Research on Interactive Graffiti Scanning Wall Design Strategies

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Abstract
Immersive exhibitions offer an exciting and novel way to provide an art experience and have the potential to expand the boundaries of traditional art exhibitions. In the context of an interactive graffiti scanning wall, this immersive experience further stimulates interaction and engages the visitor to gain a deeper understanding of the artwork and the ideas behind it. This study provides a framework for designing immersive experiences for interactive graffiti scanning walls, structured around five key elements: integration, interactivity, hypermedia, immersion, and narrative. By following this framework, designers can create interactive art experiences that are meaningful and engaging for users. In the era of digital transformation, this study focuses on "Design Strategies for Interactive Graffiti Scanning Walls", which explores the integration of interactive technology and graffiti art through the integration of digital technology into creative works. From the perspectives of technological art and interactive design, the study systematically investigates the design principles and practical methods, and through case studies and interviews with experts, the study explores the immersive experience of interactive graffiti for the audience. Through case studies and interviews with experts, the study will explore how to promote deeper interaction between graffiti art and audiences, and provide theoretical and practical references for designers and audiences.

Keywords: Interactive Design, Interactive Graffiti Scanning Wall, Immersive Experience

Introduction

With the rapid advancement of technology in recent years, immersive exhibitions have become a new trend in the art world and exhibition industry, bringing exciting new experiences to visitors. Especially in the context of interactive graffiti scanning walls, visitors can engage with and understand artworks more deeply. Art is not only about creation, but also a form of synthesis between technology and creativity. This synthesis promotes innovation and advances human society. At the same time, social interaction and creativity are recognized as key elements in the design of interactive graffiti scanning projection walls. Art plays an important role in human life, not only as a basic educational need, but also as an important means of interpersonal communication. In the case study of designing an interactive graffiti scanning projection wall, the concern is not only the technical realization, but also emphasizes the combination of artistry and humanity (Nugrahani, 2019).

Unlike traditional art exhibitions, today's immersive exhibitions introduce the integration of multiple technologies, including projection technology, interactive sensors, etc., which are no longer just viewed from a distance, but can be interacted with and build a more engaging exhibition experience. It is also common to integrate knowledge and entertainment experiences to attract audiences and stimulate their thinking. However, with the advancement of technology nowadays, over-reliance on technology may lead to a decrease in audience participation and loss of humanity in exhibitions. In order to improve the situation, this paper proposes a framework for interactive graffiti wall design that provides designers and audiences with a more valuable and immersive exhibition experience.

Purpose of the Study

This study will collect data to deeply understand the characteristics of interactive graffiti scanning projection walls, and collect and analyze the current design cases of interactive graffiti scanning projection walls and interviews with experts to create an immersive experience framework for interactive graffiti scanning wall design, hoping that this study will be helpful for professionals in different fields to apply.

Research Limitations

This study focuses on the design strategy of interactive graffiti scanning wall to investigate how to create an immersive experience through the integration of digital technology and art. However the study still has the following limitations:

1. Technical constraints: different technological solutions may have technical limitations, such as cost, equipment requirements, operational complexity, etc., which will affect the practical application of the design strategy.
2. Time constraints: The limited time available for the study may not allow for an in-depth exploration of all the relevant factors and influences that need to be focused on within a limited period of time.

This study will endeavor to overcome these limitations in order to ensure the reliability and validity of the findings and to provide valuable guidelines and recommendations for the design of interactive graffiti scanning walls.

Science and Technology

Technological art is the integration of technology and art, realizing real-time interaction between the audience and artworks through interactive technologies, including virtual reality and sensor technology, which challenge traditional art boundaries and are presented in different art forms (Yuan Guangming, 2016). Recent studies have emphasized the emotional response of technology in interactive installation art, where the artist is not only a technological manipulator, but also an emotional guide, transforming the nature of art and enriching the art experience (Mila Bujić, 2023). Through technologies such as virtual reality and interactivity, viewers are able to deeply perceive emotions and enhance their experience of the artwork.

