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Curio-Stereo: A VR Application for the Viewing of Stereograph Cards

Paige Sandheinrich

by

Submitted in Partial Fulfillment of the
Requirements for the Degree of Master of

at

Lindenwood University

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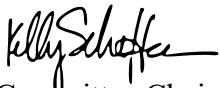Author's Name   Date

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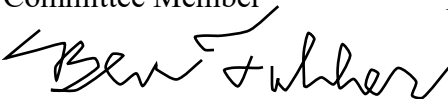
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CURIO-STEREO: A VR APPLICATION

FOR THE VIEWING OF STEREOGRAPH CARDS

A Thesis Submitted to the Faculty of the College of Arts and Humanities
in Partial Fulfillment of the Requirements for the
Degree of Master in Fine Arts
at
Lindenwood University

By

Paige Sandheinrich

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ABSTRACT

Title of Thesis**:** Curio-Stereo: A VR Application for the Viewing of Stereograph Cards

Paige Sandheinrich, Master of Fine Art, 2023

Thesis Directed by: Kelly Scheffer

This project discusses the historical significance of stereograph cards as a tool for constructing a shared visual culture in the late 19th and early 20th centuries in the United States and the United Kingdom. Stereographs were widely popularized as an entertainment and educational tool, offering an immersive experience for the viewers. The stereoscopic nature of the images allowed the viewers to immerse themselves in a non-physical reality through visual stimulation, creating a haptic involvement that was unique to the medium. The project of creating a VR application to view stereographs is presented as a potential solution to the problem of the paper media's deterioration and current presentation. The VR application would offer a way for viewers to experience stereographic cards in an immersive, illusionary manner, providing an opportunity to connect early stereoscopic and immersive technologies with modern VR environments. This project provides a significant opportunity to advance digital collection access and create virtual galleries, studios, and art pieces, enabling users to appreciate the artistic and historical value of stereograph cards.

Keywords: Stereographs, Virtual Reality, Digital Collection Presentation, Visual Literacy, Game

Application

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Introduction

The history of visual media culture often begins with discussions of photography, the subsequent inventions that followed, and the entertainment interests of consumer culture and the educational sphere. The stereograph served as an alluring form of education and entertainment to the public across Europe and the United States from their emergence in the 1850s and well into the twentieth century. They were often marketed toward the consumer's desire to travel through images from the comfort of home (Figure 1). By collecting cards, the viewers and consumers had control over the story they were building and could bend narratives and travel to faraway places with minimal effort.[1] Such collections were not so different from contemporary apps available for download on VR headsets that utilize Google imaging and crowd-sourced photos. With the Industrial Revolution and the expedient technological advancements of time, photography and stereocards became visual communication tools, solidifying the stereograph, perhaps one of the earliest forms of collectible photographic material, a staple of collectible Victorian media culture.

Although these consumers were most interested in aesthetics and entertainment, this new visual medium provided a unique opportunity for individuals to understand, document, and venerate complex emotional experiences and memories.[2] Because stereograph cards often featured exotic locales, scenic or picturesque views, or portrait-style photo cards, they had a wide appeal among the upper classes when they first hit the markets after 1855.[3] As public interest in photography grew. Advancements in the production of the cards became more accessible, and stereocards became a staple of many parlors across the United Kingdom and the United States. They were often printed and constructed with cheap materials that afforded the studios the ability to sell them at cheap,

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[1] Pauline Stakelon, "Traveling through the Stereoscope," *Media History*, 16:4, (2010):410.

[2] David Trend, "The Rise of Media Culture," *Counterpoints* 394 (2010): 75.

[3] Trend, "The Rise of Media Culture," 82.

accessible prices. At the height of their popularity in 1900 in the United States, the cards could be bought at six for one dollar or as low as three cents apiece. The consumer base of these cards could be anyone, given the varying cost. However, as they grew more popular, middle-class members became the main collectors, and the cards became closely tied to the new concept of leisure. Middle-class families could explore the world and find entertainment in the stereograph images from the comfort of their homes and with the new amounts of "free time" that came with the Industrial Revolution. The subject material of the images was greatly diverse: views from the American West to the streets of the Middle East, collections of antiques, ruins, portraits, and even pornography (Figures 2-5).

Stereocards are two images printed side-by-side on a single card. They are viewed with a stereoscope, an optical device that combines both images into a single three-dimensional image. One of the most interesting aspects of stereograph cards is how they engage the viewer's sense of touch. When viewed through a stereoscope, the images on the cards would appear to pop out of the card and into the viewer's space. They were popularized in the late 19th century in the United States and United Kingdom as entertainment and education primarily due to their immersive experience. Standard cards measure three and a half inches by seven inches, with two photographs pasted side by side on heavy-weight paper cards.

Stereoscopic viewing uses a technique called "stereopsis." It occurs when the eyes and the brain combine two slightly different views of the same scene, which is why it requires the use of two separate images and the viewing device, the stereoscope. The two images were taken with a camera at slightly varying angles or two inches apart, mimicking the stereoscopic perspective of the human eye (Figure 6). The right eye sees the right image, and the left eye sees the left image, with slightly different perspectives. The brain then combines the two images to create the stereoscopic effect, the perception of being present in a non-physical reality through visual stimulation. The

viewer could move their head around the image, understanding its depth and texture. In this way, stereograph cards created a haptic involvement with the viewer that was unique to the medium. These characteristics of the stereograph led to their success amongst the public, who then consumed media like never before due to the Industrial Age and new means of mass production. Consumers could order the cards from catalogs, order from door-to-door salesmen, or visit studios and browse collections (Figure 7).

