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Making A Real Connection: Pro-Social Collaborative Play in Extended Realities – Trends, Challenges and Potentials

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ABSTRACT

Extended reality (XR) has emerged as new cutting-edge technology, encompassing augmented, virtual and mixed reality. Extended reality redefines and elevates the game user experience within immersive and blended environments and opens new horizons, not just for gaming but also for enhancing pro-social connections through collaborative play. This workshop is dedicated to charting the course of trends, identifying and dissecting challenges, and probing the potential inherent in pro-social collaborative play within extended realities. We invite researchers, designers, and practitioners to come together, offering a platform to showcase different approaches. The core objective is to foster the exchange of knowledge and rigorous research findings within this emerging field. By doing so, we aim to build a network and lay a robust foundation for the future implementation of collaborative play in extended reality, paving the way for its seamless integration into the scientific discourse and practice.

CCS CONCEPTS

• **Human-centered computing** → **Collaborative and social computing**; **Ubiquitous and mobile computing**.

KEYWORDS

extended reality, virtual reality, augmented reality, mixed reality, collaborative games

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1 BACKGROUND

Collaborative digital games can use cutting-edge technology to create engaging and impactful experiences [10]. A specific direction in gaming is the use of extended reality (XR), which encompasses augmented reality (AR), mixed reality (MR) or virtual reality (VR) [2]. AR is a technology where virtual components are overlaid onto the real world, so that the player can engage with the illusion that these virtual components exist in the physical world, or receive additional information about the world – as seen, generally, through a smartphone camera. VR is an immersive technology that places users within a computer-generated, simulated environment, detached from the physical world. MR merges the physical and virtual worlds, creating immersive and interactive experiences via specialized devices like smart glasses or headsets.

XR presents exciting possibilities, ranging from gaming (e.g. *Pokémon Go* by Niantic [12]), education, training simulations, architectural visualization and medical therapy to virtual tourism (cf. [3–5, 13]). Yet XR's widespread adoption faces several challenges. For example, XR devices can be expensive and require robust hardware, limiting accessibility for some users. Additionally, ensuring a seamless and comfortable user experience is crucial, as poorly designed XR experiences can lead to discomfort (even motion sickness) and disengagement. Technical development is demanding, with hurdles including addressing latency issues, precise tracking, and realistic rendering of virtual objects (cf. [1, 6, 14]).

One emerging and promising field in XR is its collaborative use to foster pro-social and cooperative interactions [11], especially playing together in a real-world setting while using digital components (as in AR and MR). In that way, XR can be used to improve real-world collaboration and social connectedness [9]. A notable example of this is the AR game *LINA* [8] (see Figure 1), which uses augmented reality elements to bring entire classes of school pupils into a shared, collaborative gameplay environment, promoting positive peer relations, supportive group dynamics and ultimately a stronger sense of belonging to the group.

While collaborative XR holds immense potential [7], it brings important additional challenges, especially with focus on pro-social and cooperative interactions. For example, tracking multiple users in seamless interactions might prove difficult on a technical level, while the physical environment must meet the logistic needs of the

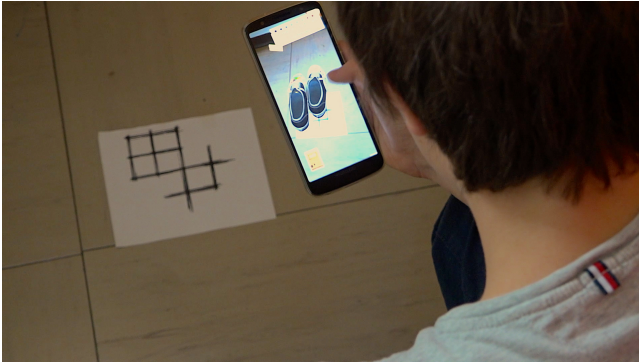


Figure 1: Example shows a child playing the AR game *LINA*

pro-social interactions. Furthermore, accessibility of the games with regard to a group of diverse people might pose challenges as well as making the technology engaging and clear to use for all players. It is essential to address such challenges and continue exploring innovative applications that can positively impact various domains, ultimately shaping a more connected and cooperative future.

1.1 Workshop Goals and Topics

The goal of this workshop is to bring together researchers, practitioners, and designers to promote interdisciplinary exchange, to increase awareness, to share experiences, and to establish a community and collaborations at the intersection of human-computer interaction, mobile games, and collaborative XR games. This workshop will serve as a starting point for mapping the design and research landscape in this area and will offer a discussion about challenges and trends for the future. We hope through this workshop to build a network of researchers interested in collaborative XR games, to encourage continued discussions, and to lay a foundation for future work in this area.

