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Astronaut Suni Williams carrying out an investigation with the help of LOCAD on board the ISS
NASA

Real Tricorders Come to Life

LOCAD to evaluate life forms during space missions

If you once were or still are a Star Trek fan, then you probably already know what a tricorder is or what it should be; it's a handheld device that practically acts as a biological laboratory. And, as usual, Sci-Fi once again becomes reality. A device similar to the tricorder, called LOCAD-PTS, standing for Lab-On-a-Chip Application Development Portable Test System, is now being developed by NASA to make quick evaluations of life forms on board the International Space Station. "LOCAD is like that tricorder in that it is portable, rapid and detects a biochemical molecule. LOCAD is specifically designed to detect and identify microbes on space station surfaces", says Heater Morris, LOCAD scientist from NASA's Marshall Space Flight Center. According to biologists, the human body carries about one trillion microbes, making for up to 2 percent of the whole mass of a person. While some of these microbes are basically harmless, others can trigger serious illnesses. LOCAD's job is to locate and keep track of these microbes. Samples collected from the surfaces of the ISS are placed in sterile water to make the sample liquid. LOCAD only requires a few drops of liquid sample and about 15 minutes to tell exactly what kind of life forms are present. "It's important to monitor bacteria on the space station so we can find the best way to keep them under control. LOCAD can't yet distinguish between live and dead bacteria. We're working to add this capability in the future", said Morris. LOCAD can now detect dangerous bacteria such as E. coli or salmonella, but one of the biggest enemies in space are the humble fungi, which in fact eat away some of the electronic systems on board the Russian Space Station MIR. Thus, during mission STS-123, NASA sent LOCAD devices capable of alerting the crew in case any fungi are detected on board, before they even have the chance to multiply. "Ultimately we want to provide cartridges for all kinds of micro-organism and chemical compounds. We'd even like to be able to use our system to figure out what 'bug' an astronaut has if he or she becomes ill", said Morris. "What we are developing at MSFC has use not only on the ISS, but also on lunar missions, long duration stays on the other planets, and most certainly here on Earth", said Lisa Monaco LOCAD project scientist. Future long space missions will most likely require astronaut health and electronics monitoring, even though until now no astronaut has suffered from a serious illness while returning from a trip into space. In case this event happens, however, LOCAD should be able to provide a quick and accurate diagnosis so that the best treatment is applied immediately.