Experiencing in Pieces

An Audible and Visual Study in Reactive Spaces

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An Audible and Visual Study in Reactive Spaces

by

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Music brought me here.

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Introduction

Context of the final project

When anything new comes along, everyone, like a child discovering the world, thinks that they've invented it, but you scratch a little and you find a cavemen scratching on a wall is creating a virtual reality in a sense. What is new here is that more sophisticated instruments give you the power to do it more easily. - Morton Heilig (Hamit,1993)

This statement helped me to develop the concept of my final project, based on the idea of engaging users in a reactive environment, and letting them choose for themselves the possible outcomes. The medium of my final project is audio and digital video projected onto a surface, in order to create a "hybrid reality." Hybrid reality is defined as a mixture of virtual reality and physical space, it's the merging of real and virtual worlds to produce new environments and audio visualizations where the digital and physical objects enact in a real time setting. (Mayra, Frans, Lankoski, Petri 129) My project creates a place where users can navigate through the space and bodily immerse themselves, giving them the choice to see and hear only certain elements of the production, and reconstruct it while walking around a mediated space. This project takes deep roots in my love for music and the idea of wanting to be a part of a band. Attending my first concert as a teen, and observing how the band played and collaborated with each other to engage the audience in a specific place and time, motivated me to do what they were doing. Ultimately, I became the best musician I could be, and still wanting to engage and help others to feel immersed in what I am doing. Engagement and immersion are the key elements of my project, and the content of this paper is the result of the research I have conducted to support the main design decisions of my final project.

Objectives and Description

When virtual reality and augmented reality are trying to become a common ground for games and entertainment, it may be difficult for some people that is resistant to confined spaces to accept the apparatuses needed, such as the virtual reality glasses. My final project proposes a mixed reality, using visuals and audio to create an installation piece with a navigable space. Appealing to all ages, this project that includes both open environment and the manipulation of media through body movements, will allow users to experience the audio and the visuals of the whole production, or deconstruct it by experiencing only certain parts. The chance for users to decide opens up a new way to experience, immersing themselves without feeling constraint, and giving to them a “choice.”

Contents of the research paper

Chapter one discusses historical and contemporary influences for the project, focusing on the purpose of virtual and augmented realty. Beginning with the French playwright Antonin Artaud in the 1800’s, I discuss his ideas based on how the theater and a production are types of experiences in their own. These ideas will be related to examples of mixed realty and hyper realities’ installations. In chapter one I also discuss digital immersion experiences, including referents of music and visuals that explore how we engage with the digital world of mixed reality based environments.

In chapter two I explain the theoretical frameworks and methods used. Addressing the works of Lev Manovich, I discuss the new media aspects of navigable spaces, as well as the framework used at Bell Labs in the 1950’s, and the way they shaped music through the medium of computers and technology.

In Chapter three I describe the tools and techniques used for the project, including the schematics of the installation and the panels, projector, and audio setup. I also discuss how the installation serves as example of a hybrid reality, in which user can chose to break apart the production and reconstruct it. I also explain how the mediated space was created, and what kind of software and technology was used. Chapter four discusses the related disciplines of the project, and how they affect it, including the notion of mixed realities that propose a higher platform for interactive learning, awareness and understanding. Through museum studies, I describe examples that illustrate the notion of mediated spaces. In relation to music, I will refer to orchestration layout and how it is relevant to the layout of an installation. I also address the concept of empathic design and how it is relevant to be considered in environments and installations in which the user actively participates.

Research Questions

How can I give to a user a meaningful interactive experience?

How users will engage differently when they have the option to intervene the medium?

Will users feel more connected to a piece of music when they have the chance to bodily engage with it, rather than just watching a music video?

Will users feel more inclined to interact with media in an open environment setting rather than with the confinement of wearing glasses, or other virtual based apparatuses?

Chapter 1

Historical and Contemporary Influences

My project consist on many elements that make up an installation of a visual and audio user immersion piece. The referents I considered for my project are related to elements consisting of projection mapping, the use of Kinetic for motion detection (and the software Touch Designer) and the theory's and influences behind my project consisting of these elements of digital immersion. Digital immersion or virtual reality has a unique history, and understanding where virtual reality comes from and the ideas behind it are important in understanding this project.

Virtual Reality

The experience I want to give to the user is essentially a virtual reality experience without the feeling of being in the virtual world, meaning the user will be able to manipulate the environment of the installation without directly being confined to VR glasses or any virtual reality wearable apparatus. Defined by as a "mixed reality" this project introduces an open area environment, allowing the user to still be connected to the visual and audio, and immersed as they wish. Studying the history and reasoning of virtual reality is important to bettering the results of the proposed installation.

The digital immersion experience can be dated as early as in the 1800's with the development of the Kaleidoscope. (Jerald 15)This was the first way a user could look into a visual portal and alter its own outcome. Manipulating and changing the perceived so every time it would be a different outcome. This was the first time a visual became a physical experience. The French playwright Antonin Artaud was first to use the term “virtual reality.” In his book *The Theater and Its Double,* Artaud speaks of the theater as “la realite virtuelle”, referring to a reality that is both illusory and purely factious. His aim was to allow people going to a production inside a theater to take away from what is real and immerse them into a virtual experience of the story. (Grimes, 2012) The static version of today’s stereoscopic 3D TV’s was called the stereoscope. Invented before photography in 1832 by Sir Charles Wheatstone, the device used mirrors angled at 45 degrees to reflect images into the eye from left and right side. *(See Fig.1)*

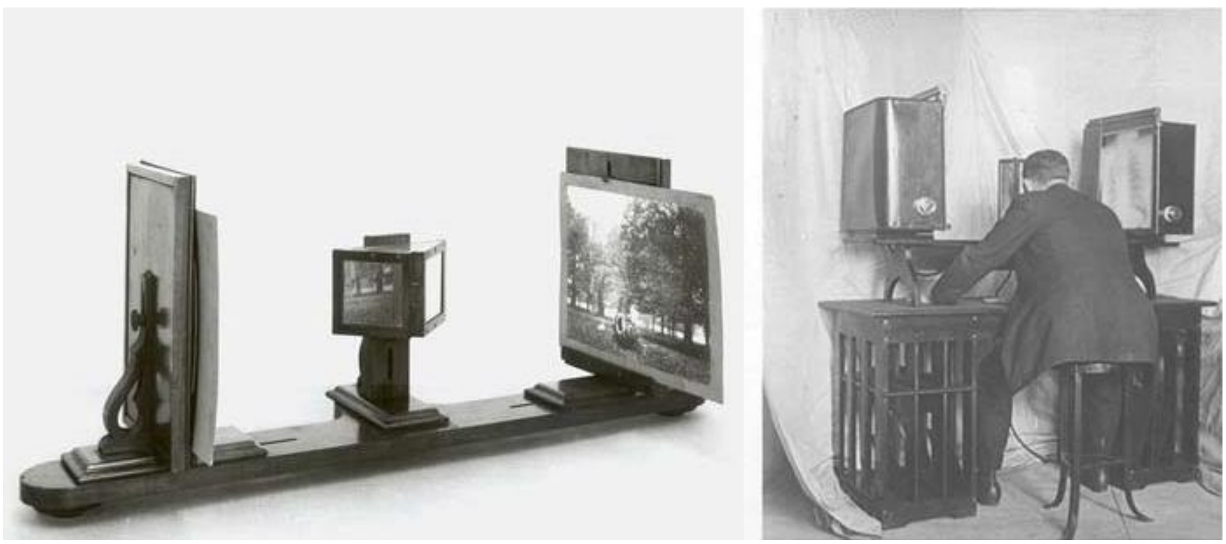

Figure 1 Figure 1 Charles Wheatstone’s stereoscope 1832- photo courtesy of “The VR Book Human-Centered Design for Virtual Reality.” ACM Books.2016

David Brewster, who earlier invented the kaleidoscope, used lenses to make a smaller consumer – friendly hand held version of the stereoscope. (Jerald 19) Quoted by the poet Oliver Wendell Holmes about Brewster’s stethoscope “…is a surprise such as no painting ever produced... The mind feels its way into the vey depth of the picture.” This assumption of immersion within a produced image that never completes itself allows the user to connect fully with art. (20)

George Méliès also first started to create image and video based visual to us in the 1800's with giving us a surreal visual and what we believe is a reality. (Manovich 200) His type of thinking brought viewers to believe that once the viewer came to accept the photographic image as reality. So with this, the way to future simulation was open and what remained were small details such as the development of digital computers. Conceptually, photorealistic computer graphics had already appeared with the Felix Nadars photographs in the 1840's and certainly with the first films of Melies in 1890's. They were the inventors of the first version of the 3-D photorealistic computer graphics, altering what we see as a reality on film. (201) It was also in 1895 that film began to mainstream, and when the audience saw virtual train coming through the screen in the short film "L'Arrivee d'un train en gare de la Ciotat,"some people reportedly screamed and ran to the back of the room. Maybe it is rumored about the screaming and running but there was certainly hype, excitement and fear about the new artistic medium, perhaps similar to what is happening with virtual reality in the present. (Jerald 18)

In 1967 the world's first interactive movie was introduced. Kinoautomat was conceived by Radúz Činčera for the Czechoslovak Pavilion at the Montreal Expo that year. *(See Fig.2)*

Figure 2 Kinoautomat: One Man and His House - 1967 - Official movie poster

At nine certain points during this film the action stops and a moderator appears on stage asking the audience to choose between two scenes: following an audience vote, the chosen scene was played. The interactive element was achieved by simply switching a lens cap between two synchronized projectors, each with a different cut of the film. (Činčerová, 2010) This film, being a step further in Artaud's definition in audience immersion. Even with the guerilla style interactivity of the lens cap, this idea started physical immersion allowing the user to control the production outcome, choosing what to see and what to take away from the film.