Origins of Technological Art

The origins of technological art can be traced back to the mid-20th century, and with the fusion of the fields of technology and art, many avant-garde art forms have emerged. One important development was electronic art, which involved the use of electronic media and devices to create art. For example, the experiments in electronic music and visual art in the 1950s and computer art in the 1960s were important milestones in technological art. With the development of digital technology, the scope of technological art has further expanded to include new areas such as virtual reality, augmented reality, and interactive art. These technologies have provided artists with brand-new creative tools and ways of expression, making artworks more avant-garde and interactive. At the same time, technological art also promotes cross-border cooperation between art and science, engineering and other fields, and facilitates cross-disciplinary innovation and development. Science and technology art has become an important branch of the art world, and continues to influence people's cultural life and art experience.

Media and Tools of Science and Technology Art

The media and tools of Art of Science and Technology refer to the use of technology as a medium and tool for the creation, expression or presentation of art. These tools include, but are not limited to, virtual reality (VR), augmented reality (AR), computer art, digital art, interactive art, and network art. Firstly, technological art media tools provide new means of creation and expression, enabling artists to explore and experiment with different artistic styles, forms and techniques. Secondly, these tools can enhance the audience's artistic experience, for example, by bringing the audience into a virtual art space through virtual reality technology, or by combining the real world with virtual artworks through augmented reality technology. In addition, technological art media tools can also promote art education and popularization, for example, through the display and sharing of digital art works on online platforms, so that more people can have access to and appreciate art. Taken together, technological art media tools bring new possibilities and opportunities for art creation, audience experience and art education, and promote the continuous innovation and development of the art field.

Mind Flow Theory

Developed by psychologist Mihaly Csikszentmihalyi in 1975, the theory of mindstreaming describes a state of mind that allows a person to be fully immersed and engaged in an activity. Mindfulness involves highly focused, goal-directed activities that allow the individual to

merge seamlessly with the activity and focus on achieving the goal. Dimitri (2021) noted that while completing a task, people may enter a state of total concentration and become virtually unaware of their surroundings. In the literature, this state is referred to as 'mindfulness flow' (Csikszentmihalyi, 1988, 2014).

Csikszentmihalyi (1996) describes mindfulness flow as “an almost automatic, effortless, and highly focused state of awareness” (p. 110). Individuals are more likely to enter a state of mindstream when there is a balance of challenge and skill, which requires challenging tasks, high levels of concentration, clear goals, immediate feedback, and skill matching. Characteristics of mindstream include high levels of concentration, self-forgetfulness, satisfaction, and great enjoyment.

Mindstream theory has many applications in a variety of fields: in personal activities, people find mindstream experiences in painting, writing, or music; athletes experience mindstream to enhance performance and enjoyment in competition; educators should use mindstream theory to design engaging learning activities to stimulate student interest; and in game design, mindstream theory is a cornerstone of immersive experiences. These applications encourage individuals to become fully engaged in the activity, increasing emotional granularity and positive affect. Table 1 lists nine characteristics of a mindstream experience (Linden, 2021) that influence emotional granularity.

Table 1. Nine Characteristics of the Heart Flow Experience

Traffic Characteristics	Description
1 Integration of action and awareness	Several aspects of the task are performed in an "automatic" manner.
2. Highly focused/concentrated	A person who is fully engaged in the task at hand.
3. Reduced self-reflection/lack of worry/forgetfulness	This may be due to concentration, less thinking and worrying about oneself, and ignoring non-task related aspects of the environment.
4. Control of everything	The person believes that adequate performance can be maintained.
5. Clear goals	The person knows what must be done and what goals to achieve.
6. Feedback	There is continuous (not necessarily conscious) monitoring of performance.
7. Autotelic experience	The experience has beneficial properties (some addictive elements).
8. Changing time experience	Subjective time passes relatively quickly.
9. Balance of skills and mission challenges	People's knowledge and skills are optimized for performance (on an individual basis).

