# Me and my world: The human factor in space

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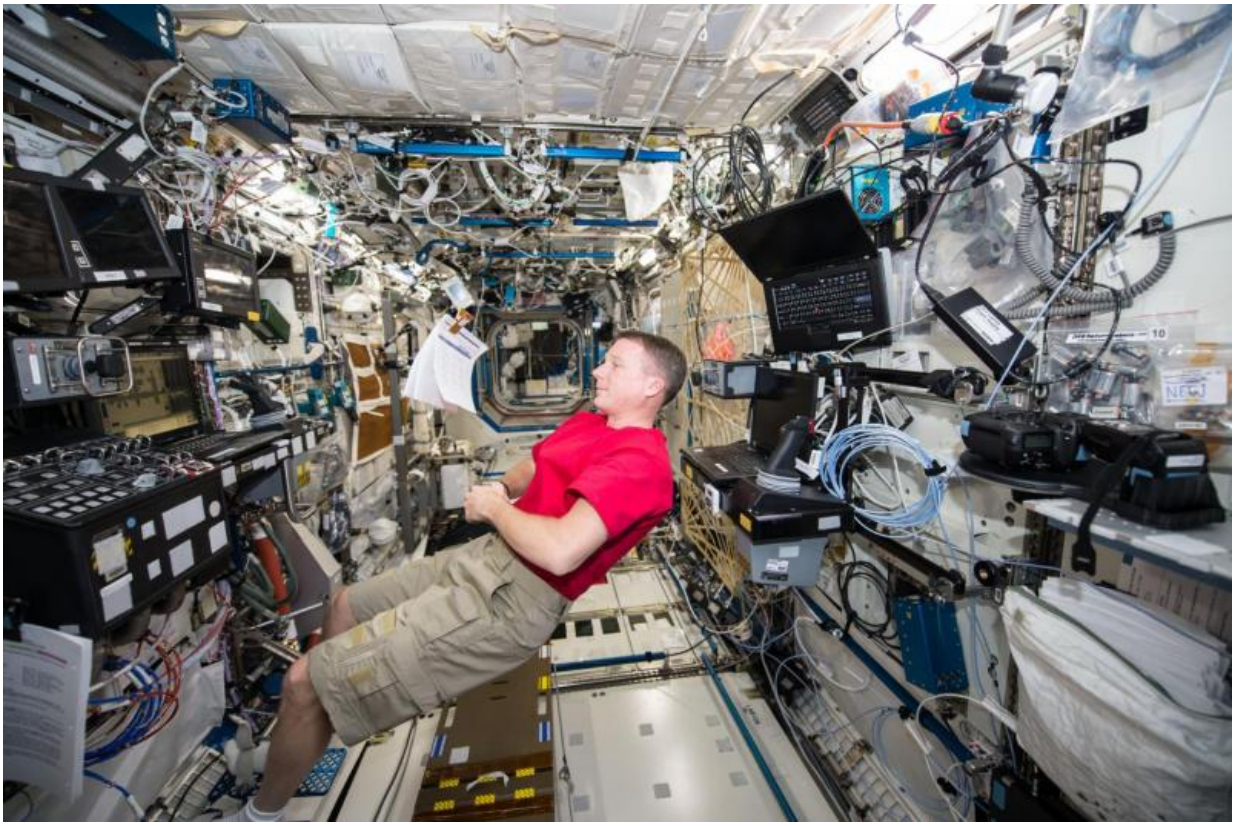