Physical apparatus became popular by Edwin A. Link and his flight simulator in 1928. (Jerald 19) It started to reveal physical immersion with an experience used for more than entertainment purposes, but for training and education. By the 1950's, Morton Heilig designed both a head mounted display and a world fixed display called the sensorama. (21)*(See Fig.3)*

Figure 3 Morton Heilig's sensorama- 1950–Photo Copyright Morton Heilig Lagacy

The sensorama was created for immersive film and it provided stereoscopic color views with a wide field of view, stereo sounds, seat tilting, vibrations, smell and wind. This can be considered one of the first virtual experiences in which it not only utilized the complete peripheral view, but let the senses be another dimension of experience, that being the physical senses.(22)

In 1961, Philco Corporation built the first working tracked Head Mounted display that included head tracking. (Jerald 23)This worked by as the user moved his head, a camera in a different room moved so the user could see as if he were at the other location. This differed than the previous in that it was the world's first working telepresence system. (24) At this point in time, the military had been utilizing visually coupled systems for pilots, consisting of head mounted displays. Where at the beginning the military had passed on apparatus training and considering it for entertainment purposes, it was now seeing the full potential of the virtual reality experience and the impact it would have on training. Government agencies began funding development for these devices, and teams within these agencies started to spring up in development of their own. Soon companies like Atari began the commercializing of this virtual reality experience and devices in the early 1980s.

Jaron Lanier and Thomas Zimmerman (some of the lead computer scientist at Atari) left Atari in 1985to start VPL Research (VPR stands for Visual Programming Language) where they built commercial VR gloves, head mounted displays, and software.(Jerald 26) During this time Lanier coined the phrase "virtual reality". In addition to building and selling head-mounted displays, VPL built the Dataglove specified by NASA- a VR glove with optical sensors to measure finger bending and tactile vibrator feedback. (26)Virtual reality exploded in popularity in the 1990's with various companies focusing on mostly the professional research market and location –based entertainment. Companies such as Sega, Disneyland General Motors and well as numerous universities and the military, also started to more extensively experiment with the virtual reality technologies. More books, movies, and documentaries were made focusing on the VR experience. Virtual reality peaked in 1996, when technology could not support the promises of certain VR companies. The business started to slowly decline and a lot of companies went out of business. (27) From 2000-2012 virtual reality was given little mainstream media attention. Researchers from the VR community started to turn a human centered design with an emphasis on user studies. A wide field of view was a major missing component of consumer Head Mounted Displays, and in the 1990's users were not getting the feeling of presence. In 2006, Mark Bolas of USC's MxR Lab and Ian McDowell of Fakespace Lab created a 150 degree field of view called the Wide5, in which users could accurately judge distances, walking to a target and having a larger field of view. (27) This research team led to the low-cost Field of View, which was shown at the IEEE VR 2012 conference in Orange County, California, where it became an Award winning device. One of the members of the team Palmer Luckey met John Carmack and formed Oculus VR, shortly after Palmer launched the Oculus Rift Kickstarter. The hacker community and media latched onto VR once again. Companies ranging from startups to the Fortune 500 began to see the value of VR and started providing resources for VR development, including Facebook, which acquired Oculus VR in 2014 for 2 billion. Thus begins a new era of virtual reality and the developments that will follow. (27) Historically, virtual reality and digital Immersion applications have not always been greeted with open arms, to the unknown public, but not to the retailer or higher learning institutions. Since 2010, digital immersion became more popular and virtual reality will became a part of how we live and it has being accepted more and more by mainstream.

My final project will include two important elements for this project will be the utilization of two ideas and the applications: one being projection mapping, in which the user will interact with the visual projections through the use of the Kinect (a motion sensors apparatus). Projections will not be on a simple flat surface, but on a panel that has been placed for mobile use. The projector will be placed in a certain spot not in front of the panel, so a method of projection mapping will be used. The Kinect system will be developed through Touch Designer to motion detect the coordinates of the user.

Projection Mapping

Projection mapping uses everyday video projectors, but instead of projecting on a flat screen, light is mapped onto any surface, turning common objects of any 3D shape into interactive displays. (Jones, 2012)In other words, projection mapping is the "the display of an image on a non-flat or non-white surface." The original term for projection mapping was "spatial augmented reality" and "video mapping."(Jones) *(See Fig.4)*

Figure 4- Display of the way a projector projects onto a non-flat surface compared to a flat surface –photo from www.Projection-mapping .org article by Brett Jones

Around 1969, the first known instance of projection onto a non-flat surface dates back to the 1969 opening off the haunted Mansion ride in Disneyland. (Jones, 2012)The dark ride featured a number of interesting optical illusions, including a disembodied head, Madame Leota and 5 bust singing the theme song of the ride. These were accomplished by filming head-shots of the singer (with 16mm film) and then projecting this film onto head busts with their faces. *(See Fig.5)*

Figure 5-Projected singing faces onto busts on Haunted Mansion ride in Disnyland 1969 - photo from www.Projection-mapping .org article by Brett Jones

One of the next groundbreaking installation came in 1981 with an immersive projection mapping film entitled “Displacements, created by Michael Naimak.” In this art installation a living room with two performers were filmed with a rotating camera; then the camera was replaced with a projector, causing rotating projection mapping around a room. (Naimark, 1980) *(See Fig.6)*

Figure 6 Still of Michael Naimak’s Displacements 1980- photo courtesy of Naimark.net

Disney had the earliest patent for projection mapping technology, helping to promote this movement along with virtual reality. This patent was entitled “Apparatus and method for projection upon a three-dimensional object,” which was described as a system for digitally painting an image onto “a contoured, three dimension object.” (Jones, 2012) GE was another big player that acquired an early patent for “A system and method for precisely superimposing images of computer models in three –dimensional space to a corresponding physical objecting physical space.” (Jones) These early patents indicated that the technology of projection mapping was in demand by certain labs, even though the way these labs defined it was not always the same.

Projection mapping really started to be popular when it was being pursed in academia. Spatial augmented reality was born out of the work and research by UNC Chapel Hill associates Ramesh Raskar, Greg Welch, Henry Fuchs and Deepek Bandyopadhyay. This all started with the paper *The Office of The Future* published in 1998. *(See Fig.7)*

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Figure 7 prototype image from the published paper "The Office of the Future"-1998 – Raskar, Welch, Cutts, Stesin, Fuchs

The Office of the Future envisioned a world where projectors could cover any surface. Instead of staring at a small computer monitor, we would be able to experience augmented reality right from our desk. (Fuch 10) This means we could Skype with life-size versions of our office colleagues, viewing virtual 3D models. This work featured an early real time, imperceptible 3D scanner, much like today's Kinect. John Underkoffler, one of the chief scientist of Oblong Industries INC, introduced the concept of the I/O Bulb/ (Input /Output Bulb), a projector coupled with a camera that could use the same as a traditional light bulb, also developing new methods in shading in the projector lenses. (Jones, 2012) From there, Raskar explored moveable projectors (predicting the Pico projectors of the future). These hand held smart projectors were aware of their position and orientation through a variety of sensors, becoming useful for engineer's projects used in the manufacturing industry and warehouses. In today's market, most projectors are oriented to entertainment and education, and its merging with the virtual reality realm opens up new technology that we find useful for the sustainability of our environment through education and awareness. Live performance and stage production have benefited the most from projection mapping. In some ways it has raised the bar on how we visualize a performance or production. The band EOTO utilized this method on their last tour by constructing their stage platform as a giant lotus leaf and projection mapped visuals during their performance. *(See Fig.8)*

Figure 8 EOTO's Lotus flower stage show by Zebbler Studios-2012 –Photo by B. Hockensmith Photography

Mute Math is another band that teamed with Rabbit Hole Creative out of Nashville, Tennessee that shifted to 3D mapped in their stage design. This stage was modeled beforehand in a 3D program and mapped out then applied live to a real scale. *(See Fig.9)*

