

# Marie Sklodowska-Curie Early Stage Researcher

Department	Mechanical and Aerospace Engineering ( <a href="http://www.strath.ac.uk/mae/">www.strath.ac.uk/mae/</a> )		
Faculty	Faculty of Engineering ( <a href="http://www.strath.ac.uk/engineering/">www.strath.ac.uk/engineering/</a> )		
Staff Category	Research	Reference No	186997
Reports To	Head of Department through Prof M. Vasile	Grade:	N/A - MC Fellowship
Salary Range:	Circa £39,811 - £41,678 per annum including allowances*	Contract Type:	Fixed Term (36 months)
FTE	1 (full-time)	Closing Date	30/04/2019

## Job Advert

Within the STARDUST-R Marie Curie Research Training Network, a Marie Sklodowska-Curie Early Stage Researcher position is available for a fixed term period of three years to work on a project entitled "Intelligent Uncertainty Treatment in Orbital Mechanics". This work relating to the development of methods and tools for uncertainty quantification and optimal control under uncertainty, the development of an AI-based tool in support of space traffic management and future satellite operations, the development of solutions to increase the resilience of the space environment, the definition of optimal strategies for collision avoidance and disposal of space debris and the deflection of asteroids, the improvement of our prediction capabilities and better manage high risk rare events. The successful applicant will work in a multi-disciplinary team with members of the Department and their partners in the STARDUST-R Marie Sklodowska-Curie Research Training Network. For further information on STARDUST-R, please see <http://www.stardust-network.eu/>

Applicants will be required to meet the Marie Sklodowska-Curie Early Stage Researcher eligibility criteria. In particular, at the time of appointment they should be within the first four years of their research career, have not been awarded a doctoral degree, and should not have resided in the host country for more than 12 months in the last three years immediately before the appointment. Researchers are normally required to undertake trans-national mobility (i.e. move from one country to another) when taking up the appointment. For a more detailed summary of the eligibility criteria see <http://www.stardust-network.eu/>

\*The successful candidate will receive a financial package consisting of a living allowance, a family allowance (where applicable) and a mobility allowance, according to the rules for Early Stage Researchers (ESRs). The minimum annual salary will be approximately £39,811 per annum.

## Job Description

### Brief Outline of Job:

The publication of the IAA Cosmic Study on STM 2006<sup>1</sup> defined Space traffic management (STM) as: "the set of technical and regulatory provisions for promoting safe access into outer space, operations in outer space and return from outer space to Earth free from physical or radio-frequency interference." This led to the subsequent creation of the Space Debris Mitigation Guidelines of UNCOUPOS of 2008<sup>2</sup> and the ISO 24113:2011 Space Systems - Space Debris Mitigation standards. These standards are necessary

<sup>1</sup> Contant-Jorgenson, Lála, Schrogl, The IAA Cosmic Study on Space Traffic Management, 2006

<sup>2</sup> United Nations Office for Outer Space Affairs, Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space, 2013

but not sufficient to reduce the risk of collisions. A viable STM program faces a great barrier caused by the ever-increasing number and variety of orbiting objects ranging in size from a few microns to several meters and the planned future large constellations. In addition, most debris objects cannot be tracked and motion cannot be accurately measured or simulated. The current two line element (TLE) sets and associated processes used for disseminating data about space debris are not adequate for precision conjunction analysis or accurate long term prediction<sup>3</sup>. In order to ensure that the space environment is resilient to anomalies and catastrophic events and its exploitation is sustainable a comprehensive STM system must be implemented, integrating improved space situational awareness (SSA), long term orbit prediction, debris removal, re-entry risk assessment and new tools to support space operators.

This position will focus on the combination of computational intelligence techniques with rigorous mathematical modelling for the treatment of uncertainty and the use of artificial and computational intelligence techniques to support Space Traffic Management and Planetary Defence. The major tasks will consist in the development of computational intelligence techniques to quantify the probability of rare, high risk events, correlate spatially and temporally distant events and study the global sustainability and resilience of the space environment. Furthermore, the successful candidate will develop the concept of Space Traffic Management and the related technologies required to detect and avoid collisions increase the resilience of the space environment and implement preventive actions including active and passive disposal with particular focus on future large constellations.

