HeyThere: Design and Evaluation of an Augmented Reality Multiplayer Social Game

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Abstract: Augmented reality (AR) head-mounted displays (HMDs) have rapidly evolved and demonstrated great potential in various domains, especially for mobile scenarios, including social gaming. In this paper, we present the design and evaluation of *HeyThere*, an AR HMD social game developed on the Microsoft HoloLens 2 and designed to foster face-to-face interactions among strangers. The game aims to enhance social interaction by facilitating initial ice-breaking and enabling users to build future interactions. It also introduces an element of "serendipity" into the gaming experience. In the paper, we present our design choices for and implementation of *HeyThere*, taking advantage of interaction with virtual pets. Our user studies indicate that such a game like *HeyThere* promotes socialization with strangers and uncovers serendipitous aspects of life, thus enhancing players' overall life satisfaction. This research contributes to introducing a new approach to social gaming in AR HMDs and provides valuable insights into the design and development of AR social games.

1 INTRODUCTION

Augmented reality (AR) head-mounted displays (HMDs) have rapidly evolved in recent years and have shown great potential in different areas, especially where mobility is important (Kim et al., 2018; Lu et al., 2021). The rise of the digital world and media industries has created prerequisites for more creative and innovative games. Building social games on AR HMDs has also attracted increasing attention.

AR HMDs, such as HoloLens 2, can seamlessly mix virtual objects with the real world, and support a variety of input modalities, including 3D spatial gestures (Zhao et al., 2025; Shi et al., 2023). They may become a mainstream platform for the next generation of social games (Chen et al., 2023). To cater to this platform, it is important to understand its challenges and opportunities in different environments. Thus, to get feasible and informed lessons on AR-based social games, we built an AR social casual game, *HeyThere*, to explore the HMD-based social casual games playing outdoors.

HeyThere is an AR HMD game aimed at enhancing face-to-face social interaction between strangers—it affords users who are not familiar with each other a common connecting point to break the ice, interact with each other through the game, and then save contact information for future communication.

We developed *HeyThere* on Microsoft HoloLens 2 and used virtual pets to help strangers wearing an AR HMD connect and interact with each other in a safe way that minimizes the case where one party rejects the approach of the other. This is the case because players can break the ice more easily, as they have a "chance encounter" with a commonality (Social Facilitation Triggered by Shared Context) rather than just a cold introduction (Guerin and Innes, 1984; Wood et al., 2015). These "chance encounters" will now be defined as *serendipity*, an aspect that can enhance the game experience.

The remainder of this paper is organized as fol-

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lows. We present the related work in Section 2 where we combed through the methods used in previous studies related to HeyThere. In Section 3, we discuss the design principle, interface innovation, interaction methods, and implementation of HeyThere. Section 4 details the experiment, including the applied procedures and the results. Subsequently, Section 5 presents our findings in the user study, generates new features for HeyThere, and discusses our final design. Finally, Section 6 shows our future plan, and Section 7 concludes our work.

2 RELATED WORK

2.1 Online Augmented Reality Games

Recent research has explored online AR games. A benefit of AR games for social interaction is that players can interact with nearby people face-to-face because users have the ability to see their physical environment. AR technology serves more as a tool, focusing on making the interaction between nearby strangers efficient or triggering more positive interaction. *JumpAR* (Klimm et al., 2019), a mobile AR game, supports co-located multiple players to build a game scenario based on the real environment. In the self-designed game scenario, the players can control the game character to play a Jump 'n' Run game. However, this game design limits the game to familiar locations and can only be played with friends. Furthermore, Mulloni et al. (Mulloni et al., 2008) designed an AR social game on handheld devices like mobile phones. Research indicates that handheld devices pose ergonomic challenges for AR social interaction, as prolonged device handling can cause user fatigue. In addition, Xu et al. (Xu et al., 2008) found that involving body movement as an additional interaction approach in the AR game can increase physical presence and enhance the relationship between players.