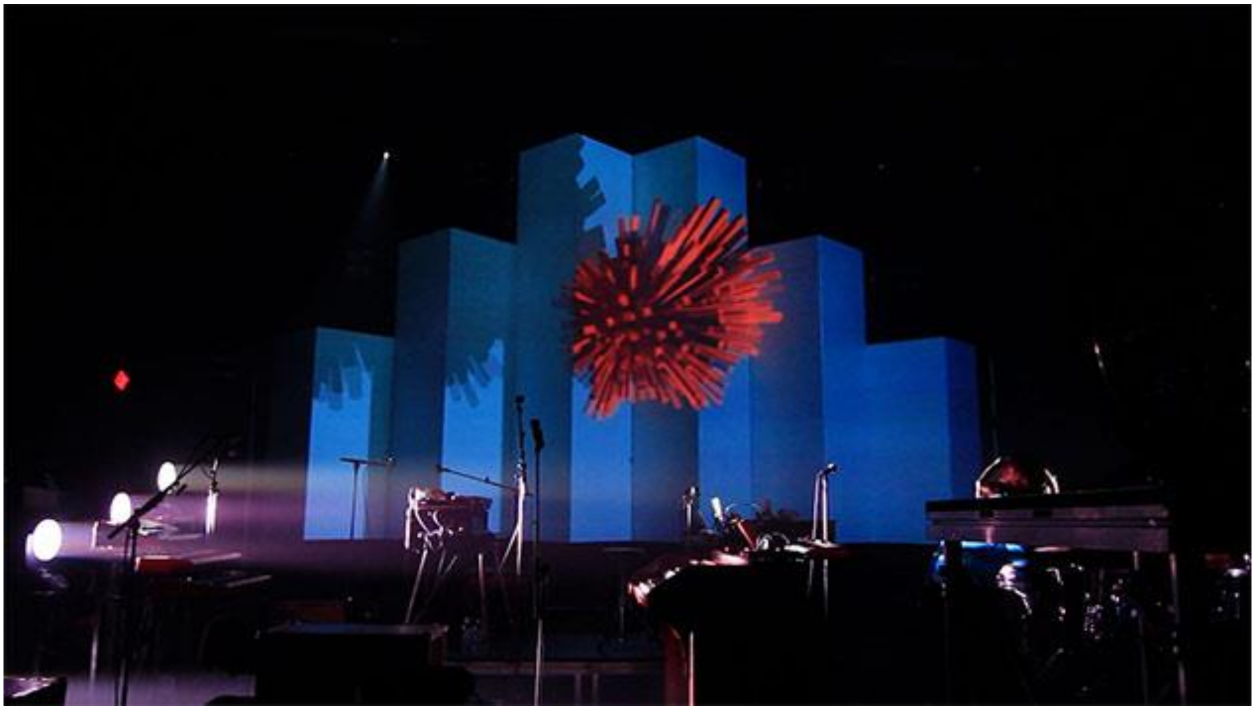

Figure 9 Mute Math's Stage Show by Rabbit Hole creative -2014- Photo by Matt Roper Photography

The visuals created by 3D mapping projection in live performances have served to create a complete new artistic approach that comes to complete and complement the traditional performance.

Kinect

Figure 10 Microsoft's Version 2 Kinect-Photo courtesy of Microsoft

The Kinect *(See Fig.10)* is a line of motion sensor input device created by Microsoft, based on a webcam-style add-on periphel. It enables users to control and interact with their console or computer without the need for a controller, but through natural user interface, using gestures and spoken commands. Originally intended for Microsoft Xbox, today it is used in entertainment, professional field, education and live performance. Even though it was first introduced in 2009, now is a common gaming and user interface system. Most large scale interactive installations are run now using a Kinect. For example: *Connected Worlds* is an interactive ecosystem installation developed for the New York Hall of Science. *(See Fig.11)*

Figure 11 –"Connected Worlds" by Cambridge (US) based creative studio Design I/O (Theo Watson, Emily Gobeille and Nick Hardeman) –Photo courtesy of Design I/O

The installation is consisted on six interactive ecosystems spread out across the walls of the Great Hall, connected together by a 3,000 sq. ft. interactive floor and a 45ft high waterfall. Visitors can use physical logs to divert water flowing across the floor from the waterfall into the different environments, where children can then use their hands to plant seeds. As the different environments bloom, creatures appear based on the health of the environment and the type of plants growing in it. If multiple environments are healthy, then creatures will migrate between them causing interesting chain reactions of behaviors. In total the installation utilizes 12 Kinects for wall interactions and 15 projectors. (Visnjic, 2015)

Another example is the interactive installation “Cube” developed by Microsoft, birthed from their belief that art can intersect with technology. This interactive piece features 4 Kinects and 5 projectors. The “Cube” *(See Fig.12)* allows users on one side of the cube to interact with users on the opposite sides, bringing technology and artistic visuals together (Riordan, 2014). Michael Megalli, senior director of brand strategy at Microsoft explains, “The Cube is a canvas for a new kind of creative expression. It’s an appliance that creates public space.”

Figure 12 Microsoft's Cube-2014-photo courtesy of Microsoft

Touch Designer

Figure 13 Touch Designer Version 088 Logo- 2015 Derivative

The Software in which I will use as the basis software for my project will be Touch Designer. *(See Fig.13*) Touch designer is a software product from Derivative which is used to build interactive 3D and 2D applications. Noted as procedural, node based real time, it is considered a visual programming language. This program is designed to give user enormous flexibility in building applications without needing to program in a conventional way, developing interactivity between the user and the applied visual in a way easier to understand and program. *(See Fig.14)*

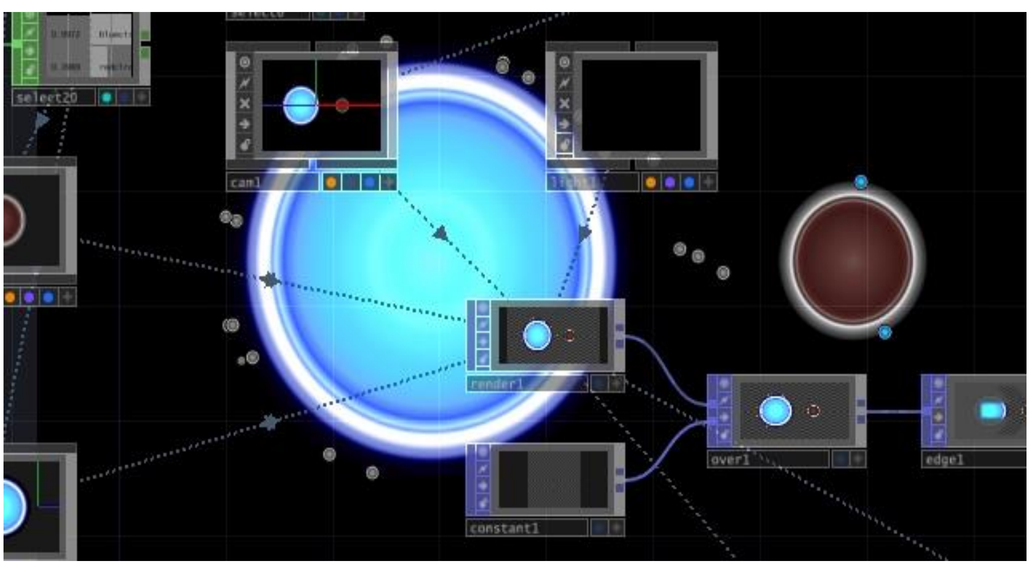

Figure 14 Screenshot of Touch Designer user interface-Photo courtesy of Derivative

Elburz Sorkhabi is the Technical Director at nVoid Art-Tech Ltd and one of the leading authorities on Touch Designer. He states "Everything in Touch Designer has a visual counterpart. All the operators have viewers. Everything, whether it be text, control data, audio, videos, and more, is visualized through each and every operation that is performed. This is unlike any traditional programming, and even node-based, language, but it is what makes Touch Designer a fantastic environment to work with." (Sorkhabi 7) Touch Designers main applications deal with education and learning along with projection mapping, interactive visualization, live show control, and high performance video playback. These contemporary uses are influenced by the historical aspects of the Digital Graphics, however what makes Touch Designer special is its capability to allow an easier programming way of virtual experiences and live control.(7) In my project I use Touch Designer to drive the audio through a system of control operators and apply visual to them. I utilize the Projection of the visual through a projection Mapping plug Kantan mapper (a plug in built for mapping in Touch Designer) *(See Fig.15)*

