Physical Music Albums in the Digital Era: Exploring Experiential Value Through the Integration of AR

Ena Fumihira
University of Technology Sydney
PO Box 123
Broadway, NSW, Australia
ena.fumihira@student.uts.edu.au

Andrew Johnston
University of Technology Sydney
PO Box 123
Broadway, NSW, Australia
andrew.johnston@uts.edu.au

ABSTRACT

This study explores physical music albums in the digital age, as well as the creation of new music experiences through the integration of Augmented Reality (AR) into physical albums. An online survey was conducted to examine the differences in user experiences between digital and physical albums, and this informed the development of a physical music album incorporating AR. We provided 8 K-POP fans, who engage with physical albums more frequently than fans of other genres, the opportunity to test existing AR-integrated albums and a new prototype featuring AR packaging animations, multiplayer virtual concerts, and interactive photo features. The results underscored the importance of understanding and respecting fan culture when using AR.

The results suggest that, compared to digital albums, physical albums derive significant experiential value from traditional supplementary materials such as booklets and lyric cards. However, AR has the potential as a complementary new material to provides users with novel experiences. This work leads to a reconsideration of Walter Benjamin's concept of *aura*, which critiques the reproducibility of art.

Author Keywords

Augmented Reality (AR), Physical Albums, Music Experience, Fan Culture, Walter Benjamin

1. INTRODUCTION

As discussions around media theory have highlighted, the concept of *aura*, introduced by Walter Benjamin (1935), is essential to understanding the implications of technological reproduction. Benjamin defined *aura* as the unique presence and authenticity of a work of art, grounded in its singular existence in time and space [2]. He argued that mechanical reproduction inevitably diminishes this *aura* by detaching artworks from their original contexts. While this shift democratised access to art, it also transformed audience engagement, prioritising convenience and immediacy over singular, ritualistic encounters.

This transformation is particularly evident in the music industry. The shift away from tangible, *ritualistic experiences* [5] towards instant accessibility is reflected in the dominance of digital music formats. As McLuhan (1964) famously asserted, "the medium is the message" [7]; in the context of music, this indicates that the transition from physical albums to streaming platforms has not merely changed the method of delivery but fundamentally altered the nature of musical engagement itself. In 2023, streaming accounted for 67.3% of global music revenue [4], underscoring the extent to which digital consumption has overtaken traditional physical media.

Despite the dominance of digital formats, physical albums continue to offer distinctive experiential and commemorative qualities, which may contribute to their enduring cultural and commercial significance. The resurgence of vinyl records highlights their continued appeal, driven not only by nostalgia but also by the tactile and *ritualistic experiences* they offer [5]. Actions such as placing a record on a turntable or reading liner notes are *rituals* that enhance the listener's connection to the music [5]. Supplementary materials, such as booklets, sleeve art, and collector's items, further enhance the storytelling aspect of physical albums, potentially differentiating them from digital formats, which often provide a less immersive experience [1].

So far, we have discussed the characteristics of physical albums. However, with recent technological advancements, producers have also been exploring new ways to enhance the value of physical albums. Augmented reality (AR) is one such innovation. AR technology may enhance experiential value by enabling listeners to access immersive content, such as virtual environments and animations, via applications. AR has been widely adopted in the music industry as a new frontier that bridges the gap between the physical and digital worlds. Examples of AR-integrated physical albums include *Women in Music Pt. III* by Haim and *Savage* by aespa (see Figure 1 and 2), both featuring AR markers on album covers that unlock interactive virtual content. These cases demonstrate how AR enhances the experiential value of music while also serving as an innovative tool for artists to communicate their creative vision. In this way, AR transforms physical albums into hybrid media, catering to both artistic and commercial purposes.

Figure 1. Women in Music Pt. III by Haim (Screenshot from Creative Review)

Figure 2. *Savage* by aespa [11]

At past NIME conferences, numerous studies explored AR applications, particularly in musical interfaces, such as AR-assisted pianos [8] and freehand musical instruments [12].

However, despite its potential, AR applications often face usability challenges that can undermine the user's sense of immersion. Previous research has highlighted that AR users may encounter difficulties in maintaining the "AR illusion," particularly due to perceptual inconsistencies, physical discomfort, and operational complexities [13]. This underlines the importance of intuitive UI/UX design when integrating AR into new music experiences.