This project will be a proof of concept for creating a VR application to aid in viewing stereograph cards, as these objects have begun to deteriorate over time. Due to the cheap material they are made of, the handling of the cards is difficult and the need for new modes of viewing is more pressing as the paper media continues to deteriorate. Within the application, the user could browse, interact with, and view stereographic cards how they were meant to be viewed, utilizing the stereoscopic nature of VR headsets. The proof of concept will cover the details of the project in full, highlighting the scope, potential market, feasibility, and overall art and design of the game. The concept of the application will focus on the stereographic cards that can be scanned using current photographic editing software, and a 3D image can be created to be viewed within a VR headset. The application's setting or background will be that of a Victorian parlor room, offering the viewer a selection of cards from a catalog separated by genre. Each card will be accompanied by important information such as studio, location, or subject and the collection in which the physical card currently resides. The importance of the game's setting will help viewers connect to this time and place and perhaps see parallels in the immersive, illusionary devices to the items we are fascinated with today. There is also the potential to include other types of devices popular in parlors at this time, such as zoetropes, kaleidoscopes, thaumatropes, and magic lanterns (Figures 8-10).

Creating such an application will allow the viewer to experience the stereographic cards as they were initially intended to be seen: as an immersive illusion. The way the cards are currently

presented in museums, in print, or on websites does not offer a chance to understand the significance the illusion would have had on a culture that had never seen anything like this before. Stereoscopes are considered one of the earliest forms of virtual reality because they use the same optical principles that virtual reality headsets use today. By looking through separate lenses to create the illusion of depth, stereoscopes can transport the user to immersive 3D worlds. Although they lack the motion tracking capabilities of modern VR headsets, they remain a great way to explore other worlds from the comfort of the home. The educational elements of the catalog and pieces will allow connections between early stereoscopic and immersive technologies and today's VR environment. This project could also allow for advancement in digital collection access. Creating virtual galleries and period-accurate realities to view certain art pieces have the possibility to aid in understanding the pieces on a deeper level. While other "games" and applications utilize galleries, studios, and art pieces, no one currently offers viewers a chance to experience stereocards through a VR headset.

<center>**Literature Review**</center>

As virtual and augmented reality technologies become commonplace in today's society, scholars have begun to look back to optical illusions utilizing photographic material such as magic lanterns and stereoscopic imagery in an attempt to understand the future by looking at the past. Stereographs have come to the forefront of the discussion due to stereoscopic viewing and depth illusion that resembles the modern technology associated with most VR headsets in creating a haptic, immersive reality.

Scholarship regarding the stereograph cards popular at the turn of the 19th century primarily focuses on the content and subjects of the cards. When attempting to understand their popularity as collectible objects and their ties to modern versions of similar tech, it is vital to consider the subjects of the popular themes. Within the last twenty years, the focus of much research has been on the subject matter of shocking subjects. These articles critique the subject, reactions, and use of the cards as a shock tool to influence public opinion and market travel and the context of the culture of those consuming this media also helps to understand why they would have been so popular and why some genres of cards were found to be more desirable. For example, pictures of the dead were considered morbidly fascinating. They were especially popular amongst the wealthy and aristocratic classes. Death and mortality were also popular themes in art and literature. It was common in Victorian culture to look for shocking media. [4] The photos of dead Civil War soldiers were common for collectible media, and the advances in photography helped to capture the world not before seen in such detail (Figure 11). There was also much more interest in erotic imagery. Despite the period's relatively repressed nature, these photographs, often of naked women or couples, served as visual representations of what openly expressed sexuality may have been like at the time. (Figure 12,

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[4] Emily Godbey, "'Terrible Fascination': Civil War Stereographs of the Dead," *History of Photography* 36, no.3 (2012):266.

sensitive content warning) They also serve as a reminder that although the Victorian code of behavior dictated appropriate public restraint, there was an equally strong desire for pleasure and exploration in private.[5] The growing levels of obscenity in the stereocards are also discussed by many and how the shocking outweighed aesthetic choices.[6] The more shocking the image, the more believable the illusion of depth the more popular the piece was on the market, as the viewers could feel more involved in the content. When considering the erotic images of stereograph cards and the concept of presence through the illusion of depth, viewers may have felt more included and present when viewing cards of this type.[7]

More recent scholarship focuses on the implications of controversial subjects as a form of entertainment and possession rather than the informative nature of other themes are also discussed by scholars. Discussions of the exotic in the stereographic image as forms of spectacle have also become commonplace when discussing the cards that feature marginalized groups.[8] The collections of street photography in the Middle East, the small tribes of Africa, and the ports of Japan that opened only two years after the stereoscope was featured in the Exhibition were often the subjects of photography sold. Documentary photography from the period also depicted people as their subjects, such as migrant laborers working for railroad companies or mines or soldiers in wartime campaigns in the State's Civil War or Europe's efforts. All these examples were popular subjects for stereocards as well. The standard consumer of the cards was often a middle-class, white member of society in the US and UK. The images featuring the exploitation of others such featured colonial activity and the exploitation of the natives for various trades were often the highest-selling cards,

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[5]Rachel Teukolsky, "Cartomania: Sensation, Celebrity, and the Democratized Portrait." *Victorian Studies* 57, no. 3 (2015): 468.

