The Third Workshop on Locomotion and Wayfinding in XR (LocXR)

Tim Weissker*
RWTH Aachen University, Germany

Daniel Zielasko†
Trier University, Germany

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1 Introduction

The Third Workshop on Locomotion and Wayfinding in XR, held in conjunction with IEEE VR 2025 in Saint-Malo, France, is dedicated to advancing research and fostering discussions around the critical topics of navigation in extended reality (XR). Navigation is a fundamental form of user interaction in XR, yet it poses numerous challenges in conceptual design, technical implementation, and systematic evaluation. By bringing together researchers and practitioners, this workshop aims to address these challenges and push the boundaries of what is achievable in XR navigation.

This iteration of the workshop is particularly inspired by the recent Dagstuhl-Seminar 24371 on *Extended Reality Accessibility* and places a thematic focus on the accessibility and standardization of XR navigation systems, thus addressing the pressing need to create more inclusive and interoperable solutions in this field. The accessibility and standardization of user interfaces are deeply interconnected research areas, as standardized templates for consistent and interoperable user interfaces form the basis for creating inclusive systems that can accommodate diverse user needs. By adopting universal guidelines and practices, developers can design interfaces that are accessible to a wider range of users while ensuring compatibility across platforms and devices.

Building on the success of its previous iterations, the workshop has become a platform to address key research gaps and to foster collaboration between academics and practitioners. The inaugural workshop, held at IEEE VR 2024 in Orlando, FL, USA, emphasized the importance of reproducibility and replication in XR locomotion research [8]. This focus continued in the second iteration at IEEE ISMAR 2024 in the Greater Seattle Area, WA, USA, where discussions focused on methodologies and practices to ensure consistent and reliable research results. These foundations have paved the way for this year's focus on accessibility and standardization, highlighting the evolving priorities in the field and the workshop's commitment to addressing emerging challenges.

2 Reviewing Process and Statistics

This workshop has traditionally employed a two-stage reviewing process, which we designed to ensure high scientific standards while still encouraging exploratory submissions that foster academic exchange, interdisciplinary collaboration, and provocative discussions. We received eight submissions for this iteration, one of which was later withdrawn. Each remaining submission was reviewed by at least two members of our international program committee, which consisted of 11 distinguished experts in the field of XR locomotion and wayfinding (see Section 5 for a full list). After the initial reviewing phase, authors were provided with detailed feedback and asked to address the reviewers' comments and refine their submissions. Following this revision phase, the workshop organizers conducted a final review to evaluate the revised papers.

As a result of this rigorous process, seven papers were accepted for presentation at the workshop, leading to an acceptance rate of 87.5%. The accepted works reflect the workshop's emphasis on accessibility and standardization, presenting innovative solutions, insights, and frameworks that advance the state-of-the-art in XR navigation.

3 Overview of Accepted Papers

Within the scope of this year's spotlight topics of **accessibility and standardization**, three contributions were included in the program. The first paper investigates the suitability of existing VR locomotion techniques for older adults [5]. By analyzing existing literature, it identifies gaps in the design and evaluation of these techniques for this demographic, emphasizing the need for tailored solutions to support healthy aging in VR. The second contribution provides a technical overview of leaning- or tilting-based locomotion interfaces, highlighting their potential as ergonomic and universally adaptable navigation systems [6]. The authors address key technical barriers, such as tracking accuracy, and propose an open-source implementation to facilitate broader adoption. The third paper examines the trade-offs between user preferences and ergonomic design in teleportation transitions [3]. Although *Dash* transitions were highly favored by participants for their engaging experience, they were associated with increased task load and cybersickness. These findings challenge previous conclusions and underscore the complexity of balancing usability and comfort in VR navigation.

The remaining contributions span a diverse range of fields within navigation research. The first work focuses on **behavioral modeling**, investigating user navigation patterns when employing multiple locomotion techniques simultaneously [2]. By analyzing navigation states through methods like Markov chains, the study offers valuable insights into optimizing redirection techniques in constrained VR environments.

Perception is addressed in the next study, which investigates user preferences for yaw rotation axes during head-induced navigation [7]. The findings reveal a tendency for the alignment with the traditional virtual camera's position, between the user's eyes, emphasizing the importance of accounting for individual differences in the perception of virtual motion to enhance user experience.

