Enhancing Joy with AR Glasses: Intergenerational Engagement for Older Adults and Youth

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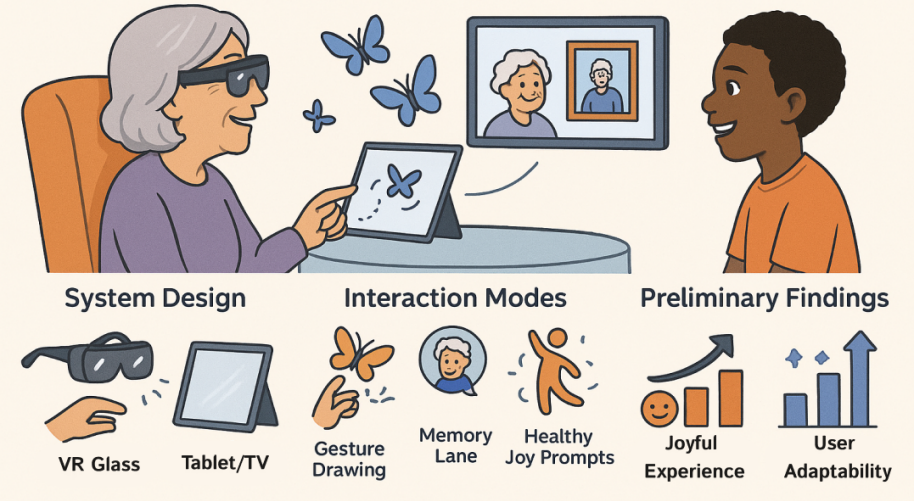

Figure 1: A conceptual depiction showing an older adult and a youth sharing joyful augmented reality experiences via AR glasses and a shared external screen. The figure highlights the three core interaction modes—Gesture Drawing (air-drawn objects), Memory Lane (augmented autobiographical prompts), and Healthy Joy Prompts (gentle movement cues)—all contributing to enhanced social engagement and emotional well-being across generations.

Abstract

Emotional well-being can be adversely affected by loneliness in older adults and digital overload in younger individuals. Leveraging recent advances in augmented reality (AR), we explore how lightweight AR glasses, paired with a shared screen, can facilitate joyful and meaningful intergenerational interactions. We designed a set of playful AR interaction modes intended to spark engagement and emotional connection between an older adult and a youth partner. Our initial findings indicate that this hybrid system can elicit laughter, storytelling, and a sense of social closeness. By combining the immersive qualities of AR with the familiarity of a shared screen, our approach supports a co-located, technology-mediated setting in which digital content augments rather than detracts from human connection.

Index Terms: Augmented Reality Glasses, Joy, Older Adults, Intergenerational Interaction, Engagement

1 Introduction and Motivation

Loneliness among older adults and digital fatigue in younger people can diminish emotional well-being [3]. As digital technologies and mobile devices become prevalent, older adults often feel compelled to adopt these tools to maintain social connections, potentially leading to increased isolation and digital fatigue. Such interactions may feel superficial, negatively affecting emotional well-being. To address this issue, we leverage lightweight Augmented Reality (AR) glasses combined with a shared external screen to promote meaningful, joyful intergenerational interactions. Our goal is to examine how AR experiences can foster authentic connections and alleviate emotional burdens associated with digital engagement. Specifically, we explore how AR glasses affect joy and social connectedness, preferred AR features across age groups, and the nature of social interactions facilitated by AR. We designed an AR system to support emotionally rich, co-located experiences between older adults and youth.

Prior research suggests that immersive technologies like AR/VR can enhance older adults' quality of life across physical, cognitive, and social domains [1, 4]. For example, AR-based virtual coaching and games have been shown to boost motivation and emotional well-being in seniors [1]. AR smart glasses, when carefully designed (e.g. non-intrusive notifications), can even improve face-to-face communication without causing distraction [2]. Mixed reality experiences have been explored to engage older adults in creative or talent-based activities, revealing both benefits and usability challenges [8]. Importantly, AR has also been used to enrich intergenerational storytelling: one study let grandparents and grandchildren view family photos as 3D AR objects and co-create narratives, leading to greater engagement and meaningful dialogue [5]. Similarly, co-located AR experiences can foster shared leisure activities and social bonding in the same physical space [6]. Building on these insights, our work focuses explicitly on using see-through AR glasses to enhance joy and connection between an older adult and a young partner, an area that remains under-explored.

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2 System Design

Our prototype system combines lightweight optical see-through AR glasses with a shared display to facilitate collaborative AR experiences for two generations. The glasses (XREAL Air prototype) include sensors for gesture recognition, and gaze tracking. A tablet or TV is used as an external mirrored display so that both users (and any observers) can see the augmented content simultaneously. This shared screen acts as a common reference, bridging the gap between the person wearing the glasses and others in the room.

2.1 Interaction Modes

We implemented three AR modes to spark joy and engagement. In **Gesture Drawing**, participants air-draw 3D objects (e.g., butterflies) via hand gestures, with sketches rendered in the glasses and mirrored on a shared screen for collaborative play. **Memory Lane** presents floating autobiographical prompts—such as family photos or trivia—in both views, prompting storytelling and dialogue. Finally, **Healthy Joy Prompts** deliver simple movement cues (e.g., dance or stretch) through AR animations, with playful feedback (confetti, emojis) to encourage gentle exercise and shared laughter.

