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A Study on the Convergence Contents of Projection Mapping in China

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중국에서 프로젝션 맵핑을 활용한 융합콘텐츠 사례 연구

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Abstract Projection mapping is one of the convergence contents combined with digital technology。After entering the Chinese market, with its fantastic shock of visual impact, it becomes China's most shocking, most popular, and most commercial value of marketing means, to be widely used in advertising, construction, tourism and other fields. But in China, the lack of projection mapping professionals and professional will affect the development of the entire industry. The study analysed the case of projection mapping in China, and discovered the future direction development of projection mapping. Projection mapping will keep going based on local cultural environment, and combined with other intelligent technologies, and spreading to daily life, also expanding the using area, creating the manifestation pattern then contributing greatly to the entertainment content industry.

Key Words : Projection mapping, Convergence contents, China, Computer graphics, Architectural projection mapping

요 약 프로젝션 맵핑은 현대 컴퓨터 그래픽 기술과 예술을 융합한 독창적인 문화산업이다. 중국 문화시장에 진출한 후 강한 시각적 충격을 주었고, 이를 마케팅 상업 수단으로 활용하는 비즈니스가 늘어나는 추세이다. 또한 광고, 건축, 관광 등 많은 분야에서 활용하고 있다. 현재 중국에서는 프로젝션 맵핑을 구현할 수 있는 전문가가 부족한 상태이며 연구 자료나 교육과정 또한 부족한 상태이므로 본 논문에서는 프로젝션 맵핑을 활용한 융합형 콘텐츠 사례에 대해 정리하고 향후 발전방향에 대해 연구하였다. 또한 프로젝션 맵핑 기술은 각기 다른 스마트 기술과 개인 생활을 융합해서 일상생활이나 더 많은 분야에 적용되어 스마트 정보사회뿐만 아니라 엔터테인먼트 콘텐츠 산업에도 크게 기여하리라 사료된다.

주제어 : 프로젝션 맵핑, 융합콘텐츠, 중국, 컴퓨터 그래픽, 건축 프로젝션 맵핑

1. Introduction

1.1 Research Background

The development of modern social life stimulates the people′s spiritual culture needs. In 2009, China promulgated the Cultural Industry Promotion Plan and a series of published documents for the cultural and creative industries to provide political support. Projection mapping is one of the convergence contents combined with digital technology and art which has enriched China′s cultural and creative industry market. The emergence of projection mapping combines the virtual world of computer graphics technology with physical space to achieve an immersive experience. It is popular with people.

1.2 Research Purpose

At present, projection mapping industry is mature,

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and the national professional research data is rich. But the lack of professionals and professional research led to uneven state of the current China projection mapping industry[1]. The existence of these problems, not only hindered normal development of the projection mapping in China, but also will affect the development of the entire industry. This paper is to choose the application case of projection mapping in China, and to analyze the development of projection mapping in China. It is hoped that the study can enrich the research perspective of projection mapping and provide reference for future research[2].

2. The Theory of Projection mapping

2.1 History and Perspectives

The public use of projection mapping can be traced back to 1969, the park project of " Haunted Mansion Ride " of the Disneyland, which produces the animated images to the fake head to create a real ghost visual effect. By the early 1920s, artists tried to apply the projection mapping to their own artistic practice of creations. After that, with the development of Pandora technology, the three-dimensional space within a number of video layers and image layer projection technology have been achieved for the development of projection mapping to provide technical support.

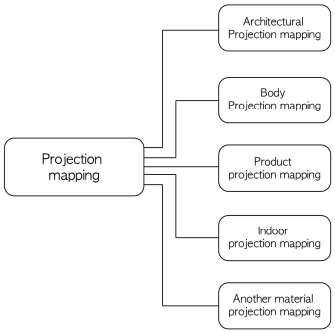
In China, most people call projection mapping 3D lighting show. 3D here refers to the video contents produced by 3D computer graphics technology and the lighting refers to the light of the projector. Projection mapping also known as video mapping and spatial augmented reality, is a projection technology used to turn objects, often irregularly shaped, into a display surface for video projection[3].

For the production, the designer needs to field the measurement of the structure and surface material of the projectile, to make the same proportional model as the mask, the production of video is achieved. Finally, the video and the real building structure are to be matched and completed with the live music and the limelight.

2.2 The Category and Traits of Projection mapping

2.2.1 The Category of Projection mapping

According to the difference of the projection object, projection mapping can be divided into five categories: architectural projection mapping, body projection mapping, product projection mapping, indoor projection mapping and another special material projection mapping[4]. Show in [Fig. 1], <Table 1>.



[Fig. 1] The category of Projection mapping

<Table 1> Projection mapping category and Traits

Category	Traits
Architectural projection mapping	Taking the out wall of the building as the object, the high-power projector and edge fusion technology are needed to achieve the effect. According to the building structure, and projecting effect video contents.
Body projection mapping	Taking the person's body or face as a projection object, the video and the body surface and texture are combined. As people put on a variety of clothes.
Product projection mapping	Taking the product surface as the projection object, the video contents is made through multi-reference product structure, appearance, environment and virtual action and other aspects of design transformation effects, displaying the product features, as well as improving the value appreciation.
Indoor projection mapping	It is used for the indoor decoration or stage effect to achieve immersive perception experience in the closed indoor conditions.
Other Materials Projection mapping	Taking the no solid state substance, such as water as a projection object, and compared to other tangible projector objects, the changed shape can change the final imaging quality, getting the unexpected visual effects.

