Job Title: Internal Research Fellow (PostDoc) in Advanced Mission Analysis

Requisition ID **11897** - Posted **03/12/2020**

EUROPEAN SPACE AGENCY

Research Fellowship Opportunity in the Directorate of Technical & Quality Manag.

ESA is an equal opportunity employer, committed to achieving diversity within the workforce and creating an inclusive working environment. For this purpose, we welcome applications from all qualified candidates irrespective of gender, sexual orientation, ethnicity, beliefs, age, disability or other characteristics. Applications from women are encouraged.

Post

Internal Research Fellow (PostDoc) in Advanced Mission Analysis
This post is classified F2.

Location

ESTEC, Noordwijk, The Netherlands

Our team and mission

This research fellowship will be carried out within ESA's Advanced Concepts Team (ACT) made up off research fellows (post-docs) and young graduates from a broad variety of academic fields aiming at an academic career. Its task is to monitor, perform and foster research on advanced space systems, innovative concepts and working methods. It interacts externally almost exclusively with academia and operates as a truly interdisciplinary team bound to high scientific standards. Via its research, the team acts as a pathfinder to exploring novel, potentially promising areas for ESA and the space sector, ranging from applied to basic fundamental research topics. An important task is communicating scientific trends and results as input to the Agency's strategic planning.

The team has been working on improving fundamental algorithms and methods to aid mission analysis since 2002, pioneering topics such as global optimisation for trajectory design, the application of differential algebra in orbital mechanics as well as asteroid deflection, autonomous on-orbit assembly, distributed control, active space debris removal, artificial neural networks for GNC and pose estimation. Candidates are invited to familiarise themselves with these projects and expand them into interesting new fields not yet covered.

Candidates are urged to acquaint themselves with the ACT's research (https://www.esa.int/act), in particular in mission analysis and the related open-source projects.

Field(s) of activities/research/learning areas

You will carry out research in advanced mission analysis, including the use of non-traditional guidance, navigation and control techniques. Areas of research are chosen partly by you based on your own expert judgements and insight into trends and developments and motivation, and partly by the team in line with the Agency's strategic directions.

On the scientific side, you will in particular:
• Propose and perform research in mission analysis, where appropriate together with ESA Member State universities (in particular through the Ariadna scheme www.esa.int/ariadna).
• Explore synergies between machine learning, artificial intelligence, artificial neural networks and the fundamentals of spaceflight mechanics, celestial mechanics and mission design.
• Further develop open-source software developed by the ACT and of use in advanced mission analysis: pygmo (optimisation), pykep (astrodynamics), pyaudi (differential algebra).
• Coordinate the team's participation in aerospace competitions including, but not limited to, the GTOC.
• Run competitions on proposed topics via ESA's Kelvins platform (https://kelvins.esa.int);

As ACT researcher, you will:
• Publish results in peer-reviewed publications and use modern tools to communicate with the broader audience inside and outside ESA;
• Lead and assist interdisciplinary projects with other ACT researchers;
• Participate together with the team in the assessment of proposed space system concepts - these not being restricted

to artificial intelligence and computer science - and propose new concepts and assessment studies;
• Perform or participate in assessments on subjects of strategic interest to ESA, and provide in-house expertise on strategy development.
• Benefit for your research from the technology and engineering expertise available at ESTEC.

Technical competencies

Knowledge relevant to the field of research
Research/publication record
Ability to conduct research autonomously
Breadth of exposure coming from past and/or current research/activities
General interest in space and space research
Ability to gather and share relevant information

Behavioural competencies

Innovation & Creativity
Continuous Learning
Communication
Self Motivation
Problem Solving
Teamwork

Education

You must have obtained:
• a degree in engineering, informatics, computer science or celestial mechanics.
• a PhD (completed before take-up of duty) in celestial mechanics or aerospace engineering, with the subject of the thesis being relevant to the tasks outlined above.

Additional requirements

• Ability and interest in prospective interdisciplinary research;
• Aptitude for contextualising specialised areas of research and quickly assessing their potential with respect to other domains and applications (rapid prototyping);
• Academic networking to add functioning links to universities and research institutes;
• Ability to work in a team, while being able to work individually on your own personal research plans and directions;
• Natural curiosity and a passion for new subjects and research areas;
• Proficiency in C++ and Python programming languages;
• Experience in open-source projects, GPU programming, distributed computing and cloud computing are considered strong assets.

Specificities

The position of Research Fellow at ESA's Advanced Concepts Team is similar to a regular academic post-doc placement, but with a few key differences:

1. ACT RFs have no teaching obligations. However, they are likely to be involved in the mentoring of Young Graduate Trainees and student interns (stagiaires) within the team.
2. As the team does not have a professor-like position, ACT RFs are academically more independent than most post-docs. This implies more freedom but also greater responsibility for their research directions and approaches.
3. ACT RFs join a diverse, changing and interdisciplinary research team embedded in a large space agency, in contrast to a more specialised, focused research group with close or similar competences.
4. ACT RFs need to actively reach out to other disciplines, to bring their competences to interdisciplinary research projects and encourage other researchers to join them in their core research projects (research at the intersections of disciplines).
5. ACT RFs need to communicate their expertise and research results internally and externally, including potential implications and importance for ESA's long-term strategy.

Other information

For behavioural competencies expected from ESA staff in general, please refer to the ESA Competency Framework.

The Agency may require applicants to undergo selection tests.

The closing date for applications is 5 January 2021.

In addition to your CV and your motivation letter, please add your proposal of no more than 5 pages outlining your proposed research in the "additional documents" field of the "application information" section.

At the Agency we value diversity and we welcome people with disabilities. Whenever possible, we seek to accommodate individuals with disabilities by providing the necessary support at the workplace. The Human Resources Department can also provide assistance during the recruitment process. If you would like to discuss this further please contact us at contact.human.resources@esa.int.

Please note that applications are only considered from nationals of one of the following States: Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, and the United Kingdom. Nationals from Latvia and Slovenia, as Associate Member States, or Canada as a Cooperating State, can apply as well as those from Bulgaria, Cyprus, Lithuania and Slovakia as European Cooperating States (ECS).
Priority will first be given to candidates from under-represented Member States.

In accordance with the European Space Agency’s security procedures and as part of the selection process, successful candidates will be required to undergo basic screening before appointment