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Evolutional Culture Heritage Project of Precious Collections With National Palace Museum

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Abstract

This project proposes a novel method solves an important problem about how to record and present digital data of precious collection and how to have an immersive experience of intangible culture treasure. The process describes how to make it possible for users to performances of a **Ting** (Chinese bronze) from the head collections of **NPM** (National Palace Museum) and **PienChung** (Chinese bronze bells) of the center for Music Heritage Council. Those precious collections researches' using a haptic device as "SPIDAR" (Space Interface Device for Artificial Reality) with computer system and MIDI shows an interactive music.

When using SPIDAR, the amount of force input by the user was strongly related to the interactivity of the vibrations and sounds of the PienChung and other such physical elements inside the artificial real environment. The sensory information is feedback to the user using the same system. All that happens within this man-made realistic space is based on physical calculations, and it is possible for users to virtually experience seeing, feeling the Ting and listening to the PienChung.

In situations where unavoidable deterioration of important cultural assets takes place, or where intangible culture treasures such as ceremonies, festivals or performances take place, they can all be digitalized using Virtual Reality (VR) technology. Additionally, they can be given an interactive element, which makes it possible to appeal to the diverse senses which human behavior, rather than simply the more traditional visually oriented senses. Eventually our objective is to take the invaluable collections found at the rich culture of NPM and the center for Music Heritage Council and creates a novel culture heritage form that fuses art and research, including expressive elements and interactivity from data that is usually only simply reproduced in a visual form. Finally, the goal for evolutional culture heritage generation by Associate Professor Noriho Takahashi (Peisuei Lee) of **IAMAS** (Institute of Advance Media Arts and Science) and Associate President Po-Ting Lin of NPM, promoting various modern culture with novel research and communication with Mainland China and Taiwan, hope help to promotes peace in the world.

Key words: Range Data Generations, Haptic Device, Interactive Music

1. Introduction

The use of digital heritage is becoming more widely utilized in major museums and galleries around the world. The reason for this trend is that digital technology is a far more effective medium than traditional papers or videos in portraying thematic content in an exhibition piece. Any user can have what could be termed a deep, 'impressive' experience. In recent years, there have been a number of cases where the meaning of archive has also included the continuation of culture or history in visual formats such as public records, old videos and photos. There are a number of advantages in using digital archiving to preserve cultural assets regardless of there materially. The greatest advantage is the ability to portray the thematic content of an exhibition piece far more effectively than by using traditional paper or video mediums. Viewers are given what could be termed as a deep 'impressive' experience.

Digital technology makes it possible to appeal to more of the diverse senses that humans possess rather than only the usual visually oriented senses. In order to correct the tendency for digital culture archives to only have one-way information flows, we added a performance-based interactive element to create an exhibit where the user participates in and is therefore incorporated into the exhibit.

Furthermore, the purpose of this research paper is not simply about performing a melody. Rather, it focuses not only on giving the user a deep impressive experience using the SPIDAR **[1]** force sensor system to provide feedback to the user by processing force input from the user to the system and vice versa, but also on creating a novel culture heritage. Through the use of this kind of system, it is possible to get to know the novel artwork far better than by traditional visually oriented methods of appreciation .

2. Generate the Precious Collections

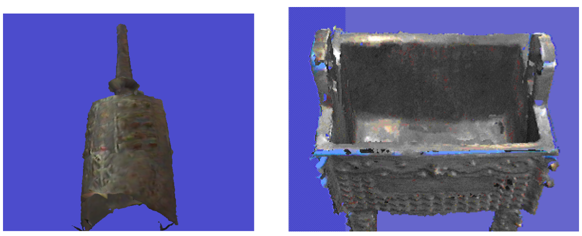
This section proposes how to generating precious collection from multiple range data. The range data from an arbitrary viewing direction cannot comprise data of occluded area.

