NASA Outlines Big Plans for Humanoid Robot (w/ Video)

April 29 2010, by Dauna Coulter

R2 pumps iron.

Astronauts on board the International Space Station will soon have a new roommate--and it's not human. It's a *humanoid*.

In Sept. 2010, space shuttle Discovery will deliver Robonaut 2--"R2" for short--to the ISS, where it will become the first humanoid robot to travel and work in space. Developed jointly by NASA and General Motors, R2 looks a bit like C-3PO of Star Wars fame but lacks the chatty robot's gift of gab. That's okay, because the humans on board need a worker that can wield more useful tools than a sharp tongue.

"Our goal is for R2 to perform routine maintenance tasks, freeing up the

station crew for more important work," explains Ron Diftler, Robonaut Project Manager at Johnson Space Center. "Here's a robot that can see the objects it's going after, feel the environment, and adjust to it as needed. That's pretty human. It opens up endless possibilities!"

The team hopes to teach R2 to do all kinds of things on the space station. For example, R2 might do delicate tasks like set up science experiments for the crew, or it might just as easily run a vacuum cleaner.

R2 won't be given free run of the ship, at least not right away. Initially, the new robot will be fastened to one location in the station's Destiny Lab, but the goal is for R2 to later move about.

"We want to give R2 one leg to grab on and anchor itself to different places. It will use its hands to move itself around from place to place inside the station much like an astronaut moves around."

First, R2 must be tested and evaluated for zero-g and other space environment effects. Then it will slowly earn its stripes by progressing from simple tasks, like monitoring its own health, to more complicated jobs.

The ground team and the ISS crew will control the robot with identical systems, each comprising a GUI (graphical user interface) on a computer screen and pushbutton navigation.

"R2 operates under 'supervised autonomy,' " says Diftler."It can think for itself within the limits we give it. We'll send it scripts - sequences of commands."

That's how, for example, the Mars rovers Spirit and Opportunity are controlled. But there's a difference.

"Our robot can 'see,' and it takes only 2 to 6 seconds for the video to get to us, so we can observe in near real time. (For comparison, the one-way video travel time from Mars is typically more than 10 minutes.) If we see R2 doing something that isn't working, we can immediately tell it, 'Stop that. Try this instead.'"

Diftler likens working with R2 to supervising a new employee. "At first you'd give them lots of detailed instructions, but later, once you work out any problem areas, you'd just check in on them once in a while."

His team will continue, however, to improve the space-bound robot's opportunities for advancement. "For instance, as we develop this robot more fully, its vision system will allow us to fine tune its movements. We'll be able to adjust how R2 reaches out to grab a target."

With the simple addition of legs or wheels, R2 could someday scout an area on a planet or asteroid where humans might land, or it could set up and take down workstations or a habitat.

Eventually, R2 could become such a familiar member of the crew, astronauts will find themselves saying "excuse me" when they bump into the humanoid. But how will R2 respond?

Adding speech is relatively easy, according to Diftler, but not a priority at the moment. "R2 will be working alone a lot. It won't really need to talk."

C-3PO once called R2D2 an "overweight glob of grease." Maybe it's just fine to leave this robot speechless for now.

Provided by Science@NASA, by Dauna Coulter