

Research on the Application and Practice of Sensor Technology in the Inheritance of Non-Heritage Culture

Fang Jiao

Sejong University, 209, Neungdong-ro, Gwangjin-gu, Seoul, Republic of Korea

Keywords: sensor technology; non-heritage cultural heritage; application; practice

Abstract: In recent years, with the continuous progress of virtual reality technology, its application in several fields has gradually expanded, especially in the inheritance and promotion of intangible cultural heritage. Virtual reality technology combines computer and modern sensor technology for simulating three-dimensional scenes, which enables people to deeply feel and experience the non-heritage culture and further deepen the understanding and inheritance of non-heritage culture. Based on this, this paper analyses in depth the application and practice of sensor technology in the inheritance of intangible cultural heritage for relevant scholars to learn and refer to.

1. Introduction

Culture is not only a key indicator of the soft power of a country or nation, but also intangible cultural heritage, as an intangible and precious national cultural wealth in China, has a very obvious role in promoting and influencing the sustainable development of culture. Virtual reality technology plays an indispensable role in the inheritance and dissemination of intangible cultural heritage, which helps to promote the inheritance and dissemination of intangible cultural heritage in China.

2. Application of Sensor Technology in Non-Heritage Cultural Inheritance

2.1 Protect the precious heritage

October 12, China Cultural Heritage Research Institute based on MEMS sensors for environmental monitoring projects, wireless intelligent inclinometer, high-precision wireless intelligent inclinometer, real-time deformation of Yingxian Wooden Pagoda, wireless intelligent temperature and humidity meter, the procurement of wind speed sensors, as well as wireless intelligent collector and other instrumentation equipment, the purpose is to monitor the deformation of the wooden pagoda in Yingxian, Shanxi Province and the external environment, to all-round protection of cultural relics safety^[1].

The protection of cultural relics, as a precious heritage of traditional culture, is undoubtedly crucial, the reason being that cultural relics can enable people to experience the depth and richness of traditional culture in a more profound manner. Therefore, museums should strengthen the protection of cultural relics. However, the protection of cultural relics during their exhibition should also receive extra attention. In order for them to be effectively preserved, certain protective measures must be taken for cultural relics. The core idea of preventive conservation is to ensure, through various interventions, that the storage environment is maintained within an acceptable range, and once this range is exceeded, it is necessary to rely on external interventions for management. Therefore, in the protection of cultural relics, it is necessary to carry out comprehensive monitoring and detection of cultural relics with the help of various technical means to ensure their safe and stable operation. Among them, sensor technology is regarded as one of the application methods.

At present, sensor monitoring technology has been more and more widely used in a number of fields, such as the maintenance of cultural and museum venues and the monitoring of heritage sites. In particular, some large museums and cultural relics protection units have established more comprehensive environmental monitoring systems. For example, the Mogao Grottoes in Dunhuang

has always attached great importance to the use of advanced technology to guard its valuable cultural heritage. Now, whenever a large number of tourists flock into the caves on a daily basis, the temperature and humidity sensors inside the caves as well as other relevant monitoring equipment will issue warnings of exceeding the standards. Once the limits are exceeded, the air-conditioning and ventilation systems are automatically switched on and alerts are sent to the people concerned. In such cases, the cave will be temporarily closed to the public.

For example, the collection environmental quality monitoring system currently used by the Hubei Provincial Museum is able to monitor its collection of cultural relics 24 hours a day. The system includes two subsystems, the temperature and humidity monitoring module and the light monitoring module. Using more than 100 different types of sensors, we can monitor the temperature, humidity, light intensity and ultraviolet light in the storage environment in real time^[2].

2.2 Protection of outdoor cultural relics

Nowadays, in addition to artefacts in curatorial collections, more outdoor artefacts are using sensor technology to ensure their safety. These sensors not only play an important role in architecture and heritage protection, but also have a very great potential in scientific research. For example, the Six Harmony Tower in Hangzhou is equipped with more than 150 sensors, such as bit Motion sensor, strain sensor, pressure sensor, temperature and humidity sensor Device, wind speed sensor, etc. To comprehensively understand the progress of various structural diseases; A total of 64 sensors have been installed at the site of Nanyue wooden gate in Guangzhou, and the monitoring range of the sensors includes hydrology, environment, temperature and humidity. By analysing these sensors, we were able to identify the root causes of the various diseases at the sluice site.

Obviously, the use of sensors is gradually increasing in the field of cultural relics protection. This paper introduces the current status of sensor research and application at home and abroad, the classification and characteristics of sensors and the role of sensors in heritage protection. The application of sensors not only helps to protect cultural relics from man-made or external environmental damage, but also is an important factor to promote the continuous progress of sensor technology.

Sensor technology has experienced continuous progress and development from structural sensors that rely on changes in structural parameters to sense and convert signals, to solid-type sensors consisting of semiconductors, dielectrics, magnetic materials and other solid-state components, to intelligent sensing technology that combines microcomputer technology and monitoring technology.

According to statistics, China currently has more than 5,000 museums of various types, and the number of cultural relics in the collection of more than 60 million pieces. With the growing awareness of society on the preventive protection of cultural relics, the protection of such cultural relics will inevitably require a large number of sensors, which also brings new development opportunities and challenges for the sensor industry.

