

Virtual Reality Tour of the “Focus of Favorites” Exhibition at the Gilcrease Museum

Will Smith
Tandy School of
Computer Sciences
University of Tulsa
800 S. College Ave
Tulsa, OK 74104, USA
will-smith-87@utulsa.edu

Andrew Couch
Thomas Gilcrease Museum
1400 N. Gilcrease Museum Rd
Tulsa
OK 74127
USA
andy-couch@utulsa.edu

Robert Pickering
Museum Science and
Management
University of Tulsa
800 S. College Ave
Tulsa, OK 74104, USA
bob-pickering@utulsa.edu

J. C. Diaz
Tandy School of
Computer Sciences
University of Tulsa
800 S. College Ave
Tulsa, OK 74104, USA
diaz@utulsa.edu

This paper discusses a virtual reality tour of the “Focus on Favorites, Masterworks from the Gilcrease Collection” exhibition at the Gilcrease Museum in Tulsa, Oklahoma. The virtual museum tour combines photographs, audio recording, and digitization. The goal was to create an engaging and self-directed interactive experience. The tour relies on photo-spheres and 3D scans of objects to create the visuals. The result is an interactive experience using virtual reality technologies to enhance the immersion of the viewer. It was designed to be used by the Gilcrease on Wheels program for rural school districts and under-served communities in Oklahoma so that these students can experience some of the museum's collection. The target audience for the virtual reality tour which uses the Oculus Rift DK2 is eighth grade students because of restrictions by the manufacturer. For lower grades, the tour can be a group experience accessed via a projector in a lecture setting.

Virtual Reality. 3D modelling. Travelling museum exhibit. Age-appropriate apps.

1. INTRODUCTION

The Gilcrease Museum (The Thomas Gilcrease Institute of American History and Art) houses one of the finest collections of American art and history. It includes art and artefacts of the American West, Native American art and artefacts, historical manuscripts, documents and maps. Across three collections – Art, Anthropology and Archives, many items combine rarity, historical significance, and sheer beauty. Many have been called treasures by the staff and the public.

1.1 Focus on Favorites Exhibition

Focus on Favorites, Masterworks from the Gilcrease Collection exhibition at the Gilcrease Museum assembles many of these treasures to present the best of the Gilcrease to the public. Thomas Gilcrease surely had favourites though he revered all items as “his children”.

Individuals whose personal collections he acquired certainly valued specific items – the papers of Sir Thomas Phillips or the Western art collection of Phillip G. Cole. Rare artworks were precious to families who retained ownership for generations,

such as the marble bust of Lafayette which descended in his family until Thomas Gilcrease purchased it, or Audubon’s Wild Turkey which the artist kept in his possession until it too was purchased from a descendant by Gilcrease.



Figure 1: Wild Turkey by John James Audubon, 0126.2322

Many objects have been of particular interest to curators who across the years have cared for, researched and provided interpretation. Finally, for the steady stream of visitors from around the world who come for the first time or for repeated visits, there are loved works – a painting, sculpture, document, or an artefact of great cultural significance. In this spirit, *Focus on Favorites* brings together some of the finest and best loved examples of favourites from the heart of the Gilcrease collections.

From the Art collection, significant portraits of some of America's founders such as Portrait of George Washington and James Madison by artist Charles Wilson Peale are included in the exhibit.



Figure 2: George Washington and James Madison by artist Charles Wilson Peale, 0126.2262 and 0126.1006

There are magnificent landscapes including Sierra Nevada Morning by Albert Bierstadt, Spectres from the North by Thomas Moran, and Grand Canyon by William R. Leigh, a painting significant for its size as well as its execution.



Figure 3: Spectres from the North by Thomas Moran, 0126.2340

Western artist Frederic Remington's one of kind bronze, Buffalo Horse, is seen in tandem with his painting of the same subject, Episode of a Buffalo Hunt.

Charles Russell's predicament painting Meat's Not Meat 'Till It's in the Pan, a masterpiece of the beloved Western painter, has always been a favourite, as has Joseph Henry Sharp's stunning still life, Peonies in Studio Window, known for its sheer beauty and glowing treatment of light.



Figure 4: Buffalo Horse and Episode of the Buffalo Hunt by Frederic Remington, 0827.51 and 0127.2308

An unparalleled group of objects from the Anthropology collection exemplifies a high level of artistry and skill, with unique materials from across the Americas. Gold from Panama, a Mexican Yarn painting, a First Phase Chiefs Blanket, and treasures from the North American Mississippian period show the variety and cultural complexity of North and South America's history. Highlights include a golden seahorse, an amber nose ring, and a 2,000 year old Beaver Effigy pipe, which is inlaid with river pearls for eyes and teeth from a beaver.

While Thomas Gilcrease was known as an avid collector of art and archaeological artefacts, he quietly amassed an extraordinary collection of documents that chronicled North America's cultural development since the 16th century. A selection of rare documents typifies one of his collecting strategies – to collect individual documents related to pivotal national events. He sought out documents related to the founding of our Republic. The hand-written copies of the Declaration of Independence, see Figure 5, and the Articles of Confederation are true national treasures.

