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Virtual Journey through an Immersive Interactive Environment: A Sensory Exploration of an Artistic Space Modeled by Dynamic Painting and Emotional Music by Domingos Mateus

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Abstract—This study explores the sensory impact of a virtual journey through an immersive, interactive environment inspired by the artistic work of Domingos Mateus. It addresses how sensory experiences in virtual spaces, using dynamic visual and auditory stimuli, can enhance emotional engagement and spatial awareness. This study aims to investigate the effectiveness of combining dynamic painting and emotionally resonant music within an interactive, digital environment, aiming to evoke a deeper connection between viewers and artistic content. A multi-sensory museum was implemented, blending interactive visual components (dynamic painting) with a custom musical score designed to elicit emotional responses. Participants navigated the virtual environment using VR equipment, creating a fully immersive experience. Sensory responses were monitored using real-time biofeedback to gauge emotional engagement and presence. Findings suggest combining interactive visual art and music significantly enhances users' emotional engagement and immersive experience. Participants reported heightened spatial presence, with biofeedback data indicating increased emotional arousal during key moments. This sensory approach is potentially used in therapeutic and educational settings, where emotional and sensory stimulation are beneficial. The study underscores the power of immersive environments in enhancing the user's connection to artistic expressions and fostering memorable experiences.

Keywords—Artistic Space, Virtual Reality, Interactive Environments, Biofeedback, Aesthetic Emotions

I. INTRODUCTION

In recent years, immersive virtual environments have transformed how individuals experience art, allowing audiences to engage with visual and auditory stimuli in a highly interactive and sensorial manner [1]. This study, "Virtual Journey through an Immersive Interactive Environment: A Sensory Exploration of an Artistic Space Modelled by Dynamic Painting and Emotional Music by Domingos Mateus," situates itself at the intersection of art, technology, and emotional engagement, exploring how digital, multi-sensory experiences can deepen the viewer's connection to artistic expressions. This work is significant as it addresses the growing interest in how immersive technologies can enhance user engagement and emotional resonance in artistic spaces and therapeutic and educational contexts [2] [3].

The primary purpose of this research is to explore the emotional and sensory impact of combining dynamic, interactive visuals with emotionally evocative music in a virtual multi-sensory museum. By immersing participants in a space that blends Domingos Mateus's [4] dynamic painting techniques with custom music, the study aims to understand how sensory elements influence perception, emotional engagement, and spatial presence [5]. The principal conclusions indicate that multi-sensory experiences, particularly when integrated with visual art and music,

can significantly enhance emotional arousal, presence, and user satisfaction, demonstrating the potential for these environments to create profound, memorable interactions in digital and physical artistic spaces [6] [7].

II. MATERIALS AND METHODS

This study was conducted using a Virtual Reality (VR) system designed to simulate an interactive, immersive environment inspired by the artistic work of Domingos Mateus. The environment incorporated two primary sensory elements: dynamic painting and a custom musical score, both developed to reflect Mateus's artistic themes.

A. *Dynamic Painting and Music Composition*

The visual component consisted of dynamic digital paintings modeled after Domingos Mateus's art style. These paintings were adapted to evolve in real time in response to the user's choice. The music from the Portuguese Guitar [8] has been selected for this study, including emotionally evocative arrangements that shifted dynamically with the user's exploration, heightening the emotional and aesthetic experience.

B. *Materials*

The VR system was developed in Unity [9]. The virtual museum can be experienced using a high-resolution headset (such as Quest 3, Quest Pro, or HTC Vive), spatial audio headphones, and motion controllers, enabling full sensory engagement and interaction.

III. AESTHETIC EMOTIONS IN ARTISTIC ARTIFACTS

Aesthetic emotions, from the combination of dynamic painting and music, play a crucial role in promoting positive emotional states within an immersive environment [10]. Dynamic painting, which evolves in real-time and responds to user interaction, creates a visual experience that feels personalized and deeply engaging, drawing viewers into the artwork itself [11]. When paired with evocative music, this fusion amplifies the emotional impact, as auditory cues guide the user's mood and reinforce the emotional tone set by the visuals. Depending on the music's rhythm and melody, the experience can evoke a range of emotions, such as calmness, nostalgia, and joy, enhancing the immersive quality of the interaction.

This synergy of visual and auditory stimuli intensifies the user's emotional engagement and sense of presence, making it easier to induce positive mental states. The harmonious interaction of these

elements creates an "emotional landscape," where each shift in sound or change in the painting stimulates profound emotional responses. As a result, this aesthetic approach can reduce stress and anxiety, making it a powerful tool in therapeutic contexts, where the goal is to promote well-being and create a meaningful emotional connection with both the art and oneself.

The Portuguese guitar is an iconic instrument with a unique sound, allowing for a diverse tonal range that complements Fado's melancholic, vibrant, and expressive nature. The singular sonority of the Portuguese guitar gives it an instantly recognizable voice, embodying the spirit of Portuguese musical heritage.

Virtual reality can be a powerful tool for promoting positive emotional states, particularly for bedridden individuals or those with limited mobility, significantly impacting their mental well-being. For individuals confined to beds or wheelchairs or with reduced mobility, VR can alleviate feelings of isolation and monotony, providing a source of engagement and mental stimulation.