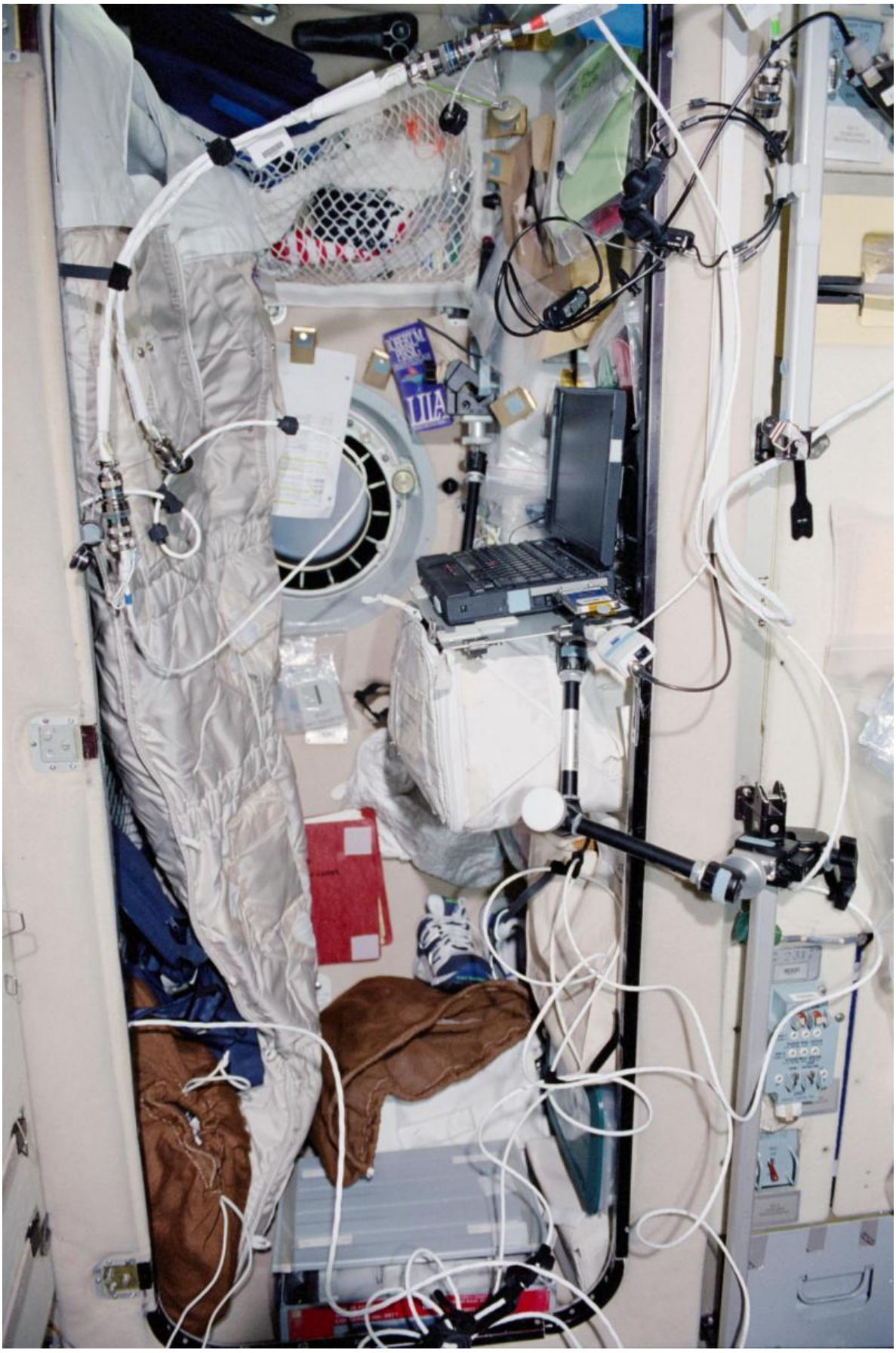
Flight engineer Terry Virts is photographed in the Destiny US Laboratory. Credit: NASA

The world around us is defined by how we interact with it. But what if our world was out of this world? As part of NASA's One-Year Mission, researchers are studying how astronauts interact with the "world" around them. To prepare for a future journey to Mars, it is important to

understand the effects spaceflight can have on crewmembers' fine motor skills and how they interact with their habitat.

As missions go further from Earth, astronauts will depend less on mission control for real-time information. Interactions between crewmembers and their equipment will need to be simplified so they will be able to react quickly without constant help from Earth. A roundtrip journey to Mars that is millions of miles away from Earth could take about three years.

Two Human Research Program investigations are being conducted to learn more about microgravity effects on fine motor performance and how astronauts interact with the International Space Station environment. The study of human factors is an important component of NASA's One-Year Mission to ensure astronauts will have adequate working and living quarters on long-duration missions. As a part of that research, NASA is learning more about human-computer interaction, the use of touchscreens, and how being in space may affect one's ability to use these types of essential technologies. Fine motor skills are crucial for successfully landing a space vehicle on a planetary surface, repairing sensitive equipment, manipulating a robotic arm, providing medical treatment and a variety of other tasks.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A view of crew quarters on the International Space Station. Credit: NASA

The Fine Motor Skills investigation will determine the effects of long-duration weightlessness on fine motor performance by using a touchscreen tablet computer and software that measures fine motor function. The software utilizes a test battery of four tasks which examines speed/response time and accuracy. It evaluates pointing, dragging, pinch-rotating, and tracing.

Patients on Earth undergoing rehabilitation for conditions that impair fine motor control could benefit from the tasks developed for this investigation. The test battery could serve as a rehabilitation tool for people with fine motor deficits such as brain injuries and Parkinson's disease.

For crew members on long-duration space missions, a spacecraft is their only home and work space, so cabin designs must balance comfort and efficiency. By evaluating humans performing normal activities in a not-so-normal environment, data can be obtained to influence the design of future space vehicles, habitats, equipment, tools, tests and processes.

The Habitability investigation will determine how livable the space station is with crew members' observations in periodic questionnaires, crew-collected video footage and videos of key areas of the orbiting complex. Up to six crewmembers report observations using an iPad application called iSHORT (Space Habitability Observation Reporting Tool) which captures the ways crewmembers live and work in microgravity, and how their interactions with their environment might require different layouts, additional space, or other alterations to future

manned space vehicles.

Habitability investigation results may also apply to workers on Earth who live and work in confined spaces over a long-duration with limited space and resources in remote locations such as ocean drilling rigs, polar research stations and mines. This investigation also could lead to better designs of automobiles, simpler exercise equipment, and other ways to make life less complicated.

NASA's Human Research Program enables space exploration beyond low Earth orbit by reducing the risks to human health and performance through a focused program of basic, applied and operational research. This leads to the development and delivery of: human health, performance, and habitability standards; countermeasures and risk mitigation solutions; and advanced habitability and medical support technologies for a more compatible world wherever we explore.

Provided by NASA