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Bettina M Mrusek

Embry Riddle Aeronautical University, USA

Biography

Bettina Mrusek received her PhD Degree in Business administration from Northcentral University in 2016. She has done MBA from Park University and is currently pursuing a Master of Science in Aeronautics, specializing in Space studies and unmanned system from Embry Riddle Aeronautical University. She is currently an assistant professor for the College of Aeronautics, Embry Riddle Aeronautical University. Her research interests include aircraft maintenance, human factors, management, and unmanned systems.

mrusekb@erau.edu

Note:

SATELLITE MAINTENANCE AND REPAIR: A CRITICAL COMPONENT IN MINIMIZING FINANCIAL RISKS AND REDUCING SPACE DEBRIS

While there are thousands of satellites orbiting the Earth's atmosphere, many are not in use due to unforeseen or unavoidable conditions. Despite the intense testing of these systems prior to launch, the unforgiving environment of space disrupts the operation of these satellites, rendering them inoperable. This presents a significant financial loss, while also contributing to space debris. The projected number of satellites scheduled to enter into low Earth orbit is expected to rise substantially over the next decade. Therefore, the associated financial losses due to inoperable satellites will likely rise as well, as will the potential of space debris colliding with other satellites or crashing back to Earth. Although rendered inoperable, many of the individual components are still valuable, which presents another opportunity for wasted resources if the satellites cannot be retrieved. Advances in unmanned technology, however, may provide an opportunity to repair these satellites. Leveraging robotics, avionics, and autonomous operations with unmanned spacecraft platforms may allow for the development of a spacecraft that can repair the satellite in orbit. However, the specific requirements needed to launch an unmanned spacecraft into low Earth orbit with repair and maintenance capabilities must be first be identified. In this exploratory paper, the author will employ a qualitative research approach in the form of a literature review and corresponding comparative analysis to gain insight into the feasibility of an unmanned robotic spacecraft that can autonomously repair inoperable satellites. Financial and feasibility elements will be reviewed to determine the most efficient and practical platforms that can be developed and used as potential prototypes for the identified mission.

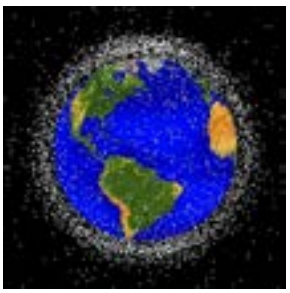

Fig.1. National Aeronautics & Space Administration (NASA) image of objects in low Earth orbit. Approximately 90% of the objects are not functional satellites (NASA, 2018).