Structural 3D analysis of an inflatable heatshield, using an integrated fibre optical sensor network

We are looking for two motivated Electromechanics or Electronics-ICT master students.

Project description

The Aether Student CubeSat team brings together young Belgian engineers who are passionate about space technology. We are designing a CubeSat: a nano-satellite small enough to hold in your hand. In the past decade, the CubeSat standard has enabled countless new innovations in the space industry, and we are determined to uphold this tradition!

Aether is focusing on the area of re-entry: creating the technology that will allow future CubeSats to safely re-enter the atmosphere and land on Earth after carrying out their experiments in orbit. This will allow scientists to analyze samples and get even more results out of their experiments, and all this with the affordability and accessibility that come with the CubeSat platform!

Thesis description

During re-entry, the CubeSat needs protection for the vital elements aboard. In order to do this, a dedicated heat shield is necessary which will deploy during the re-entry phase. The used setup of this heat shield is under study. One thing is obvious: the shape of the heat shield has to protect the CubeSat in the most optimal way. To achieve this goal, this thesis aims at further investigation and modelling the shape of the heat shield in the frame of Fiber Bragg Gratings. Currently, a dedicated distributed optical sensor network (using Fiber Bragg Gratings) is designed. This setup enables the monitoring of the shape of the heat shield in a detailed way. Unfortunately, the shape of this heat shield is a complex thing. The design of an interactive 3D model, able to simulate the behaviour of aerodynamic forces would help the team in predicting the re-entry trajectory.

Thesis objective

The goal is to design a structural 3D model of the inflatable heat shield itself. This model should allow the simulation of aerodynamic forces, acting on the heat shield during re-entry. Using the existing Fiber Bragg Grating setup, will allow to visualize the shape of a heat shield during a CubeSat re-entry. The 3D design model will include an interactive simulation environment in which aerodynamic forces can be simulated.

Profile

- 3D modelling
- Data readout and visualization
- Aerodynamic modelling

What do you gain?

- A unique engineering experience within an exciting space mission.
- Create added value for your CV and the team.
- A team of students willing to help in any way possible.
- Be part of the team that will revolutionize the CubeSat platform.
- Connection to a wide network of aerospace companies

If you are interested? Please contact us at recruitment@aetherspace.be .
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