

52nd IAF STUDENT CONFERENCE (E2)
Student Team Competition (3-GTS.4)

Author: Mr. Kevin Wibowo
Delft University of Technology (TU Delft), The Netherlands, The Netherlands

Ms. Kim Regnerij
TU Delft, The Netherlands
Mr. Nicolas Oidtmann
Delft University of Technology (TU Delft), The Netherlands
Mr. Pepijn Jeukens
TU Delft, The Netherlands
Mr. Mehrdad Mihankhah
TU Delft, The Netherlands
Mr. Michael Boutros
Delft University of Technology (TU Delft), The Netherlands
Dr. Stefano Speretta
Delft University of Technology (TU Delft), The Netherlands
Mr. Mehmet Şevket Uludağ
Delft University of Technology (TU Delft), The Netherlands

DA VINCI SATELLITE – ELEVATING EDUCATION

Abstract

The Da Vinci Satellite is a 2U CubeSatellite that is being developed with the goal to inspire and enthuse the youth to learn more about technology and space travel. The team at Delft University of Technology consists of over 80 Bachelor and Master students from disciplines such as Aerospace Engineering, Computer Science, Electrical Engineering and Applied Physics. There are also multiple Precision Engineers part of the team, that have joined from another school in the Netherlands.

Through working on the satellite and educational modules, the multidisciplinary team focusses on demystifying space and making it a fun and engaging subject for children in primary schools and high schools. That is why the satellite harbours two novel custom-made payloads on board; the Dice Payload and the Bit Flip Payload.

The Dice Payload consists of a small chamber with five small aluminium dice of different colours, which will be used by primary school children. In collaboration with the LIS, which is a school for precision engineers, a special mechanism has been designed to ‘roll the dice’ in microgravity and clamp them such that a picture of the numbers can be taken with the Earth as a backdrop. After the design, manufacturing, and assembly of the parts, the payload underwent a series of tests. These tests have included multiple 0g flight tests and a vibration test. Through the extensive testing, there have been iterative design changes to improve the payload’s overall performance and design.

The second payload of the Da Vinci Satellite is the Bit Flip Payload. This novel payload recently has been tested in a proton accelerator facility at the Paul Scherrer Institute. This subsystem is a stack of PCB’s with SRAM that has been designed for high school students. High school students can send

a picture of themselves to the satellite where the data will be stored on the SRAMs. Because of the radiation environment in LEO and the susceptibility of the memory, bitflips will occur. These changes in the information from a 1 to a 0 (or the other way around), will result in the information of the picture being changed. When the picture has been compressed using a compression algorithm such as GIF, JPEG, or PNG interesting effects can occur. Once the student will receive the altered picture, they will be able to compare it with the original and learn about space, radiation, compression algorithms, and electronics.