Social interactions are explored in a study examining the user experience of dyads walking together in VR [1]. The research aims to enhance both the social and cognitive dimensions of walking interactions by introducing features such as movement rhythm and partner awareness cues. The initial results highlight promising directions for creating more engaging and meaningful social VR experiences.

Finally, the **adaptability** of XR navigation interfaces is addressed in a contribution that emphasizes the need for personalized solutions [4]. While XR navigation interfaces have traditionally aimed for universal usability, research highlights distinct user preferences and performance variations. Drawing from empirical findings in spatial cognition and navigation, this work proposes adaptive strategies that cater to individual differences while maintaining usability. The paper also discusses opportunities for standardization in assessment methods and inclusive design, laying the groundwork for more effective and user-centered XR environments.

*e-mail: me@tim-weissker.de
†e-mail: daniel.zielasko@rwth-aachen.de

Together, these papers provide a compelling snapshot of current research in XR locomotion and wayfinding, offering insights and solutions that pave the way for more accessible, standardized, and impactful virtual environments.

4 Additional Program Highlights

In addition to paper presentations, the workshop continues its tradition of featuring invited lightning talks, showcasing cutting-edge research recently presented at leading venues such as ACM CHI, ACM VRST, IEEE TVCG, and IEEE ISMAR. These talks provide attendees with a broader overview of state-of-the-art research without requiring them to attend the growing number of significant conferences in the field. They also offer authors of accepted publications at these venues an opportunity to increase the visibility of their work and engage in discussions with a wider scientific audience.

5 International Program Committee

- Stefania Serafin, Aalborg University, Denmark
- Hugo Brument, TU Wien, Austria
- Daniel Rupp, RWTH Aachen University, Germany
- Yuen C. Law, Instituto Tecnológico de Costa Rica, Costa Rica
- Lauren Buck, University of Utah, USA
- Eelke Folmer, University of Nevada, USA
- Stefanie Zollmann, University of Otago, New Zealand
- Eike Langbehn, HAW Hamburg, Germany
- Pauline Bimberg, Trier University, Germany
- Mayra D. Barrera Machuca, Dalhousie University, Canada
- Cosmin Munteanu, University of Waterloo, Canada

References

[1] M. Bitar, J.-P. Rivière, R. Fribourg, J.-M. Normand, and Y. Prié. Sustaining the Experience of Pair Natural Walking in Social Virtual Reality. *Proc. of IEEE VR Abstracts and Workshops*, 2025. 1

[2] H. Brument. Preliminary Modelisation of User Locomotion Technique Usage during Navigation with Walking, Steering and Teleportation. *Proc. of IEEE VR Abstracts and Workshops*, 2025. 1

[3] N. Feld, N. Dubois, P. Bimberg, B. Weyers, and D. Zielasko. Dashing: Fun but Non-Ergonomic? Exploring Transition Effects in VR. *Proc. of IEEE VR Abstracts and Workshops*, 2025. 1

[4] W. S. Jong-In Lee. Towards Personalized Navigation in XR: Design Recommendations to Accommodate Individual Differences. *Proc. of IEEE VR Abstracts and Workshops*, 2025. 1

[5] C. M. Kit-Ying Angela Chong, Christine Murad. Exploring the Suitability of Existing VR Locomotion Technique Applications for Older Adults - A Scoping Review. *Proc. of IEEE VR Abstracts and Workshops*, 2025. 1

[6] D. Zielasko. A Technical Overview on Cutting-Edge Human-Joystick Locomotion aka Leaning in VR: Intuitive, Fun, Calibration-Free, and Open Source. *Proc. of IEEE VR Abstracts and Workshops*, 2025. 1

[7] D. Zielasko and J. Heib. Do Users Choose A Biomechanical Model when Virtually Turning in VR? User Preferences for Axes of Head-induced Yaw Rotation in Ego-Centric Viewpoint Control. *Proc. of IEEE VR Abstracts and Workshops*, 2025. 1

[8] D. Zielasko and T. Weissker. Stay Vigilant: The Threat of a Replication Crisis in VR Locomotion Research. *Proc. of ACM Symposium on Virtual Reality Software and Technology*, 2023. doi: 10.1145/3611659.3615697 1