# XR SALENTO 2024


**Wednesday, 4 September 2024 - Saturday, 7 September 2024**

**Convitto Palmieri - Palmieri Boarding School**

# Scientific Programme

**Programme under construction.**
Here you can find the list of the open **Special Sessions**.

Special sessions have the main aim of creating a mini-workshop on a specific topic, where researchers working on the same issues can get to know each other, familiarize, exchange ideas and create cooperation.
Special Sessions are being developed by designated chairs.

If you, as an author, have a paper that could be included in one of these sessions, you may submit your paper selecting your favourite session. If the abstract is not selected for the session, it may be included in another part of the technical program.

To submit papers to the special session, follow the submission instructions for regular sessions, but remind to specify the special session to which the paper is directed.

If you are interested in organizing a special session, carefully follow the Guidelines available HERE.

# GENERAL TRACK

# SPECIAL SESSION #1: EXTENDED REALITY TO PROMOTE MENTAL HEALTH

Organized by: Giulia Brizzi, IRCCS Istituto Auxologico Italiano

Applications, protocols and trials that use Extended reality for prevention and intervention programs in the realm of mental health. Here might be included usability and user experience studies as well as randomized control trials, case studies or protocols.

# SPECIAL SESSION #2: MACHINE LEARNING TOOLS FOR ADAPTIVE EXTENDED REALITY

Organized by: Andres Bustillo, Álvar Arnaiz-González, Universidad de Burgos, Spain, Aida de Haro-García, Universidad de Cordoba, Spain.

Extended Reality (XR) is a promising umbrella of technologies. Tasks like learning, training, or relaxing can be improved in XR interactive environments in a safe, autonomous, and customized way. In many applications, to achieve these goals, the use of biosignals acquired during the XR experience would play a major role. However, before biofeedback-based XR experiences become a standard solution, there is an extensive research to be done. Biosignals produce massive datasets in XR environments that should be processes to extract useful information. Machine-learning techniques might be the best option to extract the hidden information collected by tracking systems or to adapt XR experience to user´s performance.

The call of this Special Session is addressed to all that studies that involve the use of any machine learning technology in XR experiences. We invite researchers, educators, industry professionals, and students to submit abstracts that relate to these topics and share their insights and experiences with the community. The special session will provide a platform for cross-disciplinary collaboration and knowledge exchange, fostering the advancement of machine learning applications within XR experience with no limit to any final use.

# SPECIAL SESSION #3: EXTENDED REALITY TOOLS FOR VIRTUAL RESTAURATION OF CULTURAL HERITAGE

Organized by: Laura Corchia, University of Salento, Italy, Bruno Rodríguez-García, University of Burgos, Spain.

The proposed special session aims to explore the new frontiers of virtual restoration of cultural heritage and the eXtended Reality (XR). With the increasing development of digital technology, virtual restoration offers unprecedented opportunities to preserve, restore, and enhance our cultural heritage (CH) in innovative ways. This session will examine methodologies, technologies, and best practices in the field of virtual restoration, including case studies and practical applications. It will also discuss the ethical, technical, and cultural challenges associated with virtual restoration and its impact on preserving cultural heritage for future generations. The session aims to promote interdisciplinary dialogue among industry experts, restoration professionals, scholars, and technologists to advance understanding and implementation of virtual restoration as a fundamental component of CH conservation.

# SPECIAL SESSION #4: FROM OFFLINE PROCESSING TO ONLINE BIO-ADAPTIVITY IN XR ENVIRONMENTS

Organized by: Javier Marín-Morales, Maria Eleonora Minissi, Universitat Politècnica de València, Spain, Giovanni D'Errico, Politecnico di Torino, Italy, Giulia Pellegrino, University of Salento, Italy.

The adaptability in Extended Reality (XR) environments is an increasingly necessary paradigm to make the user experience more engaging and effective, to overcome intrinsic limitations related to limited interactivity, and to generate a high level of personalization for individuals. If in the past the adaptation of environments mainly occurred offline, following a process of analysis and processing of user data, with evident disadvantages in terms of dynamism, there is a progressive shift towards physiologically adaptive systems that implement biocybernetic closed loops. The measurement and analysis of various physiological signals (ECG, EEG, EDA, fNIRS) allow the generation of real-time feedback and responses, enabling the system to interact and respond to physiological states and changes in the human body. The identification of the user's state can direct interaction characteristics based on implicit physiological inputs, adapting the workload based on the detection of attention levels, increasing reactivity, and adaptability. The realism of the experience can also be controlled based on autonomic arousal, adjusting visual fidelity, for example by removing sensory cues to enhance the emotional experience.

This special session aims to be a collection of contributions in the field of research, design, and study of adaptive XR environments, with a particular focus on physiologically adaptive systems. The focus is primarily on the applied world and the benefits that such systems offer in various fields, from the clinical domain (personalization of therapies) to the rehabilitative one (progress monitoring), from education (improvement of learning outcomes) to the realms of art, culture, and entertainment (adaptive gamification) and even to the world of Industry 4.0 (e.g. adaptable maintenance service).

