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SPACE CONCORDIA'S MARS ROBOTICS CHALLENGE

Abstract

Space Concordia (SC) is a student society of Concordia University composed of students passionate about astronautical engineering. It was formed in 2010 and won the Canadian Satellite Design Challenge, a Canada wide cube satellite design competition. Since then, SC has formed several divisions including one dedicated to robotics. The goal of this new division is to promote robotics and Martian colonization via outreach events to industry and educational organizations. SC's Robotics Division has entered in the 2014 University Rover Challenge (URC) from the Mars Society organization. The division is currently assembling and integrating a "mars rover" (a remotely controlled robot) which is designed to perform a series of tasks in the Utah desert which emulate Mars conditions. The first of the tasks, terrain traversal, involves the rover navigating an obstacle course along a path in the Utah desert. Next, for the astronaut assistance task, the rover will have to collect items from the ground using a robotic arm, and carry them to deposit in front of mock astronauts at different locations in the desert course. The soil sample retrieval task requires the rover to survey the desert landscape for areas that have the best chance of containing or having contained life. A sample is collected, and an onboard test for life is performed. Finally, the equipment servicing task has the rover's robotic arm carrying out a series of dexterous tasks, such as attaching bolts, and connecting pipes. Part of the challenge of constructing such a robot is designing it to solve conflicting requirements while staying within a budget of $15 000 US. The future of Martian and Lunar exploration will necessitate economical solutions to sending unmanned vehicles in order to access harsh environments and perform complex studies of the terrain.