Source: Linden (2021)

Immersive Experiences Based on the Mind Flow Theory

Developed by psychologist Mihaly Csikszentmihalyi, the theory of mind flow describes the high level of concentration and satisfaction that people feel when they are fully engaged in an activity. In a state of mindfulness, the individual is fully absorbed, forgetful of time and self,

and feels a great sense of pleasure and fulfillment. In research, artists have described this state of total immersion while creating, allowing them to express ideas and emotions more freely (Chemi, 2016). This experience can increase user engagement and satisfaction, as well as loyalty to the experience. Mindstream theory has a wide range of applications, including the fields of art, sports, education, and game design, and can help individuals achieve their goals and needs.

Relevance of the Mindstream Experience to Interactive Graffiti Scanning Walls

The Interactive Graffiti and Scanning Wall combines graffiti, projection and scanning technologies to provide a unique interactive experience for users. This emerging art form is widely used in art exhibitions, public spaces and commercial activities. Interactive Graffiti and Scanning Walls provide users with moderately difficult goals, such as creating a painting or completing a game, to keep them interested and engaged. In addition, these walls provide instant feedback so that users can see their work transformed into virtual images in real time. This helps users stay focused, enter into a mind-flow experience, stimulate creativity, and enhance physical and mental well-being.

Immersive Experience Design

Immersive experience design combines technology and creativity to provide an immersive sensory experience. It utilizes technologies such as VR, AR, and MR to create simulated or fictional environments and includes a full range of sensory interactions including sight, sound, touch, and smell.Csikszentmihalyi (1975, cited in Chang, 2021) suggests that immersion allows the user to be highly conscious, to respond only to specific goals and feedback, and to feel a sense of control. This type of design emphasizes the deep involvement of the user in a virtual or augmented reality through elements such as scene, narrative, and environment, providing a deep and memorable experience.

Immersive experiences are used in a wide range of applications, including art exhibitions, cultural events, product demonstrations and educational training, to enhance perception and interaction, and to stimulate emotion and engagement. Research has shown that this design approach has a positive impact on culture, art, entertainment and education. At its core is the integration of technology and the senses. Through virtual reality devices, users can enter different virtual environments and extend their sensory experience through visual, audio and tactile feedback.

Sensory Stimulation Induced by Immersive Experiences

Immersive experiences utilize multi-sensory stimulation to simulate the real world and are widely used in entertainment, education, training, and medical fields. Sensory stimulation is one of the key elements of immersive experiences, including sight, hearing, touch, smell and taste. Research has shown that these stimuli have positive effects on cognition, such as increasing engagement, enhancing memory, facilitating learning, regulating emotions, and relieving pain (Yang, Luo, Hu, Tian, & Wen, 2021). Common techniques used in immersive experiences include: visual stimulation using high-resolution displays, 3D technology and VR to create realistic effects; auditory stimulation using a surround sound system and high-fidelity sound effects; tactile stimulation to simulate realistic touch, such as feeling the recoil of a gun in a VR shooting game; olfactory stimulation to enhance the ambience using fragrance; and gustatory stimulation to allow users to taste the virtual food. The application

of these technologies makes the immersive experience more realistic and immersive for the user.

Graffiti Painting Application in Immersive Experience

Graffiti paintings are widely used in immersive experiences to enrich sensory and emotional experiences. By creating unique scenes and backgrounds, artwork lowers cortisol levels and increases mood and self-efficacy (Kaimal, Ray, & Muniz, 2016). Brightly colored, creative patterns on walls, floors and other surfaces create unique virtual worlds. Graffiti can also be more interactive, such as participating in a graffiti project to increase engagement and satisfaction. Using augmented reality or virtual reality technology, graffiti can be combined with digital elements to provide a more immersive experience (Gwilt & Wilde, 2022). At the same time, graffiti can convey messages and stories that capture the audience's attention, penetrate the mind and heart, enrich the immersive experience, promote the integration of art and technology, and enrich life and cultural experiences.

