

9th Edition of IEEE VR Workshop: Virtual Humans and Crowds in Immersive Environments (VHCIE)

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Figure 1: Diverse applications of virtual humans and crowds in VR: (a) a virtual guide [2], (b) public speaking training [3], (c) studying human locomotion behavior in waiting, dense crowd [4], and (d) studying human gazing behavior in a populated street [1]

1 OBJECTIVES OF THE VHCIE WORKSHOP

The VHCIE workshop aims to explore and advance the creation of believable virtual humans and crowds within immersive virtual environments (IVEs). With the emergence of various tools, algorithms, and systems, it is now possible to design realistic virtual characters – known as virtual agents (VAs) – that can populate expansive environments with thousands of individuals. These sophisticated crowd simulations facilitate dynamic interactions among the VAs themselves and between VAs and virtual reality (VR) users.

The VHCIE workshop seeks to highlight the diverse range of VR applications for these advancements, including virtual tour guides, platforms for professional training, studies on human behavior, and even recreations of live events like concerts. By fostering discussions around these themes, VHCIE aims to inspire innovative approaches and collaborative efforts that push the boundaries of what is possible in social IVEs while also providing an open place for networking and exchanging ideas among participants.

2 CURRENT CHALLENGES IN THE FIELD

Despite the aforementioned advancements, several challenges remain within this domain. Key issues include ensuring **authentic and effective interactions** between VAs themselves as well as between VAs and VR users at both verbal and non-verbal communication levels. Furthermore, understanding the **interaction dynamics** of individual and situational factors that influence social interactions in populated environments remains a critical area of research. This knowledge is essential for creating realistic VAs, improving user experiences, and ensuring inclusivity in virtual spaces, ultimately leading to more effective and engaging interactions within IVEs. Thereby, achieving **multimodal representations of interactions** – such as integrating haptic feedback for social touch or physical collisions as well as sound, such as the rustling of clothing or footsteps on different surfaces – becomes more and more important for a natural and immersive VR experience.

Importantly, **accessibility** has also emerged as a significant focus within the VR community; it is vital to ensure that social interactions are inclusive for users of different abilities. This includes addressing challenges related to improving user interfaces for various needs, creating more inclusive social spaces in virtual settings, and developing tools that accommodate a broader spectrum of physical and cognitive abilities – all aimed at making VR a universally accessible medium.

3 VHCIE 2025

In this context, the 9th VHCIE workshop at IEEE VR 2025 focuses on fostering a collaborative, cross-community approach to tackle the challenges associated with creating believable VAs and crowds in IVEs. By bringing together diverse perspectives from both the VR community and other relevant fields, our goal is to deepen our understanding of human behavior during social interactions. By embracing a collective effort, we strive to create an inclusive environment where ideas can flourish and lead to meaningful advancements in the field.

The VHCIE 2025 program is structured around four key components:

SCIENTIFIC KEYNOTE

Catherine Pelechaud, Director of Research CNRS at ISIR (Sorbonne University, France) will give the scientific keynote. Catherine is the leading expert in socially interactive VAs and non-verbal communication. Her pioneering work on emotional and communicative behaviors in VAs has significantly advanced the field, making her a renowned figure within the intelligent virtual agents community. Given her expertise, Catherine's insights will be invaluable as we address ongoing challenges related to multimodal interactions and accessibility in immersive environments.

SCIENTIFIC PRESENTATIONS

Nine papers that delve into various topics related to VAs and crowds in IVEs, covering diverse areas, will be presented:

1. User-Agent Interaction

- Iachini et al. with *Virtual Reality and Humanity Attribution: The Role of Interoceptive Bodily Awareness*
This research investigates how individual differences in interoception influence the attribution of human characteristics to virtual humans, enhancing emotional connection and presence.
- Ehret et al. with *Exploring Gaze Dynamics: Initial Findings on the Role of Listening Bystanders in Conversational Interactions*
This study investigates the impact of virtual listening bystanders on gaze behavior and turn-taking perception during interactions with embodied conventional agents.
- Nunziata et al. with *Feeling Across the Distance: The Interplay of Motor and Empathic Processes with Virtual Humans*
This research explores the psychological mechanisms underlying social interactions with virtual humans, focusing on motor simulation and empathic traits.