[6]Colette Colligan, "Stereographs," *Victorian Review* 34, no. 1 (2008): 80.

[7] Simon Popple, "Photography, Vice and the Moral Dilemma in Victorian Britain,":128.

[8] Rick VanderKnyff,"Parlor Illusions: Stereoscopic Views of Sub-Saharan Africa," *African Arts* 40, no. 3 (2007): 53.

which is often the discussion of scholarship surrounding stereoscopes that feature human subjects. They were also heavily marketed on the concept that the viewer holds these worlds within their hands through the stereoscope. This sense of ownership and connection to mastery over one's experience alludes to the desire of consumer culture to possess, control, and experience media.[9]

The stereograph's ability to hold the viewer's gaze and demand interaction is what made them iconic objects of the Victorian parlor. The viewer was a part of the experience and had a role to play. The relationship built between the object and the viewer allowed for more intimate interactions[10]. The popularity of the act of viewing images and not just the content of the images themselves is also often a center of discussion in the field. Depth illusions created an interest in the performative act of looking. Understanding the psychology of the interest in the illusions of depth is often mentioned in scholarship to understand the popularity of the cards. When viewed, 3D illusions can produce a powerful and sometimes extraordinary sensation, which is believed to be linked to a neurological process called bi-stability. A unique effect of depth perception is created when transitioning between the different depths, referred to as the blurring of the sense of touch. [11] When viewers looked at the images, they felt as if they were taking part in or present in the space created.[12] Publishers also argued that the stereoscope involved the viewer on a different plane altogether and became a participant in the image and in doing so they became more educated on that deeper level.[13] This immersive quality into the material is what pushed the stereoscope to success.

With the growing developments of photography, film, and print media, photographs became the modern tool for communication, prompting the development of visual literacy. The use of

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[9] Sheenagh Pietrobruno, "The Stereoscope and the Miniature," *Film Criticism* 37/38, no. 3/1 (2013):179.

[10] Arden Reed, "New Sights for Slowness," *Qui Parle* 22, no. 2 (2014): 76.

[11] John Plunkett, "Touch, Vision, and the Stereoscope," *History of Photography* 37, no. 4 (2013):394.

[12] Brooke Belisle, "History of Presence," *Art in America* 109, no. 1 (2021): 58.

[13] Judith Babbitts, "Stereographs and the Construction of Visual Culture" Memory Bytes: History Technology, and Digital Culture, ed. Lauren Rabinovitz and Abraham Geil. Durham NC: Duke University Press 2004:131.

images to inspire, communicate and educate the public is not that different from the contemporary age of continuous streams of visual media and communication.[14] There stereoscope offered the addition layer of immersion that other forms of media did not, transforming the way in which the viewer interacted with educational material in a public and private way. Each viewer would take something different away from the visual media.[15]

Stereocards also became popular as a mode of public education. Slogans for marketing campaigns focused on the use for travel and learning. The backs of the cards featured facts or biographies and served as a tool to educate the viewers. The interest in the educational aspect was what most of the publishing companies were pushing for, claiming that the family could became scientists with the use of stereocards that became small laboratories and their subjects the specimen for scientific exploration and examination, a metaphor used by Underwood in 1901.[16] By being immersed in the media, the viewer could connect more deeply and not only to the aesthetics of the images, but to the material it was meant to educate on.[17] Several publishing companies such as Keystone and Underwood, pushed for their products to be included in American schools, claiming that the content and experience would help children understand the material. Backed by researcher's praise, the companies continued to be involved in visual education well into the 1960s. Their continued use was credited with the hopes for students to be more involved with modern technology and the growing visual culture of the world.[18]

Sources relating to the archiving and digitizing of stereographs are also a topic in the current scholarship that needs to be addressed and included. Perhaps the most important point to remember

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[14] Paul R. Deslandes, "Visual Victorians: Response." Victorian Studies 56, no. 3 (2014): 471.
[15] Michael Lesy. "Visual Literacy" *The Journal of American History* 94, no. 1 (2007): 144
[16] Babbitts, "Stereographs and the Construction of Visual Culture" :134.
[17] Belisle. "History of Presence.": 64
[18] Babbitts, "Stereographs and the Construction of Visual Culture" 145.

is the consumer base's attitude toward the cards and how they chose to interact with them.[19] The nineteenth-century consumers saw the cards as objects, and collections of cards were meant to be viewed together and in sequences. Similarly, digitized photographic archives change how users' access and experience photographs and photographic material such as stereocards. Digitization has given users unprecedented access to photographic material and various new ways of engaging with them.[20] Current studies offer insight into how digitized archives bring with them the potential to drastically change what can be seen, how artifacts of photographic history can be interacted with, how knowledge can be built, and how these changes can better inform the experience of using digitized archives.[21] The viewer interface should emphasize ease of access and user experience for innovative modes of material presentation. In the case of the stereograph, presentation and digital collections would benefit from the ability to show the cards with a focus on user interaction.