These VR experiences are designed to evoke positive emotions, reducing stress and anxiety by enabling participants to relax in peaceful settings that stimulate calm and contentment. This interaction with a virtual environment can also help regulate mood, support relaxation, and improve cognitive focus, which are essential components of mental well-being [12].

The effective incorporation of Aesthetic Emotions into 360-degree narratives in immersive environments by carefully blending visual, auditory, and interactive elements transports participants to positive emotional levels.

Aesthetic emotions, such as awe, nostalgia, tranquility, and wonder, are triggered by experiences that engage the senses and the imagination, making them particularly powerful in VR storytelling. In a 360-degree environment, these emotions can be evoked through meticulously crafted settings, dynamic interactions, and sensory details.

IV. THE VIRTUAL MUSEUM

The physical layout of the virtual museum is designed to immerse visitors in a multi-dimensional exploration of art.

Upon entering, users find themselves in a vast, open virtual space reminiscent of a cozy gallery, with ceilings and softly lit walls that highlight the artworks

without overwhelming them. The environment is carefully crafted to evoke a sense of tranquillity and focus, using neutral, subtle colors for the interior to direct attention to the vibrant digital displays of art (Fig. 1).



Fig. 1. Physical layout of the virtual museum.

The floor reflects the patterns used by the "Portuguese sidewalk," which combines the white of limestone and the black of basalt, rocks used to decorate the noblest spaces of the towns and cities of Portugal since the beginning of the 19th century.

On the walls of the gallery are discreetly represented symbols of Portuguese history and cultural heritage, representing the age of the discoveries, honoring authors such as Luís de Camões and Fernando Pessoa, the most significant monuments and patterns representative of history and people, such as the famous tile panels, and the Heart of Viana which is a jewel that was part of the relics of Portuguese families and carries the legacy of beauty, values and feelings from generation to generation.

Evoking the spirit of the Portuguese guitar, an instrument that Domingos Mateus uses so well, the gallery is decorated with elements that reflect the symbolism of the Portuguese cultural patrimony. Symbolism, representing the oldest and most striking traditions, aims to highlight the identity and belonging the artist expresses through his painting and music.

The virtual museum has an organic garden that represents natural elements and reflects freedom of thought and emotions (Fig. 2).



Fig. 2. An organic garden is seen from the inside.

A. Dynamic Painting and Music Composition

The participant can walk through the corridors freely, choosing his path freely, or guided by the visual stimuli the works of art throw. When contemplating the work of art, the participant is invited to interact with it. The traditional painting transforms and resizes, occupying almost the entire field of the participant's vision and transporting the participant to his interior. Before the participant can contemplate the painting, it will appear dynamically, undergoing transformations that the movements of the hands of the participant may influence. The dynamic process of creating images highlights details that would go unnoticed by a static observation, and the participant is no longer just an observer but an adjunct in making the final image (Fig.3).



Fig. 3. Interactive 3D Dinamig painting.

Each painting of the author is associated with a song that reflects the mental state associated with the underlying message. The music can reflect different states, from the nostalgia of a landscape to the traditionalism of costumes and characters, through the state of restlessness expressed by the "Ballad of the Tortosendo," where the feelings oscillate between the provisional definitive and the definitively provisional (Fig. 4).



Fig. 4. The author, Domingos Mateus, performs the "Ballad of the Tortosendo."

The participant can travel from work to work of art, experiencing different emotional states provided by the interaction between dynamic painting and music the author performs.

The chosen route and duration of the trip is a choice of each participant, making each experience customizable and personal, turning it into a unique and memorable moment.

V. CONCLUSION

This study demonstrates the powerful potential of immersive virtual environments in enhancing sensory and emotional engagement with art. By combining dynamic painting and evocative music, as modeled by Domingos Mateus, the virtual journey designed in this research offered participants a unique multi-sensory experience that significantly heightened emotional arousal, spatial presence, and personal connection to the artwork. The findings underscore that integrating visual and auditory elements within an interactive environment can deepen users' emotional responses and provide a more impactful artistic experience.

The concept of Emotional Aesthetics is central to these results, which serve as a vector for inducing mental states associated with mental health and well-being. Through carefully crafted sensory stimulation, Emotional Aesthetics fosters mental states that promote relaxation, introspection, and emotional resilience. By exploring these effects, this study shows how immersive environments can transcend traditional art appreciation, opening possibilities for therapeutic applications where

emotional and sensory engagement contributes to well-being.

Incorporating aesthetic emotions in immersive environments enriches the narrative and deepens the viewer's psychological involvement. By allowing participants to become emotionally invested in the story, VR narratives can create memorable and impactful experiences beyond traditional storytelling. This approach to designing VR content has applications in mental well-being, therapeutic practices, and entertainment, where aesthetic emotions are integral to achieving a transformative and lasting impact.

These results hold promising implications for using immersive environments in artistic, therapeutic, and educational settings, where emotional and sensory stimulation can be pivotal. By fostering deeper connections to artistic expressions, this approach can expand the boundaries of traditional art appreciation and open new pathways for engaging audiences in digital spaces. Future research may focus on optimizing sensory components, exploring additional senses such as touch or scent, and assessing long-term effects on emotional and cognitive responses.

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