Therefore, we chose AR HMDs as the platform for our social game. Like virtual reality HMDs, AR HMDs have the following advantages: (1) they have the capability to involve multiple users (Chen et al., 2021), (2) they can support various interaction modalities, especially spatial interactions (Xu et al., 2019; Zhao et al., 2025), (3) they are highly portable and support seamless integration with the physical environment and with other daily activities of users (Chen et al., 2023; Lu et al., 2021; Guo et al., 2024a), and (4) they provide high spatial awareness and can provide real-time feedback (Monteiro et al., 2020; Luo et al., 2022). In addition, researchers found that complex gameplay in AR/VR social games may attract much attention (Xu et al., 2024), which can cause players to pay less attention to social interaction with other players (Mulloni et al., 2008). Thus, as our game is to allow social interaction, we paid attention to this aspect and did not over-complicate the gameplay requirements when designing the game.

A casual game is a game that is lightweight, requires little knowledge, and is easy to play (Kultima, 2009). Studies have shown that even if players cannot meet each other in person, playing online casual games can still increase the liking of other players and lead to positive perceptions of players' characteristics (Dabbish, 2008). In addition, casual games often take only a few minutes to finish each round, making it easier for players to start and end the game. Therefore, to make our game work well with AR HMDs and to make the socializing features in our game easy to access in players' lives, a multiplayer casual game is a game type that fits our goals.

2.2 Serendipity

The term serendipity originated from Horace Walpole's fairy tale, *The Three Princes of Serendip*, which narrates the adventures of three princes who consistently stumble upon beneficial discoveries without prior planning (Makri et al., 2015; van Andel, 1994). Some scholars have conceptualized serendipity as a tripartite construct encompassing 'accident', 'sagacity', and 'happiness' (Merton and Barber, 2011). In the context of this paper, serendipity is a stand in for unplanned social facilitation triggered by Shared Context while engaged in unrelated pursuits. The idea that serendipitous encounters lead to increased social engagement draws on the theory of social facilitation, which posits that people often modify their behavior in the presence of others (Zajonc, 1965).

The proliferation and advances of mobile platforms, such as smartphones, smart glasses, and HMDs, facilitate the integration of real-world spatiotemporal elements with virtual components (Shi et al., 2023; Lu et al., 2021; Guo et al., 2024b), thereby enhancing the gaming experience through serendipity (Liang, 2012; Pánek et al., 2018). Empirical studies have demonstrated a positive correlation between serendipity and user satisfaction and engagement (Chen et al., 2018). Incorporating cutting-edge technologies such as AR and MR HMDs can further enhance the gaming experience by eliciting excitement and emotional engagement among players, thereby promoting user satisfaction and prolonged interaction (Chen et al., 2018).

2.3 Feasibility of Using AR HMDs for Social Interaction

Although recent advances in AR HMD technology have made them more accessible and user-friendly, using AR HMDs for social interaction still presents challenges, such as price (Xu et al., 2023), technical, interaction, and psycho-physiological issues (Wenk et al., 2021; Xu et al., 2020) and the user's resistance (Condino et al., 2020). Despite these challenges, there are also opportunities for using AR HMDs for social interaction. AR HMDs can increase social presence and improve empathy by allowing users to experience the world from different perspectives (Guo et al., 2022). This work aims to help us find further insights into the design of an AR-based application, like games, that could foster social engagement and interaction, especially among people unfamiliar with each other, through a case study.

3 HeyThere: INITIAL DESIGN

3.1 Game Principle and Logic

We designed HeyThere as a multiplayer social interaction game using AR HMDs. We opted for a "casual" game format, as it allows players to quickly learn and engage with the game, as highlighted in previous studies on casual gaming and its accessibility benefits (Hamari and Keronen, 2017), making it easily adaptable to real-life scenarios without causing disruptions or requiring significant adjustments (Juul, 2010).

We employ the concept of 'serendipity' to augment opportunities for interacting with people in public environments, such as a street, a shopping mall, or a coffee shop. Serendipity is a promising interaction approach for fostering easy engagement among physically proximate strangers, particularly in public spaces, by leveraging shared context to encourage spontaneous encounters (Paasovaara et al., 2016; Guerin and Innes, 1984; Wood et al., 2015; Makri and Blandford, 2012). The use of virtual pets as intermediaries further reduces social anxiety by shifting the focus from direct interactions to interactions through a shared digital medium.

We summarize the corresponding lessons from a user study. In general, HeyThere contains three stages. Figure 1 summarizes its workflow.