A great deal of scholarship surrounds the current uses of virtual reality headsets and programs in the classroom and museum settings. Most scholars discuss the ability of virtual reality programs to offer a deeper connection to the subjects through immersive properties and the possibility to present material in original contexts. The late 1990s saw a burst of interest in these topics, rekindled in the 2010s. The possibility of a 3D space for visitors and their ability to curate their personal experience has been in discussion since 2004.[22] In contrast, others see VR as a potential tool to explore recreated historical sites, buildings, and artifacts and its ability to offer deeper connections and understanding for viewers or players.[23] However, such uses of virtual and

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[19] Estelle Blaschke, "Making History a Slightly Profitable Thing," *The Bettmann Archive and the Commodification of Images* 30 (July 2014)229.

[20] Paul Conway, "Modes of Seeing: Digitized Photographic Archives and the Experienced User." *The American Archivist* 73, no. 2 (2010):425.

[21] Conway, "Modes of Seeing: Digitized Photographic Archives and the Experienced User.", 428.

[22] Ross Parry and John Hopwood. "Virtual Reality and the 'Soft' Museum: A Call for Further Research." Journal of Museum Ethnography, no. 16 (2004): 70.

[23] Donald H. Sanders, "Virtual Heritage: Researching and Visualizing the Past in 3D." Journal of Eastern Mediterranean Archaeology & Heritage Studies 2, no. 1 (2014): 35

augmented reality have yet to make their way into the classrooms has been rooted in the reluctance to change the formal education setting. Despite the growing public involvement and pull to modern technology and interest in potential, virtual reality has yet to be used beyond novelty in an educational setting.[24] This is like the role of the stereoscope; the potential for educational use has been overshadowed by the novelty of the object meant for play and leisure.

The current state of the field regarding stereographs offers researchers varying discussions on the subject and theme, the illusion's psychology, and the pieces' history and influence. However, there is a lack of scholarship on preserving and presenting the stereocards in a stereoscopic headset, given the delicate and ephemeral nature of the paper cards and photographs themselves. With this project's completion, a new way to view the stereographs in collections will allow for continued education on early stereoscopic and optical illusion technology. Allowing viewers to engage with the stereograph through a VR platform will bring immersive engagement and illusion full circle.

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[24] Joseph Psotka, "Educational Games and Virtual Reality as Disruptive Technologies." *Journal of Educational Technology & Society* 16, no. 2 (2013): 76.

Methodology

The approach to the project was first to identify the lack of accessibility. The current exhibition and presentation of stereocards strips them of their original purpose. Victorian ephemera are also highly delicate and cannot be used or "played with" in their intended way for fear of destroying the pieces. Given their delicate nature, there has been a great push toward virtualizing collections, not just for touring purposes but also to preserve the items more likely to be lost in the future. The potential application would allow users to view and explore a digitized collection of stereograph cards that span various popular genres, showcasing a wide array of styles and themes throughout time. The user will be able to interact with each stereograph, rotating and zooming in to examine the detailed images and view the three-dimensional effect of each card. The proof of concept for the application outlines the details of the gameplay in more depth to be used as a guide or blueprint by potential development in the future.

The Proof of Concept

The Scope:

What is the concept of the application?

Curio-Stereo is for viewing stereocards and other popular optical illusion toys within a VR headset by utilizing the "hands on" capabilities in VR. There will be an additional layer of immersion for the player placing them into the original context of viewing: a virtually replicated Victorian parlor. Through the immersive experience, players can travel back in time and experience these classic amusements, perhaps seeing the various tools of play paralleling their contemporary versions. Through this application, players will gain an appreciation of the entertainment of the past while also learning the history of optical illusion toys, primarily stereograph cards.

This application will be designed to provide an immersive experience in the earliest days of visual culture. The application will allow users to view and explore a digitized collection of stereograph cards that span three popular genres, showcasing a wide array of styles and themes throughout the mid to late nineteenth century. The user will be able to interact with each stereograph, rotating and zooming in to examine the detailed images and view the three-dimensional effect of each card. As the user moves from card to card, the captions and biographies presented will provide further insight with obscure facts on the subject of the card or studio that produced it, or other information related to stereograph cards as a form of visual entertainment. Overall, this application will serve as an unprecedented look into the past, with each card offering a tangible link to a specific moment of history, offering museums the chance to show their digital collection of stereocards how they were originally intended and granting collection viewers an immersive experience.

Who is this meant for?

The application will have a primary target audience of museums or online collections of stereocards to present their collections in an immersive way. With this addition, the viewing options available to patrons will also align with many museums' current efforts to create virtual galleries and archives of their collections accessible to remote patrons. This means that those who cannot physically visit the museum can still have access to the resources and artifacts within. The ephemeral nature of the stereocards and other paper media currently do not allow for such viewing or intractability, stripping the objects of their most important features.

Who can utilize it?

The secondary target audience or real players of the application will be the patrons of the museums or the virtual visitors who are utilizing VR to visit the museum. It will allow people to explore the collection without being in the museum, from the comfort of their own home, much like the original stereographs. With the addition of other popular parlor entertainment, such as kaleidoscopes, thaumatropes, zoetropes, and magic lanterns, players can interact with these objects rather than viewing them in stills or from behind a glass case. This will help to connect the player to the earlier forms of immersive tech and potentials see how the objects have transitioned into contemporary toys or games. With the overall goal of education, the game should be playable by a wide age range from middle school and up.

Why is it needed?