In 2015, Fenella France, chief of the Preservation Research and Testing Division of the Library of Congress, conducted analysis on the Gilcrease's hand-written copy of the Declaration of Independence as well as its companion piece, The Articles of Confederation. France's examination was based on spectral imaging conducted by Michael Toth and William Christens-Berry of R.B. Toth Associates. The analysis discovered a fingerprint in the ink of the document that identified the writer as Silas Deane, the first ambassador to France from the United States of America (French 2016). The letter was then signed by Benjamin Franklin for presentation to Frederick, King of

Prussia. This analysis provides both strong evidence for the letter's authenticity and also places it in its proper historical context.

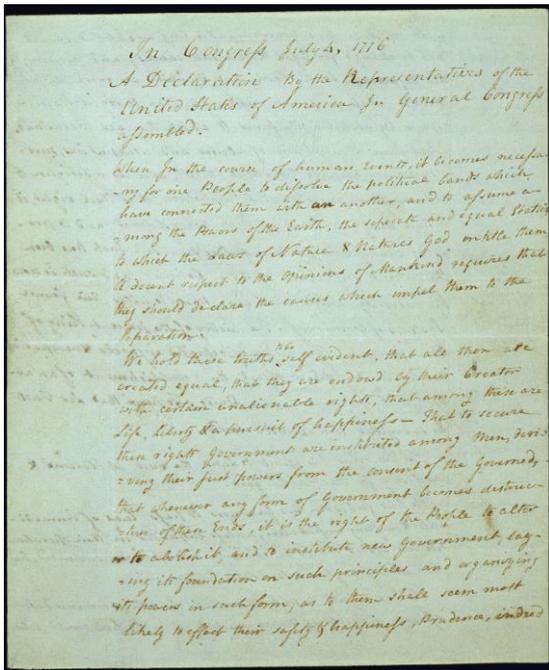


Figure 5: Declaration of Independence, 4026.901

These documents taken together with the Thomas Jefferson's letter to William Fleming and the portraits of America's founders, the Gilcrease provides rare personal views of our country in its earliest days.

This selection also reveals Mr Gilcrease's sensitivity to Native American issues. His mother was a member of the Muskogee (Creek) tribe and he sought out important documents, such as the Cherokee Muster Roll and the Sequoyah Syllabary, that provide insight from Native American perspectives.

Thomas Gilcrease left his collection to the people of Tulsa and the world. Visitors can explore and discover their own favourites from among these historical gems collected over a lifetime by a man whose intent was to provide citizens a means of valuing their heritage.

2. GILCREASE ON WHEELS

Gilcrease on Wheels is a mobile museum experience that brings art and social studies to third, fourth and fifth grade students in rural Oklahoma. Trained educators travel with the Gilcrease on Wheels exhibit to schools, libraries and community centres.

Our travelling museum exhibit consists of three curriculum themes that coincide with each grade

level: Oklahoma history for third grade, Spiro Mounds: Native American culture for fourth grade, and U.S. history for fifth grade, each comprising six panels. The program is 90 minutes per class. It consists of a discussion-based lesson with demonstrations, exploring the travelling exhibits, an art activity, and a virtual tour of *Focus on Favorites: Masterworks from the Gilcrease Collection*.

2.1 Motivation

Focus on Favorites was chosen for inclusion as a virtual reality tour on the Gilcrease on Wheels for three reasons.

First, it included some of the most important works and artefacts in the museum based on popularity, artistry and historical significance.

Second, the exhibition is an excellent display of United States history, Native American culture, and American art that corresponds with third, fourth, and fifth grade curriculum. *Focus on Favorites* provides a broad overview and an introduction to the museum and the exploration of the American experience.

Third, from a logistical perspective, the works that populated the gallery were readily accessible and accommodated the equipment needed with minimal risk to the works, and the necessary didactic material accompanied each work.

During the first 12 weeks of the *Focus on Favorites* exhibit the public was invited to participate and vote on their favourite object. After 12 weeks the public's favourite piece was *Spectres from the North* by Thomas Moran, see Figure 3.

3. VIRTUAL TOUR

The virtual tour consists of seven locations, two audio narrations, and two areas where the viewer can zoom in or out on specific paintings. The viewer moves from one location to the next by aligning the centre of their vision with arrows on the floor and waiting for the transition to take place. The viewer is free to move back through the locations but must wait for any narrations to complete.

The museum exhibition includes seven galleries; the virtual tour was broken up into seven corresponding locations from which to be viewed. A camera was positioned on a tripod and used to take pictures, with some overlap, 360° horizontally and nearly 180° vertically.

While developing the tour we chose to capture the images at the height of the average fourth grader

so that the experience for them would feel genuine; as if they were actually in front of masterpieces.