Potential topics of interest include but are not limited to the following:

- User requirement analysis for improving collaborative XR game experiences
- Design concepts and showcase of XR games applications to support collaboration
- Use cases that describe collaborative XR games in practice
- Evaluation methods for assessing collaborative XR games experience
- User studies on collaborative XR games
- New interaction approaches for collaborative XR games

2 ORGANIZERS

The organizing team is a group of international experts who have different and complementary experiences and expertise in human-computer interaction, psychology, games research, and game design. The team is currently working together on the Horizon Europe project ASP-belong, which centers around developing Augmented Social Play, which is a collaborative AR experience that aims to strengthen the sense of belonging of groups of adolescents and so boost their mental health.

Simone Kriglstein is an associate professor at Masaryk University, as well as a scientist at the Austrian Institute of Technology. She specializes in designing and evaluating user interfaces and interaction methods in different fields, including games. Her work has been published in international conference proceedings such as the Proceedings of the SIGCHI Conference on Human Factors in Computing Systems and journals like *Computer & Graphics* and *Computers in Human Behavior*.

Gloria Mittmann is a psychologist and researcher at the Karl Landsteiner University of Health Sciences. Her research interests are in social psychology and mental health with a focus on digitalisation and serious games. Her work mainly revolves around developing digital interventions for improving mental health and social connectedness. Her work has been published in international conference proceedings and journals (e.g. Proceedings of the ACM on Human-Computer Interaction).

Adam Barnard is a playwright, theatre director and immersive experience designer. He is writer and creative director of the social augmented reality game *LINA* and non-academic lead on the EU Horizon project *ASP-belong*.

Kate Woodcock is a reader (associate professor) in the School of Psychology at the University of Birmingham. Her group's research focuses on supporting disadvantaged young people's mental health and well being. It does this through theoretical work and through the development of psychotherapeutic intervention strategies linked to that theory. The group's work has a strong collaborative ethos. Kate is the scientific coordinator of the Horizon Europe project *ASP-belong*.

3 PRE-WORKSHOP PLANS

The organizers will advertise the workshop and its call for participation via different channels, such as mailing lists (e.g., chi-announcements, Gamesnetwork), social media including X (Twitter) and LinkedIn, as well as Discord/Slack workspaces specifically targeting communities around games, human-computer interaction, and game user research. Furthermore, they will send invitations via their personal networks.

Participants will be asked to submit a 2- to 6-page position paper or 1- to 2-page game demo paper which may cover the above-mentioned or related topics. The submission should be prepared as a PDF file, in single-column format, using the ACM Primary Article Template¹. The submission will be made via *EasyChair*. Each paper will be peer-reviewed by at least two of the workshop organizers and, if required, additional experts. The submitted papers will be reviewed and selected based on their quality and relevance with respect to the workshop themes. At least one author for each accepted submission must register for the conference and attend at the workshop.

3.1 Website

Furthermore, a website will be created which will contain an overview of the workshop including the goal, and a short bio about the organizers. It will also include the call for participation, information on how to submit a position/game demo paper, and an *EasyChair*

¹<https://authors.acm.org/proceedings/production-information/taps-production-workflow> (last accessed:08/2023)

link for the submissions. After the position/game demo paper selection, the list of accepted papers will be presented on the workshop website prior to the event together with the workshop program.

4 WORKSHOP STRUCTURE

The aim of the workshop is to facilitate knowledge exchange and as such will be open to all participants – newcomers as well as experienced researchers and practitioners – who are interested in the research fields games, AR, VR, MR, XR, and collaborative approaches. Therefore, it is our intention to bring people together to offer a combination of 1) presentations of the accepted papers, 2) discussion to identify topics and challenges, and 3) group work to allow for in-depth discussion about specific topics and challenges depending on the participants' interests. The main planned activities are:

