Relative Pose Estimation of Space Debris using Point Cloud Geometrical Descriptors

Space robotics experiments have shown satisfactory results in autonomous rendezvous and docking using cooperative targets as aim. Hence, the target can help the servicer giving its position and attitude information. On the other hand, the Active Debris Removal (ADR) has emerged as an alternative for reducing the space junk population in the Low Earth Orbit (LEO). In this case, the target under interest will not give support information about its current condition to the chaser satellite, which must perform additional tasks for obtaining this information remotely. We describe in this paper a methodology for using Time-of-Flight (ToF) sensors in order to recognize the target in the proximity and to obtain the 6-Degrees Of Freedom (DOF) pose of the object. We also present the outcome based on this methodology using synthetic data of the target and the point cloud as a result of a simulated sensor.