This study aims to consider the significance of physical albums in the digital era and explore how AR can expand their experiential value. Specifically, it investigates how AR technology can enrich the physical album experience by adding immersive visual and auditory layers that complement tactile interaction.

2. ONLINE SURVEY

To better understand the experiential differences between digital and physical albums and inform the prototype development, an anonymous online survey was conducted. Participants were recruited through online platforms, as well as through referrals from friends. The survey received responses from 31 participants ranging from teenagers to individuals in their 60s. The participants included music fans with diverse genre preferences, reflecting a broad spectrum of listening habits.

While 81% of respondents reported daily use of digital formats for their convenience and flexibility (see Figure 3), 84% stated that they rarely or never use physical albums (see Figure 4), highlighting a stark contrast in usage frequency.
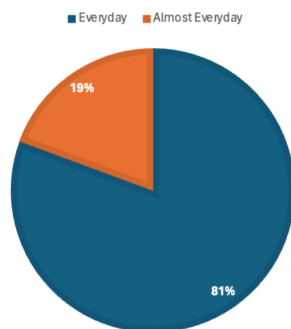
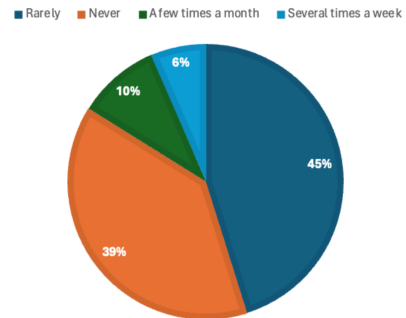Figure 3. Frequency of use of digital format

Figure 4. Frequency of use of physical formats

One of the survey's most critical findings was that physical albums had a higher revisitation rate than digital formats. Despite fewer participants having purchased physical albums recently, 14 respondents interacted with them within the past year. These interactions were often motivated by a desire to revisit commemorative elements or supplementary materials like cover art and booklets rather than the CDs or LPs themselves. This aligns with the results of a question about what participants valued most in physical albums, where 13 out of 31 respondents cited *supplementary materials*, and 10 viewed them as memorabilia (see Figure 5). This further highlights the crucial role of traditional *supplementary materials* [1] in the album experience.
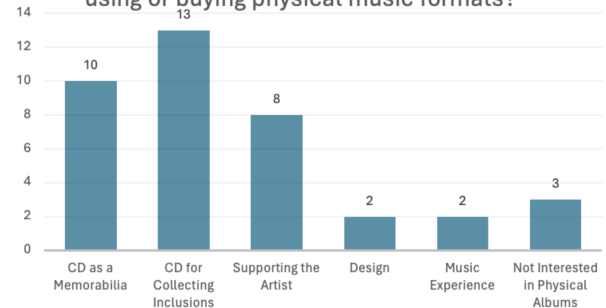

Figure 5. Value of physical formats

Another key finding relates to memories associated with digital and physical albums. Despite the low number of participants who regularly use or purchase physical albums, all 31 respondents provided detailed descriptions of memories linked to albums. Notably, 16 participants focused on actions they experienced through albums, such as "unboxing an album with a friend two years ago" or "winning a backstage pass."

In contrast, when asked about memories related to digital albums, 10 participants primarily mentioned the convenience of digital formats, with responses such as "discovering great new songs through algorithms" or "creating a favourite playlist." However, a notable difference emerged—8 participants stated that they had no memories associated with digital albums.

These results align with the earlier discussion on the *ritualistic* nature of physical albums [5], which require effort and time to engage with. This *ritual* enhances the depth of the music experience, making it more memorable and leaving a stronger impression on users.

Finally, it turned out that 30 participants had never used an album with AR functionality. This finding highlights not only the opportunity

to redefine physical albums as interactive, multi-sensory media, but also the necessity of testing whether AR integration can meaningfully enhance the music experience. This motivated the subsequent prototype development.

