Test Development of the Software for
Educational Irish Research Satellite 1 (EIRSAT-1)

18 month funded M.Sc. by Research in the School of Physics under the supervision of Prof Lorraine Hanlon.

EIRSAT-1 is a 2-U (10cm x 10cm x 22cm, 2.2kg) CubeSat being developed in UCD as part of the European Space Agency (ESA) Fly Your Satellite! Programme. The payloads are a gamma ray detector, a materials thermal experiment, a prototype Antenna Deployment Mechanism and a satellite orientation control algorithm. It is currently being integrated and tested in UCD and at ESA facilities. It is the first spacecraft to be designed, built and operated wholly in and from Ireland and will be delivered to ESA for subsequent launch into low Earth orbit. EIRSAT-1 is a student led interdisciplinary project and comprises students at postgraduate level from Physics, Maths and Statistics, Mechanical and Materials Engineering, Electrical and Electronic Engineering and Computer Science.

A crucial part of the project is the software which includes the On-Board Software (OBSW) and the Ground Segment (GS). The OBSW has been developed using the Bright Ascension Flight Software Development Kit (FSDK[1]) for the spacecraft and includes bespoke software/firmware for the payloads. The Ground Segment (GS) is under development and will be built and located in UCD. The ground station is physically located on the roof of the School of Physics and the ground segment comprises the software to control the antenna, send and receive data, and archive all payload and housekeeping information during the mission.

This M.Sc. project is focused on testing all aspects of the software in the OBSW and GS systems and will require developing a detailed understanding of the FSDK, the operational modes of the spacecraft, the payload functionality, and the communications capabilities of the satellite. It will also require developing an understanding of the ground segment in order to ensure that the entire system functions as designed.

The first step of the M.Sc. project will be to review all requirements of the EIRSAT-1 mission, so that the operations and software design can be understood.

There are three objectives in this M.Sc. listed here in order of priority:

1) To work closely with the full software team to develop a process to extensively test all aspects of the OBSW. This will include unit tests of individual software components, integration tests with real flight hardware-in-the-loop and full mission tests (i.e. day-in-the-life-of tests).

[1] https://www.brightascension.com/products/flight-software/

2) The second objective is to design an automated suite of tests for the OBSW. The purpose of this effort is to generate a robust and automated suite of tests that determine the system is functioning according to requirements.
3) The final objective is to contribute to testing and verification of the integration of the OBSW and GS.

Applicants are expected to:

- Possess a 2.1 or 1st honours degree in Physics.
- Have a keen interest in Space.
- Have demonstrably excellent technical and software development skills.
- Have knowledge of, or a keen interest in learning: C, Python, Git, Unit and Integration Testing, Communications protocols.
- Be enthusiastic and committed to the project, and willing to work on a team.

The start date is January 2020. A stipend of €16,000 per annum is offered, with EU fees paid. The successful candidate will be required to demonstrate in the School of Physics at a maximum load of 72 hours per annum and also take the Teaching and Learning 5 credit module in the School of Physics if they have not done so already.

Applicants should submit a curriculum vitae and cover letter by Monday 20th January (5pm) to sheila.mcbreen@ucd.ie. The email subject should include “EIRSAT-1 MSc Application”.