

Augmented reality increases maintenance reliability at a space station

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Credit: VTT Technical Research Centre of Finland

An international project led by VTT Technical Research Centre of Finland has developed a new augmented reality (AR) tool for the ESA. In the future, it is envisaged that astronauts will be able to use this tool to perform maintenance tasks and real-time equipment monitoring in the demanding conditions of space. The first practical tests carried out at ESA's European Astronaut Centre produced excellent results.

The two-year EdcAR project (Engineering data in cross platform AR) led by VTT developed a solution to the challenges involved in maintenance and the provision of work instructions, which have been an issue for more than a decade. Since maintenance and other work tasks in space are critical, they must be carried out without errors and at the right

time. Preparing for these requires in-depth practice, which involves coordinating the activities of various experts. Since astronauts' time is extremely valuable, their tasks and maintenance instructions must be unambiguous.

The EdcAR project developed a new AR system intended to improve the performance of manual tasks in space. The system is expected to reduce mistakes, speed up the tasks and improve the clarity of instructions via AR technology. The major benefit is the real-time location of the point requiring maintenance. This information is transmitted to the astronaut's AR glasses at the right time by using text, graphics, video, sound etc. The system displays detailed visual instructions on the astronauts' AR glasses, guiding them step by step to perform the necessary procedures in the right order, such as "now press this button," "then turn the lever (B)."

The new system also makes the invisible visible by enabling the visualization of telemetry data from equipment and other systems on board the space station, such as fault diagnostics, the latest [maintenance](#) data, life cycle, radiation, pressure or temperature—both in [space](#) and on the ground. All of this information can be displayed on the AR glasses.

"The AR system that we developed runs on the Microsoft HoloLens platform. It supports the astronauts' work in a completely new way by displaying key telemetry data through an IoT (Internet-of-Things) interface," explains Project Manager Kaj Helin of VTT.

"This is very impressive. We are exploring possibilities for an EdcAR follow on," says David Martinez Oliveira, Technical Officer, ESA. The first practical tests of the new AR systems have been performed in the ISS-Columbus training mock-up located in the ESA's on-ground European Astronaut Centre (EAC) in Cologne, Germany. The test team included an experienced astronaut.

Provided by VTT Technical Research Centre of Finland

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