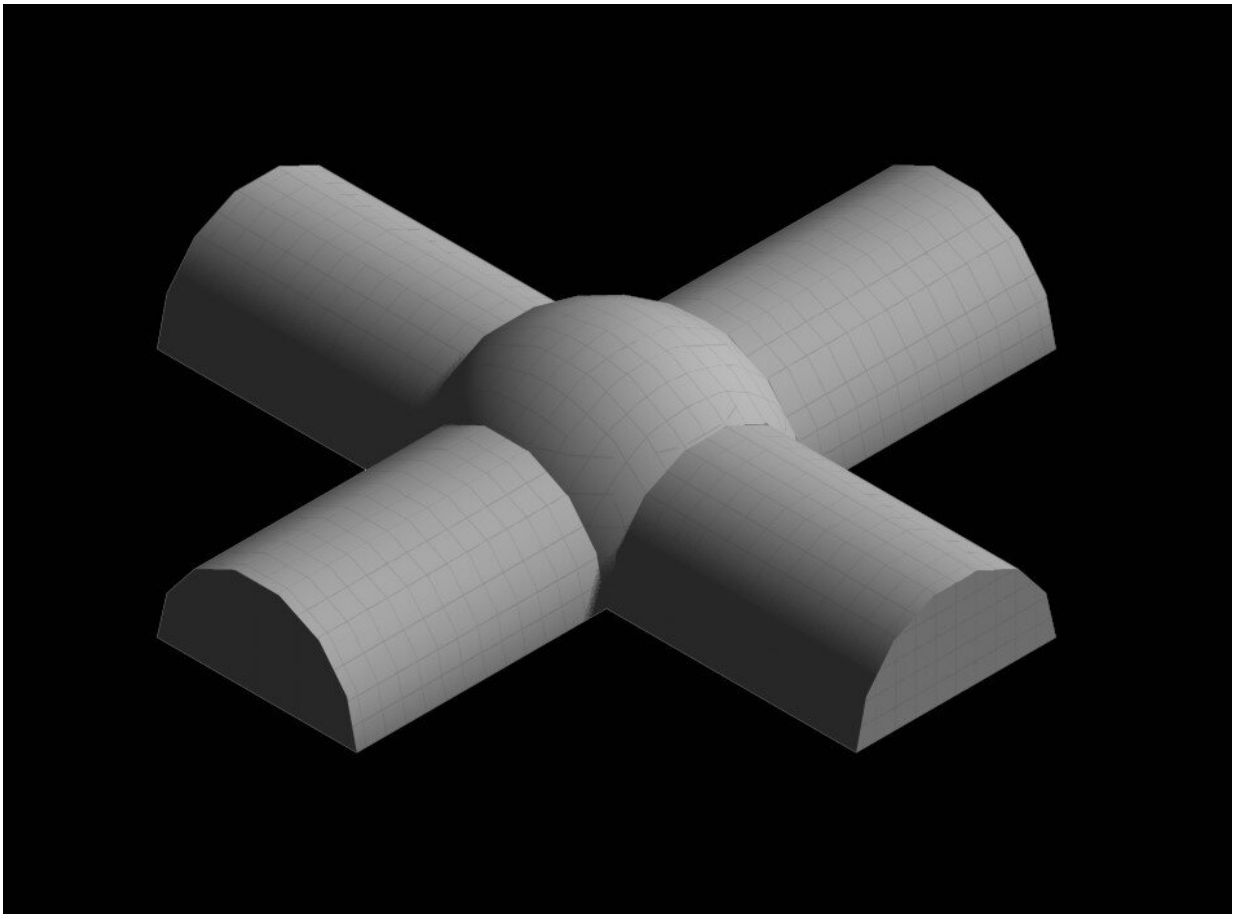
What will it take to live on the moon?

July 11 2019, by Todd Bates



This is a design for a small habitat that could be assembled on the moon. Credit: Haym Benaroya/Rutgers University-New Brunswick

With NASA planning to revisit the lunar surface by 2024 and send multiple expeditions by 2028, Rutgers University's Haym Benaroya is

optimistic that people will someday live on the moon.

Benaroya, a distinguished professor in the Department of Mechanical and Aerospace Engineering at Rutgers University–New Brunswick, has spent most of his career focusing on lunar settlement and space exploration issues.

Benaroya, who works in the School of Engineering and wrote "Turning Dust to Gold: Building a Future on the Moon and Mars" and "Building Habitats on the Moon," and specializes in designing structures for extreme environments, discussed the challenges of living on the moon.

What do you study?

How to design structures for extreme environments like the moon, Gulf of Mexico and North Sea that are very challenging and potentially dangerous. The main challenge is to determine the forces these structures will face so we can design ones that will survive.

How would you describe the forces and environment on the moon?

It's a low-gravity environment in a vacuum, with very high to very low temperatures and intense radiation from the sun. Micrometeorites the size of sand grains travel around 10 miles a second, so shielding is needed to keep them from going through you.

What would the first structures on the moon be like?

Initially, very small. A lunar base may have two or three rooms the size of a typical office. We will bring structures—basically prefabbed cylinders like the ones on the International Space Station—from Earth.

One concept is to cover them with about 10 feet of regolith—the small rocks covering the moon's surface—because that would shield the interior from micrometeorites, extreme temperatures and radiation.

What physiological and psychological challenges are there in living on the moon?

It is a psychological challenge for most humans to live in small spaces. The low-gravity environment changes blood flow and affects the eyes, bones and muscles. Some regolith particles are tiny and jagged, and they get into astronaut suits and machines. One issue is how to filter them from space suits, prevent astronauts from dragging them into structures, and safeguard rovers and other equipment outside.

How many years would it take to establish a year-round station or colony on the moon?

Ten to 15 years if we're really serious about it. We have much of the technology. The biggest challenge is ensuring that people survive on the moon. Initially, astronauts will live there for six- to 12-month stints like they do on the space station.

How important is a mission to the moon overall?

It's a very positive mission that focuses on the future. If we say we're going to go to the moon and Mars and we're exploring the solar system, we're doing it to enhance humanity and we will learn lots of things that will help people on Earth. We could create a whole new civilization and economy. It can take humanity to the next level, with huge leaps in capabilities and options for many people.

Provided by Rutgers University