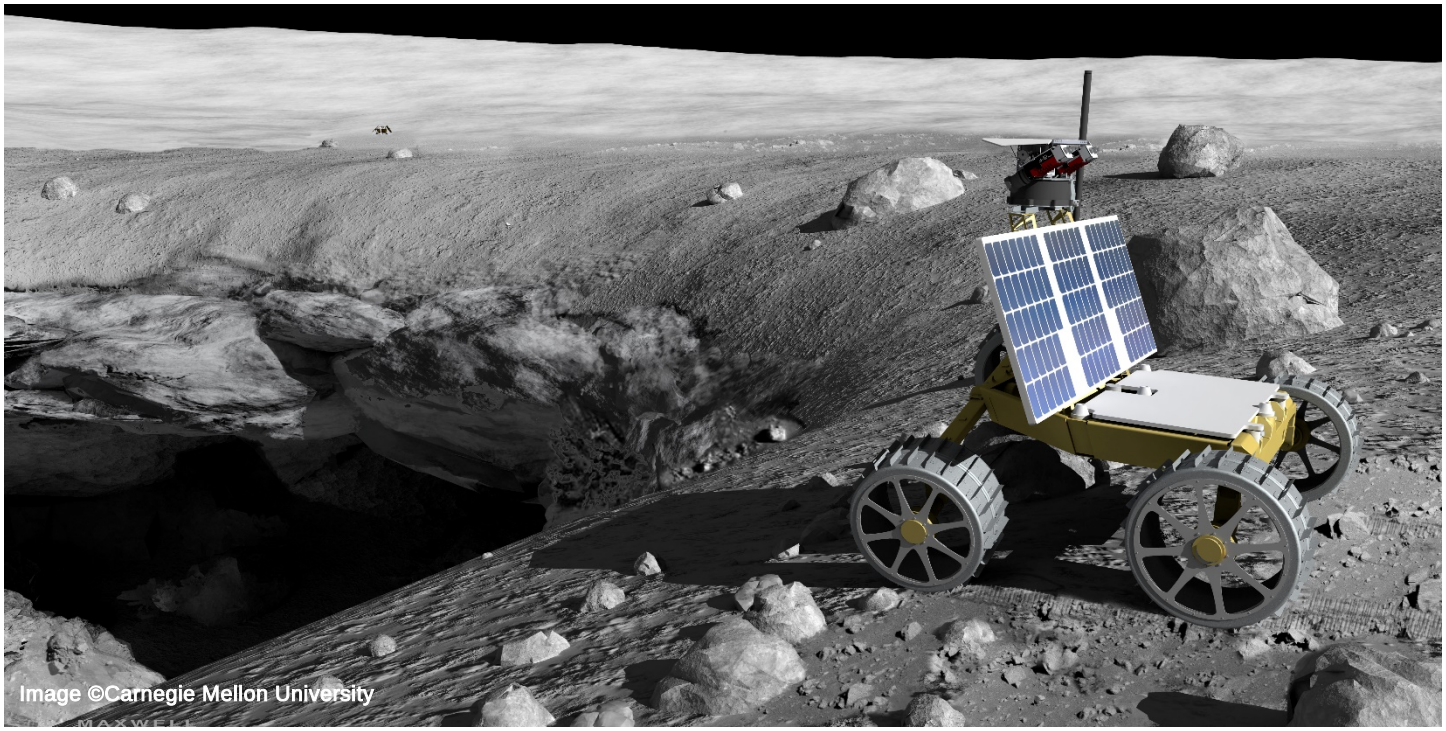


Suddenly, everyone wants to go to the Moon

For decades, it seemed like the world had lost interest in Earth's smaller companion. Now, the science and business communities have rediscovered the Moon. Several landing missions are planned for the coming years, and an American university is leading the way with their rover.

It seemed like the Moon had lost its luster. After the end of NASA's program for manned missions to the Moon in the early 1970s, the major aerospace agencies focused on other priorities: the International Space Station, Mars, and exploring the galaxy with the Hubble Space Telescope and Cosmic Background Explorer, to mention just a few. Now, after four decades, the Moon is back in the spotlight. China, Japan and India have already conducted missions of their own, and other governments, businesses, and even individuals are reaching for the lunar surface. But a small company teamed with a robotics powerhouse university might just lead the way.

Setting sights on Google's grand prize

Astrobotic Technology, a start-up based in Pittsburgh, USA, wants to send a lander and rover to the Moon in the summer of 2016. The success of this mission would be a small sensation – the first private space mission to soft land on the Moon. Astrobotic, partnered with Carnegie Mellon University to compete as Team Astrobotic, would also win the Google Lunar XPrize, a competition initiated by Google. The grand prize of 20 million dollars goes to the first private company that lands on the Moon, travels 500 m across the surface, and sends high-definition video images back to Earth. The deadline has been postponed several times and is now the end of 2016.

