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SPACE OPERATIONS SYMPOSIUM (B6)
New Operations Concepts, Advanced Systems and Commercial Space Operations (2)

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AUTONOMOUS MISSION FOR ON-ORBIT SERVICING (AMOOS)

Abstract

This paper will present the conclusions of the Team Project "Autonomous Mission for On-Orbit Servicing" (AMOOS) of the Space Studies Program 2014 (SSP'14) from the International Space University (ISU), held at the campus of École de technologie supérieure (ÉTS) in Montreal, Quebec, Canada.

The AMOOS project aims to design a virtual scenario simulation in order to demonstrate the capabilities for a modified Unmanned Aerial Vehicle (UAV) to execute autonomous on-orbit servicing missions on a Low Earth Orbit (LEO) satellite. The four main objectives of the Team Project are: (1) to identify and formulate future key space technologies of unmanned spaceplane and robotic systems suitable for an autonomous on-orbit servicing, (2) to design virtual and subscale simulations of an autonomous orbital mission based on unmanned aerial systems, (3) to understand space debris issues and demonstrate the efficiency of orbital debris removal with an unmanned spaceplane embedding robotic systems, and (4) to engage the public, space agencies, space industries and government officials about the future of space exploration.

The continuity of current space operations raises two essential questions: how to extend the operational life of a satellite in orbit? How to reduce and/or remove space debris? To address these issues, the Team Project will analyze, develop, and discuss the utilization of drones and robotic systems in an effective all-in-one package capable of: (a) servicing satellites to extend their lifetime and performance, (b) deploying small and secondary payloads in Low Earth Orbit, and (c) capturing and/or de-orbiting large space debris and errant satellites.

To achieve the listed objectives, the Team Project will assess the technical feasibility of AMOOS by designing both indoor virtual mission simulations and outdoor subscale demonstrations. In addition, the project will demonstrate the potential economic benefits by serving as an appealing alternative to current complex, risky and expensive manned missions. Finally, to demonstrate political and legal benefits, the Team Project will investigate potential threats and risks related to space debris removal and the utilization of UAVs.

The AMOOS project is expected to come up with innovative solutions for the future of space operations and exploration via the 3S credo: Saving lives, Saving money, Saving time.