# SPECIAL SESSION #5: EXTENDED REALITY AND SERIOUS GAMES FOR PREOPERATIVE PLANNING AND SURGICAL TRAINING

Organized by: Emanuela Marcelli, Laura Cercenelli, University of Bologna, Italy, Valerio De Luca, University of Salento, Italy.

eXtended Reality (XR), which includes Virtual, Augmented and Mixed Reality, can provide valuable and important support for preoperative surgical planning: visualizing 3D models derived from CT or MRI images, it offers a much more effective tool for studying the situation of a specific patient than 2D grayscale images, and it also offers simple and intuitive ways of navigating within these models and exploring them from various viewpoints.

Moreover, it offers a safe and exciting platform for surgical training, thus representing a novel digital approach to augment traditional teaching practices and inspire the next generation of surgeons. In this context, it often takes the form of the serious game, in which goals and scores are assigned to users as they practice through gradually increasing levels of difficulty. A very interesting approach in surgical training is represented by “hybrid” simulators that combine the virtual content projected in augmented reality with real, tangible patient-specific 3D printed phantoms.

# SPECIAL SESSION #6: EXTENDED REALITY FOR ENHANCING CULTURAL HERITAGE ACCESSIBILITY

Organized by: Eva Pietroni, ISPC - National Research Council, Italy, Carola Gatto, AVR Lab - University of Salento, Italy

In recent years, the integration of Extended Reality (XR) technologies has shown different possibilities of fruition in the cultural heritage field, and one promising application lies in cultural heritage accessibility. This special session aims to explore the potential of XR in making cultural heritage sites, artifacts, and experiences more accessible to diverse audiences. XR encompasses virtual reality (VR), augmented reality (AR), and mixed reality (MR), which can offer immersive and interactive experiences that transcend physical limitations. Through this session, researchers can propose new studies about the use of XR technologies to preserve, present, and interpret cultural heritage, fostering inclusivity and engagement among individuals with different backgrounds. Topics of interest include but are not limited to XR-enhanced museum exhibits, virtual museum, accessible archaeological reconstructions, richness of content, immersive historical narratives,

universal design solutions and tangible interfaces, and user-centered design approaches.

# SPECIAL SESSION #7: THE ROLE OF EXTENDED REALITY AND ARTIFICIAL INTELLIGENCE IN DIGITAL HUMANITIES

Organized by: Roberto Pierdicca, Università Politecnica delle Marche, Italy, Marina Paolanti, Università di Macerata, Università Politecnica delle Marche, Italy, Carola Gatto, AVR Lab - University of Salento, Italy.

The application of eXtended Reality (XR) technology to the Digital Humanities (DH) field is finally beginning to receive attention. The reason is due to its indisputable value, proven in a set of tech oriented environments. Indeed, boosted by marketing, gaming and entertainment fields, XR is constantly increasing in terms of both offered opportunities and audience engagement.

A well-known bottleneck, hampering the use of XR techniques in humanistic disciplines, is that they are still complex for the end-user, as well as they need a multidisciplinary team, composed of ICT experts and DH experts, to be implemented. While engineering scholars seek to understand and embrace such complexities, DH struggles to experiment XR experiences in pedagogy, data visualization, cultural heritage, social and human science and simulation. And more, the large-scale cultural and societal implications of these changes and the ethical questions that raise offer an important challenge as these technologies have matured. For instance, we are witnessing the spreading of new methods of data processing and digitalization such as Generative Artificial Intelligence (AI), Neural Radiance Fields (NeRF), and Large Language Models (LLM). These tools play pivotal roles in this convergence, offering innovative methods for reconstructing, visualizing, and interpreting data in DH domain.

This panel encourages researchers from a multidisciplinary provenance, to propose novel strategies and original research in applying XR techniques in digital humanities research (e.g., in literature, linguistics, culture heritage, media, performing arts, social science, history, music and acoustics, pedagogy and academic curricula). This special session aims not only to serve as a venue for presenting work in this area but also to build a community and share information in this new field.

# SPECIAL SESSION #8: THE EXPERIENCE OF XR TECHNOLOGIES AND THE ROLE OF SENSE OF PRESENCE IN THE STUDY, INFLUENCE AND EDUCATION OF BEHAVIOR

Organized by: Stefano Triberti, Raffaele Di Fuccio, Università Telematica Pegaso, Italy, Valerio De Luca, University of Salento, Italy, Giovanni D'Errico, Politecnico di Torino, Italy.

The study of user experience in eXtended Reality (XR) deals with many factors, especially the sense of presence. Presence refers to the subjective experience of being in one place or environment, independently of where a subject is actually located. According to many theories

across the literature, presence could be considered a mere function of virtual reality (media presence) or alternatively a fundamental function of human cognition, independent of the fruition of a medium (inner presence). Sense of presence is usually regarded as a fundamental factor that impacts XR technologies' effectiveness; thanks to the achievement of a high level of presence, XR users could experience a simulation as realistic and engaging, so that their cognitive processes and behavior are affected by it in meaningful ways. For example, XR solutions could be applied for educational and research aims.

This special session aims to gather new work on theoretical models and research results on XR for education, experimental research and behavioral change in general, with a focus on sense of presence, immersion and/or engagement or in other words on the user experience of the technology.