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DESIGN, DEVELOP AND INTEGRATING DEXTEROUS ROBOTIC MANIPULATORS WITH  
ADVANCED AI SATELLITE FOR ON-ORBIT SERVICING, DEBRIS REMOVAL AND MONITORING  
SERVICES

**Abstract**

With the advanced technology, researchers are expected to expand space mission in the coming decades. The increasing number of space debris has been in low and geostationary orbits severely threatens the safety of orbiting satellites and the longterm sustainability of space activities. Research has shown that especially in Low Earth Orbit (LEO) the space debris environment has to be stabilized and the collision risk has to be reduced to maintain an acceptable collision probability for future space missions. In order to maintain a future satellite activity, it is an important to preserve space environment with the process of on-orbit servicing and by the removing space debris. Space autonomous robotic system will play an important role in space mission by reducing working time and exposure to dangerous tasks. Notion Robotics Lab researcher are designing and developing a space tethered autonomous robotic and AI based satellite for onorbit servicing and active debris removal system, this advanced satellite active debris removal using space robotic manipulators is appealing in terms of technology readiness level and an important part of this tethered autonomous robotic on-orbit servicing mission that reaching and capturing a target (satellite or debris) based on vision, to approach for robotic manipulators to capture a noncooperative target autonomously. This system able to perform specified tasks autonomously with dexterous skills and include with autonomous navigation and also it will provide inspection amp; monitoring services, and able to making real-time decisions without awaiting instruction.

Keywords: - Artificial Intelligence, Space Tether, Autonomous Robotic Manipulator, On-orbit Servicing, Debris Removal.