will be as large as a few km by a few km will begin. This must be tasks of robots.

Currently there are several types of robots on the International Space Station. Those are suitable to handle the massive payload such as the space station's module. However those robot arms are not suitable to handle equipments and tools which are designed to be operated by astronaut. Therefore JAXA is developing the astronaut support robot named astrobot (Astronaut + Robot) and its precursor named REX-J which is an acronym of the Robot Experiments on the ISS/JEM. Mission of the REX-J is to demonstrate some key technologies which are essential to develop the astronaut support robots. The key technologies are;

(1) Manipulation capability such as handling equipments and tools to repair the malfunctioned equipments, and the robotics capability to prepare works to be conducted on the ISS. (2) Locomotion capability. To work with or instead of an astronaut, the robot needs to be able to moves around / inside the space facility, e.g. a space station and need to conduct tasks like an astronaut. The Astrobot and REX-J's locomotion capability is realized by an extendable robot arm and tethers. Tethers will be anchored to a handrail or other suitable anchoring points using an extendable robot arm. This unique mechanism of the proposed robot makes it possible to realize the robot in a small volume while the robot can move around the wide area.

In order to demonstrate usefulness of this unique robot, an onboard experiment on the exposed facility of the International Space Station Japanese Experiment Module, "KIBO" will be conducted in the year 2012. Development of the experiment system is progressing now. At the conference, development status and experiment plan of the REX-J will be presented.