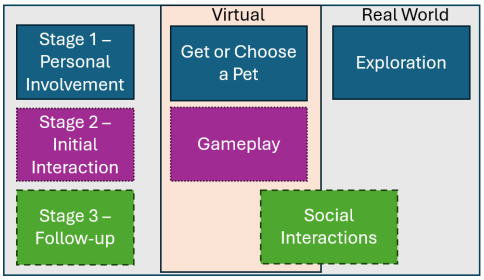

Figure 1: The flowchart of the initial design of HeyThere.

3.1.1 Stage One: Personal Involvement

As studies have shown, people tend to overvalue their creations and acquisitions compared to others (Buccafusco and Sprigman, 2010). This phenomenon can be seen, for example, in RPGs, where players spend hours customizing their characters' appearance, even though no measurable advantages will come out of it. Therefore, we decided to include one customization aspect of the game; this involves an active involvement from the player in order to create a rapport between the player and the game.

To further increase this feeling of involvement in the game, we proposed an exploratory element on stage one to incentivize the feeling of accomplishment of discovery and the serendipity element (Shim et al., 2011). In *Stage One*, players can customize their virtual pets and interact with other players' pets using AR HMDs, as shown in Figure 2a. Players can perform hand- and gaze-based interactions in the game. If a player shows interest in another player's pet, they can invite the other player to a battle game in the next stage, with the application transitioning to a new interface, as shown in Figure 2b. We define this stage as a "weak interaction" because it involves only interaction with the pets, not between the owner players.

Figure 2: Stage One: (a) selecting a pet, (b) entering into battle mode.

3.1.2 Stage Two: Initial Interaction

Players can choose to accept an invitation from another player who interacted with their pets immediately or save it for later. In the *Second Stage*, players engage in combat with their opponent's pet, utilizing hand movements, eye tracking, and/or vocal instructions, all of which are afforded by current AR HMDs.

Figure 3a depicts the whole gaming scenario. Upon initiating the game via the start button, players can manipulate the standard attack launcher using hand gestures that cause it to move or rotate. This launcher generates a standard attack gem every five seconds, as illustrated in Figure 3b and c. The game follows a somewhat standard TCG combat mechanics whose goal is to deplete the other players' Health Points. Thus, the game mechanics might appear familiar to those who have played similar trading card games, such as Pokémon, where players engage in turn-based battles.

Stage Two was designed to actively facilitate social interaction between players through the combat scenario with a clear goal. Low-stakes gameplay, like that in HeyThere, is a principle found in many social games, as it does not require strong emotional attachment from the beginning, thus lowering the barrier for engagement and encouraging players to connect without significant pressure. This approach aligns with findings from social gaming research, suggesting that low-pressure competitive interactions can act as effective icebreakers and promote positive social dynamics (Fonseca et al., 2020). This is the rationale to use battle instead of a more community-centered approach such as that of Animal Crossing. Given the constraints of certain potential environments (e.g., offices, lecture rooms, open spaces on pedestrian streets), we opted for eye-gaze-based interaction as the primary interaction modality, supplemented by hand-based interaction during this stage.

3.1.3 Stage Three: Follow-up

In *Stage Three*, the primary objective shifts toward fostering sustained interaction between players who have recently engaged with each other in the game. After Stage Two, the system automatically saves two players' contact information if they have demonstrated mutual interest. In addition, the victor is granted the option to clone the opponent's pet. This cloned pet is retained as a virtual asset of the winner. The cloned pet also acts as a conduit for continued interaction between the two players. For instance, when the new owner interacts with the cloned pet through activities such as feeding or walking, the original owner is notified of the pet's status. This mechanism aims to facilitate the establishment and maintenance of an ongoing social connection between both players, by giving them a common topic of discussion, thereby enhancing the social aspect of the game.

3.2 Interaction

3.2.1 Eye Gaze

Eye tracking has become a significant interaction modality in AR HMDs, enhancing the user experience by allowing hands-free operation (Wei et al., 2023). In HeyThere, we decided to use eye gaze as the primary interaction method to limit physical fatigue (Pathmanathan et al., 2020) and feelings of self-awareness about making large gestures in public (Taniberg et al., 2018). In our game, it allowed users to engage with game elements such as the start button, cards, and interactive circles.