Conceptual Framework: Design Features of Interactive Graffiti Scanning Walls

In order to explore the design features of the interactive graffiti scanning wall in providing rich interactive experience, this conceptual framework is discussed from both technical and user experience perspectives. The technical features include hardware, software and network considerations, while the user experience focuses on the user's participation, perception and emotion in the interactive graffiti scanning wall. According to Jordan (1998), there are five characteristics of digital media art that are also applicable to the design of interactive graffiti scanning walls as a form of digital media art. These characteristics are crucial to the design of interactive graffiti scanning walls, specifically:

1. Integration: The integration of multiple elements, including hardware and software components, to create a seamless interactive environment.
2. Interactivity: Provide opportunities for users to interact with the wall, allowing them to participate directly in the creative process and provide immediate feedback on the virtual elements.
3. Hypermedia: By integrating multimedia elements such as graphics, sound and video, it creates a rich interactive experience and enhances the user's sense of involvement.
4. Immersion: Through realistic visual and auditory effects, users are immersed in the creative process, forgetting about their surroundings and concentrating fully on the interactive experience.
5. Narrativity: Through interaction and creation, users can build stories on the graffiti wall to show their creativity and imagination, thus enriching the interactive experience.

Together, these features ensure that the interactive Graffiti Wall is designed to provide a rich and engaging user experience, making it a compelling form of digital media art.

Interactive Graffiti Scanning Wall Design Exhibition

The Interactive Graffiti Scanning Wall exhibition is a compelling interactive art experience that provides visitors with an interactive environment unlike traditional art. The interactive wall in the exhibition engages people and allows visitors to use tools or applications to create artworks on the wall. This participatory design turns art into a creative activity where visitors have fun creating and sharing creative ideas, facilitating communication and

interaction.Nugrahani et al. (2019) state that creating enhances creativity and provides a means of self-expression. The Interactive Graffiti Scanning Wall exhibition aims to create shared and interactive art spaces that integrate art into everyday life and promote social interaction.

Interactive Graffiti Scanning Wall Design Exhibition Production Teams

In this study, four case samples were analyzed and summarized through the collection of case data, including “Sketch Animals Papercraft”, “Walk, Walk, Walk Home”, and so on, a total of four domestic and international cases, and the basic data of the cases include the case name, the date of display and publication, the design team, and the source of the data, etc., as shown in Table 2.

Table 2. Four Case Studies

No.	Name of case	period	Design Teams	Source of information
1	Sketch Animals Papercraft	2016	TeamLab	TeamLab
2	paint2life	2019	Vertigo Systemsru	Vertigo Systemsru
3	Walk, Walk, Walk Home	2021	TeamLab	TeamLab
4	Chinese Post Museum	2021	Lightfull Studio	Lightfull Studio

Case 1: Sketch Animals Papercraft

TeamLab is a multidisciplinary international art organization founded in 2001 and headquartered in Tokyo, Japan. Their team consists of artists, programmers, engineers, CG animators, mathematicians and architects, and they call themselves “super technologists”. The team's animal-themed paper sculptures display life-like animal shapes, with the silhouettes and features of the animals hand-drawn onto the paper to create unique and vibrant artworks.

Figure 1. TeamLab resonance microchamber - curing light color, dusk to dawn.
Source: TeamLab

Case 2: paint2life

Vertigo Systems specializes in creating digital illusions using the latest 3D virtual reality technology and offers exclusive pieces for use in trade shows, events and permanent installations. Through projection technology, they transform static paintings into vibrant art experiences, creating aquarium-like motion effects that bring dimension and movement to flat paintings.Figure 2 Vertigo Systemsru living ocean.