3. PROTOTYPE

Based on the research and the online survey, a prototype was developed and tested through a moderated user experience study. Participants first tested aespa's AR-integrated album *Savage*, which is themed around the intersection of reality and the virtual world. The album allows users to explore their 360-degree virtual universe, *KWANGYA*, by scanning an AR marker [11]. Selected for its award-winning UX design, this album provided a short, efficient AR experience. Participants then engaged with the prototype's physical album, and feedback was gathered through comparative analysis.

3.1 Objective

The primary objective of this prototype was to determine whether AR could encourage long-term engagement, considering the high revisit rate of physical albums, and whether AR itself could prompt users to return to the experience.

3.2 Participant Selection

The user experience test involved 8 participants, aged 22 to 27, all of whom identified as K-POP fans who had purchased a physical K-POP album at least once. This selection was determined by data from the IFPI's 2023 Global Album Sales Ranking. The ranking showed that 19 of the top 20 albums were physical K-POP albums [4], indicating that K-POP fans maintain the strongest interaction with physical albums in an increasingly digital era. Participants were recruited directly from events likely to attract K-POP fans or through social media platforms.

3.3 Design Process

The prototype album was designed around NCT DREAM, a seven-member K-POP group celebrated for themes of youth and dream. The reason for selecting this group is their long-standing career, the strong bond established between fans and idols, and the fact that their agency, SM Entertainment, has been a pioneer in releasing new forms of physical albums in recent years. Titled *Chapter 7*, the album chronicled the group's journey from debut to 2024, featuring seven significant tracks. The packaging was conceptualised as a treasure chest, symbolising the unearthing of memories. NFC-enabled keys replaced traditional CDs, allowing users to unlock music digitally while preserving the tactile experience.

For this user test, the album was represented by a treasure box-style box (see Figure 6), the design was based on a mood board, and substitute items were used for the NFC keychain and other album accessories.

Figure 6. The treasure chest with an AR marker

3.4 Features and Materials

The album included various supplementary materials and AR functionalities to enhance its narrative and user engagement:

- Lyric Booklet: Featuring the lyrics of the included tracks.
- Photobook: Highlighting the group's career milestones with dynamic layouts.
- AR Ticket Card: Unlocking a virtual concert experience with single-player and multiplayer modes.
- AR Card: Enabling users to interact with digital figurines of the idols and themed frames.
- Trading Card: A random selfie card of one group member to encourage collectability.

The AR functionalities were central to the prototype and included:

- AR Packaging (Marker-Based): When users scan the album box's interior with the dedicated app, music videos and related AR animations appear. They can select tracks within the app, triggering themed animations that decorate the album box, creating an immersive and interactive experience (see Figures 7 and 8).

Figure 7. Image of the AR animation around the album package

Figure 8. AR animation used for the UX test

- AR Concert (Marker and Location Based): Scanning the AR ticket card brings a live stage and artist into the user's environment, with options for solo or multiplayer mode. The multiplayer mode uses location-based AR to synchronise animations across devices, and fans can cheer with AR light sticks, compete in support levels, and enhance immersion by moving their devices closer to the stage, which amplifies the sound. 3D avatars resembling

the artists appear in the AR world, offering a realistic and engaging experience (see Figure 9).

Figure 9. Image of multiplayer of AR concert

- AR Photo (Marker Based or Marker Less): This feature allows fans to take AR photos, integrating fan culture through two options: concept-themed photo frames that match the album's theme and AR idol characterisation, enabling fans to capture AR idol figurines anytime without physical ones. Exclusive to album owners via an AR card, this functionality enhances exclusivity and strengthens the feeling of connection to the album.

