AUGMENTED REALITY–BASED WEDDING INVITATIONS: A PERSONALIZED AND INTERACTIVE FRAMEWORK FOR ENHANCED GUEST ENGAGEMENT

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ABSTRACT: Traditional printed wedding invitations often lack interactivity, personalization, and long-term engagement while contributing to unnecessary production costs and paper waste. With the widespread adoption of mobile devices and immersive technologies, Augmented Reality (AR) has emerged as a promising medium for enhancing guest experiences through interactive and multimedia-rich content. This study presents the development and evaluation of an AR-based wedding invitation system designed to modernize conventional invitation practices by integrating 3D avatars, animations, personalized wedding information, interactive guest messaging, and ambient music. The system was developed using the Multimedia Development Life Cycle (MDLC) framework and evaluated through usability testing involving 24 participants from various backgrounds. Quantitative results from the System Usability Scale (SUS), User Experience Questionnaire (UEQ-S), and Engagement Questionnaire indicate strong usability, memorability, and emotional engagement. Qualitative feedback further highlights the system's potential to reduce environmental impact while providing a meaningful and customizable digital experience. Overall findings confirm that AR-based wedding invitations offer a usable, engaging, and sustainable alternative to traditional printed wedding cards.

KEYWORDS: *Augmented Reality; Wedding Invitations; Usability; Guest Engagement; Personalization; MDLC; Multimedia Applications;*

1.0 INTRODUCTION

Wedding invitations traditionally serve as a formal medium to announce significant life events and to convey essential information such as date, venue, and ceremonial details. However, conventional printed invitations are increasingly viewed as limited due to their static nature, high production costs, minimal personalization, and contribution to paper waste [1], [2]. As modern couples and guests become more digitally inclined, there is a growing demand for invitation formats that are not only visually appealing but also interactive, memorable, and environmentally responsible.

With advancements in immersive technologies, Augmented Reality (AR) has emerged as a promising medium for transforming traditional communication materials into interactive experiences. AR overlays digital content—such as 3D models, animations, audio, and interactive elements—onto real-world environments through mobile devices [3], [4]. Prior studies have shown that AR applications can enhance user engagement, emotional connection, and information retention, making the technology suitable for modernizing event-related communication, including wedding invitations [5].

Existing AR-based invitation solutions and commercial prototypes demonstrate the potential of AR in creating memorable invitation experiences [6], [7]. However, a closer examination of existing implementations reveals several limitations. Most current solutions fail to combine three critical aspects within a single platform: (1) integrated multimedia personalization, where couples can meaningfully customize content beyond static templates; (2) interactive guest engagement, such as two-way communication or participatory features; and (3) empirical validation, where usability, engagement, and user experience are systematically evaluated using established instruments. These gaps highlight the need for a more comprehensive and user-centered AR invitation system.

Therefore, this study aims to design, develop, and evaluate an AR-based wedding invitation application that integrates personalized multimedia elements, interactive guest features, and empirical usability assessment. Using the Multimedia Development Life Cycle (MDLC) framework, the proposed system incorporates 3D avatars, animations, ambient music, customizable wedding information, and a guest message board accessible through mobile devices. The system is evaluated through usability and user experience testing to validate its

effectiveness as a modern and sustainable alternative to traditional printed wedding invitations.

2.0 LITERATURE REVIEW

This section reviews the existing work related to Augmented Reality (AR), event invitations, multimedia engagement, personalization technologies, and the research gaps that justify the development of an AR-based wedding invitation system.

2.1 Augmented Reality in Interactive Media

Augmented Reality (AR) enhances real-world environments by superimposing digital objects—such as 3D models, animations, audio, and textual information—onto physical surroundings in real time through mobile devices or AR-enabled platforms. AR has been widely adopted across domains including education, retail, healthcare, navigation, and entertainment due to its ability to increase immersion and user engagement [1], [2]. Azuma formally defines AR as a system that integrates virtual and real-world elements, operates interactively in real time, and presents information in three-dimensional space [3].

Recent studies report that AR-based applications significantly improve emotional engagement and information retention compared to traditional static media [4], [5]. Advances in mobile hardware and AR development frameworks have further accelerated the adoption of AR in consumer-oriented applications, making it feasible to deploy immersive experiences on widely available smartphones.

2.2 AR Adoption in Event and Wedding Invitations

AR has increasingly been explored in event-related applications, including invitations and promotional materials. Studies report that AR-enhanced invitations improve memorability and engagement by transforming static content into interactive multimedia experiences, particularly among digitally literate users [6], [7]. However, most existing implementations remain limited to basic visual overlays with minimal interactivity or personalization [8], highlighting the need for more comprehensive AR invitation systems.

2.3 Limitations of Traditional Wedding Invitations

Traditional printed wedding invitations continue to play an important cultural role; however, their functional limitations have been widely discussed in prior research. Printed invitations are static in nature and lack the ability to convey dynamic multimedia elements such as animations, sound, or interactive content [9 - 11]. As a result, guest engagement is often limited to passive information consumption.

