

Alice Dali MR: A Mixed Reality Interactive Narrative Experience

Svetlana Rudenko¹[0000-0003-2036-8120] and Xiangpeng Fu^{1,2} and Mads Haahr^{1,2}[0000-0002-9273-6458]

¹ Haunted Planet Studios, 12 Fitzwilliam Street Upper, Dublin 2, Ireland

² Trinity College Dublin, University of Dublin, Dublin 2, Ireland
{rudenos, fuxi, haahrm}@tcd.ie

Abstract. This late breaking work paper presents *Alice Dali Mixed Reality (MR)*, a cutting-edge, first-ever concept of an interactive experience using music, art and narrative in a new and interactive fashion for individual use and as a live performance. We approach the project like a surrealist painting: an experience that resides halfway between the visible and the invisible. MR technology is uniquely suited for this purpose because it positions the audience not within a virtual world (like VR technology does) but in a liminal space that blends the real with the un-real, the conscious with the unconscious, the physical world with the world of dreams. We performed three interactive *Alice Dali MR* scenes for the Meta Quest Pro headset, projected to the screen for audience view in a live performance. The original mixed reality audio-visual experience and interaction in the MR app involves orchestration of original piano tracks, activated by the magic conductor’s wand when touching one of the rivers in Chapter 2 “Pool of Tears,” by petting animals in Chapter 11 “Who Stole the tarts?” and growing roses in Chapter 12 “Alice’s Evidence.” We present our motivation for the work, the overall experience design and brief reflections on future work, including usage areas such as family entertainment, intergenerational play, the music industry in the genre of concert with visuals, and music art therapy in rehabilitation programs.

Keywords: Mixed Reality, Art, Music, Interactive Storytelling, Salvador Dali, Lewis Carroll, Intergenerational Play

1 Introduction

Mixed Reality (MR) is fast emerging field, and new headsets like the Meta Quest Pro have found a place in business and industry to show layers of design, architecture, for example for training, or for assistance during repair and maintenance jobs. With *Alice Dali MR* we are exploring what Mixed Reality can offer for culture, arts and entertainment. In this paper we describe design approaches for interactive narrative with art visuals and music and also look at the areas (including the music performance industry and society more broadly) where our MR experience may be of interest and could serve people well. Our experience was inspired by Salvador Dali’s art for Lewis Carroll’s

iconic story “Alice’s Adventures in Wonderland.” In 1969, Salvador Dali painted 12 chapters of Lewis Carroll’s book for a Random House special edition. Svetlana Rudenko wrote original music for all twelve chapters on Dali’s paintings for our earlier location-based Augmented Reality app *Alice Dali AR* (see fig. 1), which was produced by Haunted Planet Studios and narrated by Mads Haahr.¹ Despite their similar names, the two experiences (*Alice Dali MR* and *Alice Dali AR*) are different and independent projects that offer quite different play experiences. The location-based play experience of *Alice Dali AR* is designed for outdoor use (for example, a city park), runs on smartphones and is based on the core idea of using a “radar” to find music-art augmented reality encounters.² Our Augmented Reality work inspired us further: What would it be like to be immersed into the painting of Dali and to play with the elements of art? To explore this question, we recreated three scenes of Dali’s art in VR/MR to capture the magical world of a dream and fantasy. Fig. 1 shows an AR art image by Salvador Dali “The Pool of Tears” (from *Alice Dali AR*), which we recreated later in one of Mixed Reality scenes (Fig. 4 and Fig. 5, *Alice Dali MR*).



Fig. 1. AR image from *Alice Dali AR* app with original art by Salvador Dali for Chapter 2 of *Alice’s Adventures in Wonderland* entitled “The Pool of Tears.”

2 Alice Dali MR: Design and Experience

As a Danish artist Asger Jorn proclaimed: “The innermost essence of art is to grasp the human being. The artistic experience is neither to look at nor to admire, but to live in the work of art.”³ With our Mixed Reality experience we want to give people the feeling how “to live in the work of art.” For the interactive experience’s scenes in Mixed Reality, Svetlana Rudenko orchestrated her piano tracks with additional layers of music

¹ Free download for Android and iOS: <https://rebrand.ly/alice-dali-ar-download>

² Screen recording: <https://youtu.be/00z4W-za-28>

³ Museum Jorn, Silkeborg, Denmark

texture in Logic Pro, to distinguish visual scenes, moods and characters with different instrumentation. The concept and design were developed Svetlana Rudenko and Mads Haahr, with 3D modelling, additional design and software by Xiangpeng Fu. The project was funded and produced by Haunted Planet Studios. The experience is built in Unreal Engine and runs on the Meta Quest Pro headset. Demo link: <https://youtube.com/watch?v=O-iP8k8duY0> (Note: *Alice Dali MR* is after “Dreaming: Amy Beach,” which demonstrates a music narrative visualisation for classical music unrelated to this paper.)

