Training Opportunity for Irish Trainees

Reference	Title	Duty Station
IE-2019-SCI-ODS	**Prototype a scheduling tool for instrument operations of the Solar Orbiter Mission**	**ESAC**

Overview of the unit's mission:

Solar Orbiter is a mission in development, dedicated to solar and heliospheric physics. Its goal is to study the development of planets and the emergence of life, how the Solar System works, the origins of the Universe, and the fundamental physics at work in the Universe (see http://sci.esa.int/solar-orbiter/). The Solar Orbiter Science Operation Center at ESAC in Spain is responsible for the handling the instruments on board of the spacecraft and planning the scientific observations.

Overview of the field of activity proposed:

The Science Operation Center (SOC) for the Solar Orbiter mission (and commonly every SOC for a planetary or heliophysics mission) is responsible for verifying that the science operation plan agreed with the on-board instrument teams is feasible. Do to this, the ESAC personnel uses software tools that allow to schedule a complex sequence of observations with the on-board instruments according to their respective constraints, and within the resources and constraints of the spacecraft and mission operations.

ESA's European Space Astronomy Centre (ESAC) has already ad-hoc tools available for this purpose which involve, among other matters, simulating the spacecraft platform and instruments as state machines to verify that the operations resulting from the sequence of commands uploaded are within the science operations parameters agreed beforehand. The current tools have been used already by a variety of ESA Solar System science missions but, being legacy tools, they present substantial challenges with regards to software-maintenance and evolution to on-going mission needs. We want to understand whether these tools can be update/upgraded or replaced, and if so, at which cost. A successful feasibility study demonstrated that using a modern discrete event simulator framework (OMNet++) might be an improvement.

The work proposed during this traineeship covers the production of a prototype software system to replace existing component of the existing tool. In particular, replacing the part used to process instrument operations requests and check the resulting payload operations requests with respect to mission constraints. In practice, the prototype will be evaluated against the short-term planning cycle activities carried out by the Solar Orbiter SOC.

The trainee will work under the responsibility of the technical manager of the existing scheduling tool, interacting in the day-to-day work with the Solar Orbiter team.

Required education:

Master degree in engineering, preferably with extensive experience in programming and/or software development