3. The Practice of Sensor Technology in Non-Heritage Cultural Inheritance

3.1 Environment modelling technology

In the field of virtual reality technology, environment modelling technology is regarded as a key part of the technology, which can provide people with a more realistic experience. The core objective of environment modelling technology is to accurately obtain 3D information about the real environment and create a simulated environment based on actual needs and collected data. By integrating this information and the scene with each other, it can make people experience the virtual space in a more realistic and natural way, which in turn will lead to better visual effects and a higher sense of immersion. In order to truly achieve the goal of 3D visual modelling, in the actual construction process, image-based drawing and graphics-based drawing methods are also used. Image-based drawing and graphics-based drawing are more convenient and effective methods compared to traditional methods. In practice, image-based rendering techniques capture real

environments and objects to obtain relevant images of the environment and objects. The core objective of this operation is to ensure that the virtual environment is created with a high degree of realism, which provides the audience with a more realistic experience, making them feel as if they were there^[3].

3.2 Stereo sound synthesis, stereo visual display

In everyday life, both objects that can be observed by the naked eye and sounds that can be heard display a sense of space. Therefore, it can be assumed that both objects and sounds are objects that occupy a specific space. Therefore, it is of great significance for intangible cultural heritage to construct a virtual environment through the use of virtual simulation technology. In the process of using virtual reality technology to inherit and disseminate intangible cultural heritage, this technology can break through the limitations of traditional audio technology that lacks natural spatial sense, so that objects and sounds can obtain a certain degree of three-dimensional spatial sense, thus effectively enhancing the sense of reality of the virtual environment. In addition, the immersive experience through the virtual scene can also allow people to feel a more realistic auditory perception. In order to achieve this goal, the technical means of stereo sound synthesis and stereo display must be used. In specific use, the combination of these two technologies can play a more significant role. To create a more three-dimensional visual effect in stereo synthesis technology, it is necessary to carefully design the mixing, echo, and surrounding environment; To achieve three-dimensional, the application of display technology must rely on specific stereoscopic display devices, such as Helmet display, light valve glass lighting equipment.

3.3 System integration technology

In the application of virtual reality technology, the system often contains a large amount of perceptual data and models within the system. Therefore, this technology also involves system integration technology, such as data conversion technology, information synchronisation technology and synthesis technology. The main goal of system integration technology is to process the virtual reality environment in a real systematic way to ensure that it has practical application value and high efficiency. In the process of current social development, many places have begun the protection of intangible cultural heritage. There is an obvious difference between non-heritage culture and traditional culture. Since the cultural space of intangible cultural heritage is dynamic, in order to truly show its intrinsic value, it must be placed in a specific cultural environment. If the cultural space does not respond accordingly, it cannot be called a non-heritage culture. Therefore, in the process of passing on and spreading NRM culture, it is necessary to ensure that it has a living character". However, from the current point of view, many regions in China have not established a comprehensive non-heritage museum. In this regard, virtual reality technology plays an indispensable and important role. Through the use of virtual simulation technology for the protection of traditional art as well as innovation, not only can effectively enhance the integrity of intangible cultural heritage, authenticity and other characteristics, but also conducive to promoting the development of China's traditional national art career. The use of virtual reality technology to disseminate and inherit intangible cultural heritage can truly achieve the goal of transmission and dissemination of intangible cultural heritage. This paper mainly discusses some problems that should be paid attention to when using virtual reality technology to preserve and disseminate intangible cultural heritage, and puts forward corresponding countermeasures. After using virtual reality technology to preserve intangible cultural heritage, we can upload some of the analogue videos produced by these cultural heritages to the Internet, which can not only attract more people's attention to our country's intangible cultural heritage, but also may promote our country's intangible cultural heritage to the international stage.

4. Conclusion

All in all, sensor technology as a tool enables traditional handicraft intangible cultural heritage to be more widely disseminated and promoted to the public. Starting from the theory of

communication, this paper explores issues such as the communication effect and the influencing factors through the study of the dissemination and display of traditional handicrafts on the Internet platform. With the continuous progress of digital interaction technology, the way of interaction between media devices and users has become simpler and more abstract. The introduction and application of artificial intelligence has pushed the development of communication media in a direction more in line with human biological characteristics, which not only expands the ability and scope of human communication, but also minimises the loss of information.

References

- [1] Wang J,Chen Y. Application and Analysis of Non-Heritage Culture in Art Education in Colleges and Universities under the Background of Public Health Emergency[J]. *Frontiers in Educational Research*,2023,6(10).
- [2] Feng M,He X,Luo X, et al. Teaching Reform and Practice of Sensor Technology Based on CDIO Concept[C]//Information Engineering Research Institute,USA.Proceedings of 2012 2nd International Conference on Education and Education Management(EEM 2012 V3). INFORMATION ENGINEERING RESEARCH INSTITUTE,2012:344-348.
- [3] Xu Y,Li Z. Research on Creative Design Method of Expanding Non-heritage Culture Based on Big Data[C]//Singapore Management and Sports Science Institute(Singapore), Information Engineering Research Institute(USA).Proceedings of 2018 3rd ERR International Conference on Language, Humanities, Education and Social Sciences (ERR-LHES 2018)(Advances in Social and Behavioral Sciences, VOL.26).2018:127-131.