

Researchers develop solution for deep-space communication

October 28 2015, by Olli Ernvall

The international UNISONO project, which is coordinated by VTT Technical Research Centre of Finland, has developed a communication solution that can allow orbiting space station to maintain uninterrupted contact with robots working on the surface of a planet. The technology also has potential industrial applications, such as to reduce lags and jitters in mobile gaming.

The technology developed in the course of the UNISONO project is an important step forward for initiatives such as the human mission to Mars. Before humans can land on Mars, the planet needs infrastructure, such as housing and laboratories, which need to be built by robots. These robots need to be controlled by astronauts from a [space station](#) orbiting the planet.

Astronauts can currently practice controlling the robots on Earth from the International Space Station (ISS). The ISS is in constant orbit around Earth, which means that the astronauts frequently lose direct contact with the robot. This results in discontinuity in data and video transmission, inhibiting human control of robots.

"Losing control of the robot during a critical task can cause damage to the task or the robot itself. The UNISONO project has developed a solution that can keep the astronaut in constant contact with the robot during entire orbit," explains Dr. Ali Muhammad, principal investigator in Robotics Systems at VTT Technical Research Centre of Finland.

The time window for ISS to be in direct contact with a robot on Earth is much shorter than what is planned for a Mars orbiter. The UNISONO project has shown this [time window](#) can be widened by seamlessly switching between relaying stations on the ground. This allows astronauts to realistically simulate future robotic missions on Mars, the moon or other planetary bodies.

At this stage, the project has demonstrated a seamless switching concept that can be further developed for future human missions to Mars.

Potential industrial applications of the technology

The technology also has many potential [industrial applications](#). The same idea can be used to design seamless wireless data transmission systems to solve the problem of smart phones losing signal when people use them in a moving car or on a train.

The gaming industry could use the technology to eliminate lags and jitters in mobile games.

"Mobile gamers frequently experience lags and other connection issues during a game. The technology developed in the course of the UNISONO project could improve their experience," said Janne Seppänen, Research Scientist at VTT.

A boost to Finland's reputation in space research

VTT Technical Research Centre of Finland has considerable experience with developing telerobotics technologies for extreme environments such as ITER fusion reactor. VTT has developed a number of robot-based solutions for the maintenance of the reactor, which is being built in France.

The UNISONO project also relied on communication tools such as Qosmet, developed during research projects at VTT. Qosmet is a tool for measuring network performance. In the UNISONO project, Qosmet was used to monitor and demonstrate seamless connectivity when communication was switched between the relaying stations.

VTT once again demonstrated its core strength of being able to combine multiple technologies and expertise. In the case of UNISONO, it is telerobotics and telecommunication. This is what gives VTT an advantage over many other organisations in many fields, including space research.

"The UNISONO [project](#) made an important contribution in reinforcing VTT's reputation among the [space research](#) organisations, industries and research institutions involved in the space ecosystem," said Dr. Muhammad.

Provided by VTT Technical Research Centre of Finland

Citation: Researchers develop solution for deep-space communication (2015, October 28)
retrieved 11 May 2024 from <https://phys.org/news/2015-10-solution-deep-space.html>

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