SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
Space Culture: Innovative Approaches for Public Engagement in Space (9)

Author: Dr. Nazish Rubab
Institute of Space Technology (IST), Pakistan

Dr. Ghulam JAFFER
Institute of Space Technology (IST), Pakistan
Mr. Ronnie Nader
Ecuadorian Civilian Space Agency (EXA), Ecuador

SPACE OUTREACH INITIATIVES THROUGH ONLINE AND REAL-TIME SPACE OPERATIONS USING VIRTUAL GROUND STATION

Abstract

The ground-satellite communications are expensive yet highly significant for the success of a space mission and to envisage its end-of-life by continuously monitoring its health and all sub-systems. One cost-effective possibility for honing skills is to use amateur satellite service and an online internet-to-orbit gateway. The gateway has a maximum range of tracking and detection of 22000 km and sensitivity down to 0.1 watts, capable enough to receive the faint satellites in even omni directional reception scenario. The gateway allows the connectivity of remote users involving in the processes like orbital control, communication control, real time simulations and data/ image processing and analysis. This paper details all above processes along with experimental results obtained by controlling it remotely, online reception of audio frequency signals of telemetry, housekeeping data and half-duplex communication through amateur satellites and images from NOAA weather satellites. We have involved post-grad students studying at Japan, USA, Austria and Australia. We analyzed the received data through a suite of free softwares and the results are enhanced with real-time Satellite Toolkit simulations. The exclusive ability of the gateway to act as a gateway between remote users (internet) and satellites (in orbit) makes the virtual ground station at user end more feasible for the long-term real-time nano/ cubesats space operations and space outreach. The only requirement is broadband internet at user end. After the successful satellite tracking remotely, monitoring and downloading online and real-time data from many operational satellites, the gateway has proved reliable and capable enough to be used as a potential ground station for current and future university missions and a training platform for individuals pursuing space operations.