COMPUTER AND CONTROL ENGINEERING

XR for knowledge-exchange, education and training

Funded By	FONDAZIONE LINKS - LEADING INNOVATION & KNOWLEDGE FOR SOCIETY [P.iva/CF:11904960017] Ministero dell'Università e della Ricerca - MUR [P.iva/CF:96446770586]

Supervisor	LAMBERTI FABRIZIO - fabrizio.lamberti@polito.it

Contact	OSELLO ANNA - anna.osello@polito.it LAMBERTI FABRIZIO - fabrizio.lamberti@polito.it

Context of the research activity	Innovative XR tools to support knowledge-exchange, education and training Extended Reality (XR) technologies are becoming more and more commonplace, and demonstrated a relevant capability to improve people communication and knowledge-exchange. Sectors like Cultural Heritage, Urban Planning, Industry 4.0, Health, among others, are starting to take advantage of most recent XR-related systems and devices. Over a continuously evolving technology, made up of very different devices, processes, interfaces and necessary skills, many research opportunities arise thus to design and test new methodologies and tools able to produce an effective impact on the society, paving the way to innovative digital services. The candidate will be requested to explore these opportunities in coherence with the national digitalization strategies, in particular with PNRR missions M1C2 and M1C3.

Objectives	Despite their fast and continuous evolution, XR technologies present still relevant limitations that prevent them to become a mass-standard. For instance, Virtual Reality is still far by achieving a complete sense of immersion/presence and overcoming the sense of discomfort given by cybersickness, which can be particularly critical in any application and, particularly, in the perspective of knowledge-exchange, education and training. Limitations given by the hardware (resolution, framerate, etc.) do certainly play a role, but User Experience and perceived performance can also be enhanced by developing more advanced algorithms (e.g., simulation logics and mechanics), User Interfaces, etc. For what it regards Augmented/Mixed Reality, the integration of image-recognition and image-anchoring algorithms with 5G/6G mobile connections, e.g., still strives to become a smooth process (or at least to be perceived as such by the users). While some specific applications arose, the need to

	design new software frameworks capable to support upcoming services like is still concrete. Although, in some cases, findings obtained by experimenting with a given technology and/or with a particular task may generalize, in most of the cases results are specific to a given application domain. The goal of this research will be to explore the opportunities of creating usable, reliable and effective XR-based solutions that can work well in different sectors. The limitation of the various technologies will be investigated, and approaches to cope with them will be proposed, by exploring configurations that can satisfy the needs of the different stakeholders.

Skills and competencies for the development of the activity	Competences in the areas of XR solutions and their applications to sectors of interest for the proposal.