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ASTROBOT, AN ASTRONAUT SUPPORT ROBOT, ITS CONCEPT AND DEMONSTRATION PLAN
ON THE INTERNATIONAL SPACE STATION

Abstract

JAXA is to conduct a space robot experiment named REXJ (Robot Experiment on JEM of the International Space Station). Aim of the experiment is to demonstrate technologies needed to realize a new type of space robot named Astrobot (Astronaut + Robot). The Astrobots will conduct tasks of astronauts to reduce workload of astronauts or to prevent astronauts from conducting dangerous tasks.

Astrobot needs some additional technologies beside technologies realized by the existing space robot systems such as the manipulator systems on the space station. The traditional orbital manipulators are mostly crane type systems that can handle massive payload in the weightless orbital environment. On the other hand, the Astrobot has to move around / inside the space station and handle much smaller equipment and tools that astronauts have to handle.

REXJ mission is planned to demonstrate the dexterous manipulation and space traversing capabilities needed to realize the Astrobot. For the traversing system of the Astrobot, tethers and an extendable robotic arm will be used. Tethers are installed inside the robot's body and will be pulled out by the extendable robot arm. Then the tethers will be attached to the handrails using hooks. Hand rails are attached inside and outside the space station to be used by astronauts to support their body. If proper numbers of tethers (mostly more than four) are attached to the handrails, lengths of each tether are controlled to traverse the robot. A similar experiment named Charlotte was conducted on the space shuttle in 1995. A major difference is that the REXJ can travel by itself since it can locate tethers by itself while the Charlotte needed astronauts' help to locate tethers.

The REXJ mission will be conducted in the year 2012 on the exposed facility of the Japanese experiment module of the international space station. Development of the onboard experiment system is in progress now. Details of the experiment system and the experiment plan will be introduced at the conference.