A dedicated app, *Dream Connect*, was developed to integrate playback, AR features, and additional functions for a seamless user experience (see Figure 10). To minimise breaks in presence (BIP) [10], the app was designed to be intuitive and reduce resistance—especially important for users new to AR. As users transition from the physical album to the digital app, design choices focused on maintaining continuity. Rather than stylised illustrations, the app used photographs and paper-textured backgrounds to preserve material familiarity (see Figures 10 and 11). The interface also accounted for the AR camera view, ensuring the digital content appeared naturally integrated with the physical environment.
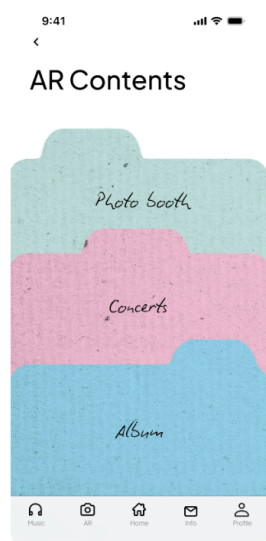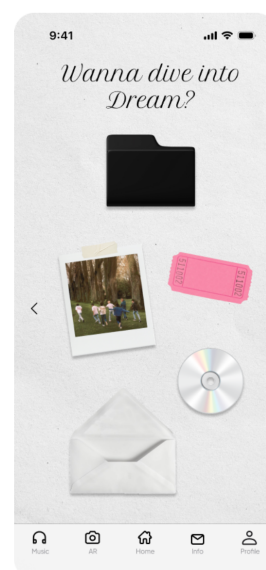

Figure 10. AR mode screen of Dream Connect

Figure 11. Used real-world objects as icons.

3.5 Results

The comparison between aespa's *Savage* album and the prototype album revealed that both effectively used AR technology to enhance the physical album experience. Participants consistently noted that in both cases, AR successfully conveyed the album's concept and thematic messages.

For *Savage*, the integration of the album's narrative with AR elements was particularly effective, and all eight participants experiencing an AR-integrated album for the first time described it as "interesting." Similarly, the prototype album received high evaluations for its design and overall experience, with three participants, who also happened to be NCT DREAM fans, praising in particular its concept and treasure box-like design. One participant remarked that "opening the album felt like memories were jumping out," highlighting the emotional impact of the experience.

Despite its strengths, *Savage* did not strongly encourage long-term engagement. Six out of eight participants stated that they felt satisfied after a single use and were unlikely to revisit it. Additionally, all eight participants expressed disappointment that the AR experience lacked music, and three noted dissatisfaction with the absence of aespa's members in the AR content. Moreover, difficulties navigating the dedicated AR app were identified as further limiting user engagement.

In contrast, the prototype album successfully promoted revisitation. Six out of eight participants expressed a willingness to use it over the long term, and five indicated that they would revisit the app when a new release from their favourite artist became available. Furthermore, three participants explicitly mentioned their intention to continue using the AR concert mode, suggesting that multiplayer functionalities enabling shared experiences, and this played a stronger role in encouraging revisitation compared to individual AR features. In addition, the availability of multiple AR modes, allowing users to choose features based on their individual preferences, may have further supported long-term engagement.

Regarding the AR applications, participants reported experiencing significant confusion when using the existing app associated with *Savage*. In contrast, all participants were able to achieve their goals without difficulty using the prototype app. However, two participants expressed lingering concerns about whether they could navigate the app independently in the future, indicating a general resistance towards AR applications.

Finally, the study highlighted that since physical albums act as storytelling devices conveying an artist's world-building, any disruptions or inconveniences during the transition from physical

(album) to digital (AR) risks diminishing the experiential value, and consequently reducing user engagement.

These results suggest that while not all AR applications guarantee long-term engagement, certain features—particularly those that support shared experiences and offer user choice—can significantly increase revisit potential. The prototype's higher engagement levels, compared to Savage, indicate that AR has the capacity to foster sustained interaction when it is meaningfully integrated with fan activities and designed with intuitive usability in mind.

3.6 Improved Prototype

Following prototype testing, several enhancements were made to improve the AR experience.

First, the multiplayer functionality of the AR concert was expanded, allowing users in different locations to view animations simultaneously. This encouraged remote interaction among fans and enhanced overall engagement.

Second, AR was integrated into lyric cards, enabling users to scan them and view animations tied to each song's theme. This deepened narrative engagement and encouraged users to revisit supplementary materials such as lyric cards and booklets.

Third, AR animations were enlarged, requiring users to move their devices to view the full content. This change promoted a more active and immersive experience.

Fourth, the app was made more beginner-friendly by introducing step-by-step instructions on each AR feature screen, helping first-time users navigate the experience with confidence (see Figures 12 and 13).