2.2.2 The Traits of Projection mapping

(1)Projection mapping is the visual effect community of the 3D computer graphic video and structure of physical projection object.

(2)Projection mapping is to achieve true and false immersion naked-eye three-dimensional through the projection of 3D computer graphic video in real physical space, full of fun and plasticity.

(3)Through the virtual form of structure transformation, collapse and other special effects, the stretching of the physical structure and the spaciousness of the video, the projection mapping has a strong visual impact.

(4)Through the video, the projection mapping is to blur the edge of the projected object, to stretch the depth of the physical space, so that the audience will be immersed in the entire video.

(5)The implementation of projection mapping needs the coordination of environment. The show of projection mapping has more choice in the external light environment of darker night, in order to achieve the optimization of the effect.[3]

3. The Case Show and Development of Projection mapping

3.1 The Development Opportunity of China Projection mapping

At the beginning of the 21st century, most of the traditional knowledge of the projector was limited to classroom teaching or cinemas. In some parts of China, although there is projection mapping display, they are more for the overseas input mode, and the people who have the real understanding are relatively small. Opportunities for the development of it are in the 2008 Beijing Olympic Games. At the opening ceremony of the Olympic Games, 147 high-light digital projectors were enabled as the state lights support.

On the show “Nature”, 52 projectors are used to project video contents in the Tai Chi warriors and their backed six moving gauze, interpreting Tai Chi pursuit of the balance and harmony of the production before the heaven, the earth and the human. Show in [Fig. 2].

On the show "Dream", 8 projectors are used based on a spherical model with a degree of integration of 12.5, two for a group of parallel superimposed patterns to project animated video, showing a colorful planet[6]. Show in [Fig. 3].

[Fig. 2] Show-Nature

[Fig. 3] Show-Dream[5]

The stage show centers on the presentation of the 5000 years of Chinese history and culture and the contemporary spiritual outlook. The application of Projection mapping, combined with stage lighting, rendering the performance environment, fantasy shocking visual effects, deepened the memories of meeting of the people all over the world. After the opening ceremony of the Olympic Games, Chinese traditional culture enjoys the popular support, not only to awaken the Chinese people's national pride, but also to trigger a world-wide Chinese culture boom.

3.2 Study of the Case

After the opening ceremony of the Olympic Games, projection mapping began to active in all areas of social life in a variety of forms.

[Fig. 4] Lift up : Wuhan Projection Mapping Show[7]
[Fig. 5] Right up: Beijing International Design Week[9]
[Fig. 6] Below: The tower Projection Mapping Show

In the 2013 China Wuhan Lantern Projection Mapping Show, the simultaneous projection of 36 projectors covered four connected buildings, with a total of seven facades, and two of which are not in the same plane. The projection mapping show is the largest existing area of China's projection mapping show and the first attempt to try the projection of different surface to show the history of Wuhan. We can see that China has always devoted to the study and enrich the projection mapping technology[8]. Show in [Fig. 4].

On the 2016 Beijing International Design Week, casting the video of the past life of the Dashilan in the façade of Quanye Chang, Dashilan, combining with the architectural style, the ceremony is to reproduce the city memory of Quanye Chang, to show the revitalization of China's old streets and revival of the new look, showing the revival of China's old streets, to promote the implementation of the transformation of the old city in China. Show in [Fig. 5].

2016 Kaifeng, Henan, The tower Projection Mapping Show. Show in [Fig. 6]. The pylon was built in the Song Dynasty. The projected video takes the Buddhist culture as the theme, with 6 projectors to achieve the unchanged video and the high definition effect, representing the scenery of the tower and the heavy feeling of history. The value of the art, appreciation, study, history combines with the modern technology, to deepen the history memory of the watcher, and the advocacy of the projection of the history relics. For the local residents, it enriches the tourism culture, and it not only boosts the development of tourism, but also enriches the local people's cultural life[10].

Architectural projection mapping contents has the spectacular visual effects. It could entertain the public, in the meantime, make more people to know about this new media art. But it needs a lot of manpower, material and financial resources.

Living theatre National Style - Lyre-Playing, Chess, Calligraphy And Painting is based on Chinese traditional culture. Multi-functional slope stage set a precedent which give up the LED screen, and take the whole projection mapping way to show the choreography to empathize the interaction of the video contents and actors and strengthen the artistic appeal making audience be immersed in the stage performances, triggering cultural resonance, arouse audience's resonance about the traditional Chinese culture, then benefit to the inherit and modernized development of Chinese traditional culture. Show in [Fig. 7].

[Fig. 7] Lift up : National Style - lyre-playing, chess, calligraphy and painting[11]
[Fig. 8] Right up : The three body problem
[Fig. 9] Lift below: Forever Long March[12]
[Fig. 10] Right below: Real Experience Garden of The Legend of Sword and Fairy

In the living theatre 'The three body problem', the circular projection mapping technology is used to be restored the imaginable story of the scene, so that the viewers seem to be staying in the plot[13]. Show in [Fig. 8].