During the initial phase of HeyThere, eye gaze helps to identify the mutual interest among players, using the duration of their gaze as an indicator of interest level. This feature not only facilitates engagement, but also supports introverts by reducing the anxiety associated with initiating direct interactions (Koike et al., 2019). In subsequent stages, players can interact with all the elements of the game using eye gaze, which is only later confirmed by air tapping. Figure 3c and d illustrate these interactions, with a visual cue indicating the target before confirmation.

The integration of eye tracking was carefully planned to complement the physical environment and daily activities, ensuring that gameplay is feasible in public spaces like workplaces or streets where convenience and non-disruption are crucial. The flexibility of eye gaze allows for seamless interaction with the game environment and other players, enhancing focus and sociability.

3.2.2 Hand Gestures

Hand gestures are utilized primarily for "natural interactions" such as petting or feeding virtual pets, analogous to real-world interactions. And briefly, as validation when eye-tracking could be perceived as slow and/or inaccurate (Pradipta Biswas and Langdon, 2016). The familiarity of hand gestures lowers the learning curve and compensates for the occasional instability of eye-tracking technology in devices such as the HoloLens 2 (Jean et al., 2024).

3.3 Implementation

HeyThere was developed using Unity (version 2020.3.31f1c1) and C#, leveraging the capabilities of the Mixed Reality Toolkit (MRTK). For real-time Player Versus Player (PVP) interactions, Photon Unity Networking 2 (PUN 2) and Azure Spatial Anchors (ASA) were integrated, enabling seamless connectivity and synchronization of player data and

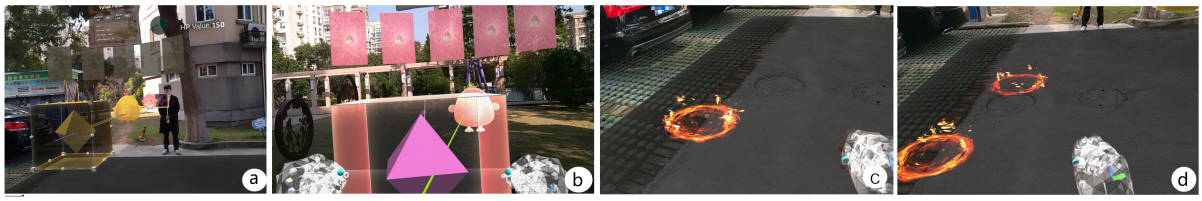

Figure 3: Screenshots for (a) the entire gaming scenario, (b) standard attack launcher (fist), (c) moving fire circle (start moving), (d) moving fire circle (during the move).

game elements across multiple AR HMDs. MRTK's support for both hand and eye tracking enriches the interactive experience, making it both immersive and intuitive.

4 USER STUDY

4.1 Participants

Participants were recruited through a randomized selection process carried out in public parks and urban streets. Interested individuals underwent a screening procedure to ensure eligibility based on the study inclusion criteria. Each participant received a detailed explanation of the study objectives, procedures, and their rights, including the ability to withdraw from the study at any time without penalty. Informed consent was obtained from all participants prior to their involvement in the experiment. This consent process included providing detailed information on the confidentiality of the data collected and how it would be used for research purposes.

The study sample was intentionally diverse, encompassing a variety of age groups, genders, and educational backgrounds to mitigate sampling bias. Eight participants were enrolled (two females and six males). The participants' ages ranged from 15 to 47 years, with a mean age of 27.125 and a standard deviation of 12.22.

The participants' experience with AR and VR technologies was documented to assess familiarity and potential biases in technology interaction. Two participants reported previous experience with AR HMDs, two had engaged with mobile AR games, two had used VR devices, and four had no prior experience with either AR or VR technologies. Participants were grouped and participated in pairs during the study.

4.2 Procedure

The study was conducted *in situ* in public parks and urban streets, providing a naturalistic setting that reflects typical user environments. This approach, often referred to as studying technology *in the wild*, allowed the observation and collection of data under real-world conditions, improving the ecological validity of the findings. Before experiencing the game, participants were first given a pre-experiment questionnaire to collect demographic information, including their past experiences with the devices, gaming habits, and personal information. They were then required to complete the official HoloLens usage tutorial[1] and eye-tracking user calibration. After this, they were introduced to HeyThere! and asked to familiarize themselves with its controls and input mechanisms.