Alice Dali MR combines art, music and narrative. The scenes have aesthetic value of art and music in themselves and are playful in their interaction design, but they also raise deep questions about dreams and fantasy worlds, as well as their role as interfaces between the conscious and the unconscious parts of our psyches. Tjeu van den Berk summarises Carl Jung’s distinction between “two kinds of thinking: rational thinking and fantasy thinking. The first consists of thoughts, the second of images: in the first the logos is central, in the second the mythos: the first gives knowledge, the second wisdom” [2, p. 46]. The intention of *Alice Dali MR* is to bridge the two. The interactive experience in Mixed Reality exercises “fantasy thinking” and facilitates immersion into the story world. The MR design utilises principles of a multisensory approach [3][4]. By exercising a sense of touch (petting animals, growing flowers, etc.) and supported by the audio-visual synchronisation in composition (colour palette, emotional perception of characters are reflected in music genre and texture) [5], the emotional and sensory experience helps immersion into the story of digitally enhanced reality. Scientific studies of consciousness reveal that we perceive the world with our bodily experience, relying on the sensory responses, as Anil Seth puts it, “being a beast machine” [11]. Seth’s approach is to look at consciousness from a biological model of the brain and it constitutes a large area of current research: human consciousness in XR, when “reality” is digitally enhanced. (We are not concerned with this research area in the scope of this paper, but it is something we intend to pursue in future research.)

Fig. 2 shows Mixed Reality scenes from two of the chapters from *Alice Dali MR*. In fig. 2 (left) is the court of beasts from the book’s chapter 11 in which the Knave is on trial for stealing the Queen of Hearts’ tarts. In our MR scene, the “beasts” from Dali’s painting of chapter 11 are represented as reactive particle models. Our design for the beasts and the tart were inspired by a natural phenomenon called “pareidolia” in which humans perceive meaningful shapes in random or ambiguous visuals, e.g., faces in clouds. We modelled the beasts and the tart as particle systems, which allows them to be reshaped and to react when the player touches them. Playing cards (featuring Dali’s original art) are also present and can be interacted with and used as portals to other scenes.⁴ Fig. 3 shows images of two animals from Dali’s painting juxtaposed with our reactive 3D particle models. In relation to music design, the scene uses the original piano part from *Alice Dali AR* (see fig. 1), which is in 4/4 time and B flat major, reflecting on Alice’s mood of amusement with the court arrangement. In addition to the piano track, every animal has its own timbre orchestrated track, activated by the player’s interaction, which is a “petting” touch. The Rabbit recalls original Piano Voice

⁴ Video: <https://vimeo.com/800082423>

Narrative track from chapter 1 of the *Alice Dali AR* experience (“Down the Rabbit-Hole”), which is waltzing in E flat major. Each of the three scenes start with a piano and narration track.

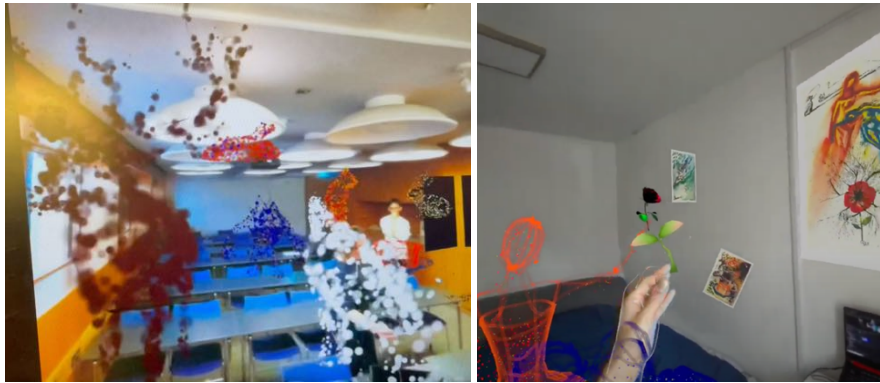


Fig. 2. Interaction in MR: Screenshots from Alice Dali MR prototype: Chapters 11-12 (“Who Stole the Tarts?” and “Alice’s Evidence”) multisensory approach: touching the animals of the trial and growing flowers.