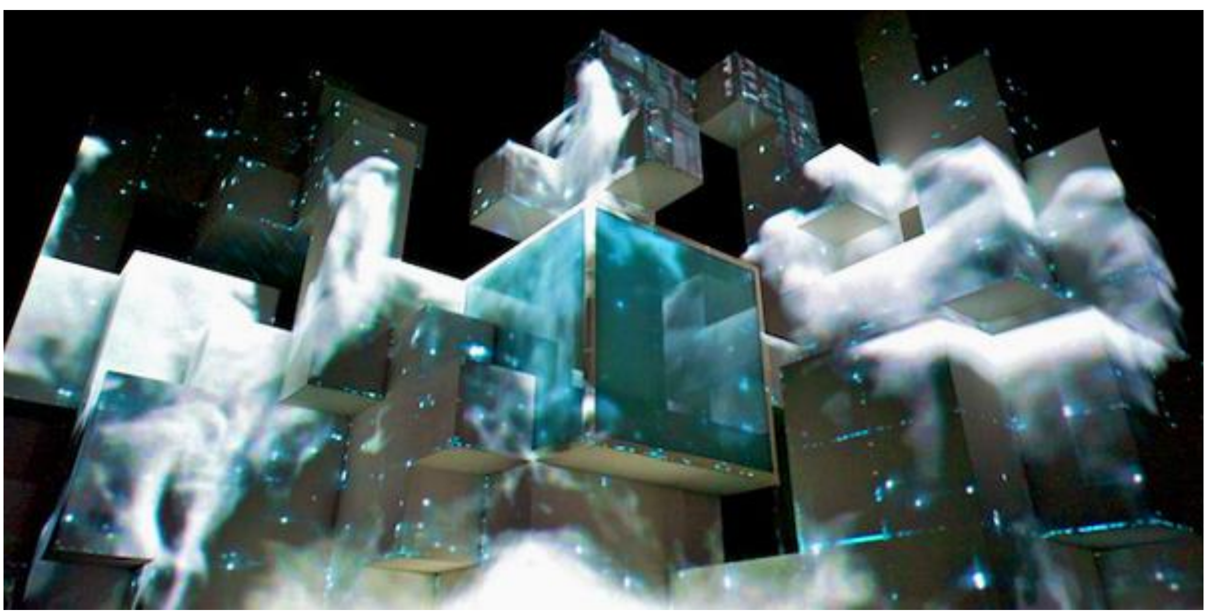

Figure 15 Applied Touch Designer for modern day uses in projection mapping and live production--Amon Tobin's Show ISAM-2011-photo by Valerio Berdini

One of the leading companies in projection mapping and visual interaction is Obscura Digital, that uses Touch Designer on almost every big scale job, pushing the software to its max .Recently projection mapped the Vatican *(See Fig.16)*in honor of Earth Day, to raise awareness and give the already beautiful Architecture a new look. Companies like Obscura Digital push the boundaries on what is a canvas and use this method and software to connect people to an idea.

Figure 16 Obscura Digital's Vatican projection mapping for Earth Day-2015-Photo courtesy of Obscura Digital

My project uses the advancements in technology and virtual reality at the same time allowing us to find new ways of deconstructing and reconstructing elements of a production through this technology of self-immersion. All the examples of contemporary applications and uses of technology have influenced and shaped my final project and the technological devices that are considered for its operation.

Chapter 2

Theoretical Framework

Society has gone well equipped to hosting all types of realty consisting of the digital medium. Virtual realties, augmented and other various types of mixed realties play a key factor in our culture thriving in technology. This project identifies with a mixed reality environment and is built on theoretical framework of the way these realities including the narrative and the audio fit into our way of life.

Mixed reality is often classified somewhere in between a virtual and augmented realty. Professor Steve Mann (University of Toronto) suggest that representation of the separation by stating the conventionally held view of a Virtual Reality environment is one in which the participant-observer is totally immersed in, and able to interact with, in a completely synthetic world. (Mann.44) Such a world may mimic the properties of some real-world environments, either existing or fictional; however, it can also exceed the bounds of physical reality by creating a world in which the physical laws ordinarily governing space, time, mechanics, material properties, etc. no longer hold. What may be overlooked in this view, however, is that the virtual reality label is frequently used in association with a variety of other environments, to which total immersion and complete synthesis do not necessarily pertain, but which fall along a virtuality continuum. (46) In my project I focus on a particular subclass of virtual reality related technologies that involve the merging of real and virtual worlds, to which I will call this subclass of virtual reality as “mixed reality,” which merges the real and virtual worlds to produce new environments where physical and digital objects co-exist and interact in real time.

Interaction with Media and the Narrative

Interactive installations involve physically interfacing with *digital technology*. In other words, they incorporate the particular affordances of digital media. Janet Murray states that digital media has its own unique affordances defined by their computational nature. (Murray 52) She claims this nature as procedural, spatial, participatory, and encyclopedic as it transforms the user through agency. Lev Manovich broadens the categories of digital media, suggesting that digital processes affect not only the production, but also "all stages of communication, including acquisition, manipulation, storage, and Distribution." In an attempt to categorize the digital characteristics, he presents numerical representation, modularity, automation, variability, and transcoding. (Nitsche 2) He argues that through digital media, the "cultural layer" and the "computer layer" affect one another. These affordances influence how interactive installations can present performance and participatory features making the transition from object to event and from delivering meaning to providing dialogue.(4) Janet Murray's descriptive framework starts with her understanding of a computer's ability to "execute a set of rules" and to be an engine that runs instructions as the procedural affordance. (Koenitz .2) The participatory affordance captures the computer's ability to react to user input, and respond in a predictable manner. The spatial affordance denotes the ability of computers to represent space and allow a user to traverse this representation on the computer. (2)The encyclopedic affordance is Murray's term for the computer's ability to handle and present huge amounts of data. Murray then defines the phenomenological categories of agency, immersion, and transformation to constitute the aesthetics of digital media.(3) She sees agency as the experience a user gains by "making something happen in a dynamically responsive world" if the digital artifact reacts in a coherent and predictable manner. Immersion is the ability of a digital artifact to hold our interest, and minimize distraction by offering an “expansive, detailed, and complete” experience. (3) Murray is one that sees no conflict between “interactivity “and “immersion” or interactivity and narrative unlike other game creation theorist.(3) Computer-based narrative is created by exploiting the affordances of the digital medium, and is reinforced by participation, so that the interactor experiences agency is based on arousing and rewarding narrative expectations, and the active creation of belief in the story world. (Murray 20) From this perspective the compound term “interactive narrative” is perhaps misleading, since it can be misunderstood in a way that takes interactivity as an “added feature” for narrative. (Koenitz 3) On the contrary, the perspective taken here understands interactivity and narratively as inseparable, mutually reinforcing aspects of the emerging expressive form of IDN. (3) Most virtual reality creators agree about this no conflict theory. As a responsive and communicative tool, interactive installations accelerate the connection between a participant and a corresponding representation. (Jerald 463) The constitutive qualities of interactive installations not only reference participants’ individual experiences but also influence their social and cultural perspectives.(465) This project relates no conflict but a welcoming immersion and interactivity.

In regards to the narrative development of the project. Part of the narrative indirectly deals with the way we engage with the environment. Other parts deal with how we hear and see the visual/ audio narrative. These later parts are focused with **not** how we engage but what we engage with. A crucial step towards an adequate theory of interactive digital narrative is to understand interactive digital narrative works as comprised of *system*, *process*, and *product.* (Koenitz 4) (*See Fig.17*)

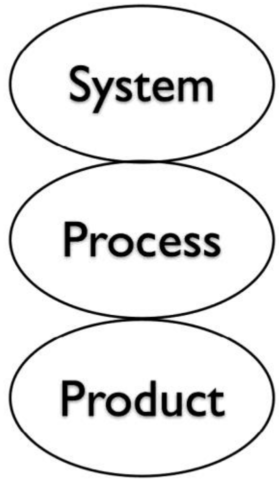

Figure 17 Interactive Digital Narrative model inspired by Roy Ascott's theories- image used in Hartmut Koenitz's paper -2010- "Towards a Theoritical Framework for Interactive Digital Narrative"

This model of Interactive narrative is inspired by Roy Ascott's theory of cybernetic art included in his works *The Construction of Change*. Ascott advises artists to look at the scientific discipline of cybernetics, the study of "control and communication in the animal and the machine" (Weiner, 1948) and create art inspired by cybernetics' concern with the behavior and regulation of environments, and with organizational structures. (Koenitz 4) Espen Aarseth must be credited with the introduction of cybernetics to interactive digital narrative. He derives his term Cyber text explicitly from cybernetics and describes the "cyber textual process" (Aarseth, 1997) in which a user affects the narrative in a cybernetic feedback loop. Ascott's definition provides a better basis for a theory of interactive digital narrative, as he improves upon Wiener's mechanistic concept by merging it with artistic sensibility. (Koenitz 5)His "cybernetic art matrix" proposes a tight integration between art and the computer and foreshadows the importance of interaction for digital media. Furthermore, Ascott understands cybernetic art to represent a change in the artistic focus from product to process and from structure to systems, which will turn the "observer" into a "participant."(5)

Total Installation

Interactive installations also involve *full-body* interaction. Such an engagement of the whole bodily presence breaks the dominance of the eye as the main organ that perceives art. (Manovich 255) In interactive installations, the interface as an event is not limited to a viewed object, but provides a stage on which the entire body can be engaged. An interactive installation reconfigures not only the space of the gallery but also the spatial presence of the visitor. Instead of Cartesian dualism of mind and body, Merleau-Ponty, the French phenomenological philosopher, suggest that our body is tied to a world. Consequently, embodied artistic interaction can provide unique qualities of physical and cognitive transitions for participants, for it shifts participants from visitors to performers. (258) As Manovich asserts, interaction art is the meeting point of body and technology. Along with painting, a genre of modern art with particular relevance to the design of navigable virtual spaces is installations Seen in the context of new media, many installations can be thought of as a dense multimedia information spaces. (Manovich 266) They combine images, video, texts, and graphics and 3-D elements within a spatial layout. While most installations allow the viewer to determine the order of "information access" to their elements, one of the most well –known installation artist, Ilyaq Kabakov, elaborated a system of strategies to structure the viewer's navigation through hi spaces. (266)In most installations according to Kabakov, the viewer is completely free because the space surrounding her and the installation remain completely indifferent to the installation it encloses. In contrast , by creating a separate enclosed space with carefully chosen proportions, colors , and lighting within the larger space of a museum or gallery, Kabakov aims to completely "immerse "the viewer inside his installation. He calls this type of installation "total installation". (Manovich 255) This total installation refer to both the media you see and the space it encloses, and I consider my project a "total installation" space in which it immerse one into the space itself and gives the suggested medium or cinema.

