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Human Robotic Partnerships for Exploration (04)
Human Robotic Exploration Partnership (1)

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AN INTERDISCIPLINARY APPROACH TO HUMAN-ROBOT COOPERATION IN MARS EXPLORATION.

Abstract

This paper will present the conclusions of the Team Project "Human-Robotic Cooperation" of the International Space University's (ISU) Space Studies Program 2011 (SSP 2011), held in Graz, Austria. In addition to the need for international cooperation, is the need to address how humans and robots will cooperate for future exploratory and scientific space missions. This is a result of the fact that human and robotic capabilities differ, with each offering their own benefits and drawbacks. Robots have reliance, accuracy, and can operate in hostile environments - all attributes well suited for space exploration. However, when faced with new scenarios and unexpected events, robots pale in comparison with the intuition and creativity of humans. Sustainable space development will have to intelligently balance the flexibility and ingenuity of humans, with robust and sophisticated robotic systems. The Cooperation of Humans and Robots for Mars (CHARM) team at the ISU's SSP 2011 integrated international, intercultural, and interdisciplinary perspectives to investigate Mars exploration objectives, robotic capabilities, and the interaction between humans and robots. Based on various space agency goals, this paper selects an exploration objective for the time frame between 2015 and 2035, and drafts different scenarios to accomplish this objective. Each scenario uses different degrees of human-robot interaction. A theoretical model is then developed based on discrete requirements to help create an effective combination of human and robots. The CHARM model uses an interdisciplinary approach, including technical, societal, political, legal, financial and scientific perspectives. The results of the CHARM model are then further analyzed using these interdisciplinary aspects, with considerations to the future studies of human-robot cooperation. The CHARM team believes that this decision-making model can be used to select missions more efficiently and rationally, thus bringing down both mission costs and risks, making space exploration more feasible, and enabling long-term space sustainability.