Job Title: Internal Research Fellow (PostDoc) in Advanced Onboard Image Processing and Computational Imaging

Req ID **9128** - Posted **19/06/2020**

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. Applications from women are encouraged.

Post
Internal Research Fellow (PostDoc) in Advanced Onboard Image Processing and Computational Imaging
This post is classified F2.

Location
ESTEC, Noordwijk, The Netherlands

Description
This position is located in the RF Digital Equipment & Payload Data Processing Section of the RF Payloads & Technology Division. This research position will focus on advanced onboard image processing and computational imaging techniques allowing new imaging concepts and improved satellite autonomy.

The Division is responsible for RF payloads, instruments and technologies for space and ground applications, including all equipment having an RF space/ ground interface and its associated laboratories. It supports the definition, specification and development/procurement of laboratories for ESA projects and technology programmes or for external customers.

The Section provides functional support to ESA projects and carries out technological research (R&D) in the fields of RF digital equipment and building-blocks, onboard data processing, image and signal processing approaches, related designs and processing devices.

Field(s) of activity/research
Over the past decade, rapid developments in digital technologies and in our capability to monitor our planet from space with Earth observation satellites have enabled unprecedented monitoring of the terrestrial environment, bringing new and huge opportunities for science and businesses.

Accordingly, classic paradigms for EO space missions are evolving in order to respond to new challenges such as permanent coverage, rapid product generation, direct delivery of added-value information, end-to-end image quality optimisation and satellite tasking autonomy. Good examples of this evolution are the numerous emerging NewSpace EO satellite constellations developed by private companies such as Planet, Satellogic, BlackSky, Reaktor, UrtheCast, Earth-I, QianSheng. To achieve their goals in practice, these cost-effective missions are extensively relying on innovative techniques powered by increased onboard processing capabilities, which also allow new imaging concepts and improved satellite autonomy.

This Research Fellowship will monitor, perform and foster research in some of the most advanced methods in computational imaging, involving novel distribution of the onboard and on-ground processing functions.

Recent developments arising from the field of Artificial Intelligence are also expected to contribute extensively to these research activities. The specific areas selected will be based on your fields of expertise, while following the Agency's strategic direction, in particular in Earth observation.

The main fields of research are expected to be focused on the image processing required for:
- super-resolution
- active optics (for deformable, segmented, deployable mirrors and active optical zooms)

- innovative acquisition modes (e.g. digitally stabilized push-frame and stabilized digital TDI)
- feature/information extraction and AI-powered selective data reduction
- end-to-end image quality & image restoration
- onboard photogrammetry: 3D digital surface modelling (stereo imaging, video)
- light field imagery (and related use of super-resolution, wave-front analysis and 3D modelling)
- autonomous onboard image-quality (for commissioning, calibration and acquisition phases).
- synthetic optical aperture
- coded aperture
- neuromorphic imaging
- compressive sensing.

Additional tasks related to this are in particular:

- proposing and performing novel research in the field of advanced onboard image processing and computational imaging, where appropriate together with universities in ESA Member States;
- publishing results in peer-reviewed publications and using modern communication tools to engage with a broader audience inside and outside ESA;
- performing and participating in assessments of subjects of strategic interest to ESA, providing in-house expertise for strategy development;
- benefitting from the technology and engineering expertise available at ESTEC.

You will work closely with other staff from this Directorate, as well as from other ESA directorates involved in optical imaging payloads. A close collaboration is expected in particular with the Advanced Concepts Team (based at ESTEC – www.esa.int/act) and the Φ-lab (based at ESRIN - blogs.esa.int/philab/).

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

You should have recently completed, or be close to completing, a PhD in image processing/computer vision, electronics, optics, computer science, mathematics or physics, the subject of which should be relevant to the description of the tasks outlined above, and aim at an academic/research career.

Additional requirements

Solid background in image processing is expected. Experience in optoelectronic systems, computer vision, optics, computational imagery, artificial intelligence or data science is considered a strong asset.
Solid programming skills in Python, Matlab, C++ and/or other high-level programming languages.
Preference will be given to candidates awarded their doctorate within the last five years.

Other requirements are:

- 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;
- academic networking to add functioning links to universities and research institutes;
- ability to work in a team, and also individually on personal research plans and directions;
- natural curiosity and a passion for new subjects and research areas.

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 31 July 2020.

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.

If you require support with your application due to a disability, please email 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 Slovenia, as an Associate Member, or Canada as a Cooperating State, can apply as well as those from Bulgaria, Cyprus, Latvia, 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