Behind the scenes, the AR software uses spatial computing features (plane detection, image anchoring) to place content realistically in the environment. The glasses track both position and hand gestures, enabling natural interaction. We also apply optimized rendering techniques (e.g. late-stage reprojection/warping) to minimize latency and avoid visual discomfort. All AR content is rendered in real time and aligned for both the headset view and the external display.

2.2 Use Case Illustration

Figure 1 shows how AR glasses bridge generations. In the "Memory Lane" scenario, a grandmother sees a childhood photo appear in her living room via AR and shares the memory with her granddaughter through a mirrored tablet, prompting a "magical" response. In "AR Pictionary," a grandson's hand-drawn 3D butterfly flutters across the room, sparking shared laughter. These brief examples demonstrate AR's ability to act as a social catalyst—fostering storytelling, play, and emotional connection between older adults and youth.

3 Study Methodology

We conducted an exploratory user study to examine the impact of our AR system on joy and social connectedness. The study included five intergenerational dyads, each pairing one older adult (65–85 years) with one younger participant (19–25 years). Sessions were held in participants' homes or community centers to ensure comfort, lasting approximately 45 minutes and encompassing an introduction, guided use of the AR system, and a post-activity reflection.

Procedure: Participants first completed pre-session surveys assessing baseline mood, joy, and social connection. They then explored each AR interaction mode (e.g., gesture drawing, memory prompts, and physical cues) for 5–10 minutes, supported by a facilitator as needed. After the activities, participants filled out post-session surveys and participated in brief interviews. All sessions were video-recorded with consent, and we took field notes on spontaneous reactions.

Measures: We administered validated scales pre- and post-session to assess emotional outcomes. Joy was measured using the Positive Affect subscale of the PANAS [9], while social connection was evaluated with adapted items from the UCLA Loneliness Scale and the Social Connectedness Scale [4, 7]. All items were rated on 5-point Likert scales. We conducted thematic analysis on interview transcripts to extract qualitative insights into emotional and social experiences.

4 Preliminary Findings

Participants reported significant increases in joy (30%) and social connectedness (25%). Older adults overcame initial hesitancy, describing sessions as engaging and enjoyable. Key factors contributing to positive experiences included novelty, creative co-creation, and shared interaction. Youth favored interactive elements, while older adults preferred reminiscing and gentle activities, indicating a need for balanced content.

5 Conclusion

Our pilot study revealed several challenges. First, usability and comfort are critical.This aligns with prior findings that socially acceptable, comfortable design is key for senior adoption of AR [8]. Key challenges include usability concerns (glasses' comfort and social acceptance), the need for personalized content, and evaluating long-term effects. Future studies will address these through refined designs for comfort, personalized interactions, extended trials to assess sustained impacts, and multi-user group experiences. Enhancing accessibility for diverse sensory and motor abilities will improve usability and user engagement. Our AR system, combining immersive visuals with a shared display, successfully increased joy and strengthened intergenerational connections. Participants felt more energized and closer, indicating AR's potential as a tool for emotional well-being and reducing isolation.

References

[1] R. S. Baragash, H. Aldowah, and S. Ghazal. Virtual and augmented reality applications to improve older adults' quality of life: A systematic mapping review and future directions. *DIGITAL HEALTH*, 8:205520762211320, Jan. 2022. doi: 10.1177/20552076221132099 1

[2] I. Belkacem, I. Pecci, and B. Martin. Pointing task on smart glasses: Comparison of four interaction techniques. *CoRR*, abs/1905.05810, 2019. 1

[3] U. C. for Disease Control and Prevention. Health effects of social isolation and loneliness. Centers for Disease Control and Prevention, October 2024. 1

[4] R. M. Lee and S. B. Robbins. Measuring belongingness: The social connectedness and the social assurance scales. *Journal of Counseling Psychology*, 42(2):232–241, Apr. 1995. doi: 10.1037/0022-0167.42.2.232 1, 2

[5] Z. Li, L. Feng, C. Liang, Y. Huang, and M. Fan. Exploring the opportunities of ar for enriching storytelling with family photos between grandparents and grandchildren. *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies*, 7(3):1–26, Sept. 2023. doi: 10.1145/3610903 1

[6] S. Reig, E. Principe Cruz, M. M. Powers, J. He, T. Chong, Y. J. Tham, S. Kratz, A. Robinson, B. A. Smith, R. Vaish, and A. Monroy-Hernández. Supporting piggybacked co-located leisure activities via augmented reality. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*, CHI '23, p. 1–15. ACM, Apr. 2023. doi: 10.1145/3544548.3580833 1

[7] D. W. Russell. Ucla loneliness scale (version 3): Reliability, validity, and factor structure. *Journal of Personality Assessment*, 66(1):20–40, Feb. 1996. doi: 10.1207/s15327752jpa6601_2 2

[8] J. Sehrt, E. Mbamara, M. Rafati, and V. Schwind. From skepticism to acceptance: On the dynamics of elderly engagement with mixed reality. In *Proceedings of Mensch und Computer 2024*, MuC '24, p. 67–82. ACM, Sept. 2024. doi: 10.1145/3670653.3670666 1, 2

[9] D. Watson, L. A. Clark, and A. Tellegen. Development and validation of brief measures of positive and negative affect: The panas scales. *Journal of Personality and Social Psychology*, 54(6):1063–1070, 1988. doi: 10.1037/0022-3514.54.6.1063 2