- *Presentation of the Papers/Demos*: Participants will be asked to introduce themselves and to give a short presentation based on their paper/game demo submission. For game demo submissions, participants are encouraged to bring an interactive demo version that other participants can try out. In the case that not many position/demo papers have been accepted for the workshop, the project *LINA* will be presented as an alternative with the goal of showing the challenges and best practices of this project that can be used for further discussions. Participants will be invited to ask questions or/and write down questions and ideas on Post-Its which will be used to identify topics that will be the starting point to structure the group work and discussions.
- *Group Work and Discussions*: Small groups (3-5 people depending on the number of people who will attend) will be formed among the workshop participants based on their interests, with the goal of discussing the identified topics resulting from the presentation session. For the case, if not many different topics/questions were identified, we will additionally offer topics/questions, for example: what technique is just coming onto the scene and how could this be exploited in social XR? Can we create new kinds of collaboration using XR, what are these? The idea of this group work is to identify the challenges with focus on pro-social and cooperative interactions, possible trends, and best practices for each topic/question. We will also consider that the groups will consist of people with different expertise in each group to offer a discussion from different viewpoints. Based on the results, they will be asked to work on potential solutions for one of the pro-social and cooperative interactions challenges which they identified earlier.
- *Cross-group Discussion*: At the end of the workshop, all workshop participants will attend the cross-group discussion session with the goal to present the results of their group work and to discuss it with the other participants. Furthermore, possibilities for future steps to support collaborations and community building will be discussed.

Table 1 summarises the planned activities based on the timeline of the workshop. Workshop organisers will pre-allocate groups for group work based on participants' interest and expertise ascertained

Time	Activity
09:00 – 09:15	Opening and Introduction
09:15 – 10:30	Participants Presentation
10:30 – 11:00	Coffee Break (Networking)
11:00 – 12:30	Identify Topics for Group Work
12:30 – 14:00	Lunch (Networking)
14:00 – 15:30	Group Work and Discussion
15:30 – 16:00	Coffee Break (Networking)
16:00 – 17:00	Cross-group Discussion
17:00 – 17:30	Wrap Up
18:00 –	Dinner (Networking)

Table 1: Workshop Schedule

from the workshop submissions. Groups will be constructed to contain a mix of interests and expertise to facilitate discussion.

5 POST-WORKSHOP PLANS

We hope that this workshop will serve as a starting point for mapping the design and research landscape in the area of collaborative XR games and will offer a discussion about challenges and trends for the future. Furthermore, the workshop can be helpful for graduate students and early career researchers interested in joining and helping establish a community around this area. Therefore, we will ask the participants how we can support them best to stay in touch and reach out about potential opportunities (e.g. via Discord, Slack or Google Group). For building a network and community around the workshop themes, we will also explore possibilities for organizing future workshops on these topics at the next MUM conference or related conferences. Furthermore, within the next 12 months or so, we will be establishing a regular seminar series on interdisciplinary methods and publicising this widely as a part of the Horizon Europe project *ASP-belong*. We will look to this network for both presenters and participants of this series.

Depending on the number of accepted papers, we plan to publish them as a CEUR Workshop Proceeding². If we were not to fulfill the CEUR requirements, we will make the accepted papers available on the workshop's website. Furthermore, we will additionally explore the possibility of publishing the workshop outcomes either through an article or blog post in *ACM Interactions*³. We will also explore the possibility of a special issue in human-computer interaction - or games-related journal based on the workshop goals and themes. Authors of accepted papers will be invited to submit an extended version of their papers to this special issue, but we plan to announce it also widely to reach researchers who could not attend the workshop.

6 CALL FOR PARTICIPATION

The "Making A Real Connection: Pro-Social Collaborative Play in Extended Realities – Trends, Challenges and Potentials" is a one-day workshop that aims to bring together researchers, practitioners, and designers to promote interdisciplinary exchange in the field of human-computer interaction, XR games and collaborative

²<https://ceur-ws.org/> (last accessed:08/2023)

³<https://interactions.acm.org/> (last accessed:08/2023)

approaches. The workshop will consist of a combination of presentations, group work, and discussion sessions to identify possible trends, potentials, best practices, and challenges, especially with focus on pro-social and cooperative interactions.

Submissions are invited on, but not limited to, the following topics:

- User requirement analysis for improving collaborative XR game experiences
- Design concepts and showcase of XR games applications to support collaboration
- Use cases that describe collaborative XR games in practice
- Evaluation methods for assessing collaborative XR games experience
- User studies on collaborative XR games
- New interaction approaches for collaborative XR games

The workshop welcomes 2- to 6-page position papers or 1- to 2-page game demo papers in the ACM Primary Article Template (single column) on or before October 28th, 2023 (AoE) via EasyChair. Each submission will be peer-reviewed by at least two of the workshop organizers (and, if required, additional experts) and will be selected based on quality and relevance to the workshop themes. At least one author must attend the workshop and all participants have to register for the conference. Further details about the workshop can be found at <https://xrsocialinteraction.wordpress.com/>.

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