Additionally, because participants responded positively to the idea of sharing AR experiences with others, the originally solo-oriented AR feature was reimagined for broader use. The AR package turned into a portable, keyring-sized treasure chest, allowing users to enjoy animations and music playback on the go. This enhanced the contextual flexibility of the feature and reinforced conceptual consistency by enabling the AR keyring to be carried alongside the NFC music key. (See Figure 14)

Together, these improvements elevated the AR functionality and marked a significant step toward redefining music albums as hybrid experiences that blend storytelling, interaction, and immersion.
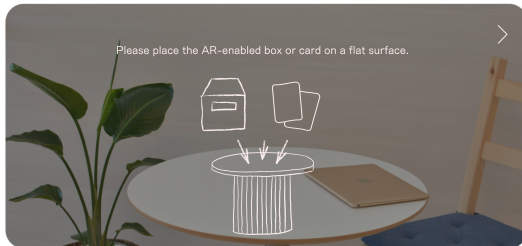
Figure 12. Combined textual instructions with clear illustrations to help users easily understand their next actions
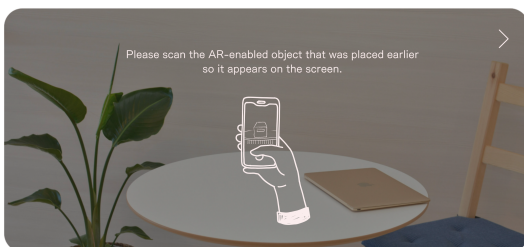
Figure 13. Combined textual instructions with clear illustrations to help users easily understand their next actions

Figure 14. Concept illustration of a compact cloud-shaped AR box and an NFC-enabled audio key

4. DISCUSSION

4.1 Rituals, Tangibility, and Attachment

The initial online survey revealed that physical albums are perceived more as artistic objects, while digital albums are viewed primarily as functional tools. This suggests users value not only music playback, but also supplementary elements such as packaging, or the prioritisation of usability and personalised user experience.

The experiential gap between physical and digital albums largely stems from the role of *traditional supplementary* materials, which prior research has identified as key to enhancing user value. These materials not only support initial engagement but also encourage repeated interaction—even without playing the music—by fostering *ritual-like behaviour* through tactile experiences.

Such interactions are closely tied to users' emotional responses and personal investment, often leading to a deeper sense of attachment to physical albums. Attachment to physical albums can be understood through four key aspects: *(1) Emotional, (2) Self-Expression, (3) Memory, and (4) Functional.*[6] Unboxing or browsing a booklet enhances sensory immersion; owning an album expresses identity and belonging [9]; handling the album evokes personal memories; and its relative "inconvenience" can serve as a meaningful ritual.

Together, these aspects demonstrate how the ritualistic and tactile qualities of physical albums foster deeper, more enduring user connections than digital formats.

4.2 Augmenting Rituals

AR technology has the potential to enhance the physical album experience by integrating visual and auditory elements. This study demonstrated, through prototype testing, that AR can effectively convey an album's conceptual and immersive world. This function aligns with the traditional role of supplementary materials, which have historically contributed to the *ritualistic* value of physical albums. However, the experiential value of such materials often stems from their perceived "inconvenience" compared to digital media, which raises questions about whether AR can fully assume this *ritualistic role*.

As digital media is commonly perceived as a functional tool, usability remains a key concern for users. Even when AR is employed to enhance the physical album experience, user-friendliness should remain a primary design consideration. Interacting with physical supplementary materials provides tactile stimulation that is absent in digital formats. In this regard, AR holds promise as a complementary medium, but careful design is necessary to ensure it is seamlessly integrated into the overall album experience.

Survey results revealed that many participants were either unaware of the existence of AR features in albums or had never used them, highlighting a significant gap between technological offerings and

actual user uptake. Additionally, interviews suggested a degree of resistance toward AR app operation, indicating that immediate visual and auditory feedback may play a critical role in shaping the user experience.

Moreover, the use of marker-based AR allowed participants to interact with related physical objects even after the AR experience had ended, potentially mitigating disruptions in immersion. These physical elements may also serve as triggers for users to revisit the AR content, encouraging continued interaction. However, there is insufficient evidence to confirm this effect, suggesting the need for further exploration into design strategies that minimise breaks in immersion between physical and digital realms, and AR triggers in the context of music albums.