Figure 2. Vertigo Systems living ocean
Source: Vertigo Systemsru

Case 3: Walk, Walk, Walk Home

Produced by TeamLab International Art Group, the artwork shows people's journey home through projection technology, giving the audience a sense of time travel, blending projection technology with the understanding of walking and going home, presenting a unique artistic style and reflecting the trend of fusion between technology and art.

Figure 3. TeamLab Walk, Walk, Walk Home
Source: TeamLab

Case 4: Chinese Postal Museum

Lightfull Studio is a light sculpture design company located in Changhua, specializing in providing complete services in light sculpture projection design, including architectural projection, interactive projection, immersive projection, and light art installations. This is a colorful collection of sea creatures for a special stamp exhibition.

Figure 4. Lightfull Studio Chinese Postal Museum
Source: Lightfull Studio

Literature Summary

Interactive graffiti projection walls play an important role in digital media, combining projection technology and interactivity to bring unique experiences to a variety of venues, with companies such as TeamLab, Vertigo Systemsru, and Light House demonstrating innovation. According to the theory of mind flow, interactive graffiti scanning walls help

users enter an immersive state of mind that enhances creativity and physical and mental well-being. Immersive experiences are designed to enhance perception and interaction through technologies such as virtual reality, and to enrich the user's life and cultural experience. Overall, these combinations blur the boundaries between the virtual and the real, facilitating deeper engagement and meaningful connections.

1. Research Framework

According to the literature, interactive graffiti scanning wall is an emerging interactive art form with potential creativity stimulation and physical and mental health enhancement functions. This study will be divided into three phases: demand survey, prototype design and production, and prototype evaluation and follow-up recommendations. First, a user needs survey was conducted to understand the needs and expectations of the interactive graffiti scanning wall, and a prototype structure was designed to meet the needs. Then, prototypes will be created and developed, and finally, expert evaluation will be conducted to provide recommendations for further improvement as a reference for design strategy.

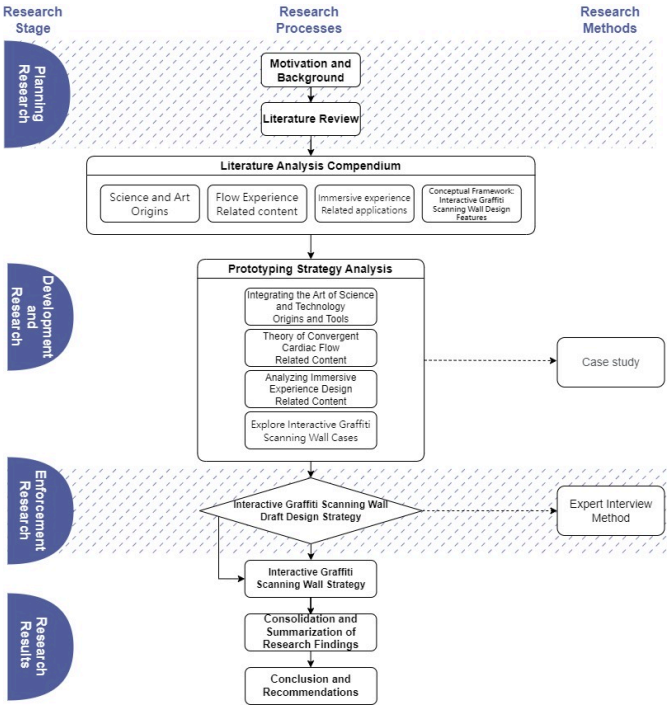

Figure 5. Research Organization Flowchart
Source: This study draws

2. Expert Interview Method

This stage evaluates the usability of the interactive graffiti scanning wall interface through expert interviews, covering insights from experts in the fields of light sculpture, software engineering, digital media design, and so on. Their suggestions will provide multiple references for designers and audiences to discuss the considerations, features and difficulties in creating interactive graffiti scanning walls.

