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IDET-SAT: A CUBESAT DESIGN FOR SPACE DEBRIS DETECTION AND ANALYSIS

Abstract

Identification of Debris & Telemetry Satellite (IDeT-Sat) is a 3U CubeSat platform designed by the University of Nottingham student team for the UKSEDS Satellite Design Competition. The objective of IDeT-Sat is to monitor space debris and promote space sustainability by gathering data on space debris 1cm-10cm in size with stereovision cameras. To achieve this objective, two novel payload designs were proposed as potential solutions, with one design utilizing three cameras for data acquisition accuracy while the other only employing two cameras for system simplicity and practicality. The satellite bus, with subsystems including Attitude Determination and Control System (ADCS), Structural System, On-board Data Handling System (OBDH), Electric Power System (EPS), and Telecommunication, Tracking and Control System (TT&C) were also developed in-house by the student team for the mission. An engineering model of the satellite has been constructed, and testing on it is currently ongoing. For the three-camera payload design, a critical design flaw has been spotted. Several mitigation measures have been implemented, but they were found to have negative impacts on system reliability. For the two-camera payload design, its function of debris identification has been tested and verified. For other satellite subsystems, most testing has been completed and received positive results, with others still ongoing. This paper will summarize and discuss the achievements and failures during the development of IDeT-Sat, as well as potential improvements that can be made for similar student projects in the future.