During the gaming session, participants initiated gameplay when ready. Meanwhile, a researcher meticulously observed and recorded the participants' behavior, focusing on strategic decision-making, interaction patterns, and other notable behaviors. This observational data was systematically categorized to identify recurring behaviors and strategies. The session ended once one participant had won.

Following the game session, participants were asked to complete the core module of the Game Experience Questionnaire (GEQ) (IJsselsteijn et al., 2013), which is designed to assess various aspects of user experience during interactive gameplay. This standardized instrument allowed for the quantitative assessment of participants' experiences based on predefined scales.

4.3 Semi-Structured Interviews

We conducted semi-structured interviews to gather insights into participants' experiences and perceptions of the AR game. The interviews focused on the following areas:

- **Usage Scenarios.** Participants were asked to describe potential scenarios in which they could use the AR game if it were as ubiquitous as games for mobile phones today. This question aimed to explore the contexts in which participants see AR

[1] https://learn.microsoft.com/en-us/hololens/hololens2-basic-usage

games fitting into their daily lives and social interactions.

- **Social Interaction Comparison.** Participants were queried about how the social interactions facilitated by the AR game compare to those available on the current social media platforms they use. This question was intended to assess the game's social dynamics and its potential to supplement or alter existing social interaction patterns.
- **Game Design Preferences.** Interviewees were asked to identify and discuss the elements of the game's design that they particularly liked. This feedback is crucial to understanding the features that resonate with users and could guide future design enhancements.
- **Suggestions for Improvement.** Participants were encouraged to offer suggestions for improvements or additional features they would like to see in the game. This open-ended question was designed to elicit constructive feedback and innovative ideas from users, which could be invaluable for iterative design processes.

These questions would help evaluate the game's current state and identify opportunities for making AR gaming more engaging and relevant to potential users across various contexts.

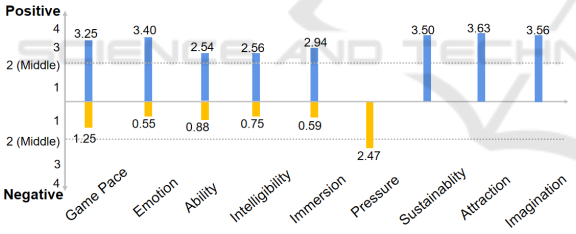

Figure 4: The results derived from a Game Experience Questionnaire.

4.4 Results

In this section, we report the results derived from the GEQ. For all other interview responses, we discuss them in the next section.

The ratings from GEQ were categorized into five distinct dimensions: Game Pace, Emotion, Ability, Intelligibility, Immersion, Pressure, Sustainable, Attraction, and Imagination (IJsselsteijn et al., 2013). Figure 4 shows the mean values for positive and negative evaluations of each category.

The results indicated that most users were highly satisfied with the game's pace (M = 3.25) and were highly immersed in the game (M = 2.94). The results also indicated that the game acknowledged participants' abilities and intelligence (M = 2.54 and 2.56, respectively), leading them to believe that it amplified their positive emotional experiences. However, the average ranking of pressure was 2.47, indicating that the game was relatively challenging for some users. In the semi-structured interviews, we found that five players who did not have experience with VR or AR HMDs initially struggled with the basic interaction gestures of HoloLens 2. However, three of them reported a sense of accomplishment after completing complex tasks, while two others found it difficult to position the healing and fire circle via eye gaze.

4.5 Semi-Structured Questionnaire

During the semi-structured interviews, participants provided valuable feedback on various aspects of the AR game, revealing several interesting patterns that could inform future development. The responses were categorized into usage scenarios, social interaction comparisons, design preferences, and suggestions for improvements.

4.5.1 Usage Scenarios

Participants envisioned using the AR game in various settings, indicating a strong preference for integrating gaming into everyday activities. Common scenarios included playing after work or school, during commutes, and in social gatherings with friends or strangers.

4.5.2 Social Interaction Comparison

The feedback indicated that the AR game facilitates a unique form of social interaction, distinct from traditional social media platforms. Participants appreciated the ability to engage in face-to-face real-time interactions while playing, which contrasts with the often asynchronous and remote interactions typical of current social media.

4.5.3 Game Design Preferences

Participants favored design elements that enhanced interactivity and realism, such as eye-tracking to control game actions and realistic augmented environments. The ability to interact with the game through natural gestures was particularly praised, as it added an immersive quality that is less prevalent in traditional gaming.