Table 3. List of experts for in-depth interviews

Interviewee	Design Experience	Expertise/Experience	Date of interview	Location
Mr. Wong	deep	Light Carving Designer	2023/04/10	Online
Mr. Lin	deep	Light Carving Designer	2023/04/12	Online
Mr. Chan	Medium	Digital Media Design	2023/04/15	Entity
Ms. Tsang	shallow	Digital Media Design	2023/04/17	Entity

Source: Organized by this study

3. Semi-structured Interviews

The semi-structured interviews were designed to explore specific topics in depth and in a flexible way, whilst ensuring a degree of structure to the interviews. The interviewees will consist of four photomontage designers, experts with backgrounds in digital media design. These subjects will have a wealth of relevant experience and insights that will enable an in-depth understanding of the design strategy and impact of the interactive graffiti scanning wall. The interviews will cover the following topics:

- Integration: A unified and complete experience.
- Interactivity: Participation of visitors in the creation of art to enhance the visiting experience.
- Hypermedia: Multi-media elements will be incorporated to enrich the sensory experience.
- Immersion: To create an immersive art experience.
- Narrative: To guide visitors to create stories and stimulate their imagination.

4. Empirical Research

Interviews were conducted with experts with relevant backgrounds in making interactive graffiti scanning walls, one female and three males, with a total of four respondents. The interviews contained five key elements that characterize the content that should be used in an interactive graffiti scanning wall.

Table 4. Content of Expert Interviews

Integrative	1. Experts believe that the interactive graffiti scanning wall is an innovative art form that combines hardware and software. In terms of hardware, it requires equipment such as projectors, sensors and computers to realize image projection and interaction. For software, machine learning algorithms are used to recognize the user's graffiti and provide real-time feedback. 2. The advantage of an interactive graffiti scanning wall is that it allows users to participate in the creative process and gain a unique interactive experience. This is a good format for art installations in public spaces, which can attract people's attention and promote social interaction. 3. Experts believe that the development of interactive graffiti scanning wall is inseparable from the synergistic evolution of hardware and software. With the continuous progress of sensors, projectors and machine learning technology, the interactive graffiti scanning wall will present a richer form and function. 4. Experts emphasize the important role of open source software in the creation of interactive graffiti scanning walls. Open source software allows more developers to participate in the development of interactive graffiti scanning walls, thus promoting the rapid development of this technology.
Interactivity	1. It is considered that the interface design of the interactive graffiti wall should follow the principles of simplicity and comprehensibility so that users can get started quickly. In addition, the interface elements should be consistent with the user's intention and operation to avoid confusion. For example, the functions can be clearly labeled with icons or text labels. 2. Suggested that the interface of the interactive graffiti wall should provide diversified interaction methods, such as touch control, voice, etc., to meet the needs of different users. 3. Considered that there is still room for improvement in the hardware and software integration of the interactive graffiti wall. For example, the resolution and accuracy of the sensors need to be improved, and the speed and stability of the software also need to be further optimized. 4. The user experience of the interactive graffiti wall is affected by the integration of hardware and software. Poor integration may lead to delays, lagging, and other problems, affecting the user's smoothness of operation.
	1. The expert emphasized the role of multimedia elements in enriching the experience of using the interactive graffiti scanning wall. He opined that multimedia elements could provide users with a more vivid and three-dimensional sensory experience, allowing them to be more immersed in the interactive process.