3.1 Virtual Tour Narrative

The first 12-weeks favourite object vote is mentioned in the narration and its connection with the theme of the exhibit and the idea for each student to "Find a Favorite" within the virtual tour is introduced. We chose to create a narrative for Moran's *Spectres from the North* due to its popularity with the public and its size. An audio recording of ocean waves (Corsica_S 2011) is used to accompany the narrative associated with the painting. The audio greatly enhances the experience for the students. This painting is also used with a divergent thinking activity within the Gilcrease on Wheels program.

Fifth grade students in Oklahoma are required to learn about United States history as part of their social studies curriculum. We chose to incorporate a narrative piece on the Declaration of Independence to coincide with their curriculum, see Figure 5. While virtually viewing the Declaration students will hear the narrative piece and learn about the museum's most significant object.

4. VIRTUAL TOUR CONSTRUCTION

The virtual tour was created with the Unity game engine (Unity 2016). Other software such as Blender (2016), Photoshop (2016), and Hugin (2016) were used to create the assets that the application relies on. The Unity engine supports the Oculus Rift DK2 and allows the application to run on a computer without any virtual reality hardware. This allows for the experience to be shown via a projector to large audiences.

Once the pictures were acquired, they were stitched together using the Hugin program. Hugin was used to create an equirectangular projection of the images which was mapped onto a sphere.

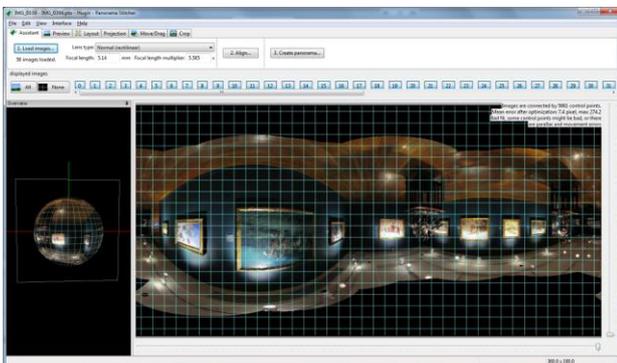


Figure 6: Creating an equirectangular panorama in Hugin

The images produced by Hugin generally needed some editing in another program such as Photoshop.



Figure 7: Correcting stitching irregularities with Photoshop

Unity only provides low quality sphere models so a higher quality sphere was created and UV mapped in Blender.

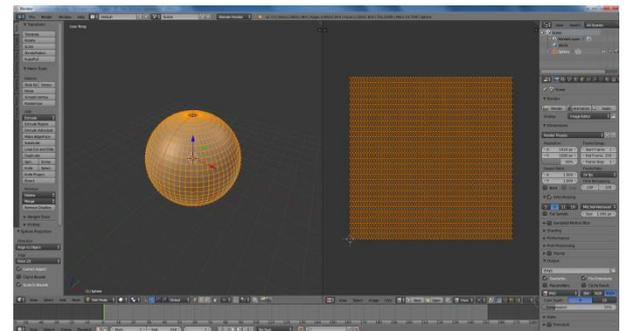


Figure 8: UV mapping a sphere in Blender

In Unity, the player and cameras are placed inside of the spheres. The spheres are textured with the equirectangular images and a script flips normal vectors of the material so that the image is on the inside of the sphere instead of the outside.

Another script manages which sphere the player is in and how they move from one to the others.



Figure 9: The application running in Unity

4.2 Virtual Reality Alternatives

Once the Tour is completed it is ported to the device of choice. The Unity engine supports the Oculus Rift DK2 and it also allows the application to run on a computer without any virtual reality hardware by displaying it on the monitor. This provides for an experience that can be shown via a projector to large audiences.

5. IMPACT

In a little over a year, Gilcrease on Wheels has served more than 8,000 children throughout 18 counties in rural Oklahoma. This school year alone, the program has reached over 3,000 students all of which have experienced the virtual tour.

Many rural schools do not benefit from museum programming due to geographic location and limited funding for field trips. Gilcrease on Wheels is designed to extend the benefits of a museum experience to students in rural communities. The virtual tour is important because it allows these students to experience the museum from their classroom.

After the virtual tour, we receive questions from students pertaining to admission cost, and hours of operations. The virtual tour is a key component to the program; it inspires students to visit a museum. Impact can be measured several ways. There are the Teacher Surveys as well as a participant vote on selecting their own "Favorites" in the virtual tour.

Students always like to talk about what their favourite piece is after experiencing the virtual tour. Children get excited about the museum's larger paintings.

5.1 Teacher Surveys

A question that is a part of the Gilcrease on Wheels teacher survey is "What did your students like best about the Gilcrease on Wheels visit?" Several of the responses to that question are simply summarized with two words, "virtual tour." For example, a third grade teacher from Poteau Upper Elementary responded, "The students loved the virtual tour of the museum."

The virtual tour has been one of the most successful elements within our rural outreach program. The virtual tour is not only enjoyed by students but by their teachers as well. Recently a fifth grade teacher from Choctaw County said that they personally enjoyed "experiencing new things we don't see in Hugo, OK."

6. REFERENCES

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