SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
Interactive Presentations (IP)

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ROBOTIC PLANETARY EXPLORATION ANALOGUE MISSIONS AT THE INTERNATIONAL SPACE UNIVERSITY, LATEST RESULTS

Abstract

Participants at the International Space University's (ISU) 2014, 2015, 2016 and 2017 Space Studies Program (SSP) were provided an opportunity to learn about, and engage in, the definition, planning, and execution of a robotic planetary exploration analogue mission. Participants were provided with a scenario in which they were in a spacecraft en route to Mars and tasked with controlling a rover on the Martian surface in order to determine if its location was appropriate as a landing site for their spacecraft. Their mission statement was to: Operate exploration rovers in order to determine if the potential landing site warrants human exploration in the context of finding signs of past or present life on Mars. The missions were implemented through the use of Canadian Space Agency (CSA) owned rover prototypes and the CSA Mars Emulation Terrain (MET) analogue facility. The activity involved three phases necessary to learn the concepts and theories specific to robotic planetary exploration. The first phase provided preliminary knowledge necessary to complete subsequent phases, including computer vision, rover systems, and planetary science. The second phase consisted of a mission planning session and the third and final phase was the execution of the analogue missions. For the second and third phases of the activity participants were separated into pre-defined teams. The teams had been created to ensure cultural and experiential diversity. Participants were asked to define roles for their mission, produce an organizational chart, assign these roles amongst their team members, and develop a communications plan including a defined protocol and a plan to deal with high latency communication. Teams were asked to identify specific scientific goals relating to their pre-stated mission objective. They were provided with a Digital Elevation Model (DEM) of the terrain surrounding the notional rover landing site. Participants

used an Excel based tool developed by the organizers which allowed them to configure a rover platform with sensors and science instruments while taking into account the trade-offs associated with limitations in mass, power, bandwidth, cost and reliability. Each team conducted a mission of 3 or 3.5 hours controlling the rover from the Rover Control Centre (RCC) while RPEAM organizers acted as the ground control team supervising their mission. Each team was able to locate scientifically interesting sites and make a determination that landing a rover in the region was appropriate.