First, this method gets range data with color information from multiple viewing directions. The range data constructs mesh by triangle patches. Then, two models, which are overlapped, are registrants with 3D shape and color information, and the two models are integrated into one surface model. Overlapping patches are detected by considering much information of shapes, color and continuous surface. The results show that this method is efficient for the integration of multiple range data as is shown on **Figure 1**.

In order to model the motifs necessary for creating a precious digital collection, a range finder, which can measure a three-dimensional shape, was used to acquire images of the unique shapes and rare articles without actually touching the pieces. By using this method, it was possible to automatically generate the shape of the object in a relatively short period of time. The actual method used consists of preparation, alignment and then the integration of the data. The preparation stage consists of the measurement of multiple visual points using the range finder. The images derived from the range finder's data are displayed using a triangular patch. When producing the patch models displayed with this triangular patch, we added perimeter relationship data for all the data points, color information, and then re-applied the three-dimensional features. In order to complete the alignment of the color and perimeter relationship data, the data is regionally disaggregated, and by fixing the central point it is possible to output the features of the image. We then fixed the features on two patch models and derived the initial values of the transformation parameters. After aligning the edges of the sector based on the initial values, we accurately realigned them using all the data points **[2]**.

Taking data from what were considered important points and applying the data, which appeared to be the same on the surface of the objects of each of the patch models, achieved the integration of the data. This data was evaluated, and accurate data was kept. The patches containing inaccurate data were deleted. New data was created from the data points in the patch that had been deleted. The deleted patch was recreated by filling the gap from the edge to the center. At this point, the lines, which were the basis of the reconstruction of the patch, were used as the boundary edges. If a new patch is reconstructed with the new data points chosen from around the boundary edges and perimeter relationships, the patches will cause interference, so before the patches cause interference, the boundary edges were fixed.

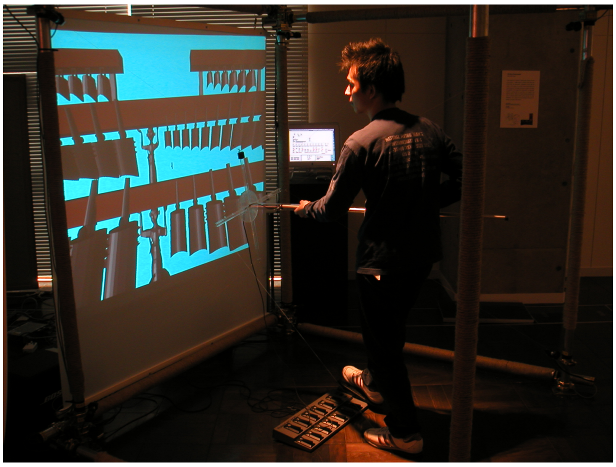
Last of all, the boundary edges were connected with new patches and the image smoothed over to ensure that the consecutive images appeared uninterrupted.



(Fig.1, Range data of "PeinChung" & "Ting")

3. Using MIDI and Haptic Device

The process by using lots sounds from a performance of the bells, which has achieved a high level of presence and realism. The force sensor system presented here allows the participants to experience the same sensation of sound as was heard at the time the actual bell was hit and bounced **[3]**. This is accomplished by hitting the bell displayed in virtual space using an interface, and is made possible by using the force sensor indicator capable of inputting and outputting data of SPIDAR, which is a haptic interface. Musician artist **"Yoshihisa Suzuki"** and **F"Satoshi Fukushima"** use SPIDAR control the MIDI with computer system and performance an interactive modern music as shows on **Figure 2**.



(Figure 2, Interactive music system)

4. Conclusion

A novel point of this project that we are currently carrying out with this content research to create the appearance of true "reality," by interactive due to the hardware aspects of the PeinChung image data and sound

Currently, we are only using one screen; however, in the future we would like to add a screen on the left and one on the right, for a total of three screens. With three screens, we would be able to afford the participant an increasingly realistic experience.

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