The primary mode of viewing stereocards currently strips the cards of their original function. Other Victorian ephemera are also highly delicate and cannot be used or "played with" in their intended way for fear of destroying the pieces. The selling point of many of these items and toys was their intractability and demand for user participation, which is currently off-limits. If one wanted to study such items, one would have to rely on stills or videos done by other researchers,

make their versions of the toys, or print the stereocards and build a stereoscope. Using the motion tracking and hand-held controls of Virtual Reality headsets, players could pick a kaleidoscope up and bring it to their eye, twirl a thaumatrope between their virtual hands, or carefully change the slides in a magic lantern. The connection created between player and object would allow for a deeper understanding of why the items were popular and how they may relate to contemporary visual entertainment media.

How is it adding to what we have currently?

Given the delicate nature of paper material such as stereographs, there has been a great push toward digitizing collections, not just for keeping a digital copy but also to preserve the items more likely to be lost in the future. Digital collections of stereocards already exist, with many being well-documented and high-resolution. However, the collections' solution for viewing includes the dimensions the cards could be printed on to be enjoyed with a "DIY"ed stereoscope. Currently, no other options are offered to patrons or viewers of stereograph cards. As for the other objects to be included in the virtual space, creating 3D rendered virtual duplicates of the objects could allow for opportunities to study and compare the objects more thoroughly.

How can it be expanded?

With the inclusion of other popular paper media and optical devices, players can become more connected to the context of the items and see the influence of these early tools of entertainment on contemporary versions. The intractability of the application with these objects could grow into more than just optical illusion toys. There is potential in virtually recreating any relic or art object through high-resolution scans and 3D modeling software. The taboo of touch within the museum setting would no longer apply to the potential virtual patrons, as they could swing an eighth-century sword, stare out from the Sutton Hoo mask, or hold the leg bone of a T-Rex in one virtual hand and a Chihuly vase in the other.

The Market:

Current Market:

The current market for VR games focusing on education is growing quickly as technology advances and educators become more focused on incorporating VR into the classroom. VR is becoming recognized as providing powerful tools for teaching concepts within immersive learning experiences that can help engage students in the course material. Companies such as Oculus and Google are beginning to focus more on educational content, specifically for VR, as the industry is becoming more saturated with these products.

Virtual Reality technology has allowed many cultural institutions to become more accessible than ever before. Increasingly, museums and galleries offer virtual tours, interactive installations, 3D reconstructions, and more to enhance the visitor experience. VR is also helping to create a more inclusive and diverse cultural environment, allowing culturally diverse and underserved populations to access and explore art and history from the comfort of their homes.

Digitizing art and ephemeral media remain important as it continues to preserve historical and cultural artifacts, providing access to these materials for educational use and research and ensuring they remain available for future generations. As technology advances, secure, long-term archival solutions advance with it. Art preservation methods continue to advance as archival methods begin to include new photographic methods and technologies. There are several large databases for stereocards currently available to the public. Some databases are large collections of unorganized cards, while some offer filters or sub-genre collections to sort through the subjects. There are also websites available that focus on single themes (See Appendix 1).

What it could add:

The creation of this application will give distance learners and remote patrons access to and the opportunity to interact with the pieces they study on a much more intimate and immersive level.

This way of engaging with art objects in augmented and immersive reality has yet to be utilized to its full potential. There could be greater engagement on a personal level, increased knowledge retention, and critical thinking skills by allowing patrons to interact with the objects. It could also motivate students to go explore other subjects and become more engaged with the educational content. Also, this type of application could cultivate enthusiasm for exploring not just stylistic aspects of art objects but also the historical contexts of pieces. As for the continued expansion of virtual archives, the potential to house 3D renditions and replicas of significant objects will aid in further research as it becomes available to scholars wanting closer looks at them from the other side of the world.

The Idea:

Feasibility:

Creating the application is highly feasible and can be done with a well-rounded team of skilled professionals, such as software engineers and web developers. There are no objectives for the "gameplay." The application will be geared toward an education and exploration model. The creation of the categories and the biographies of the cards and high-resolution scans already exist in some format within the collections they are currently housed. The setting of the parlor will be a limited explorable environment, much like other game settings, where players are limited in their actions yet can still explore the scene. The creation of the application could be considered a similar concept to the "tutorial" users play with the Oculus headset, where items can be picked up and interacted with when learning the hand-held controls.

Functions:

The application will need to be built primarily for VR headsets with additional hand-held controllers or the motion tracking feature to experience the interactive nature of the application.

Controls and functions within the application:

1. Movement: *walking* will be available in two modes: through the handheld controller or if the player has a "playable area" large enough to explore.

2. Camera Controls: *panning, moving, rotating* camera functions will take place by tracking the headset's motion, i.e., the player looks right, and the camera will follow. *Zooming* can be made possible by using a trigger button on a hand-held controller.

3. Interactions: *picking up objects,* the interactions with the game objects will be standard and offer both interaction options: direct, for items within reach, and raycasting, a type based on pointing at it with the controller. The controls of "poke," "pinch," or "hold" will be explained at the beginning of the gameplay.

4. Environmental Controls: The environment will not be intractable, just the main game objects, to ensure that the player is not overwhelmed by accidental interactions with other items.

5. Menu Controls: *opening menus, adjusting settings, or accessing tutorials* can be reached from the main and pause menu, which will be able to be activated by a single button from the handheld controller.

Standard Play-through:

The application will open on the main title screen. Since the game is non-narrative, the gameplay focuses more on exploration and interaction with the objects within the environment. If a first-time player, an introduction video will feature the history of stereograph cards and the Victorians' interest in optical illusion devices. The video will include commentary on the similarities between the stereoscopic viewing of the cards to that of the headset they are currently wearing. This should not be any longer than five minutes. After the video explains the interactive controls to the player, a tutorial will also play. Once through the introductory material, a common play-through

could follow these steps.

