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ROBOTIC PLANETARY EXPLORATION MISSION SIMULATION AT ISU SSP14

Abstract

Participants at the International Space University's (ISU) 2014 Space Studies Program (SSP14) were provided an opportunity to learn about, and engage in, the definition, planning, and execution of a robotic planetary exploration analogue mission. The activity centered on the planning and execution of a mission simulation based on material learned in relevant preparatory sessions. This paper describes the entire activity from conception through planning and implementation and discusses lessons learned by the participants and organizers. Discussion about the benefits of such an activity are provided and follow-on work outlined.

SSP14 took place in Montreal, Canada and the proximity to the Canadian Space Agency's (CSA) headquarters allowed for a unique opportunity to leverage CSA-owned robotic assets and infrastructure for the development of a complex, multifaceted educational experience. The Robotic Planetary Exploration Activity was conceived of and developed by a team composed of ISU alumni at Neptec Design Group. This team solicited the help of the CSA and the Centre for Planetary Science and Exploration (CPSX) at the University of Western Ontario and ISU.

Participants were divided into mission teams and trained by subject matter experts in specialized topics including Planetary Science, Computer Vision and Rover Systems. The participant teams were then provided the following mission scenario: Your team of interdisciplinary astronauts is en route to Mars for an extended exploration mission which will attempt to find signs of past or present life. A fleet of science rovers has been sent to potential landing areas in order to determine the optimal location for human exploration. You must:

Operate the exploration rover 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.

Under the guidance of representatives from Neptec, CPSX, ISU and the CSA – including astronaut David Saint-Jacques – the teams completed a mission planning activity requiring them to: • Devise team organization and assign roles • Establish science targets • Plan a rover path • Develop payload requirements • Select a rover configuration

With the requisite background knowledge and the newly developed mission plans, the teams then traveled to the CSA headquarters where they used the ExDOC Rover Control center to operate a CSA-owned rover prototype in their Mars Emulation Terrain in a real-time mission operations environment. The simulation was conducted at a high level fidelity including a Ground Control Centre manned by the organizational team.