Expression of Interest (EoI)

MSCA Postdoctoral Fellowships 2026

Host Institution: University of L'Aquila, Italy — Department of Engineering, Computer Science and Mathematics, Software Engineering Group, FrAmeLab laboratory

Project

`Intuitive Urban Discovery: Bridging Monumental History and Wearable AI via Agentic Smart Glasses.`

Hosting Information: University of L'Aquila (UnivAQ), Italy

Offer Deadline: July 10th, 2026
EU Research Framework: Horizon Europe - MSCA Postdoctoral Fellowships 2026
Country: Italy
City: L'Aquila

Organisation/Institute

Organisation: Software Engineering Research Group, University of L'Aquila, Italy
Department: DISIM - Department of Engineering, Computer Science, and Mathematics.
Potential Secondment: Multimedia and Information Technologies Laboratory (https://ltim.uib.es/) at the Universitat de les Illes Balears.

Contact Information

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Description

Project Title: Intuitive Urban Discovery: Bridging Monumental History and Wearable AI via Agentic Smart Glasses

Research Context & Motivation

Despite the proliferation of mobile applications for tourism, current digital tools often isolate users from their physical surroundings. The "Smart City" paradigm remains largely screen-bound, creating a "Digital Gap" between urban spaces and historical knowledge. This project addresses the critical challenge of **real-time urban semantic understanding** on energy-constrained wearable devices. Current XR systems rely on heavy cloud-offloading, raising significant privacy concerns and latency issues that disrupt the "flow" of urban exploration.

This research is urgently aligned with the **EU Digital Transition (2030 Digital Compass)**, which promotes human-centric, sovereign AI. By processing data locally via Small Language Models (SLMs), we reduce the carbon footprint of data centers, supporting the **EU**

Green Deal([2]). Furthermore, the project directly contributes to the **Europeana Strategy 2025–2030** [1] by making the "Common European Data Space for Cultural Heritage" accessible through immersive, hands-free interfaces. Enhancing the visibility of cultural monuments through AI-XR is not merely a technical goal but a social one: fostering European identity and sustainable "Slow Tourism" in post-pandemic urban centers.

Goal & Objectives

The primary ambition is to engineer a **Privacy-by-Design, On-Device Intelligence Framework** for smart glasses that enables seamless discovery of cultural heritage. Unlike generic AR, this system will provide "Context-Aware Immersion," where the environment itself acts as the interface.

The specific scientific objectives are:

1. **Develop Ultra-Lightweight Visual Grounding:** Design and optimize a Small Language Model (SLM) capable of performing monument identification and semantic retrieval within a 200mW power budget, utilizing 4-bit quantization [3] for deployment on edge-processors like the GAP9 or Snapdragon AR2.
2. **Engineer Spatially-Anchored "Pinned" Interaction:** Create an XR interface that utilizes Gaze-Duration-Triggering to anchor dynamic metadata "pins" on monuments [**?**], minimizing cognitive load through glanceable information architecture.
3. **Establish a Multimodal Feedback Loop:** Implement a local, voice-enabled conversational agent that allows users to perform "Deep Dive" queries about pinned objects, achieving sub-100ms latency for a natural dialogue experience without cloud reliance.

Research Method

This project adopts an **interdisciplinary, computational-experimental approach**.

- **Computational Phase:** We will utilize model distillation and pruning techniques to adapt LLMs into SLMs for smart glasses. We will benchmark these against the *TinyissimoYOLO* family for detection and *Gemini Nano* for retrieval, measuring efficiency per query as suggested by [2]. We will employ "Hardware-in-the-Loop" testing to measure energy efficiency per query.
- **HCI & Experimental Phase:** User-centric "City-Walk" trials will be conducted in L'Aquila. We will measure "Time-to-Information" and "Cognitive Overlay" using NASA-TLX scales to ensure the XR interface enhances rather than distracts from the urban experience.
- **Open Science Practices:** In adherence to MSCA mandates, we will release the **Urban Monument Dataset (UMD2026)**, containing energy-annotated 3D scans and semantic metadata. All framework plugins for Android XR will be published as Open Source on GitHub and Zenodo, ensuring the interoperability of European cultural data [1].

Technology & Infrastructure

The fellow will have full access to:

- The FrAmeLab and UnivAq equipment (workstations, Caliban High-Performance Computing Cluster)
- ACM/IEEE library archives
- Office space within the Information Engineering, Computer Science, and Mathematics Department (DISM).

Expected Output

As per our team policy, we will work together to publish on top journals (such as IEEE TSE, ACM TOSEM, JSS, IST) and in top conferences (such as ICSE, ICSA, ECSA, FSE, ASE, MODELS). The MSCA fellow will work in collaboration with the FrAmeLab team members. He/She will be mentioned as the first author in all those publications he/she will lead.

Proposing Research Group

The Software Engineering Research Group (SWEN) is recognized as one of the worldwide leaders in software engineering. Its members have been organizing and co-leading international conferences such as ICSA, ASE, ICPE, MODELS, and being active members of the organizing committee of conferences such as ICSE, ASE, FSE, MODELS, ICSA, ECSA, and others.

We ensure a supportive environment for career development.

- **Global Network:** Active participation in over ten Horizon Europe projects.
- **Infrastructure:** State-of-the-art facilities located in L'Aquila.
- **Mentorship:** Our supervisors have supervised tens of Ph.D. students and PostDocs, most of them holding a professorship or a practitioner position worldwide.

Our Support for Your Proposal

We don't just host you; we help you win. Candidates selected for this topic will receive:

- **MSCA Master Class:** A 1-day intensive workshop (July 2026) on proposal writing.
- **Expert Review:** One-to-one feedback from our scientists.

Candidate Requirements

- **Degree:** PhD in Computer Science, Software Engineering, or related disciplines. It must be obtained by Sept 9, 2026, and not earlier than Sept. 2018.
- **Publications:** A strong publication track record (e.g., high-impact journals and conferences)
- **Prior Knowledge:** Research focus on (Software Engineering or Software Architecture) and (Extended Reality or Mixed Reality or Smart Glasses) and (Sustainability or Energy consumption).
- **Language Proficiency:** Excellent command of spoken and written English, strong interpersonal skills, and the ability to work both independently and in a team.
- **Mobility Rule:** Compliance with the MSCA mobility rule. Among them, candidates must not have resided in Italy for more than 12 months in the 3 years before the deadline.

Interested?

Interested candidates should send the following to `henry.muccini@univaq.it` by **July 01, 2026** with subject "MSCA Postdoctoral Fellowships 2026":

1. A brief CV (max 2 pages).
2. A motivation letter (1 page) outlining research alignment.
3. A 1-page summary of your proposed research idea.

We look forward to building a winning proposal with you!

References

[1] Europeana Initiative: Strategy 2025-2030: A long-term vision for the common european data space for cultural heritage. Tech. rep. (2026), https://pro.europeana.eu/strategy-2030

[2] Verdecchia, R., et al.: A systematic review of green ai and sustainable software engineering. ACM Computing Surveys **55**(12) (2023)

[3] Zhang, Y., et al.: Ultra-efficient on-device object detection on ai-integrated smart glasses with tinyissimoyolo. arXiv preprint arXiv:2311.01057v3 (2026)