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# NASA seeks robotic rescuers to give Hubble extra lease of life

**Tony Reichhardt, Washington**

NASA is seeking to damp a firestorm over its decision to stop astronaut servicing of the Hubble Space Telescope by lining up ideas for robots that could do the job.

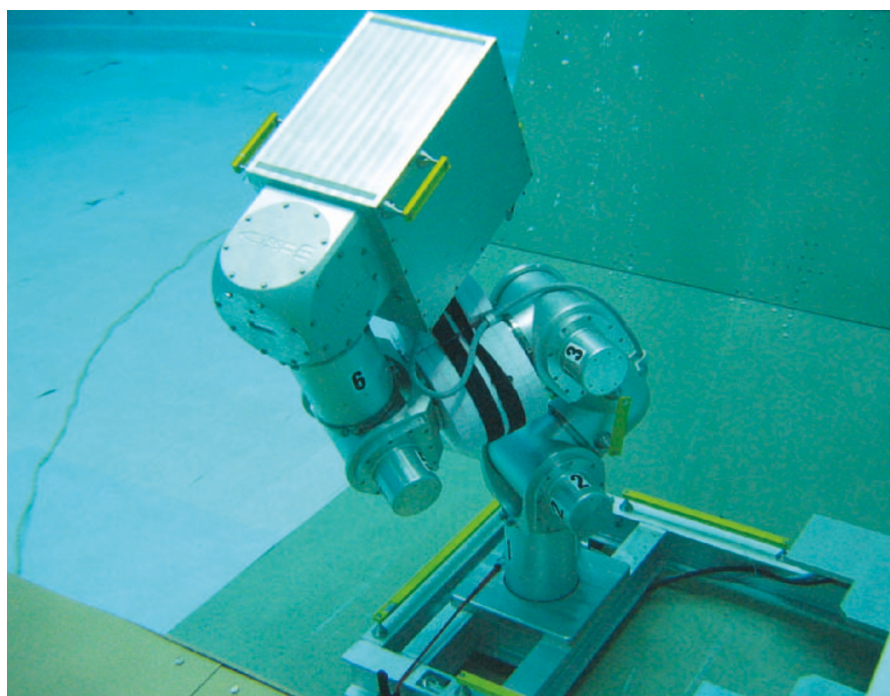
Dozens of teams from industry bodies and academic institutions have responded to an agency request for schemes to use a robotic spacecraft to replace the telescope's batteries and gyroscopes and install two new science instruments.

These were traditionally jobs for astronauts. But NASA science chief Ed Weiler told the National Academies of Sciences' Space Studies Board last week that "it's not a big leap of faith" to imagine that an automated mission could extend the Hubble's working life. A robot could change the telescope's batteries, which are expected to run out of power around 2007.

The deadline for submitting ideas was 22 March. NASA has not yet issued a formal request for bids on such a mission, but Hubble programme executive Michael Moore told the board: "We're actually getting ideas from folks who can do things."

The academy is also forming a committee to study how to service the telescope and extend its life. NASA administrator Sean O'Keefe has vowed not to send astronauts back to Hubble owing to safety concerns with the space shuttle — although critics charge that budgetary and political considerations have also swayed the decision. Shuttle crews have upgraded the telescope four times since its 1990 launch.

Among the teams proposing a robotic mission is one from Lockheed Martin, which built Hubble. At least three systems in development could do the job, says Bruce McCandless, a former astronaut who helped design the procedures for servicing the telescope and is now chief scientist for reusable space transportation systems at Lockheed Martin in Denver. One is made by Canadian company MD Robotics of Brampton, Ontario, which also made the robot arms on the space shuttle and space station. Another is the anthropomorphic Robonaut under study at NASA's Johnson Space Center in Houston. The third is being built by the Uni-



Helping hand? The University of Maryland's robotic arm is one contender for a Hubble mission.

versity of Maryland's Space Systems Laboratory in College Park, a partner in the Lockheed Martin proposal.

The Maryland system, which includes robotic arms bearing tools like those used by astronauts, has been tested in the laboratory and in underwater tanks to simulate weightlessness. It was intended for a shuttle test flight this year, but NASA cut the test's funding when the space station hit financial trouble several years ago. "I've got pieces for 70% of a flight robot locked up in my lab right now," says David Akin, who leads the Maryland project.

Using robots with astronauts on a Hubble repair would not be a big technical stretch, Akin and McCandless say. Having a robot do the whole job is more ambitious and would take longer, says Akin, but is still within reach. And NASA could decide to scrap the more challenging tasks, such as adding new instruments.

Another team, led by SkyCorp of Huntsville, Alabama, has suggested sending up a

robot mission to attach a low-thrust rocket to Hubble and bring it down to the International Space Station for servicing by astronauts. But Steven Beckwith, head of the Space Telescope Science Institute in Baltimore, told the Space Studies Board he was concerned about the technical readiness of any robotic servicing option, and preferred an astronaut mission. Dennis Wingo of SkyCorp believes this may no longer be an option, however. "The administrator has dug in his heels. So what we have is a compromise position between dropping Hubble in the ocean and risking another seven astronauts."

Weiler estimated that building the service robot would cost less than \$300 million, and said that even with a rocket launch and other technology development thrown in, robotic servicing would still be cheaper than a shuttle mission. That may make it the perfect way out of O'Keefe's dilemma — it might be riskier for the telescope, but not for the astronauts. ■