Combining Total Installation and the Narrative

Another type of total installation is the choice of particular kinds of narratives that lead to spatialization. These choices link the theories of total installation and interactive narrative together. Narratives that take place around a main event that becomes the center of the installation. The reaction of the viewer during the movement through the installation is the main concern of the designer. The loss of the viewers' attention is the end of the installation. (Manovich 260)This focus on the viewer offers an important lesson for new media designers, who often forget that what they are designing is not an object in itself but a viewer's experience in time and space.

Navigable Space

My project focuses on the notion of mix reality, which combines virtual and physical engagement, in which the user must physically navigate the mediated space. Why is navigable space such a popular construct in new media then? The navigable space is thus a subjective space, its architecture responding to the users (or subject) movement and emotion. In the case of navigation through a virtual space, the space can literally change, becoming a mirror of the user's subjectivity. (Manovich 267)While movement through space as a means of building character or experience , is one theme of American frontier mythology, another is exploring and "culturing" unknown space.(268) This theme is also reflected in the structure of the project in which exploring the unknown and engaging in new methods of "culturing" and "building". From the 1980's concept of cyberspace to 1990's software such as Netscape Navigator, interacting with computerized data and media has been consistently framed in spatial terms. Computer scientist adopted this metaphor as well: They use the term navigation to refer to different methods of organizing and accessing hypermedia. (268) Every reality has a navigable space but when you add the medium of the digital world it alters the way we navigate the space or the way we perceive it.

Music in this Mixed Reality

The way we perceive the music in the project is no different than physically hearing it live except for the fact we hear through speakers and the user is allowed to augment or mix the actual music itself. Which allows us to perceive the sounds and instruments in different forms and ways. This can only be done through passing the music through the medium of the program allowing us to remix and mix it in our own fashion. Music and computers covers a wide range of development but the theoretical framework that enabled musical pioneers such as Max Mathews to develop digital audio programs stretches back over a century. A mention of the groundbreaking theoretical work done at Bell Labs (Hicks, 2012) in the mid-20th century is worth noting. Bell Labs was concerned with transmitting larger amounts of voice data over existing telephone lines than could normally be sent with analog transmissions, due to bandwidth restrictions. Many of the developments pertaining to computer music were directly related to work on this topic. (Mass, 2013) At Bell Labs in the 1950's Max Matthews developed wrote MUSIC, which was the first widely program for sound generation, capturing, and replaying. Here these frameworks were developed on the basis of how we hear the music in different mediums. Experimenting and testing new methods, developing new ways a person will playback the music and hear it until the software became more prevalent and user friendly in the next decades. Now in a vast world of music recording, mixing and listening we have these frameworks on which the actual concepts can be developed. This project introduces the concept on the user is able to choose how they want to perceive that music in any form chosen the framework of the interactive narrative and music.

Chapter 3

Tools and Techniques

The core experience is the essential moment –to moment activity of users making meaningful choices resulting in meaningful feedback. (Jerald 228) Giving the audience the choice in elements and helping them feel immersed in the production has been an ongoing idea since the French playwright Antonin Artaud who was first to use the term “virtual reality.” In his book *The Theater and Its Double* Artaud speaks of the theater as “la realite virtuelle”, referring to a reality that is both illusory and purely factious. He thought for people going to a production inside a theater was could someone away from what is real and immerse them into a virtual experience of the story. (Grimes, 2012) This is what I set out to accomplish and following the methods and techniques like the innovators before me I can find new ways to engage my audience.

Placement Methods

In 1967 The International and Universal Exposition Montreal, Canada was considered to be one of the most groundbreaking in its experimentation with the delivery and the way to engage in a film. The most popular film at Expo 67 was "Canada 67" commissioned by the Canadian telephone companies. (Stanton, 1997)The 22 minute film was executed in 360 degree Circle-Vision, a total wrap-around process where 1500 people stood around in a room surrounded where by nine large movie screens. Nine projectors, concealed in the space between screens, projected a completely circular image while twelve synchronized sound channels enveloped the audience in sound. (*See Fig.18*)

Figure 18- Top view of "Canada 67" 1967-viewing -photo courtesy of Jeffery Stanton blog. "Experimental Multi-Screen Cinema-Expo 67"

The film was made by the Walt Disney Studios with a nine-camera rig weighing 400 pounds, in order people could feel self-immersed with this installation film style. Although it did not get adopted into the mainstream after the event, those who were present felt that "the effect was magical, especially when the camera was in motion in a plane, on a boat or on a railroad train [and] while flying above Niagara Falls, when the plane banked to keep the falls in view, people gasped and reached for the railings to keep from falling." (Stanton,1997) We know from the history of media technologies that any new emerging medium does not immediately render its immediate predecessor obsolete, rather, the new medium adopts the conventions of the old medium early on as it attempts to stand on its own feet. (Manovich 311) Over time, the medium continues to develop its own unique narrative language and conventions and subsequently fosters a culture of enthusiasts and innovators from around the world. (312)

The Element of Choice

The 67 Expo is also where the Kinoautomat was debuted at the Czechoslovakia pavilion. It was planned to be a sociological and psychological experiment with the participation of the audience, 127 people in an intimate theater. (Stanton, 1997) It was developed by cinematographer Raduz Cincera; according to him as children like to make Tinkerbell live by applauding during Peter Pan, an adult audience might become involved in a performance with live audiences. Therefore, at five points in the film's plot, the film it stopped and the audience was asked to vote on which way Mr. Novak, the hero, should act. Meanwhile, the actor appeared in the theater in person and appealed to the audience to help in solving his problems. Each viewer was asked to either push the red or green button beside him at each decision point. The votes were registered by seat number on a border around the screen, so each viewer could see their own vote counted. Although the film always ended in the same scenario it gave viewers an opportunity to choose a different path. Many felt, especially the cinematographer, that it was really a satire on democracy; everyone gets a chance to vote, but voting never changes anything. (Stanton, 1997) What Cincera established with his audience is a design consisting of choice. The film showing is set up to let the users chose their experience. Using this idea of immersive choice like the Kinaoutomatic and referencing the layout of the "Canada 67 In my final project the user will be given a selection of ten panels will be set up in a U shaped pattern giving the user the opportunity to walk into the three sided containment environment.

Installation Layout

Looking forward, we can see the potential for creative work across the spectrum of lightweight to heavyweight technologies into different contexts. Virtual Reality is very in depth to play a role in regular everyday life, but it could play an important role in defining future high-end entertainment, such as games and narrative experiences. On the other hand, pervasive sensors and displays integrate more seamlessly into existing contexts, (Nitsche, Yam 8). Thus in mixed reality the user is not confined to any such apparatus and the digital displays have been set in an already laid out environment. This is influenced by this method of design in mixed realty installations. (8) In order to create an engaging interactive experience between the user and the installation piece I will design, mixed methods of virtual reality will be included.

The panels I propose will be 6 feet by 2 feet and will each one will have a projection displaying the visual content. The height and width of the panels are in regard to the ability to create a small room and comfortably house a person with plenty of walking space between the panels. Most average room walls are set between 8-10 feet high so people won't have any problem viewing the content with the visuals reaching out of visual range. Because music will be the key element that will guide the interaction between the piece and the user, so the panels will be setup like an orchestra. *(See Fig. 19)* Different types of orchestral layout require different type of design.