Theme Party of 'Forever Long March'. The choreography of the show is supplemented by stage lighting and projecting mapping. The audience will feel to be in the scene of the Long March, and this will strengthen the artistic appeal. Show in [Fig. 9].

According to the plot of the game The Legend of Sword and Fairy, through the projection mapping technology, the Real Experience park show combines the video contents and actor performances to promote the development of the plot, and to reproduce Lei Ling curse, Sword Surgery and other immortal effects of the game for tourists[14]. Show in [Fig. 10].

The applying of projection mapping in the drama

stage changes the traditional expression way and enriches the theme of the drama stage. Compared to the frosty movie screen, appreciating the actor's action and saturate view effect in a close distance satisfied people so much and promotes the development of Chinese stage drama. Meanwhile, the classical culture stage drama enriches the cultural industry chain and benefits to the continuous development of the cultural industry.

'Silver-based O Show'. The performance adopts patented technology of six level curtain, with 10 advanced digital projectors, triple superimposed projection, to create the most clear on-water sculpture projection mapping art. Show in [Fig. 11].

Shanghai "UV Restaurant". The restaurant adopts the projection mapping technology, projecting the effect video contents in the food and restaurant to add the interesting eating experience[15]. Show in [Fig. 12].

Instead of complex interior decoration, Theme Wedding of Projection Mapping adopts the projection mapping to be as the decorative means to create a variety of wedding procedures, to rich the auditorium scene, and the couples and the visitors will like to be in the fairyland. The formal dress of the bride is inspired by the projection mapping art of the human body. Projection mapping will project the colored elements onto the pure white dress, as if the bride is exposure to the flowers, with the magnificent scene. Show in [Fig. 13].

The emergence of projection mapping of the creative restaurant and creative wedding are the innovative products of China projection mapping market under the vigorous development, broadening the market and application model. Directing taking the technology to the customers, it adds the cultural consumer way, creates more social value. At the same time, the technology is to stimulate the consumers' interest in projection mapping, and this can be helpful to the development of projection mapping.

[Fig. 11] Light up: Silver-based O Show
[Fig. 12] Right up: UV Restaurant
[Fig. 13] Below: Theme Wedding Of Projection Mapping

4. Conclusion

By analyzing the case of the Projection mapping in China, we can see that the future development direction will keep into living area and gradually change into the innovative industry model which is closer to our life. After projection mapping enters China, and combing with Chinese history cultural environment and Chinese market situation, it has already combined artistic value with social value and formed a unique innovative industry model in Chinese style. Projection mapping will keep going based on local cultural environment, and control the manufacturing costs, also improve the quality of the products. Meanwhile, combining with other intelligent technologies, make the projection mapping technology spread to daily life, also expanding the using area, creating the manifestation pattern then contributing greatly to the entertainment content industry.

REFERENCES

[1] Liwen Rao, Current situation and development trend of projection mapping industry, Technological Development of Enterprise, pp.114-115, 2015.

[2] L. G. Lee, J. H. Chung, "A Study on Visual Mise-en-Scene of VR Animation <Peal>", Journal of Digital Convergence, Vol.15, No.9, pp.408-411, 2017.

[3] https://en.wikipedia.org/wiki/Projection_mapping
[4] Liwen Rao, “The first Analysis of Projection mapping-Study on Art Traits”, Brand, pp.101-102, 2014.
[5] https://www.youtube.com/watch?v=8n-gMKtR77g&t=2953s
[6] Beijing win Kang Technology Development Co., Ltd., Christie projectors in the application of the 2008 Beijing Olympic Games
[7] http://www.szzs360.com/news/2016/10/2016_7_zs15464.htm
[8] Sijie Liu, “Research on Methods of Projection Art Based on Surrealism”, Wuhan University of Technology, Paper, pp.2-6, 2013.
[9] http://fashion.huanqiu.com/zxtg/2016-09/9490587.html
[10] Yingjun Yang, Projection Display System Applien in the Field of Performing Arts, Enter- tainment Technology, Vol.1 No.131, pp.53-55, 2017.
[11] Ran Geng, Bin Zhang, Sansheng Cao, “The application of projection mapping in new media drama”, Video Production, p.88, 2017
[12] Xiaolan Sha, Fushen Yu, “Forever Long March lighting, projection design creation”, Scanning Industry, p.60, 2016
[13] Xinyi Shan, J. H. Chung, “Comparison of the Characteristics of Three Premium Large-Format Platforms IMAX, screen X and 360 Degrees Circular Screen”, Journal of Digital Convergence, Vol.15, No.8, pp.378-380, 2017.
[14] J. S. Yu, J. H. Chung, “Media Research in Global Brand Timelapse Advertisement”, Journal of Digital Convergence, pp.336-337, 2017.
[15] Xiaoyi Liao, “The Research on Light and shadow themed restaurant interior space design”, Central South University of Forestry and Technology, paper, pp.3-8, 2015.

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