4.5.4 Suggestions for Improvement

Suggestions for improvement focused on enhancing user interface intuitiveness and accessibility. Participants wanted more intuitive controls and clearer instructions to accommodate users of all ages and tech-savviness levels. In addition, there was a recurring request for more customizable game elements, allowing players to tailor their gaming experience to personal preferences and scenarios.

4.5.5 Emerging Patterns

A notable pattern was the universal appeal of integrating social interactions directly into the gaming experience. Moreover, the preference for immersive and intuitive interaction indicates a trend toward more natural user interfaces in gaming.

5 DISCUSSION

We have distilled five key findings from the user study and incorporated these findings into the inclusion of new features.

5.1 Findings

Based on the results, we have distilled five key findings (***F#***).

F1: AR HMDs Enhance Immersion and Social Interaction. A participant with experience in mobile AR games noted that AR HMDs allowed for hands-free interaction, enhancing communication with opponents and fostering more engaging social interactions. Another noted the potential of AR HMDs to foster real-world connections, suggesting that these devices could significantly enhance the social aspects of gaming by promoting interactions that feel more meaningful and sustainable.

F2: Learning Curve and Stress with AR HMD-based Games. The results of our Game Experience Questionnaire (GEQ) indicated an average stress level of 2.47, higher than the neutral rating of 2.00, suggesting that our game poses significant challenges, particularly for novices to AR or VR. Several first-time users of HoloLens 2 struggled initially with basic interactions, though some reported a sense of accomplishment upon mastering more complex tasks. However, challenges like accurately using gaze to control game elements persisted for some, underlining the need for more intuitive game designs that minimize early frustrations and improve the onboarding process.

F3: Natural Connection Building in the Gameplay. The players expressed a desire for more organic methods for establishing connections within the game. Direct interactions, such as expressing affection, were sometimes perceived as somewhat forced or awkward. This feedback highlights a preference for subtler, more gradual interaction mechanisms that allow relationships to develop over time, emphasizing the need for game designs that facilitate natural and less intrusive social interactions.

F4: Balancing Gameplay Complexity with Social Interaction. High cognitive demands from complex gameplay features, such as in-depth mathematical calculations, were found to detract from social interactions. The players reported difficulties managing these dual demands, suggesting that simplifying complex game mechanics could enhance social engagement and make interactions more meaningful.

F5: Enhancing Long-Term Engagement in AR Games. Feedback indicated that while the initial gameplay period was engaging, maintaining long-term interest remains a challenge. Strategies to maintain player engagement could include incentives for continued play, periodic introduction of new content, and mechanisms that encourage resource accumulation and collaborative or competitive play. These approaches can help extend the game's life cycle and promote ongoing player investment and relationship development.

5.2 Recommendations for Design Features

Based on the insights derived from our user study, we propose several design recommendations and new features that could significantly enhance the game's quality and appeal. These suggestions are aimed at future implementations that may be tested to determine their effectiveness. Table 1 outlines these potential design implementations and new features.

Enhancing Replayability. To enhance replayability, we suggest introducing Collectible Card Game (CCG) elements and expanding the variety of cards and pets. These additions aim to provide players with new challenges and strategic options, potentially increasing the game's replayability.

Simplifying Game Difficulty. We recommend minimizing the reliance on numerical cards to simplify gameplay. This change is intended to make the game more accessible and enjoyable by reducing its complexity and enhancing visual interactions.

Introducing More Implicit Expression and Serendipity Elements. We propose using pets and game systems as primary catalysts for ice-breaking

Table 1: A summary of design implementations and new features.

Finding(s)	Design Implementations	New Features
F5	Increase replayability	Add Collectible Card Game (CCG) elements, and increase the categories of cards and pets.
F2, F4, F5	Reduce the difficulty of the game	Reduce the number of numerical cards.
F3	Add more implicit expression and serendipity elements	Enhancing social interaction through pet-centered ice-breaking.
F1, F3	Encourage player self-disclosure before the game starts	Users need to enter more information that interests them, such as music or artwork.