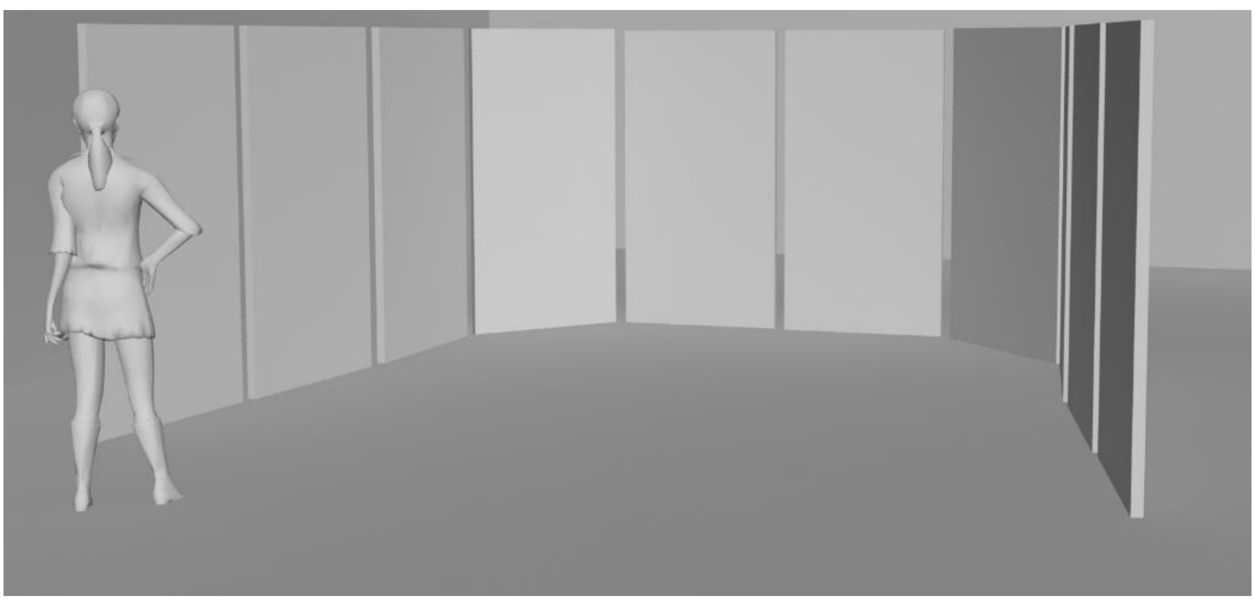

Figure 19 prototype -U shaped panel layout creating a projectable walk in mediated space

The types of orchestra layouts depend on the size of the orchestra, the room or hall the ensemble is playing in, and the dynamics of the instruments used. Seating arrangements usually keep classes of instruments together. (Grosz, 2003) In most orchestra layouts, the softer sounding instruments sit closest to the audience as they are more difficult to hear. Louder instruments, such as horns or percussion, are farther from the audience because they are easier to hear. Regardless of orchestra size, the conductor arranges the instruments to give the listener the optimum effect of the musical work. Symphony orchestras play in grand theaters or music halls and usually have many members. In a symphony orchestra layout, the musicians are seated in a semi-circle with the conductor placed in center front. In my final project I take the symphony orchestra design and line them up in a fashion of a big orchestra, the audio piece considered in the installation is meant and played by a big orchestra. *(See Fig 20)*

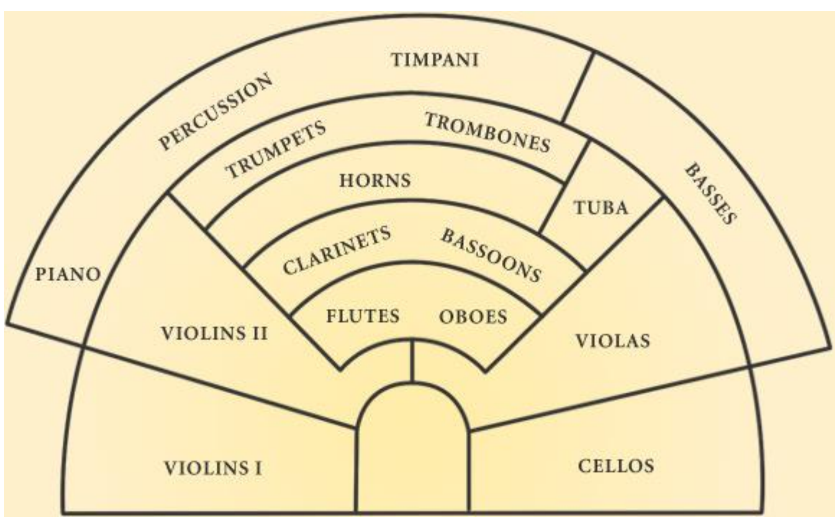

Figure 20 orchestration design layout example –Graphic courtesy of Ravel Virtual Studios-www.ravel-vs.com

I will assign an instrument and a visual to each panel in reference to the general orchestration layout (*See Fig.21*)

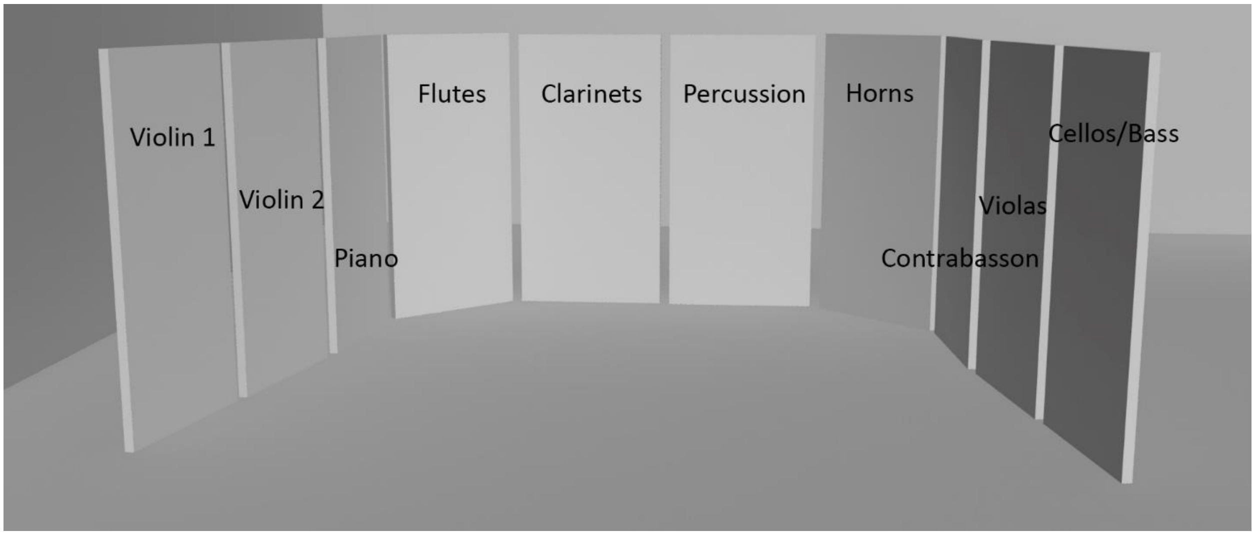

Figure 21 prototype Installation in relations to orchestration layout

The panels will be laid in order to the visuals and audio can be seen and heard in a linear fashion. When the user steps in front of a certain panel or coordinate of the room it will then trigger the visuals and audio assigned to that panel. (*See Fig.22*)

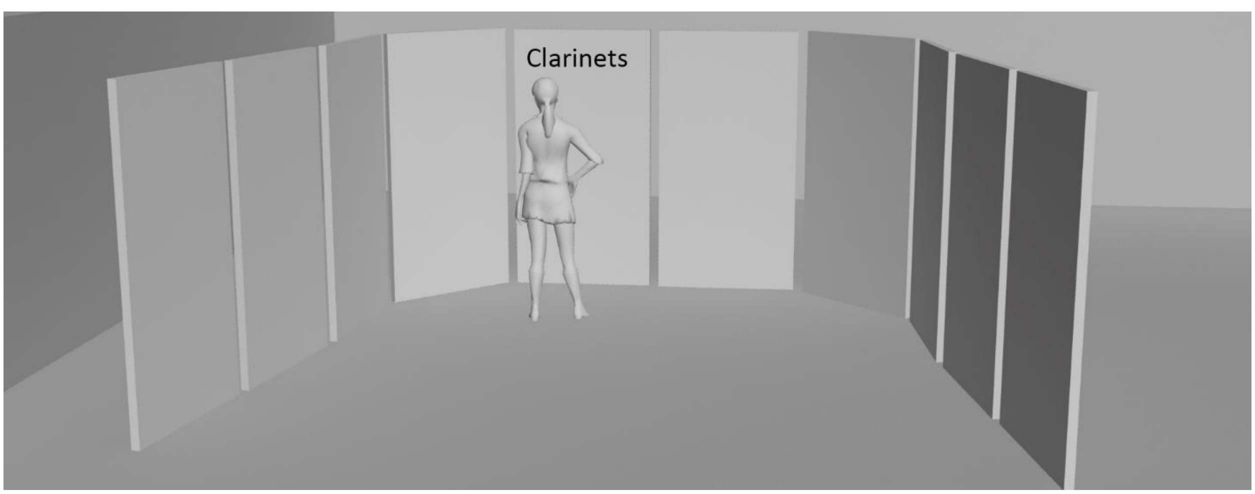

Figure 22 When in front of a certain panel the visual and audio will appear and sound for that designated panel

