

Heat flux sensor for reusable re-entry vehicle

Company: Space Forge Ltd (<https://spaceforge.co.uk>)

Project open to: Final year undergraduate and Masters students

Application closing date: 1st June 2021

Expected duration of project: 2-6 months (longer if part time)

Latest start date: Beginning of October 2021

Application link: <https://forms.gle/tMUu35aEr5WMxue38>

Organisation description

Space Forge Ltd is a UK start-up that is looking to lead the clean industrial revolution by harnessing space. We are developing fully reusable satellites, known as ForgeStars, that are designed for manufacturing next generation super materials in space for return to Earth to be used to help move to low carbon technologies. Space Forge is based in Cardiff, Wales and has a rapidly growing team who are focused on transforming the way we return to Earth.

Project description

Our ForgeStars are small satellites that will be capable of returning to Earth independently, without the need for a shuttle or separating stages. They have a completely new type of heat shield technology that we have been developing in secret for a number of years now.

This new type of heat shield is expected to experience significantly lower levels of heating than previous designs, making them easier to re-use. However in order to improve our design over many flights we would be aided by designing sensors that can measure the incident heat flux during re-entry at various locations around the shield. Such sensors today are bulky, expensive and not well suited to our new design.

Therefore this project is about starting from the drawing board on new ways of building heat flux sensors, to be able to make one that is smaller, cheaper and potentially reusable so we can fly them on all our future missions. We want students to research sensors flown on previous vehicles, identify technologies used, trade-off old & new approaches, design one suited for our vehicle and build/test a prototype if time allows.

This project will start with a meeting with our engineering team so you can understand the requirements and constraints for the sensor, and you will be given an interface specification (mounting, power, mass, operating temperature, etc) to work to. The team will help you learn about the conditions of re-entry and what the sensors will be used for. As you move through the key stages of the project (research, trade-off, design, prototype) there will be opportunities to present your findings to the team to get feedback and learn about real space engineering.

At the end of the program you will present to the team your final design and any test/simulations results you may have generated, as well as your conclusions & recommendations on how the design could be taken forward.

The work should be able to be carried out using the systems and software of the student's choosing. We will deliver requirements in pdf format, and any presentations delivered should be in pptx, or google slides format. A final report should be delivered using gdocs, openoffice or microsoft office formats.

Person specification

We are looking for students who are comfortable running a research and design project individually. Space Forge will be able to provide feedback at key points throughout the project, but the day to day activities will be set by you. We want people who are naturally curious and happy to learn the lessons of previous entry sensor designers, but be able to challenge historical assumptions about how something should be done. We expect someone studying a physics, electronics or aerospace degree would be best suited, but we are open to other backgrounds as well.