4.3 Relationship Between Fandom Culture and AR Experiences

The study also suggested that the effectiveness of AR depends significantly on the particular music genre utilised. In this prototype, the target audience consisted of K-POP fans, whose culture of social media interaction and desire to connect with their favourite artists appeared to enhance the acceptance of AR functionalities. K-POP fans place immense value on the idols themselves, frequently collecting photo cards featuring their pictures and purchasing related merchandise. Therefore, designing the prototype's AR packaging and concert modes to create an experience where it feels as though the idol or artist is right in front of them aligns with their experiential desires and has the potential to deliver a highly satisfying experience. Although it is normally impossible for idols to appear directly in front of fans, AR technology enables a virtual experience that makes this feel real, deepening the emotional connection and reinforcing fan identity.

However, different feedback may emerge in other music genres or fandoms, indicating the need to understand cultural contexts when designing AR features.

4.4 Reinterpreting Benjamin's Concept of *Aura*

The emotional attachment to physical albums appears to enhance their experiential value. This tendency may relate to a broader human preference for authenticity—people often favour originals over perfect copies [3]. This brings us back to a familiar concept: *aura*.

Walter Benjamin's notion of *aura* refers to the uniqueness and presence of a work of art in time and space. He criticised the mechanical reproduction enabled by technological advancement for diminishing this *aura*, arguing that reproducibility undermines the "here and now " of an object. Under this view, even physical albums—products of industrial duplication—might seem to lack *aura*.

However, today's music consumption landscape has shifted dramatically. With digital formats such as streaming and playlists now the dominant mode of consumption, music is no longer tied to a single physical object or fixed order. This extreme convenience furthers the detachment from aura as Benjamin defined it.

In contrast, physical albums retain tactile and visual qualities that offer a sense of uniqueness. Their material limitations—such as having to flip through booklets or handle the packaging—may actually reinforce their *aura* by demanding *ritual-like* engagement. In this sense, physical albums, while technically reproducible, differentiate themselves from digital formats through sensory interaction and narrative cohesion.

This reframing suggests that Benjamin's concept of *aura*, while originally a critique, can also be reinterpreted to support the continued significance of physical albums in the digital age.

Whether AR can preserve *aura*, however, remains an open question. Findings from the prototype utilised in this study indicate that AR has the potential to evoke memorable, emotionally rich experiences. Because it was integrated with the physical album rather than existing as a standalone digital product, participants saw it as an extension of the album rather than a distraction. Responses such as awe and excitement suggest that AR can support emotional engagement similar to physical formats.

Moreover, AR can complement physical albums by creating hybrid experiences that expand their storytelling scope while preserving the cultural context of physical media. In doing so, AR may acquire *aura*-like qualities by extending the album's presence through multisensory engagement.

That said, AR also has limitations. It is easily replicable, lacks materiality, and is accessible only via devices. Unlike physical albums, AR does not offer lasting presence and may struggle to sustain *aura*. Its experiential value is more transient, tied to screen-based interaction.

Ultimately, whether AR can preserve *aura* depends on its design. In the case of this prototype, the use of marker-based AR anchored the digital elements in physical reality. This reliance on tangible objects may be crucial in maintaining sensory continuity and, by extension, *aura*.

Understanding these limitations is essential to fully harnessing AR's potential in redefining music experiences.

5. CONCLUSION

This study conducted an online survey and prototype test to explore the redefined significance of physical albums in the digital age, and the potential of AR to form novel music experiences for users. The results indicated that while physical albums provide memorable experiences through supplementary materials and *ritualistic* engagement, AR has the potential to offer new value by integrating auditory and visual elements.

Additionally, the high evaluation of the prototype may have been influenced by the K-pop fandom culture, highlighting the need for further research on its applicability across different cultural backgrounds and music genres. Furthermore, by reinterpreting Benjamin's concept of *aura*, this study highlighted how the inconvenience of physical albums can create meaningful value for users. However, whether AR can preserve this *aura* remains an open question, requiring further investigation.

6. ETHICAL STANDARDS

This study was approved by the FEIT LNR Ethics Committee at the University of Technology, Sydney. All participants were provided with an information sheet and informed that their data would be used solely for the purposes of this study. Participation was voluntary, and there are no observed conflicts of interest in this research.