When backed up in full view of the entire installation, the entire video and full orchestrate piece will be played. (*See Fig. 23*)

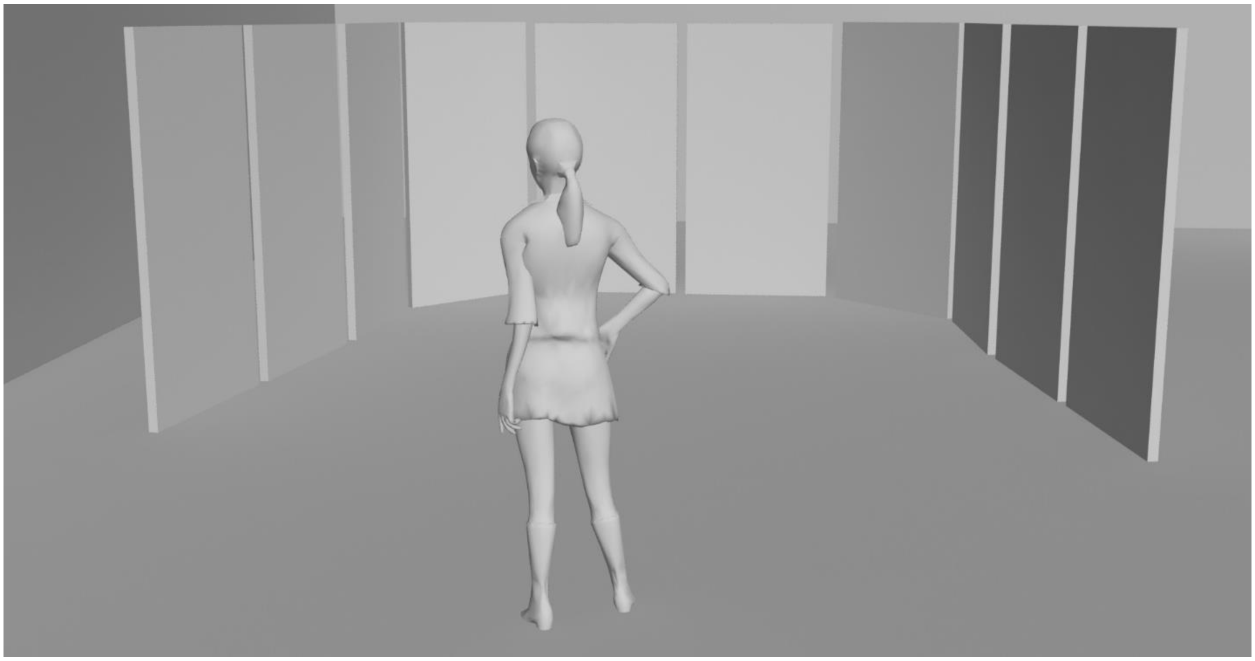

Figure 23 Complete visual and music played simultaneously when in full view of installation

Audio Design

To accomplish the idea of mixed reality installation, it was necessary to consider that the music and the visuals of my final project had to both work together, but also they could be broken in parts to display them separately in each panel. Giving the user the opportunity to listen and view parts or the entire piece. Janet Cardiff a lead in sound design installations has done many works in the manipulation of sounds and the installation space environment.

Figure 24 Janet Cardiff's "The Whispering Room" 1991-photo courtesy of Art Gallery of Ontario

The Whispering Room (See Fig. 24) is an example of exploring narrative structure with audio and the way one hears it in a room. It is composed of both audio and film elements, underscoring the shifting ground upon which our concepts of meaning and reality rest. (AGO, 2002) Each of the 16 speakers in this reinstallation plays a different segment of a narrative. The parts come together according to the path that the visitor takes from speaker to speaker. At intervals triggered by the viewer's movement, an image is projected onto the wall. The gentle murmur of the voices imbues the work with a dream-like quality that is reinforced by the slowed-down speed of the film. (AGO, 2002) One of the key aspects of Cardiff's project was the consideration of the room in where the installation would be displayed, she used audio that fit the room designated for her installation, choosing an audio music piece I must keep this same design consciousness of the room so I went with a piece that can fill up a room musically and be used as a loop, has breaks and builds. The tracks must be able to work together and at the same time, separately. Another consideration was the type of music; a classical score could be appealing to all audiences and also it is not associated to a specific demography, and the piece also has to incite movement. I have decided on a piece of music written by the composer, Michael Lee *(See Fig.25)* We both collaborated in this piece and felt it was a piece that represented constant movement and was a standalone piece that could be broke down into instruments and still continue to relate to the planned visuals of a moving body . The next step was deconstructing all the music into ten separate tracks and place them into the program Touch Designer to be played when the motion detector (Kinetic) picks up a human body at the point of calibration. These audio tracks will play in unison at a certain point and will be played separately at certain point, depending on where the user is standing within the installation.

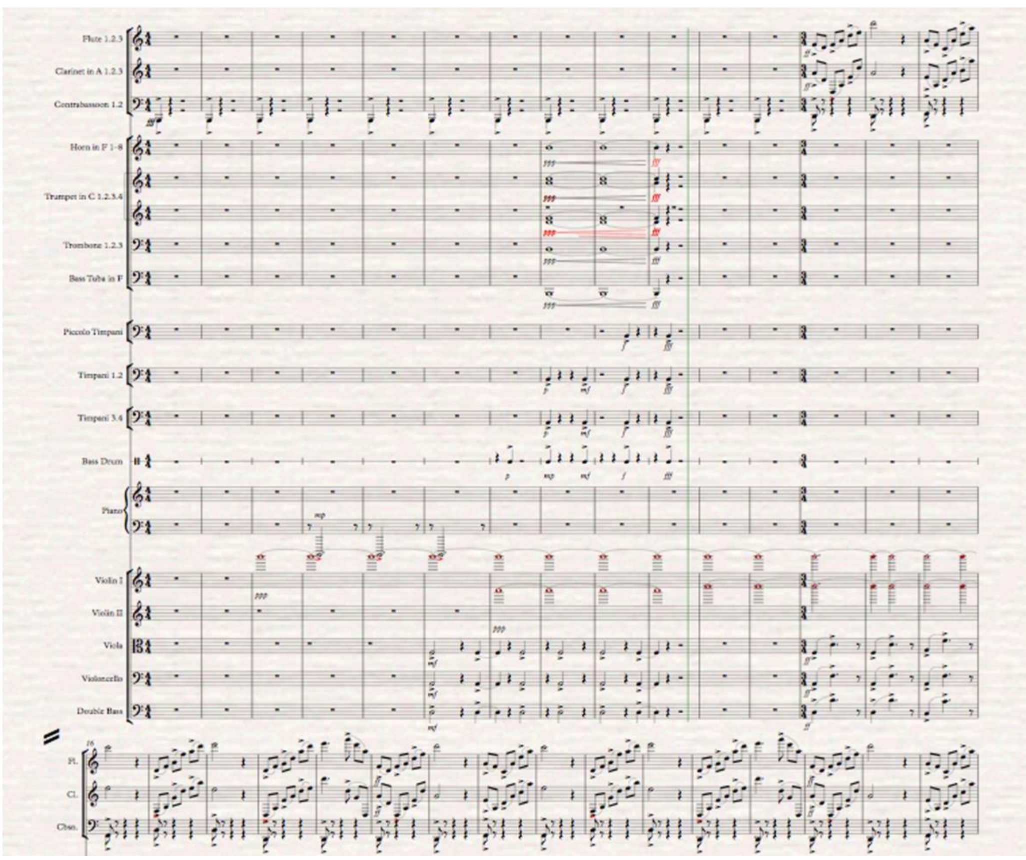

Figure 25 A sample piece from "Untitled," a Composition by Michael Lee Roberts

Narrative and Visual Content

Games and narrative experiences that mix virtual content into physical environments have emerged in the computer human interface (CHI) research community in recent years continuing a general trend of looking beyond standard desktop interaction. (Nitsche,1) Research thrusts towards more immersive technologies such as Virtual Reality (VR) or Augmented Reality (AR) suggest a link between more embodied interfaces and increased feelings of both presence and engagement in the experience. (1)The VR community has studied the concept of presence for years, seeking to understand how different immersion factors (e.g., rendering latency, animation quality, interaction techniques) affect a person's sense of being in a real space However, aside from largely quantitative studies of task performance there has been relatively little work comparing the impact of different interfaces on user engagement.(1) Without comparing similar, fully developed experiences across different media, it has been difficult to convincingly answer the research question: how does the feeling of presence created by immersive technology impact engagement with a game or narrative experience? (2)

The visual content of my project considers videos that explore moving images can work when they are associated with certain audio in order each audio track will relate to a certain visual. The first step in this process was define the content of each film related to specific audio track within the piece. The film will feature a figure moving through an open space environment and the length of the visual piece will be the same as the length of the audio piece allowing for a loop and play continuously. Each audio track will relate to a certain visual. These visuals will be projected mapped upon the panels in alignment so if the user is standing a certain point of calibration it will display the entire visual or a part of the visual. The visual I propose will be that of relating movement and parts of the body to certain elements of the music. Pianos will be displayed when the shot is directed more onto the legs, the violin on the hands. Deciding on these relations I referenced the image by Tobias Cohan "House of the Body" (*See Fig. 26*)

Figure 26 Tobais Cohan "House of the Body" Ma'aseh Tuviyah (1708), folio 106a. (Berman National Medical Library, Hebrew University of Jerusalem.)

