Extended Abstract Doctoral Consortium

Extending Interaction Design Dimensions for Augmented Reality Supporting Children with Dyslexia

Emy Hazlinda Mohammad Ridzwan, Husniza Husni

Dyslexia is a prevalent learning difficulty that affects children's ability to read, spell, and process information effectively, requiring innovative approaches to support inclusive education. Augmented reality (AR) has gained attention as a promising tool due to its interactive and multisensory features, which can enhance motivation, engagement, and comprehension. However, current AR applications are rarely designed as assistive technologies specifically for children with dyslexia, as most are developed for mainstream learners and emphasize visual appeal or basic textual elements rather than aligning with the unique cognitive, perceptual, and behavioral needs of children with dyslexia. This misalignment results in interaction difficulties such as confusion with symbols, errors in distinguishing characters, spatial disorientation, and challenges in managing time, which collectively increase cognitive load and reduce the intended learning benefits of AR. Moreover, research on AR in special education has largely prioritized pedagogical contributions and performance outcomes such as reading fluency and academic achievement, while overlooking usability and learner experience. Similarly, multisensory learning approaches proven to be effective for children with dyslexia are underutilized in AR, with limited integration of tactile and kinesthetic modalities. To address these gaps, this research aims to identify the interaction difficulties experienced by children with dyslexia in AR environments, construct an interaction design (IxD) framework by integrating both established and inductively derived dimensions, and validate the framework's relevance through expert review. The expected contributions include empirical evidence of interaction challenges, a validated IxD framework tailored for dyslexia, and design recommendations for inclusive AR applications, with attention to emotion as a potential sixth dimension of IxD.

Social Media Platforms as Learning Environments: A Pilot Test of Discord and TikTok Live

Nurul Asmaa Abd Razak, Noris Mohd Norowi, Lili Nurliyana Abdullah, Azrina Kamaruddin, Mas Nida Md Khambari

Social media integration in the classroom has opened up new avenues for instruction and learning, especially for students who are digital natives. Discord and TikTok Live's suitability as online learning platforms was investigated in this pilot study. A total of 28 undergraduate students participated in learning sessions conducted on both platforms, followed by a questionnaire and semi-structured interviews. The analysis focused on four dimensions of online learning: engagement and interaction, learning and understanding, collaboration and communication, and accessibility and usability. Results indicate a clear preference for Discord, with 85.7% of students selecting it as the most effective platform, compared to only 10.7% for TikTok Live. According to qualitative feedback, TikTok Live was viewed as limited and engaging, better suited for asynchronous or microlearning use, while Discord excelled at promoting collaboration, content organization, and interactivity. The results highlight how crucial it is to match platform affordances to students' digital practices and pedagogical objectives. Future studies will build on this work by contrasting Microsoft Teams with Discord and investigating the effects of long-form (YouTube) versus short-form (TikTok) video learning.

Emotion-Recognition Brain-Computer Interface for User-Centric UX Evaluation
Lai Ting Ying, Masitah Ghazali

Despite the rapid rise in accuracy, intelligence and usefulness of artificial intelligence deep learning models, a critical gap exists in the fields related to Human-Computer Interface (HCI), such as application interface design and evaluation. This study suggests the use of electroencephalography (EEG) signals to interpret a user's emotional state in real time while interacting with interfaces. Barriers such as language stand where users face difficulty in conveying their feedback in terms of user interface design and the usefulness of an application. This is where emotion recognition with deep learning models comes in to bridge the existing gap, thus allowing for the creation of more user-focused and oriented interfaces.

Multivariate Determinants of Playability in Massively Multiplayer Online Game Teams: The Case of China
Xiaoxue Gong, Lili Nurliyana Abdullah, Azrul Hazri Jantan, Noris Mohd Norowi

With the advancement of computer technology, video games have evolved into platforms for human-computer interaction (HCI). Massively multiplayer online games (MMOGs) now enable thousands of players to interact in real time, creating valuable contexts for studying user experience and group behavior (Linares et al., 2021). The global MMOG market, valued at 48.98 billion USD in 2022, is expected to reach 134.68 billion USD by 2031. China, the largest market with over 400 million users, provides abundant data for HCI and behavioral research (Ye, 2023). However, most existing research isolates social, technical, or gameplay variables, leading to fragmented findings (Cheng et al., 2019). While studies have explored social ties, communication structures, and emotional engagement (Ghawi et al., 2021; Ma et al., 2023; Zeng, 2024), no integrated model yet accounts for both player and technical factors in MMOG team play. Current MMOG design frameworks remain insufficient to address the complex mix of social, technical, and emotional dynamics in large-scale online environments. Although trust and cooperation are crucial (Tu et al., 2023), player insights rarely inform real-time design strategies. Existing models often focus on isolated elements such as communication or leadership and neglect adaptability to players' emotional or cultural contexts (Yu & Cardoso-Leite, 2023). Likewise, established heuristic tools like HEP (Desurvire et al., 2004), GameFlow (Sweetser, 2020), and Nielsen's heuristics (Nielsen, 1994) cater mainly to single-player or simple multiplayer experiences, overlooking emergent teamwork and live interaction (Aker et al., 2020). This highlights the need for a specialized heuristic evaluation framework to assess playability, usability, and social cooperation in complex MMOG team environments. This study examines complex multivariable relationships that cannot be addressed by a single method. An explanatory sequential mixed-methods design will therefore be adopted, beginning with quantitative research followed by qualitative analysis for interpretation and expansion. This approach enables deeper understanding of underlying mechanisms, allows methodological flexibility, and strengthens the validity of findings through complementary qualitative insights (Creswell & Guetterman, 2024).

Designing Co-Located Mixed Reality Gamelan Collaboration Using Non-verbal Cues
Mohamad Faris Hakimin, Noris Mohd Norowi

The advancement of immersive technologies has transformed how music is created, performed, and experienced. Virtual reality (VR) platforms enable new forms of interactive spatial music-making, allowing users to engage with instruments and sound environments in three-dimensional spaces. Applications such as *TheWaveVR* and *SynthVR* demonstrate how users can compose

and perform music in virtual settings (Hamilton, 2021; Zhang et al., 2020). However, these systems primarily reflect Western music traditions, leaving traditional ensembles like Gamelan Melayu underrepresented in virtual and mixed reality (MR) environments (Tan, 2020; Dobrian, 2019). Gamelan Melayu is a traditional ensemble music of the Malay world, featuring bronze and wooden percussion instruments, gongs, and drums. Its performance relies heavily on non-verbal communication such as eye contact, gestures, and body movements to maintain ensemble coordination and expressiveness. However, in co-located MR settings where one performer uses a head-mounted display (HMD), these cues are often obstructed by the headset, reducing visibility of facial and eye signals. This loss of communicative expressivity can disrupt synchrony, weaken social presence, and hinder collaborative flow. This research investigates how non-verbal communication can be restored and enhanced in co-located MR environments for Gamelan musicians. The aim is to develop a design framework that supports social presence, coordination, and expressive collaboration between HMD and non-HMD performers.