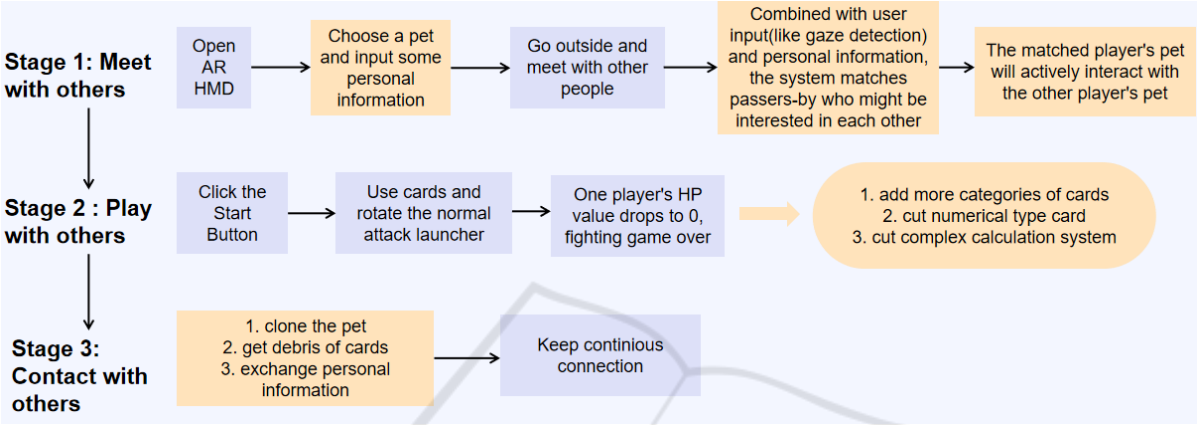

Figure 5: The proposed process for an improved design. The yellow boxes indicate new features.

to reduce direct communication barriers and foster more natural social interactions among players.

Promoting Player Self-Disclosure Before the Game Starts. We recommend a feature that encourages players to disclose personal information to foster deeper connections and trust. This process can be facilitated by a system that prompts players to share their interests at the game's outset.

6 FUTURE WORK

The current study represents an initial exploration of AR-enabled interactions for fostering social engagement through HeyThere, our multiplayer social game. While the findings provide valuable insights, there are areas that require further exploration.

The current study's small participant pool was intended for initial feasibility validation and proof-of-concept exploration. To better generalize our findings and improve the reliability of conclusions, subsequent studies will include a larger and more diverse participant group (Monteiro et al., 2024). This will also allow for a more nuanced understanding of social behaviors in AR environments and will enhance the validity of our insights into how AR can facilitate social engagement.

Future studies will incorporate comparative analyses between experienced and novice users of AR technology. In our exploratory study, the participants had varying levels of familiarity with AR, which influenced their learning curve and interaction preferences. However, a structured comparative analysis was beyond the scope of the current work. By including more participants with different levels of AR familiarity and conducting comparative assessments, we hope to derive tailored design recommendations for both experienced users and novices. This will aid improve accessibility and user experiences across a wider audience.

Furthermore, we recognize the importance of evaluating the social potential of AR beyond the technology itself. Although the current study touched on the usability and social interaction affordances of AR HMDs, future research will focus on directly comparing these experiences with more traditional forms of interaction or with non-human characters players (Monteiro et al., 2018). Such comparisons will help evaluate whether AR uniquely enhances social engagement or simply replicates existing social mechanisms in a digital form.

We believe that by addressing these aspects in future research, we can further refine and substantiate our understanding of AR's role in facilitating meaningful, serendipitous social interactions and con-

tribute to the growing body of literature on AR-enabled social engagement.

7 CONCLUSION

In this paper, we presented *HeyThere*, an augmented reality (AR) head-mounted display (HMD) social game designed to foster face-to-face interactions among strangers. We developed the core gameplay elements integral to our design and development process on HoloLens 2 and conducted a user study to evaluate its efficacy. Our game allows players to customize virtual pets, engage in combat games with other players, and maintain ongoing communication with friends through the medium of these pets. This innovative interaction interface not only facilitates socialization with strangers, but also uncovers the serendipitous aspects during their interaction, which can enhance players' social engagement and interaction with others whom they meet in public places. HeyThere represents a pioneering approach to social games using AR HMDs, focusing on facilitating novel social experiences for their players. This research provides valuable insights into the development of AR social games, and the lessons learned can contribute to the future development of such games.

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