2.4 Multimedia Elements and Guest Engagement

Multimedia elements such as animations, audio, and interactive 3D content have been shown to enhance engagement, emotional response, and memory retention in digital systems, consistent with Mayer's Cognitive Theory of Multimedia Learning [12]. In event-based applications, personalized multimedia and AR-enabled interaction further strengthen emotional connection and perceived value by allowing users to actively engage with content in real-world contexts [13], [14].

2.5 AR for Personalization and User-Centered Experiences

Personalization plays a crucial role in shaping user satisfaction and engagement in interactive systems. AR technologies support personalization through customizable content, dynamic interaction, and user-generated inputs [15]. Prior studies indicate that personalized AR experiences foster a stronger sense of emotional attachment and anticipation among users [16]. Within wedding invitations, personalization may include custom avatars, thematic designs, interactive messages, and immersive storytelling.

2.6 Research Gaps and Need for an Enhanced AR Wedding Invitation System

Although AR has been widely adopted across various industries, its application in wedding invitations remains underexplored and fragmented. Existing AR invitation solutions often rely on external applications, offer limited personalization, and provide minimal interactive features. More importantly, most prior implementations lack empirical validation of usability, engagement, and user experience using established evaluation instruments. This study addresses these gaps by proposing an integrated AR wedding invitation system that combines

multimedia personalization, interactive guest engagement, and systematic usability evaluation within a single framework.

3.0 METHODOLOGY

The methodology adopted in this study is structured according to the Multimedia Development Life Cycle (MDLC) framework, supported by usability evaluations using standardised instruments. This section outlines the development phases, system features, and evaluation methods used to assess the effectiveness of the AR wedding invitation application.

3.1 Development Framework

The development of the AR wedding invitation system follows the MDLC model, a well-established approach for multimedia and interactive application development. The MDLC comprises six sequential phases: concept, design, material collecting, assembly, testing, and distribution. This model was selected due to its suitability for multimedia-rich systems that incorporate visual, auditory, and interactive components [1], [2].

The phases are described as follows:

i. Concept:
Identification of project objectives, target users, and system requirements. During this phase, the limitations of traditional wedding invitations were analysed, and AR was identified as a suitable medium for enhancing interactivity, personalization, and guest engagement.

ii. Design:
Creation of interface layouts, interaction flowcharts, AR marker structures, and multimedia integration plans. Design decisions included mobile-first usability, intuitive navigation, and minimal user effort for accessing AR content.

iii. Material Collecting:
Collection and preparation of multimedia assets, including 3D avatars, animation sequences, wedding information templates, user interface graphics, and audio components.

iv. Assembly:
Implementation of the system using Unity3D and AR libraries suitable for mobile Android devices. This phase involved programming AR interactions, developing the user interface, integrating multimedia elements, and enabling QR-based access.

v. Testing:
Initial internal testing was conducted to ensure functionality, stability, and compatibility across mobile devices. Bugs were identified and resolved before formal usability assessments.

vi. Distribution:
Preparation of the prototype for user testing, including packaging the APK for installation and generating QR codes for participant access.

3.2 Key Features of the AR Wedding Invitation System

The proposed system integrates interactive AR elements such as 3D avatars and animations, personalized wedding information, a guest message board, mobile accessibility, and eco-friendly digital delivery. These features collectively enhance engagement, personalization, and sustainability while reducing reliance on printed materials.

3.3 Evaluation Methods

The study involved 24 participants, which is consistent with established usability and user experience research practices. Prior studies suggest that a sample size of 20–30 participants is sufficient to identify usability issues and obtain reliable measurements using instruments such as the System Usability Scale (SUS) and User Experience Questionnaire (UEQ). This sample size is commonly adopted in early-stage evaluation of interactive and AR-based applications, where the focus is on usability, engagement, and experiential feedback rather than statistical generalisation. The participants consisted of individuals from diverse backgrounds, including students and working adults. The age range of participants was between 20 and 45 years old, with a balanced representation of male and female users. All participants had prior experience using smartphones, while familiarity with AR applications varied, allowing the evaluation to capture both novice and experienced

user perspectives.

i. System Usability Scale (SUS):
A widely adopted 10-item questionnaire designed to measure perceived usability. SUS provides a single usability score based on user responses [3].

ii. User Experience Questionnaire – Short (UEQ-S):
Used to evaluate attractiveness, efficiency, clarity, and stimulation in digital applications. The UEQ-S captures user perceptions regarding the quality of interactions and emotional responses [4].

iii. Engagement Questionnaire:
Assessed user curiosity, enjoyment, and emotional involvement while interacting with the AR invitation.

iv. Open-Ended Feedback:
Participants provided qualitative insights regarding strengths, shortcomings, and suggestions for improvement.

The combination of quantitative and qualitative methods ensures a comprehensive evaluation of the system, covering usability, aesthetics, emotional engagement, and overall user satisfaction.

4.0 RESULTS AND DISCUSSION

This section presents the findings from the usability, user experience, and engagement evaluations as in Table 1, followed by a discussion on how these results support the effectiveness of the AR-based wedding invitation system.