A) The player fades into the interior of a Victorian parlor, surrounded by bookcases and oddities. The player is seated on a couch with a table with three boxes labeled by genre in front of them.

B) The player points their controller toward the boxes to interact/ or moves forward and opens the box of their choice to access the catalog of cards.

C) The player can then browse the card selection, reading the biography section about each as they move through the inventory. They can also move between genres from this screen if they wish.

D) The player selects a card, and a brief animation will play the movement of the card as it is loaded into the stereoscope and then raised to the player's eyes, projecting the stereograph card with the 3D illusion. The player can then back out of the screen and into the inventory.

E) Once the player is satisfied with the stereocards, they may "stand" from the couch and navigate the room. Moving around, they find other optical illusion toys around the room that highlights as they get close. Once they select the object, an "About" card will open detailing the object, what it does, and how to use it.

F) The player then can maneuver the room and interact with the objects around them per the instructions until they are finished.

The Design:

The Style:

The art style of the application will be realistic so that the environment has highly detailed textures and dynamic lighting effects. Realism in this application is important for players to feel truly immersed. By using realistic visuals, detailed audio, and a believable environment, players can

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have a much more engaging experience.

The Setting:

The setting will be created utilizing reference images of parlors and be populated with items common to see in any upper-middle-class home. Since the parlor was the most formal room in the house, it was used to entertain and host parties. The upper-middle-class parlor reflected one's social standing in Victorian times and must be accurately depicted within the application. A common description of this type of room is as follows: it will be decorated in rich colors with intricate details that draw the eye, such as wallpaper or wooden paneling. The floors are covered with ornate Persian carpets, and large chandeliers hang from the ceiling. The furniture will be carefully chosen to ensure the rendition is as accurate as possible to populate the space. Common articles of furniture that may be included are matching velvet sofas, several chairs with ornate wood carvings, and mahogany tables. The walls would be adorned with decorative clocks and mirrors, vases and urns, and sculptures or paintings. Collections of books and oddities could be included on bookcases or in curio cabinets. A fireplace would often be the room's centerpiece, usually with a mantel, holding ceramic figurines, and other decorations. The parlor could include additional oddities that would have also been common in many households that could afford the luxury, such as skulls, shells, flowers and bugs, and other taxidermized animals (Figure 13-15).

Game-Objects:

- Three wooden, decorative boxes, each containing a genre of the stereocards, will appear on the table in front of a couch. Common measurements for a case are eleven and a half inches long by seven and a half inches wide and four and a half inches tall, with space for around 150 cards (Figure 16).

- The Stereoscope: the stereoscope will be the Holmes Model, popular after 1861 and perhaps the most recognizable model. As a fun twist, the object could be colored like an Oculus headset (Figure 5).

- Other items, such as kaleidoscopes, thaumatropes, zoetropes, and magic lanterns, will be scattered throughout the room to promote exploration. Once the player is near an object, it will become highlighted, indicating it can be interacted with. The player can then read the automatically generated "About" card and interact with the object and "play with" it per the instructions on the card to see the illusion (Figures 7-9).

Genres of Cards available:

- Tableaux: featuring staged imagery of various topics and themes, ie. religious, theater, or everyday staged scenes (Figure 17).

- Travel: featuring cards that contain landscapes of famous destinations and monuments, ie. Egypt, Paris, the American West, Japan, etc. (Figure 18).

- Miscellanea: offering an amalgamation of stereographs featuring seemingly random subjects such as collections of objects in a still life, a stereocard of a woman viewing a stereocard, or the use of mirrors and other objects that would push the limits of the 3D illusion. (Figure 19).

Opening Title Card and Menu Graphics:

The title card and menu text will be reminiscent of Victorian-era hand-lettered signs with a combination of calligraphy and illustration, ornamental borders, simple, elegant typography utilizing serif and script fonts, and bold decorative typefaces. The font colors will also fall into the classic sign coloring of black, gold, and silver, and bolder colors like red, blue, and green (Figure 20). The Pause Menu will keep the same style as the Main Menu (Figure 21).

The catalog of cards featuring their biographies will also include consistent stylistic

treatment. The images will remain in the standard two-image view, and once selected, the 3D image

will appear in the headset. The catalog view will feature a standard "inventory" set-up allowing the

player to browse the selection before they select for further viewing. When a card is hovered over on

the left side of the screen in the list, the card's biography will pop up to the left side of the screen,

featuring the name, date, and photographer or studio (Figure 22). The "About" card pop-up will be a

different style from the genre inventory screen (Figure 23). Rather than an inventory menu, a

handwritten note screen will pop up, featuring the name of the object and information about it. The

player can choose to interact with the object or to back out.

