Polish Space Agency

Training Opportunity for Polish National Trainees

Reference	Title	Duty Station
PL-2023-HRE-E	**Exploration Robotics with Spaceship Initiatives and LUNA Facility**	**EAC, Cologne**

Overview of the mission:

The Directorate of Human and Robotic Exploration is the main ESA entity in charge of supporting and coordinating efforts towards the current and the future endeavours of human spaceflight. The exploration activities are part of the strategic plans in securing a central role for Europe with respect to the global initiatives. The European Exploration Envelope Programme (E3P) is integrating the ESA activities in this field to ensure a single exploration process. The strategy includes three destinations where humans will work with robots to gather new knowledge: Low Earth Orbit (LEO), the Moon, and Mars.

The “Spaceship EAC” initiative is investigating low Technology Readiness Level (TRL) technologies for supporting the future cislunar space mission as well as surface activities on the Moon as part of the Exploration Preparation, Research and Technology (ExPeRT) team. This multidisciplinary, innovation-driven team composed by researchers, graduate and undergraduate students is based at the ESA European Astronaut Centre (EAC). The mission statement of “Spaceship EAC” is centred on three main pillars: enhance, enable and inspire. The founding idea behind this initiative is indeed to enhance the capabilities of EAC via exploiting the spaceflight experience of the centre to develop and validate new operational concepts and valuable technologies in support of lunar human exploration scenarios.

In the past at EAC we have been involved in a number of robotic precursor activities, such as Meteron, MARVIN, Supvis-M and ANALOG-1 – activities where human robotic cooperation is critical to achieving a successful mission outcome. As exploration evolves beyond ISS missions to the lunar surface and beyond, EAC is aiming to prepare itself for further robotic cooperation (cobotics) activities in the future. Towards that end, a joint facility between DLR and ESA named LUNA is planned to be built, which will provide an environment where these cobotic developments can be tested within an analogue environment. This facility will serve as a central hub for lunar exploration preparations at ESA and DLR. It features a 700 sqm lunar surface testbed, facilitating the development and validation of operational concepts, astronaut training, and technology demonstrations for Moon exploration.

Developing a general robotics capability based on commercial off the shelf (COTS) elements for this LUNA facility is envisaged. Such a capability would be able to support general test payloads, and support locomotion, positioning and remote teleoperation in support of ESA’s exploration programme. It is envisaged that this role will support the activities of the Spaceship Initiatives and the ongoing development of LUNA around this theme.

For more information on Spaceship EAC and some of the work we have been advancing, please look at the Spaceship EAC blog (Spaceship EAC – ESA – Exploration)

Candidates interested are encouraged to visit the ESA website: www.esa.int/ESA

Overview of the field of activity proposed:

As a Polish National Trainee, a number of activities are envisioned for you to participate in. These include:

Supporting the EAC and Spaceship teams in developing cobotics testing capability at the LUNA facility, specifically:

- Working on advancing Spaceship and ESA robotics projects that can be brought into and deployed at LUNA
- Where possible, reuse and enhance existing project infrastructure to support LUNA

Converting operational experience gained working on the robotics platform into robust documentation, to support end users within ESA and external parties

- Use best known industry standards to enhance the project, taking into account requirements and constraints such as scope, budget and location.
- Support the Spaceship Initiatives project and activities within the centre
- Liaise with the management team on related robotics activities within the centre, via meetings and discussions

Exploring educational and outreach possibilities for cobotics at the LUNA facility

Required education and skills:

- You should have just completed or be in the final year of your Master' s degree in a technical or scientific discipline.
- Good interpersonal and communication skills
- Ability to work in a multi-cultural environment, both independently and as part of a team
- Fluency in English and/or German, the working languages of the Agency
- Basic knowledge in Systems Engineering, Computer Systems or Mechanical Engineering is an asset.