Table 1: Summary of Quantitative Evaluation Results

Category	Item	Mean	SD
System Usability Scale (SUS)	Easy to navigate the app	4.33	0.76
	Instructions were clear	4.29	0.69
	Viewing	4.54	0.69

	wedding details was easy		
	AR feature loaded smoothly	4.58	0.58
	Design and layout were attractive	4.33	0.70
	Enjoyed interacting with 3D/AR elements	**4.63**	0.58
User Experience (UEQ-S)	AR more memorable than printed invitations	4.38	0.65
	Would consider using this app	4.38	0.58
	App felt unique	4.42	0.78
	AR concept appealing	**4.58**	0.50
Engagement	Curious/excited to explore	**4.67**	0.48
	Enjoyed interacting with AR elements	4.58	0.58
	Guest message increased connection	4.58	0.50
	Design matched wedding atmosphere	4.58	0.72

**SD refers to standard deviation, indicating the variability of participant responses.*

4.1 Quantitative Results

A total of 24 participants evaluated the system using the System Usability Scale (SUS), User Experience Questionnaire – Short (UEQ-S), and an Engagement Questionnaire.

System Usability Scale (SUS)
Participants reported strong usability across key items. Navigation, clarity of instructions, ease of viewing details, and smooth AR loading each scored above 4.2 on a 5-point scale. Interaction with 3D/AR elements scored the highest (Mean = **4.63**), indicating strong user acceptance of AR components.

User Experience (UEQ-S)
The system achieved high ratings in memorability, uniqueness, and overall attraction. Participants agreed that AR invitations are more memorable than printed cards (Mean = **4.38**) and felt the application provided a unique experience (Mean = **4.42**).

Engagement Questionnaire
Engagement results were also positive, especially enjoyment and emotional connection. Participants expressed high curiosity when exploring the AR elements (Mean = **4.67**) and strongly agreed that the guest message feature increased their sense of connection (Mean = **4.58**). Overall, all metrics reflected high perceived usability, emotional resonance, and strong engagement, with standard deviations below 0.8, indicating consistent positive responses across participants.

The consistently high mean scores across all evaluation categories, combined with relatively low standard deviation values (SD < 0.8), indicate stable and consistent user perceptions of the system's usability, engagement, and user experience. This suggests that participants shared similar positive views toward the AR-based invitation, regardless of individual background differences.

4.2 Qualitative Feedback

Open-ended feedback supported the quantitative findings:

- **Positive Comments:**
  Participants enjoyed interacting with 3D avatars and appreciated the personalized and immersive presentation. The design theme

was considered aesthetically aligned with wedding atmospheres.

- **Suggested Improvements:**
  Some participants requested additional customization (avatars, music, themes). Others suggested removing the installation requirement by implementing web-based AR, which aligns with current trends in lightweight AR deployment.
- **Expert Review:**
  Experts praised the innovative concept and modern delivery format but recommended expanding personalization and adopting browser-based AR to improve accessibility.

4.3 Discussion

The results indicate that the proposed AR-based wedding invitation system effectively enhances usability, engagement, and memorability compared to traditional printed invitations. High scores from the System Usability Scale (SUS) and User Experience Questionnaire (UEQ-S) suggest that participants found the system intuitive, visually appealing, and enjoyable to use.

The findings address the identified research gaps by integrating multimedia personalization, interactive guest engagement, and empirical evaluation within a single AR platform. Features such as 3D avatars, animations, ambient music, and the guest message board contributed to increased emotional connection and user involvement.

In addition, the use of established usability and engagement instruments provides empirical evidence supporting the effectiveness of AR invitations, which is often lacking in prior implementations. While participants acknowledged the benefits of digital and eco-friendly invitations, the requirement for application installation was identified as a usability limitation, suggesting that WebAR deployment could further improve accessibility and adoption.

5.0 LIMITATIONS AND FUTURE WORK

Despite the positive usability and engagement results, several limitations were identified. The current prototype offers limited customization options for avatars, themes, and background music, which may restrict full personalization according to user preferences. In addition, the requirement for Android application installation may limit accessibility for non-Android users or less technologically experienced

guests.
The evaluation was conducted with 24 participants, which is sufficient for usability validation but does not fully represent broader demographic groups, particularly older users. Furthermore, the system does not yet support advanced interactive features such as storytelling sequences, RSVP integration, or social sharing.

Future work should focus on deploying the system using WebAR to eliminate installation barriers, expanding personalization and interactive features, and conducting evaluations with larger and more diverse participant groups to improve generalisability.

6.0 CONCLUSION

This study demonstrates the effectiveness of Augmented Reality (AR) in modernizing traditional wedding invitations through the integration of interactive multimedia, personalization, and guest engagement features. Developed using the Multimedia Development Life Cycle (MDLC), the proposed system combines 3D animations, customizable wedding information, ambient music, and guest interaction within a single AR platform.

Evaluation results confirm high usability, positive user experience, and strong engagement, indicating that AR-based invitations offer a more memorable and emotionally engaging alternative to printed cards. By addressing gaps in multimedia integration, interactivity, and empirical validation, this work provides evidence-based support for AR as a sustainable and practical solution for contemporary wedding invitations.

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