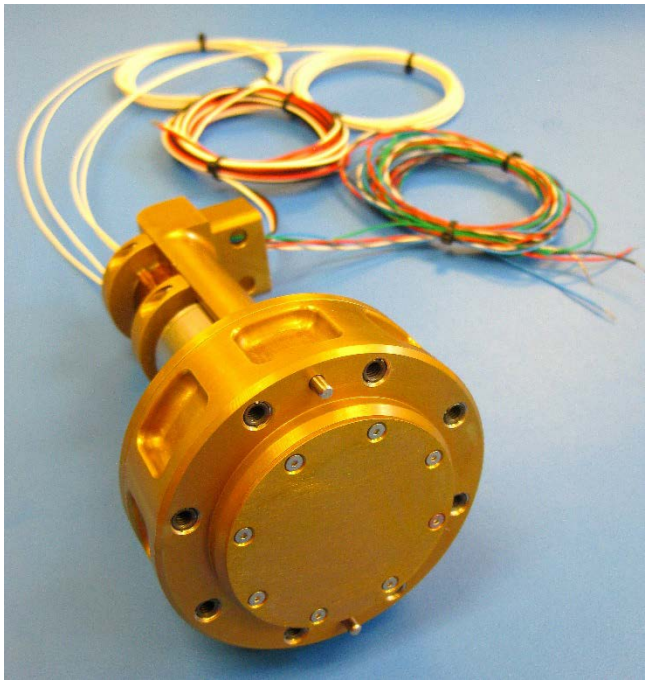
Astrobotic is a young company founded in 2008 by robotics pioneer Dr. William "Red" Whittaker, director of the Field Robotics Institute. It is a spin-off of Carnegie Mellon University's world-renowned Robotics Institute, with which it still cooperates closely. The company's long-term goal is to cost-effectively deliver payloads to the Moon for goverments, universities, business ventures, and nonprofits.

Rover looks for caves on the Moon

On the inaugural mission, Astrobotic's Griffin lunar lander will deliver the Andy exploration rover to the Moon's surface. Built by a team of researchers and students at Carnegie Mellon University, Andy has its sights set on exploring caves. Planetary scientists believe that a certain type of hole discovered on the Moon, called a skylight, could provide entry to underground cave systems. Such caves would be ideal for future human bases, as they offer protection from radiation, micrometeorite strikes, and temperature swings.

It remains to be seen whether Andy can win the Google prize. Astrobotic is planning to carry other Lunar XPrize candidates on the mission – provided they pay for a ticket on the lander. Negotiations are in progress. If all goes as expected, Mankind may soon witness a NASCAR-style rover race on the Moon.

Today, Astrobotic and CMU are clearly in the pole position, evidenced by the three milestone prizes totaling $1.75M that Google awarded to Astrobotic in January, in the categories of Landing, Mobility, and Imaging. All teams competing for the Mobility prize had to demonstrate that their rovers can function under vacuum conditions and in the other harsh environments of the Moon. The Andy rover impressively demonstrated these abilities in multiple tests and to the XPrize judging panel.



The rotor has two pole pairs for very high power density and high torque. The motor is combined with the planetary gearhead GP 32 HD, which was developed specifically for use in harsh environmental conditions. Left: The compact drive unit.
Image ©Carnegie Mellon University

High torque is critical

During the nine-month development of Andy, the researcher and student team in Pittsburgh focused on building a rover that is economical and practical, using standard components wherever possible. The four wheels are driven by brushless maxon EC 4-pole motors with GP 32 HD planetary gearheads. "This combination gives us more than enough torque to conquer all obstacles," says Jon Anderson, a Robotics Masters student at CMU and technical lead of Andy's development. The team made small modifications to lubricants and circuit boards to withstand the anticipated operating conditions in space. The team values maxon motor's extensive experience with space projects. "maxon motors are proven in space. The Mars rovers Spirit and Opportunity each have 35 maxon DC motors driving their wheels, steering, and some science instruments. While we have a lot of obstacles to overcome on our way to the Moon, having a proven partner like maxon to supply our motors makes our job a lot easier," says Anderson.

Rover Andy

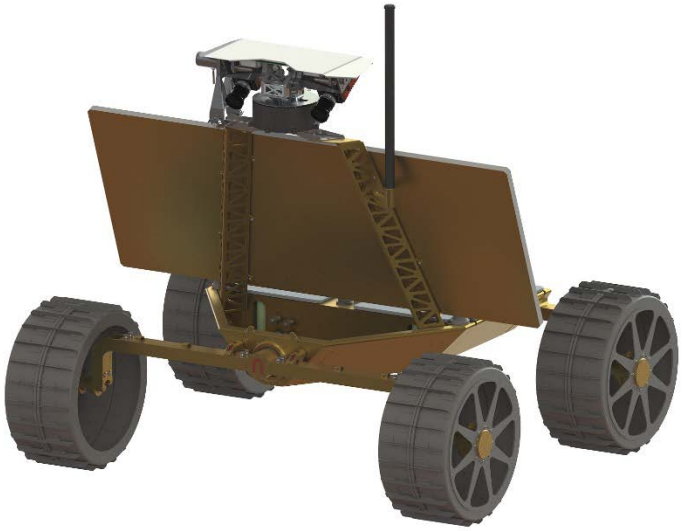
Size: 102 cm

Mass: 33 kg (weighs only about 5 kg c

Velocity: 18 cm /s

Max. inclination: 30°

Max. size of obstacles: 15 cm



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