Hypermedia	2. In designing interactive graffiti walls, multimedia elements can be utilized to enhance users' immersion and participation. For example, sound effects, light effects and animation can be used to create a virtual environment and atmosphere so that users feel as if they were there. 3. Updating and iteration of multimedia elements. With the advancement of technology, new multimedia elements continue to emerge, we can apply these new elements to the interactive graffiti wall to bring users a newer and more unique experience. For example, we can use virtual reality technology to create a more realistic virtual environment or artificial intelligence technology to realize more personalized interaction. 4. When designing and applying multimedia elements, we should fully utilize their advantages to create a better experience for users.
Immersiveness	1. Immersive interactive installation art breaks the traditional mode of viewing art, allowing the viewer to become part of the work and participate in its creation. However, I think the immersive feeling can be enhanced by VR, AR and AI technologies. 2. Suggestion: Add more dynamic visual effects, sound effects to interact with the graffiti, and diversified interactive methods to enhance the immersion! 3. I think that the immersion of the interactive graffiti scanning wall can be further enhanced by personalized experiences or open-ended results, so that viewers can feel more unique and imaginative. 4. Immersive interactive installation art brings new sensory experience to the viewers through technological means. However, I think it can also be done through multi-sensory stimulation, storytelling, characterization, or by adding social interaction.
Narrative	1. In order to inspire users to create, the interactive graffiti wall can provide diversified story templates and materials, covering fairy tales, science fiction scenes and other topics, and allow users to freely combine and customize to create unique creative stories. 2. In order to further enhance users' creative experience, the interactive graffiti wall can add a guided creation function to provide users with some creative ideas and suggestions on techniques. At the same time, it can also consider adding an AI intelligent assistant function that automatically generates a story line based on the user's graffiti and provides translation services in different languages, so that the creator's work can cross the language barrier. 3. To further enhance user immersion, the interactive graffiti wall can introduce VR/AR technology to create more realistic virtual scenes, allowing users to feel as if they were in the story, interacting with virtual characters and experiencing a more immersive experience.

4. In order to enhance the sharing experience of users, the interactive graffiti wall can provide diversified sharing channels to support users to publish their works to different platforms such as social platforms, art communities, etc. It also provides interactive functions such as clicking "Like" and leaving comments on the works, which encourages users to communicate and interact with each other to form an active creative community.

Research Analysis and Findings

Interactive Graffiti Scanning Wall is an emerging art form that integrates hardware, software and multimedia elements and has a broad development prospect. In order to explore the design strategy of the interactive graffiti scanning wall in depth, we conducted interviews with four experts and summarized the following conclusions on this basis:

Immersive exhibitions provide novel ways to experience art, and interactive graffiti scanning walls take the immersive experience to new heights. This study conducted expert interviews based on five design features of interactive graffiti scanning walls and proposed design strategies to improve interactive graffiti scanning walls.

1. Interface Design

The interface design should be simple and easy to understand, and follow the user's habit, so that the user can get started quickly. Provide a variety of interactive methods, such as touch, voice, gesture recognition, etc., to meet the needs of different users. Ensure the stability and smoothness of hardware and software to avoid delays, lagging and other problems affecting the user's operating experience.

2. Enhance Immersion

Utilize multimedia elements, such as sound effects, light effects, animation, etc., to create a virtual environment and atmosphere, so that users feel as if they were there. Adding dynamic visual effects, audio feedback for interacting with graffiti, and multiple interactive methods will further enhance the sense of immersion. Provide personalized experiences or open-ended results to make users feel more unique and imaginative.

3. Open Source

Open source will help more developers to participate in the development of interactive graffiti scanning wall and promote the rapid development of this technology. Open source can promote communication and cooperation between different teams and promote innovation. Open source code can reduce the cost of use, so that more people can experience the fun brought by the interactive graffiti scanning wall.

4. Focus on the Synergistic Evolution of Hardware and Software

With the continuous advancement of sensors, projectors and machine learning technologies, interactive graffiti scanning walls will present richer functions and forms. The synergistic evolution of hardware and software can continuously enhance the performance and

experience of interactive graffiti scanning walls. Focusing on the development of cutting-edge technologies and applying them to the design of interactive graffiti scanning walls can lead the way in the development of this technology.

Conclusion

The Interactive Graffiti Scanning Wall is an emerging form of art exhibition with a broad development prospect. It integrates hardware, software and multimedia elements to provide an immersive and interactive art experience for the audience.