Fig. 3. Modelling art into MR: Art from Dali’s original paintings and our reactive 3D particle models based on pareidolia: The Rabbit (left) and the Cat (right).

In fig. 2 (right) is a scene from the book’s final chapter 12 in which Alice awakens in her sister’s lap. Our 3D models are based on Dali’s painting and feature Alice and her sister and the flower, which are also present in the painting. The flower is the key interactive element in this scene: by pinching their fingers, the interactor can conjure a flower, which will grow at the corresponding position. Flowers make a sound when appearing and can be moved around the scene, enhancing a feeling of euphoria when many flowers (up to 100) are created and float playfully around the scene, reacting gently to the interactor’s touch. In relation to music design, waltz (dance in $\frac{3}{4}$ time) is the leitmotiv of Alice. But in “The Pool of Tears”, even though the piano part is in $\frac{3}{4}$ time, the musical texture does not have traditional waltz accompaniment, and is smooth in order to reflect on the “tragedy” of Alice. It is in A-minor (“sad”) key transiting to C-major key. For an in-depth discussion on the music design, we refer to another published paper [5]. The flowers orchestrated episode is in A-major manifesting eventually back to the waltz with clear traditional waltz accompaniment, reminiscent of the waltz from chapter 1. Music plays an important role as a transmission of emotional states of

the characters and additional music narrative to the participant in the MR scene, evoking empathy and immersion.

Fig. 4 shows a screenshot from our scene of chapter 2 in which Alice has grown very large and is crying so much that her tears cause a flood. In this scene, our 3D models based on Dali's painting of the book's chapter 2 show the brightly coloured waterfalls (green and blue) of tears, three rivers of tears (one orange shown in the figure) and Alice's tears as drops (shown in fig. 5) implementing a flocking behaviour. The interactor can interact with the teardrops, changing their direction of movement, and can use the "dream conductor's wand" (also shown) to interact with each of the three rivers to activate the corresponding layers of orchestration.



Fig. 4. MR app interaction with a virtual "dream conductor's wand" and gestures to interact with the music by activating layers of orchestration.⁵

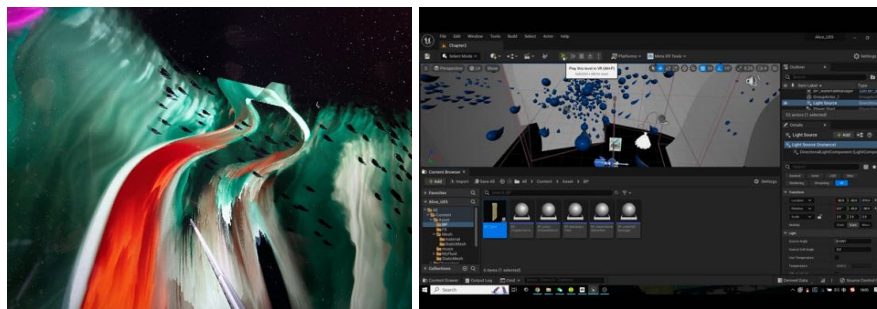


Fig. 5. Left: Screenshot from early VR prototype of *Alice Dali MR*, Chapter 2 ("Pool of Tears"), showing the rivers of tears and the Dream Conductor's wand interaction. Right: Technical implementation of *Alice Dali MR* in Unreal Engine (early prototype); the tears from "Pool of Tears" exhibit flocking behavior, orchestrated with a marimba track in Logic Pro.⁶

⁵ Screen recording: <https://www.youtube.com/watch?v=u8r3WC6T9WM>

⁶ Video: https://www.youtube.com/watch?v=h8LfTeQo_F4

3 Where and How *Alice Dali MR* Could Be Used: Intergenerational Play as a Family Experience (App) and Concert with Visuals MR (Music Industry).

