

Engineers design spider-like robot that may be used to explore caves on Mars

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Close-up photos of ReachBot. Credit: BDML Stanford University

A team of roboticists and mechanical and aeronautical engineers at Stanford University has developed a spider-like robot for possible use in exploring caves or lava tubes on Mars. In their paper [published](#) in the journal *Science Robotics*, the group describes their reasons for developing the new robot, their inspiration for the design, and how well it worked when tested in a real-world environment.

As space scientists develop robots for use as exploratory agents on the surface of other planets or moons, they have typically used two types of designs: small rovers or walkers that can squeeze through tight spaces or larger machines that can roll around on the surface. In this new effort, the research team sought to fill in what they see as a gap in the technology—a mid-sized robot that can explore areas that would be difficult for other types of robots to access—caves, for example, or lava tubes.

To build the robot, the team was inspired by the harvestmen spider, commonly referred to as a daddy longlegs. They noted its ability to move across a wide variety of terrain with relative ease, including cave walls.

The team calls their robot ReachBot. Like its inspiration, it has several extendable, boom-like legs it can use for walking. To allow it to hold onto rock walls, the team designed three-finger grippers as feet. They also gave it the ability to explore on its own by adding a processor that looks at potential terrain and maps out good areas to place its feet—such sites need to be slightly rounded to allow for leverage gripping.



Field testing photos of ReachBot in a lava tube in the Mojave Desert. Credit: BDML Stanford University

In testing, the robot could walk up walls and even climb across ceilings. Further testing showed that it was capable of exploring [lava tubes](#) in the vicinity of the Pisgah crater in the Mojave Desert.

The research team concludes that their concept idea is sound and that a wide variety of similar robots could prove useful in developing new kinds of probes for exploring other planets such as Mars. The robot could allow for study of places no other kind of [robot](#) could reach, perhaps finding evidence of earlier habitation.

More information: Tony G. Chen et al, Locomotion as manipulation with ReachBot, *Science Robotics* (2024). [DOI: 10.1126/scirobotics.adi9762](https://doi.org/10.1126/scirobotics.adi9762)

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