Recommendations

Based on the findings of the expert interviews and the study, we propose the following recommendations to improve the design of the interactive graffiti scanning wall:

- In terms of interface design, it should be simple and easy to understand, provide diversified ways of interaction, and ensure the stability and smoothness of hardware and software.
- To enhance immersion, multimedia elements should be used, dynamic visual effects should be added, and personalized experiences or open-ended results should be provided.
- Open source code will help promote the technical development of interactive graffiti scanning walls, facilitate exchanges and cooperation, and reduce the cost of use.
- In terms of synergistic evolution of hardware and software, attention should be paid to the development of cutting-edge technologies and their application in design.

Bibliography

Chemi, T. (2016). The Experience of Flow in Artistic Creation. In: Harmat, L., Ørsted Andersen, F., Ullén, F., Wright, J., Sadlo, G. (eds) Flow Experience. Springer, Cham. doi:10.1007/978-3-319-28634-1_3

Csikszentmihályi, M. (1990). The domain of creativity. In M. A. Runco & R. S. Albert (Eds.), Theories of creativity (pp. 190–212). Sage Publications, Inc.

Csikszentmihalyi, M. (2014). Toward a psychology of optimal experience. In Csikszentmihalyi M. (Ed.), Flow and the foundations of positive psychology,209–226.

Development Overview of Media Arts (2016, September 22). Taiwan Digital Arts. Retrieved from https://www.digiarts.org.tw/DigiArts/DataBasePage/4_88361759652866/Chi

Eisenberger, R., Jones, J. R., Stinglhamber, F., Shanock, L., & Randall, A. T. (2005). Flow experiences at work: For high-need achievers alone? Journal of Organizational Behavior, 26, 755–775. doi:10.1002/job.337

G. Kaimal, K. Ray, J.M. Muniz (2016). Reduction of cortisol levels and participants' responses following artmaking, Art Therapy: Journal of the American Art Therapy Association, 33 (2) (2016), pp. 74-80, doi:10.1080/07421656.2016.1166832

Gwilt, I., Wilde, J. (2022). Augmented Reality Graffiti and Street Art. In: Geroimenko, V. (eds) Augmented Reality Art. Springer Series on Cultural Computing. Springer, Cham. doi:10.1007/978-3-030-96863-2_15

Hoemann, K., Khan, Z., Kamona, N., Dy, J., Barrett, L. F., & Quigley, K. S. (2021). Investigating the relationship between emotional granularity and cardiorespiratory physiological activity in daily life. Psychophysiology, 58(6), e13818. doi:10.1111

Jordan, K. (1998). Defining multimedia. IEEE Multimedia, 5, p.8-15.

Kaimal, G., & Ray, K. (2017). Free art-making in an art therapy open studio: changes in affect and self-efficacy. Arts & Health, 9(2), 154–166. doi:10.1080/17533015.2016.1217248

Mila Bujić, Mikko Salminen, Juho Hamari(2023)Effects of Immersive Media on Emotion and Memory: An Experiment Comparing Article, 360-video, and Virtual Reality, International Journal of Human-Computer Studies,179, doi:10.1016/j.ijhcs.2023.103118

Nugrahani, R., Wibawanto, W., Nazam, R., Syakir, & Supatmo. (2019). Augmented Interactive Wall as a Technology-based Art Learning Media. Journal of Physics: Conference Series, 1387. doi:10.1088/1742-6596/1387/1/012114

Wen, W. L., Wang, F., Liu, Y., Jiang, X., Wang, W. F. (2022). Research on the influencing factors of emotional experience in interactive devices. Packaging Engineering, 43(20), 187-193.Retrieved from https://www.airitilibrary.com/Article/Detail?DocID=bzgc202220021

Yang, H., Luo, Y., Hu, Q., Tian, X., & Wen, H. (2021). Benefits in Alzheimer's Disease of Sensory and Multisensory Stimulation. Journal of Alzheimer's disease : JAD, 82(2), 463–484. doi:10.3233/JAD-201554

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