### Main Activities/Responsibilities:

1.	Develop computational intelligence techniques for the identification and correlation of anomalies and high risk rare events.
2.	Develop methods to optimise the resilience of the space environment to catastrophic events in high traffic regimes.
3.	Develop computational efficient techniques to calculate impact and collision probabilities under mixed aleatory/epistemic uncertainty.
4.	Develop methods for optimal collision/impact avoidance and disposal manoeuvres, under uncertainty.
5.	Plan and manage own workload in order to conduct research both independently and collaboratively per project requirements, refining the work programme as necessary in conjunction with the supervisor. This will involve regular communication with other project researchers in the Network.
6.	Produce regular project reports and present these at project meetings.
7.	Disseminate research results through journal and conference papers.
8.	Develop and implement outreach activities.
9.	Attend training events and complete training activities organised by the Stardust-R network.
10.	Engage with the scientific community and collaborate with other scholars within and outside the Stardust-R network.

## Person Specification

### Educational and/or Professional Qualifications

(E=Essential, i.e. a candidate must meet all essential criteria to be considered for selection, D=Desirable)

E1 Good honours degree

E2 MEng, MSc (or equivalent professional experience) in engineering, applied mathematics, or computer science.

### Experience

E3 Research experience in Computational and/or Artificial Intelligence

E4 Research experience in Orbital Mechanics

D1 Research experience in Uncertainty Quantification and Propagation

E5 Experience in algorithm development and analysis

D2 Experience with the design, implementation, deployment and maintenance of software systems using appropriate software engineering methods

<sup>3</sup> Kaplan, An Integrated Approach to Orbital Debris Research and Management., 2014

---

## Job Related Skills and Achievements

E6 Computer programming ability in C++/Matlab/ Python in a Linux environment

E7 Ability to plan and organise own workload effectively

E8 Excellent interpersonal and communication skills, with the ability to listen, engage and persuade, and to present complex information in an accessible way to a range of audiences (it is essential that the researcher is able to produce reports on results/deliver presentations in English).

D3 Ability to engage with the general public and stakeholders

## Personal Attributes

E9 Ability to work both independently and as part of a team

E10 Confident with enthusiasm for the project

## Other Relevant Factors

E11 Meets Marie Curie Eligibility Criteria: In particular, at the time of appointment applicants should be within the first four years of research career, not been awarded a doctoral degree and should not have resided in the host country for more than 12 months in the last three years immediately before the appointment

---

## Application Procedure

Applicants are required to complete an application form including the name of three referees who will be contacted before interview without permission, unless you indicate that you would prefer otherwise. Applicants should also submit a Curriculum Vitae and a covering letter as a single document detailing the knowledge, skills and experience you think make you the right candidate for the job together with copies of transcripts and certificates in English and two reference letters. A template CV is available from <http://www.stardust-network.eu/about/jobs/>. Applicants should confirm within their covering letter the length of time they have resided in the host country in the last three years before 1 October 2019. Applicants should also complete the Equal Opportunities Monitoring Form.

## Other Information

Further information on the application process and working at Strathclyde can be found on our website (<http://www.strath.ac.uk/hr/workforus>).

Informal enquiries about the post can be directed to Prof Massimiliano Vasile, Department of Mechanical and Aerospace Engineering (info@Stardust-R.eu / 0141 548 2326).

### Rewards and Benefits

Our staff have access to a wide range of outstanding benefits that include financial rewards, family friendly and wellbeing benefits and career development opportunities, details of which can be found [here](#).

### Conditions of Employment

Conditions of employment relating to the Research staff category can be found at: [Conditions of Employment](#)

### Probation

Where applicable, the successful applicant will be required to serve a 9 month probationary period.

### Pension

The successful applicant will be eligible to join the Universities' Superannuation Scheme. Further information regarding this scheme is available from [Payroll and Pensions](#).

### Relocation

Relocation expenses are covered via the Fellowship's mobility allowance.

### Interviews

Formal interviews for this post will be held on 15/05/2019.

### Equality and Diversity

We value diversity and welcome applications from all sections of the community.

The University currently holds a Bronze Athena SWAN award, recognising our commitment to advancing women's careers in science, technology, engineering, maths and medicine (STEMM) employment in academia.

## University Values

The University's Values capture what we're all about: who we are, what we believe in and what we stand for. [Our Values](#) have been derived from how we act and how we expect to be treated as part of Strathclyde.