7. REFERENCES

[1] S. Aiken. *Towards a new theoretical framework for the concept album*. Student Thesis, Utrecht University, 2021.

[2] W. Benjamin. *The Work of Art in the Age of Mechanical Reproduction*. In H. Eiland and M. W. Jennings (Eds.), *Walter Benjamin: Selected Writings, Volume 3: 1935–1938*, Cambridge, MA: Harvard University Press, 2006, pp. 101–133.

[3] M. Hood and P. Bloom. Children prefer certain individuals over perfect duplicates. *Cognition*, vol. 106, no. 1, pp. 455–462, 2008.

[4] IFPI. *Global Music Report 2023*. International Federation of the Phonographic Industry, 2024.

[5] M. Ideguchi. *How has the "revival" of vinyl records been talked about? From 1988 to the present in Japan*. Rikkyo University, 2021.

[6] T. Kino, S. Iwaki, H. Ishihara, and H. Dekihara. Analysis of attachment to objects. *Journal of the Japan Society of Kansei Engineering*, vol. 6, no. 2, pp. 33–38, 2005–2006.

[7] M. McLuhan. *Understanding Media: The Extensions of Man*. New York: McGraw-Hill, 1964.

[8] G. Santini. Augmented Piano in Augmented Reality. *Proceedings of the International Conference on New Interfaces for Musical Expression*, 2020.

[9] T. Shiba. The resurgence of vinyl record popularity driven by the younger generation and "Record Store Day". *Yahoo! Japan News*, Apr. 22, 2023.

[10] M. Slater and A. Steed. A virtual presence counter. *Presence: Teleoperators and Virtual Environments*, vol. 9, no. 5, pp. 413–434, 2000.

[11] SM Entertainment. aespa's first mini-album 'Savage' wins 'iF Design Award' main prize!, 2022.

[12] M. Wang, M. Xi, M. Adcock, and C. P. Martin. Mobility, space and sound activate expressive musical experience in augmented reality. *Proceedings of the International Conference on New Interfaces for Musical Expression*, 2023.

[13] J. Yang, S. Bednarski, A. Bullock, R. Harrap, Z. MacDonald, A. Moore, and T. C. N. Graham. Fostering the AR illusion: a study of how people interact with a shared artifact in collocated augmented reality. *Frontiers in Virtual Reality*, vol. 5, 2024.

8. APPENDICES
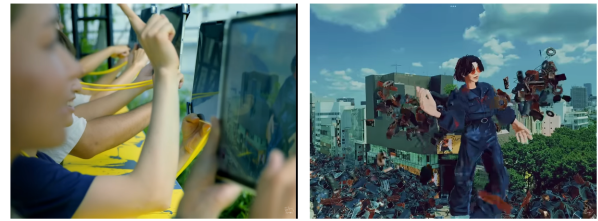
Items Used in the Prototype

Appendix 1. Mood board
(Reference: 주년@anivarchive on X/Dulcia Design on Pinterest/ChuLin on Pinterest/h__xxx on Pinterest/@NCTsmtown_dream on X)
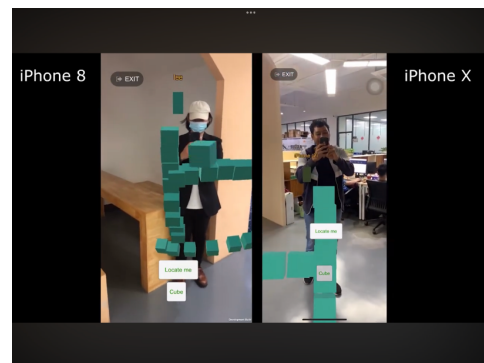

Appendix 2. Other elements stuf

Appendix 3. To better convey the idea, we showed participants a video example pf AR multiplayer functionality.

Source: https://www.youtube.com/watch?v=1kfO39Qrltg

Appendix 4. The video was used to explain how the same AR animation could
be viewed simultaneously during multiplayer interactions.

Source: https://www.youtube.com/watch?v=rym_tEbzSJ8

AR app: *Dream Connect*