2. Rendering and Appearance

- Sun et al. with *Evaluating CrowdSplat: Perceived Level of Detail for Gaussian Crowds*
This study evaluates user perceptions of 3D Gaussian avatars to inform optimization strategies for efficient crowd rendering in real-time applications.
- Vyas et al. with *Shape Shifters: Does Body Shape Change the Perception of Small-Scale Crowd Motions?*
This study examines how body shape diversity affects the perception of motion realism in small-scale virtual crowds.

3. Motion and Interaction Techniques

- Akmatbekov et al. with *Simulating Body Movements for Multiple Agent Avoidance*
This research focuses on automating realistic human motion synthesis in multi-agent environments to improve collision avoidance and interaction among virtual characters.
- Azizi et al. with *Demonstrating Effectiveness Combining Heuristic/Data-Driven Methods*
This paper presents a hybrid framework that combines heuristic techniques with data-driven models to improve efficiency and quality in motion style transfer applications.

4. Frameworks and Toolkits

- Mostajeran et al. with *A Toolkit for Creating Intelligent Virtual Humans in Extended Reality*
This work introduces a toolkit aimed at facilitating realistic multimodal interactions between users and intelligent virtual humans in extended reality environments.
- Best et al. with *A Virtual Platform for Overground Manual Wheelchair Navigation*
This research aims to explore manual wheelchair mobility strategies through a large overground virtual suite, comparing them to bipedal walking behaviors.

LATE-BREAKING REPORTS

An opportunity for participants to share recent findings and developments in the field is provided, as well as to discuss plans for future research related to VAs and crowds in VR. As the deadline for these contributions is shortly before the workshop to ensure they reflect the latest developments and ideas, no further information can be provided at this time.

NETWORKING & DEMOS

VHCIE provides a unique opportunity for attendees to connect and build meaningful relationships in a welcoming and supportive environment. The workshop is designed to foster the exchange of ideas, insights, and experiences across diverse communities, all brought together by a shared passion for virtual agents (VAs). To facilitate the exchange and networking, we introduce the option of showcasing current applications during the workshop, greatly enhancing the visibility of the respective research and encouraging fruitful discussions within the academic community. This chance is used by the authors of scientific presentations but also late-breaking reports.

4 SPECIAL THANKS

We would like to express our sincere appreciation to the Workshop Organizers of IEEE VR 2025, Rebecca Fribourg, Hugo Brument, Dirk Reiners, and Carolin Wienrich, for recognizing the significance of the VHCIE workshop and facilitating its execution. We extend our gratitude to our international committee members Roman Boulic (École polytechnique fédérale de Lausanne (EPFL), Switzerland), Yann Glémarec (Inria, France), Alberto Jovane (Trinity College Dublin, Ireland), Christos Mousas (Purdue University, Indiana, USA), Stefan Olafsson (Reykjavik University, Iceland), Nuria Pelechano (Universitat Politècnica de Catalunya, Spain), Pierre Raimbaud (École Centrale de Lyon, France), and Katja Zibrek (Inria, France), for their critical role in reviewing submissions, which contributed to the development of a robust and insightful program. Additionally, we thank all authors for their valuable contributions and commitment to advancing research in this area, as well as all attendees for their active participation and constructive exchanges that enriched the workshop experience.

5 CONTACT INFORMATION



For any inquiries related to the VHCIE workshop or the covered topics, please reach out to the organizing committee at vhcie.vr@gmail.com.

Your feedback is essential for enhancing the VHCIE workshops. We welcome

any suggestions for future topics or comments on your experience.

We are looking forward to future editions of the workshop. Stay connected.

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