EUROPEAN SPACE AGENCY

SFR Fetching System Robotics Engineer

Job Req ID: 15109
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Vacancy Type: Permanent
Date Posted: 29 March 2022

Vacancy 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. We therefore welcome applications from all qualified candidates irrespective of gender, sexual orientation, ethnicity, beliefs, age, disability or other characteristics. Applications from women are encouraged.

This post is classified A2-A4 on the Coordinated Organisations' salary scale.

Location
ESTEC, Noordwijk, Netherlands

Description
The Sample Fetch Rover (SFR) is one of ESA's contributions to the joint NASA-ESA Mars Sample Return campaign, which aims to return the first set of Martian samples to Earth in the early-2030 timeframe, with a series of interconnected missions. The SFR will have fast and long traverse capabilities in order to collect and store the individual sample tubes, already prepared by the NASA Perseverance Rover, and safely transport them back to the Sample Return Lander. SFR will carry a novel, sophisticated robotic payload, namely the SFR Fetching System, equipped with computer vision for the autonomous detection of the sample tubes on the Martian surface, and a dexterous robotic arm and gripper for the autonomous pick-up, manipulation and storage of the samples. The SFR Rover has just entered phase B2/C/D of development, with the goal being delivery of the flight model in 2026.

As SFR Fetching System Robotics Engineer, you will be integrated support from the Automation and Robotics Section, Mechatronics and Optics Division, Mechanical Department, Directorate of Technology, Engineering and Quality and you will report hierarchically to the SFR Fetching System Team Leader, in the SFR Project Team, Mars Exploration Group, Directorate of Human and Robotic Exploration Programmes.

Duties
As SFR Fetching System Robotics Engineer ("FSRE"), you will provide support to the SFR Fetching System (FS) Team Leader with regard to the timely development and delivery of the FS hardware and related software, in accordance with the approved technical and programmatic budgets, requirements and interfaces, and you will work in close cooperation with the Fetching System Functional System Engineer ("FSE"). As FSRE, you will be the technical focal point for all the engineering activities related to the Fetching System robotics, and will follow up the procurement of specific subsystems. It should be noted that the two particularly

challenging technical areas of the development are: i) the autonomous management of contacts, where the control engineering architecture will include hybrid force-position control; and ii) the autonomous detection of tubes on the Martian surface by means of computer vision.

Duties Continued

Within the project guidelines and constraints, your areas of responsibility will include:

- Monitoring the prime contractor activities with respect to the development and verification of the SFR Arm-Gripper System (AGS). The AGS comprises the Robotic Arm, Gripper, Re-Grip Bracket and Hold-Down and Release Mechanism. You will monitor the technical progress and schedule at all stages of development of the AGS, including integration, testing and final acceptance on the SFR models and the PFM.
- Supporting definition of the AGS motion control architecture and monitoring all related control engineering activities.
- Supporting all stages of the development of the computer vision algorithms for the Visual Based Detection Software (VBDS) for the autonomous detection of the sample tubes on the surface of Mars.
- Supporting and monitoring all the stages of development of the robotics related algorithms of the Arm- Gripper control software and the Arm Management software.
- Monitoring the definition and execution of FS robotics calibration procedures by the prime contractor during development and AIT.
- Supporting the FS Functional System engineering and the SFR Assembly Integration and Verification Engineer in the monitoring of end-to-end functional verification of the complete FS.
- Supporting the SFR Engineering Team in monitoring the development and verification of the Motion Control Electronics (MCE) that will drive the AGS. You will monitor the proper flow of performance and interface requirements from AGS to MCE and vice-versa.
- Ensuring, in coordination with the rest of the FS Team, that the system level requirements are properly flown down to the Fetching System and their interfaces, and that the corresponding requirements are properly documented and controlled.
- Supporting the SFR-JPL Interface System Engineer with the coordination and conduct of the technical exchanges between the European industrial prime and NASA/JPL.
- Supporting the Functional System Engineer and Surface Operations Engineer regarding FS-related operational aspects.
- Ensuring that technical and programmatic issues are identified, reported, and resolved in a timely and, as far as practicable, autonomous manner.
- Monitoring, controlling, and reporting on the technical progress and milestones of the industrial work in your area of responsibility.
- Working in close cooperation with the SFR Engineering Team on the specification, implementation and verification of the SFR Fetching System interfaces.
- Liaising with the SFR Product Assurance Manager to ensure that proper PA practices are followed throughout the development in your areas of responsibility;
- Participating in Tender Evaluation Boards and Project Reviews as required.
- Participating in technical workshops and co-engineering meetings with prime/subcontractors or JPL as needed throughout the project lifecycle.
- Providing support to other areas of the project where your experience can be applied.

In carrying out these tasks, you will be responsible for identifying and coordinating the specialist engineering support provided by D/TEC during development and in relation to the formal review milestones by:

- defining and communicating clear tasks and objectives;
- promoting an effective work environment by encouraging cooperation and collaboration within the team and with the various project interfaces;
- participating in periodic meetings with the parent division and contributing to the transfer of technical knowledge and lessons learned across the Agency.

Technical competencies
ESA space systems procurement, development and verification processes and standards (incl. code of best practices and project reviews)
Experience in space automation and robotics systems engineering
Knowledge of cost and schedule aspects related to area of responsibility
Knowledge of human and robotic exploration programmes

Behavioural competencies
Result Orientation
Operational Efficiency
Fostering Cooperation
Relationship Management
Continuous Improvement
Forward Thinking

Education
A master's degree or PhD in robotics/mechatronics engineering or a closely related discipline is required.

Additional requirements
Experience in computer vision, robotic arm kinematics and dynamics, control engineering, force/torque control, contact-based robotic manipulation and robotic arm calibration.
- Basic systems engineering skills as a minimum.
- Any experience in flight project development will be considered an asset.
- A strong aptitude for relationship management as well as good communication skills. The post requires a results-oriented approach to working in a highly complex project environment.
- A strong ability to plan and organise tasks.
- A strong capacity to work independently and have ownership and accountability of the area of responsibility.
- Excellent verbal and written communication skills, including the ability to deliver focused and concise management reports and presentations.
- A team-oriented attitude, good interpersonal skills and the ability to work effectively in a multi-disciplinary environment.
- The ability to develop and acquire new skills as needed for the post.

Other information
For behavioural competencies expected from ESA staff in general, please refer to the ESA Competency Framework.
For further information please visit: Professionals, What we offer and FAQ

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.

The Agency may require applicants to undergo selection tests.

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
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, the United Kingdom and Canada, Latvia, Lithuania and Slovenia.

According to the ESA Convention, the recruitment of staff must take into account an adequate distribution of posts among nationals of the ESA Member States*. When short-listing for an interview, priority will first be given to internal candidates and secondly to external candidates from under-represented or balanced Member States*. (https://esamultimedia.esa.int/docs/careers/NationalityTargets.pdf)

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 conducted by an external background screening service.

Recruitment will normally be at the first grade in the band (A2); however, if the candidate selected has little or no experience, the position may be filled at A1 level.
*Member States, Associate Members or Cooperating States.