Conclusion

If the proof of concept were to be utilized to build the discussed application, it would bring researchers, collections, and patrons one step closer to understanding the effects of the illusionary devices of the Victorian era. It would also offer patrons a way to interact with the items as they were meant to be. They could participate in the act of looking that made the stereograph cards as popular as they were. By utilizing the advancing imaging and 3D object rendering software, the preservation of object collections will allow for more detailed study in the future. The only limitation is the quality of the technology used to make the scans and render the objects. The project could continue to be expanded, as mentioned in the proof of concept, to include additional materials and items. However, the concept of a virtual space for iterating with artifacts should be wider than photographic material and optical toys ephemera. Utilizing this concept, museums could render their object collections with 3D scans to allow for interaction by players in augmented or virtual reality, allowing for a deeper connection to the history of the objects. By breaking the taboo of "touch" within the virtual space, viewers and players can connect to the material they are presented in ways unavailable before. This project provides a significant opportunity to connect early stereoscopic and immersive technologies with modern VR environments, allowing for advancement in digital collection access and virtual galleries, studios, and art pieces.

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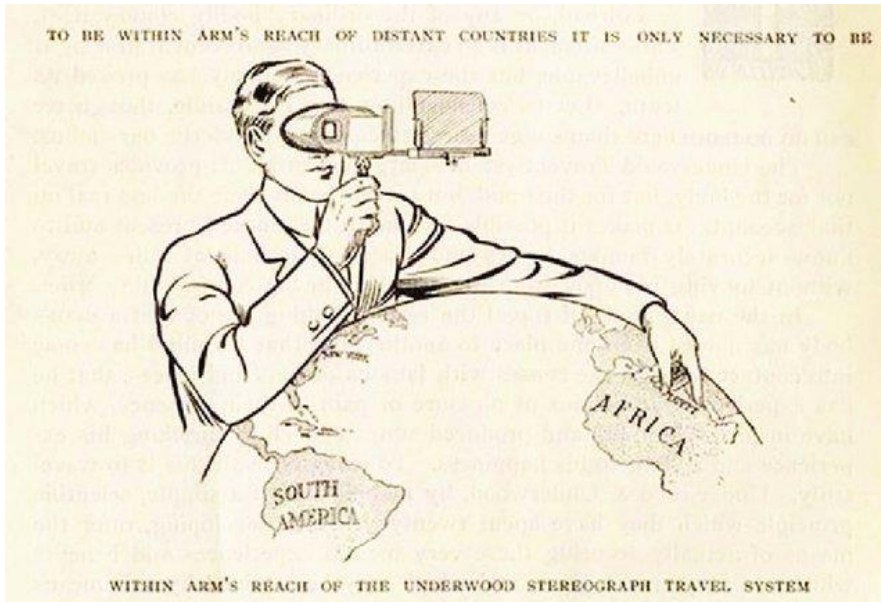
Figures

Figure *1. Underwood Stereograph Travel System* Advert, c. 1907.

Figure *2*. The Globe Stereograph Co., Publisher. *Interior, cathedral, Guadalupe, near a city of Mexico.* Mexico, 1906. Photograph.

Figure *3*. United States Stereograph Co., Publisher. *The Islands, Lakes of Killarney, Ireland.* Ireland, 1906. Photograph.

Figure *4*. *Favorites of the Harem,* Constantinople, Turkey ca. 1900. Photograph.

Figure 5. J. Gurney & Son *Stereograph depicting a sculpture of a woman and lion,* ca. 1870. Photograph.

Figure 6. Science Museum Group. *Holmes-type stereoscope. 1990-5036/3755* Science Museum Group Collection Online.

Figure *7. Ireland, Through the Stereoscope. Complete with Set of 100 stereoviews.* New York: Underwood & Underwood, 1907.

Figure *8. Zoetrope,* Leeds Industrial Museum. Ca. 1850

Figure *9. Brewster type kaleidoscope on tripod mount,* Robert Brettell Bate, c. 1820.

Figure *10. Magic Lantern.* Alex Maness and North Carolina School of Science and Mathematics, via Flickr.

Figure *11*. Gardner, Alexander. *The Horrors of War.* Pennsylvania United States Arkansas Gettysburg Helena, 1863. Photograph.

Figure *12*. *"Le Stéréo-Nu",* stereograph lot. 1906.

Figure *13*. Visual Reference for the parlor. *Victorian Parlor Room ca. 1895* Uploaded by Mike Fitzgerald via Flickr.

Figure *14*. Visual Reference for the parlor. *A comfortable study* via isabellaalden.com from Alden personal albums.

Figure *15*. Visual Reference for the parlor. *Eclectic Victorian Psychic Living Room* by set decorator Rick Romer. Image via Rick Romer on Flickr.

Figure *16*. Enamel Box for stereocards ca 1860s.

