EUROPEAN SPACE AGENCY

Intern in the XR-Lab

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Internship Opportunity in the Directorate of Human and Robotic Exploration Programmes.

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.

Location
EAC, Porz-Wahn, Germany

Our team and mission
Within the XR-Lab, the trainee will work with Virtual Reality tools for astronaut training. The potential usage of XR (Virtual Reality, Augmented Reality or Mixed Reality) and associated haptic devices at EAC are suitable for EVA, robotics, LUNA analogue facility and onboard ISS purposes requiring incremental preparation, prototyping and tests of tools helping the crew and ground support personal to design, prepare or complement space training. XR at EAC is also used in support of mission design for various missions (Low Earth Orbit, EL3 on the Moon, Gateway around the Moon or Mars). When used in weightlessness conditions, XR hardware and software necessitate specific research, modification, tests or ground up design to ensure full realism, functionality and robust tracking in Zero-G conditions.

Therefore, the XR-lab is looking for 2 candidates.

1. The first project is software based and intends to assess the benefit of Mixed Reality (MR) for the projects LUNA VR to transition to MR.
2. The second project will support the design, prototyping and test of a custom-made HMD (Head Mounted Display) specially developed to be used in microgravity conditions.

Both internships will be also focused on analyzing the current tools and XR-Lab on-going projects, complement them (Unreal Engine based) and create/modify relevant additional tools or models in close cooperation with the XR-Lab team.

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

Field(s) of activity/research for the traineeship

Topic 1
The first project is software based and intends to assess the benefit of Mixed Reality (MR) for the projects LUNA VR to transition to MR. LUNA VR is a Virtual Reality environment developed to support initially the architectural main choices and is now used to support the outfitting phase. LUNA VR allows also to get familiarized with the building to prepare a test campaign, assess lighting-dust or simulation conditions as well as simulate what and how the visitors can see within the building. This current position will support the usage of Mixed

Reality for LUNA to better support the addition of new equipment in the building, improve haptics and enhance the overall immersive experience. The project aims at deploying LUNA MR on Varjo XR-3 device.

Topic 2
As part of its mission to promote the use of immersive technologies in space, the EAC XR Lab is investigating key technologies that needs adaptation to weightlessness. For instance, most eXtended Reality (XR) devices relies on 6 degrees-of-freedom motion tracking, which in turn relies on sensing the gravity acceleration vector. Consequently, commercial off-the-shelf XR devices are known not to work onboard the International Space Station without heavy modifications.

The XR Lab proposes to improve on this status-quo by demonstrating a purely optical tracking technology. The goal is therefore to develop and integrate a low-latency optical tracking technology into a custom-made standalone VR headset.
This internship would deal with the refinement of an internal technology demonstrator.

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

Education
You must be enrolled at university for the entire duration of the internship. You should preferably be in your final or second to last year of a University course at master's level in a technical or scientific discipline.

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.
The topics listed in Section 2 above respectively require such educational knowledge as:

Topic 1
LUNA MR project:
- Knowledge and background in skills relating to VR/AR development or better MR
- Relevant programming capability in this area and with relevant tools (e.g. Unreal/Unity)
- Proficiency in the use of Microsoft Office
- Once the LUNA MR application to one or multiple project(s) has been implemented, the intern shall further interact with the rest of the XR team to best test the device with other VR/AR projects.

Topic 2
VR 0-G custom-made HMD project:
- Computer Vision software development
- Embedded systems design (UART and SPI interfaces)
- ARM-based software development
- Signal processing and Control Theory (Kalman filtering, digital filter design, sensor data fusion)
- In addition, knowledge related to XR middleware like Vulkan, OpenVR, and OpenXR are considered a plus.
- Prior development experience with Nvidia Jetson products is also desirable.

Other information

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

If you require support with your application due to a disability, please email contact.human.resources@esa.int.
Internships can take place remotely, on-site or partially on-site depending on the pandemic situation, and in line with the relevant Establishment's policy (e.g. possible Green Pass requirement) applicable at the time of starting the internship.

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, Lithuania and Slovenia, as Associate Member States, or Canada as a Cooperating State, can apply as well as those from Bulgaria, Cyprus and Slovakia as European Cooperating States (ECS).