Mixed Reality Music Art experiences could be rewarding for families as a type of intergenerational play, which is therapeutic for adults and educational for children. This experience is particularly important between grandparents and grandchildren to help each other with digital proficiency and pass ideas and values. A study by Hunt focused on the use of technology as an intergenerational communication tool and showed that “grandchildren play a moderate to significant role in grandparents’ learning of technological devices” [6]. Hunt also concluded that her “study confirms grandparents’ high level of satisfaction in the learning process, along with interest and desire to interact with grandchildren at the technological level” [6]. Similarly, Zhang et al observe the following:

Interaction with young people can provide opportunities for older people to develop intimacy and to nurture younger generation. Intergenerational interaction is a crucial means of exchanging knowledge, skills, information, ideas and values. [7]

Zhang et al’s study observes that the roles of adults and children can be reversed when playing with digital games, since children generally take control of them. This may offer a refreshing and worthwhile experience for both generations. With this in mind, we addressed the play experience design to be narrative as well playful. The art images and the interactive narrative elements in the scenes combined with original text by Lewis Carroll are intended to facilitate both age groups.

On the topic of the intergenerational dynamic associated with play, Agate et al conclude the following:

Because play is a meaningful developmental process for children and for older adults, intergenerational play may address the needs of both and allow each to reap the benefits of playful interactions. The grandchild–grandparent relationship is believed to be an important one. In such relationships, grandchildren often receive support and guidance and grandparents find meaning and pride in the opportunities for caring and mentoring. [8]

Furthermore, a grandfather who participated in the study commented: “By cherishing time spent in play, we anchor ourselves together ... We become bonded” [8].

We see considerable potential in the use of our MR app for family entertainment and intergenerational play, music art cultural education, music art therapy and rehabilitation programs, and are planning to conduct user studies in these areas in the future. In the interim, we are presenting the work in a series of public performances with live music and narration and the MR headset worn by one performer and the headset view shown on a large screen, as shown in fig. 6. In this setup, the audience see themselves and their environment on the screen as part of the performance due to the visual characteristics of mixed reality. There is a rise of using technology in music industry, and we see a great potential for Mixed Reality applications in a live performance [12].



Fig. 6. Photo from live concert performance of *Alice Dali MR* projected to the audience.⁷

4 Related Work on Interactivity and Storytelling in Mixed Reality: Future Directions

While *Alice Dali MR*, contains many interactive elements (including rivers, teardrops, plants and animals), our design has not focused on including responsive human characters. However, the addition of such characters of course has great narrative potential. Fortunately, there is work ongoing that can help support for responsive human characters in MR, such as that introduced by Egges et al.:

[...] Flexible interaction and animation engine, in combination with a robust real-time rendering engine that uses a global illumination for real-time PRT extension for virtual humans. The animation engine allows to switch dynamically between interaction and scenario playing, without interrupting the animation cycle. [9]

While *Alice Dali MR*, used a multisensory approach and audio-visual synchronisation, other researchers are also showing an interest in such multisensory approaches and have identified their importance for immersion. For example, Marija Nakevska, Anika van der Sanden, Mathias Funk, Jun Hu, Matthias Rauterberg who in their paper entitled “Interactive storytelling in a mixed reality environment: The effects of interactivity on user experiences” observe: “Immersiveness is a crucial aspect of such an installation and can be influenced by multiple factors such as video, sounds, interaction and, finally,

⁷ <https://www.eventbrite.com/e/piano-concert-with-visuals-music-art-and-technology-arvrmr-tickets-604877754647>

the density of all combined stimuli” [10]. Conducting a user study on their MR environment, Nakevska et al. found that:

The user’s agency in interactive storytelling environments is divided between the own sense of control and the empowerment of the story characters and events. The motivation for a user to act in an interactive narrative may be very different from common interaction with a product: in interactive storytelling, the source for agency may be the ability to navigate and to influence the environment, to interact with characters, or to have an effect on the course of events and the eventual outcome of the narrative. [10]

5 Conclusion

Mixed Reality in both versions, as a live performance concert (music industry) and the standalone MR app, offer an invaluable experience of surreal interaction that is so important for the brain fantasy world. The conscious agency offered in the interactive scenes is not normally available to a dreamer, and in this way the experience can be considered a type of technologically mediated lucid dream, for which Mixed Reality is an ideal tool. In this fashion, the work inspires dialogue about technology in service of culture and the mind – and vice versa. Specifically, it explores technology as a tool for: (a) mediating and exploring the human experiences of dreaming and fantasy worlds of storytelling; (b) reinventing and recombining classic cultural works of art, music and literature; and (c) for live performance concerts.

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