Figure *17*. Example for Tableaux section. Keystone View Company, *The Little Protector,* ca 1898.
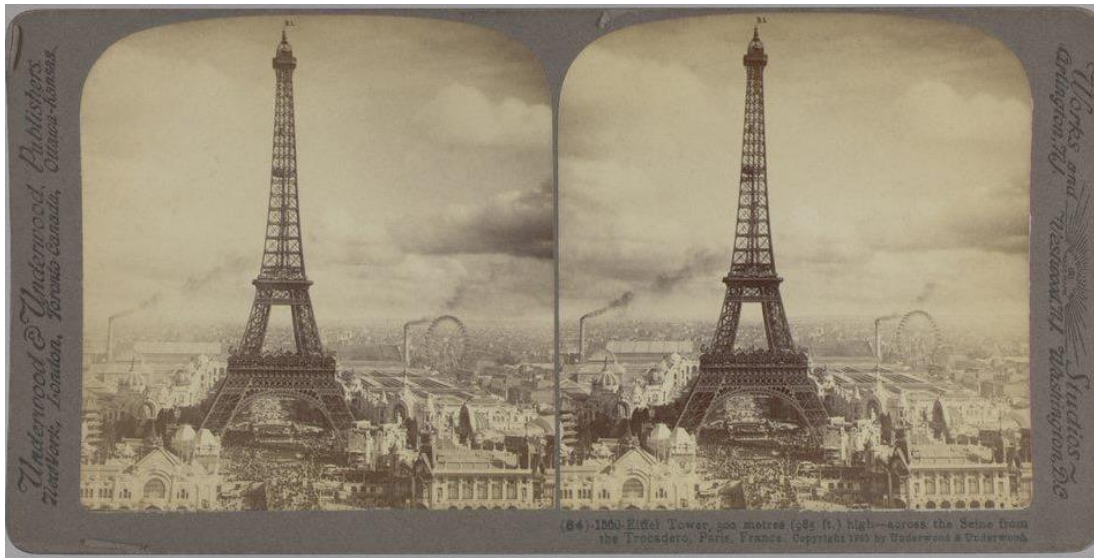
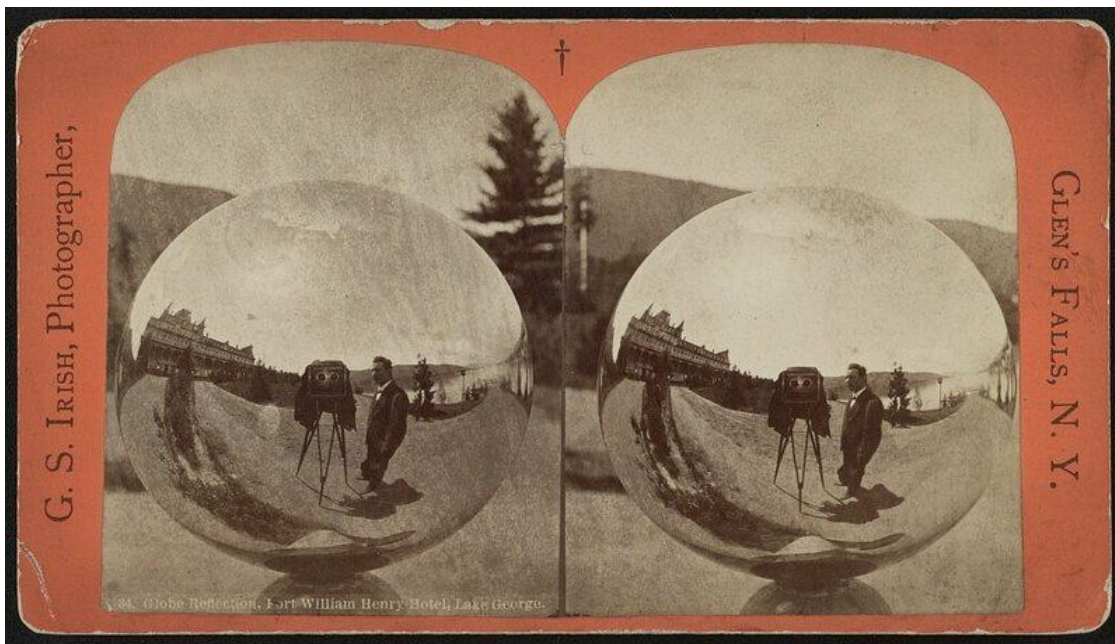Figure *18*. Example for the Travel section. Underwood & Underwood, *Eifel Tower* ca 1901, Photograph.

Figure *19*. Example for the Miscellanea section Irish, G. S, *Globe reflection*, Fort William Henry Hotel, Lake George ca. 1870 Photograph.

Figure *20*. Opening Title Card

Figure *21*. Pause Menu

Figure *22*. Inventory Screen, with card title and biography

Figure *23*. "About" note for other game objects to include information.

Appendix 1: Current Digital Stereograph Collections

List of the largest digital stereograph collections currently available:

- The Library of Congress's Stereograph Cards Collection - https://www.loc.gov/collections/stereographs/

- The New York Public Library https://digitalcollections.nypl.org/collections/stereograph-collection#/?tab=navigation

- The California State Library's Stereograph Collection - https://oac.cdlib.org/findaid/ark:/13030/kt4q2nf1r5/entire_text/

- The University of California's Bancroft Library Stereograph Collection - https://oac.cdlib.org/findaid/ark:/13030/tf8j49p5w3/admin/

- The Boston Public Library's Stereograph Collection - https://www.digitalcommonwealth.org/collections/commonwealth:4q77fw06j

- The Oregon Historical Society's Stereograph Collection - https://digitalcollections.ohs.org/stereographs

List of Digital collections for specific themed stereographs:

- The Great War in Stereoviews - https://www.greatwarin3d.org/httpdocs/Keystone.htm

- Harvard Business School Baker Library Historical Collections: Stereographic Collections - https://www.library.hbs.edu/hc/pc/stereograph.html

- New York Heritage Digital Collections: Civil War Stereographs, 1861- 1865- https://cdm16694.contentdm.oclc.org/digital/collection/p16694coll47/id/2502

- History Miami Museum: Stereoviews of Florida and the Caribbean - https://historymiami.org/exhibition/stereographs-of-florida-and-the-caribbean/

- SMU Libraries: banks McLaurin, Jr. Stereograph Collections Series 1-19 - https://www.smu.edu/libraries/digitalcollection