Job Title: Internal Research Fellow (PostDoc) in Advanced Software Technologies

Requisition ID **8261** - Posted **21/12/2020**

EUROPEAN SPACE AGENCY

Research Fellowship Opportunity in the Directorate of Technology, Engineering and Quality.

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 Software Technologies
This post is classified F2.

Location

ESTEC, Noordwijk, The Netherlands

Description

The Software Systems Division deals with development techniques for ground and space systems. This covers all life-cycle aspects from requirements specification to development, verification, validation and maintenance. Within this Division, the Software Technology Section aims to explore the use of new technologies in the different areas. This covers several technologies and domains of application:

• Machine Learning (ML) techniques for verification, validation and maintenance based on the analysis of data captured during verification and validation tests or data available on board a spacecraft.
• Planning techniques to increase the on-board autonomy of spacecraft that are part of a telecommunication or Earth observation constellation.
• Model-Based System/Software Engineering to verify the correctness of the models that are used for the automatic generation of code.
Interested candidates are highly encouraged to visit the ESA website: www.esa.int

Field(s) of activities/research

The Research Fellow (RF) will be assigned to consolidating research and applying a new technology in one of the following topics. Each topic can be consolidated with respect to the profile and experience of the candidate.

Machine Learning: preventive maintenance

On this topic, the objective of the RF project is to study the state of the art of machine learning and data mining algorithms that would make it possible to detect anomalies in the data recorded during the verification and validation of space systems and apply the most appropriate one to a set of representative (or real) time series. The anomalies to detect include regressions with respect to previous execution of the tests, sporadic behaviours as well as identification of trends that could lead to anomalies through automatic and exhaustive analysis of test results and system of systems environment data.

Planning: Autonomous operations

On this topic, the objective of the RF project is to study the state of the art of planning algorithms that would support on-board autonomous operations of a telecommunication or Earth observation constellation. The autonomy concepts shall be implemented on board the spacecraft of the constellation in order to manage high-level requests (objectives and constraints) sent from Ground. The overall planning is distributed among all spacecraft to ensure the highest availability (telecommunication) or the highest reactivity (Earth observation) of the mission.

Model-Based System/Software Engineering: Model Checking

On this topic, the objective of the RF project is to study the state of the art of formal verification, in order to develop and integrate model-checking techniques into ESA's Model-Based development framework (TASTE, check https://taste.tools) and to demonstrate them. The approach relies on the joint use of formal modelling languages (SDL, MSC, ASN.1) and constrained programming languages such as Spark/Ada. The RF shall assess the possibility to reuse existing languages and tools (e.g. Promela/Spin, Uppaal, BIP, IF) and define a realistic engineering work plan to design, implement and put together the tools needed for the introduction of model-checking into the TASTE framework.

Technical competencies

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

Behavioural competencies

Innovation & Creativity
Continuous Learning
Relationship Management
Self Motivation
Communication
Problem Solving
Cross-Cultural Sensitivity

Education

Applicants should have recently completed, or be close to completing, a PhD in computer science, modelling methods, or systems (requirements) engineering. Preference will be given to candidates awarded their doctorate within past five years.

Additional requirements

The working languages of the Agency are English and French. A good knowledge of one of these is required. Knowledge of another Member State language would be an asset.

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 01 February 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