In Cohan's drawing he self-related a human body part to architecture to visual convey his message to others. He used this as a medical reference to relate the human body to parts of a working house. I will use this same relation thinking when I relate parts of the body to music. For example: When the cellos are selected images of the legs will project, the hand with the piano, the fingers with flute, etc... When the musical piece is being fully played and all instruments are played the body will be on full motion stride using all parts of the body.

Stylistically the visuals that are to be filmed will be shot in a way that references the experience of a mixed reality in that 2D film will be layered on a human body with the motion sensor. This gives the finished film a mix of reality and surrealism. This is achieved by shooting with a HD Digital Camera and a Kinetic simultaneously. *(See Fig.26)*

Figure 26 Cannon 60D and Microsoft Kinect

The sequences will then be composited in Adobe Effects and final edit with audio in Adobe Premier.

(*See Fig.30, 31)*

Figure 27 Test Shot

Figure 28 Test shot

Chapter 4

Related Disciplines

This Project relates to many other studies and types of designs studied in various disciplines. These related disciplines and theories help to inform and project this project: Interactive Learning with a Digital Medium, Museum Studies, Empathetic Design and Orchestration Layout.

Interactive Learning (Digital Medium)

This project informs the user and makes him or her aware of the realties we face as a society that digital immersion and digital learning are inevitable. Interactive learning through digital means are a staple now in our school systems and our educational system has benefited greatly. Blended Learning, for example is a way students are meeting together as groups instead of the traditional grades levels and these group learn and interact with computers and digital pads instead of the traditional passive learning and lecturing. Educators note a host of other, related benefits of personalized learning through digital instruction to this self-pacing. (Soifer 9) Particularly in urban settings, digital learning avoids stigmas associated with the act of raising your hand in class, “acting smart,” or the more subtle examples indicated by education research around gender and bias. (9) On digital platforms that encourage group discussion, often students are more willing, or more confident, when it comes to substantive expression. In Pennsylvania in the Spring-Ford Area School District, Spring City Elementary Principal Mitch Edmunds describes his school as the first public elementary school east of the Mississippi River to utilize a fully hybrid approach, which he defines as, “the integration of traditional teaching with digital instruction to help deliver the core curriculum at school.”(11) The results were encouraging for the first full year of implementation. The percentage of students scoring proficient and advanced on the PSSA statewide standardized assessment increased 20 points in reading, 24 points in math, and 27 points in science, as indicated on the state school performance profile. Some of the students improved their reading scores by 50 percent, report school officials. (12)

Museum Studies

This project is an installation that can be viewed as a museum study making it a hyper mediated space or environment and the museum has established itself as having a clear role for society, digital and interactive hubs have found home in these institutions. The museum as a whole could be considered a non-place, or a hyper mediated space "where individuals tend to have little interaction with other individuals and therefore interact with the space using written text and narratives" (McKay 163) The role of a museum is to display objects that are important in historical and cultural value to a civilization and "to see the thing itself, with one's own eyes and in a public place, surrounded by other people having some version of the same experience can be enchanting" (Conn 262) For Example : The Guggenheim. Despite hosting large numbers of visitors and employees, a museum of large dimensions such as the Guggenheim does not promote social and human interaction and is therefore considered a non-anthropological space.(Irvine,2014) Throughout the museum other forms of media are offered to the visitor: audio guides, the Guggenheim iPhone app, plasma screens with detailed information about the current exhibitions, multimedia information points, and designated educational spaces where the visitor has educational tools such as panels, interactive software, audiovisuals, audio clips, illustrations, images, and reading rooms. (Irvine, 2014) The focus of each educational space varies from the social to the political, economic, artistic, or architectural perspective with interactive materials available for the users making of this museum a highly hyper mediated space. Digital Images can be used for speculative installations and educational design uses. (Irvine, 2014) Digital art installations offer new opportunities for viewers to actively participate in the artwork. Artists and designers have the opportunity to play with the "real-virtual" boundary between the viewer, or "user," and the digital dimension. (Cooper, 2015)

Touch, physical participation, and social interaction become essential qualities. The “Behaviours of Light” *(See Fig.32)* and “Plane White” *(See Fig.33)* installations listed below allow users to literally feel their way around the design script and form their own experience.

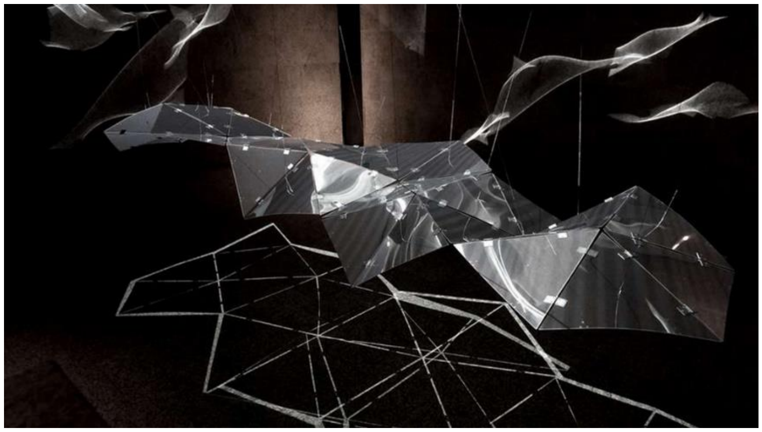

Figure 29 Canadian architecture firm JNZNBRK has transformed an entire gallery space with their temporary installation “Behaviours of Light.” The designers carefully placed 39 acrylic triangles, each treated with a semi-reflective film, at a specific height to create a space for the work, but are an essential part of the display.-Photo courtesy of Architzer.com

Figure 30 The “Plane White” installation is interactive digital experience for Kandinsky’s famed painting “Composition VIII.” Kandinsky himself was a synesthete, meaning he lived with a psychological condition that made him “hear colors”; he associated each shade with a specific musical note, making an entire artwork signify a finished song. Like Kandinsky, these digital artists experience art in a non-traditional, multi-sensory way by blurring the line between the visitor and the digital dimension. The artwork feels tangible to the viewer as they go through the motions recreating Kandinsky’s images on the wall. (Cooper, 2015) - Photo courtesy of Architzer.com

These installations also can be noted as immersive spaces. Immersive spaces create subliminal awe helping the viewer/participant become aware of inherent or internal body senses. (Seo 2) Physically immersive environments expand the boundary of our vision and create imagination evoking immersive feelings from materials that affect with perceptions of dimension. Jinsil Hwaryoung Seo created the physical space of Light Strings. *(See Fig. 34)* This installation consisted of 2500 strands of Fiber optics hung from the ceiling. "In *Light Strings*, I tried to create a physically embracing pace that is flexible and open, and provides participants with free movement in the space." (Seo 3*)* Participants and multimedia agents co-exist and meet in *Light Strings* through touching and using their whole bodies. Full freedom of physical body movement, creating relations to the physical installation and a virtual world is a critical condition of *Light Strings. (3)*

Figure 31 Audience Interaction with "Light Strings" installation-2015- photo courtesy of Jinsil Hwaryoung Seo

Orchestration layout

The panels and the audio of this project is meant to represent an orchestra. The sciences behind orchestra layout can be a vast science but one thing is important to know is an orchestra is meant to be laid out for the benefit of the musicians and the way they hear the music in their performance. This project differs, in that, it is meant to be for the listener, so a linear pattern layout will suffice, where in the panels representing the orchestra. A typical seating layout for musicians in a concert is: strings in the front, woodwinds further back, then brass. (Kunert, 2013) What is less obvious is that, higher pitched instruments are seated on the left and lower pitched instruments on the right. The strings show this pattern perfectly: from left to right one sees violins, violas, cellos and then basses. Choirs show the same pattern: higher voices (soprano and tenor) stand left of the lower voices (alt and basses). This kind of organization is not a historical accident, but instead a biological requirement. (Kunert, 2013) Diana Deutsch has used a series of audio illusions, which all showed a curious pattern: when you present two series of tones each to one ear, you have the illusion that the high tones are being played to your right ear, and the low ones to the left ear. Apparently, there is a right ear advantage for high tones.

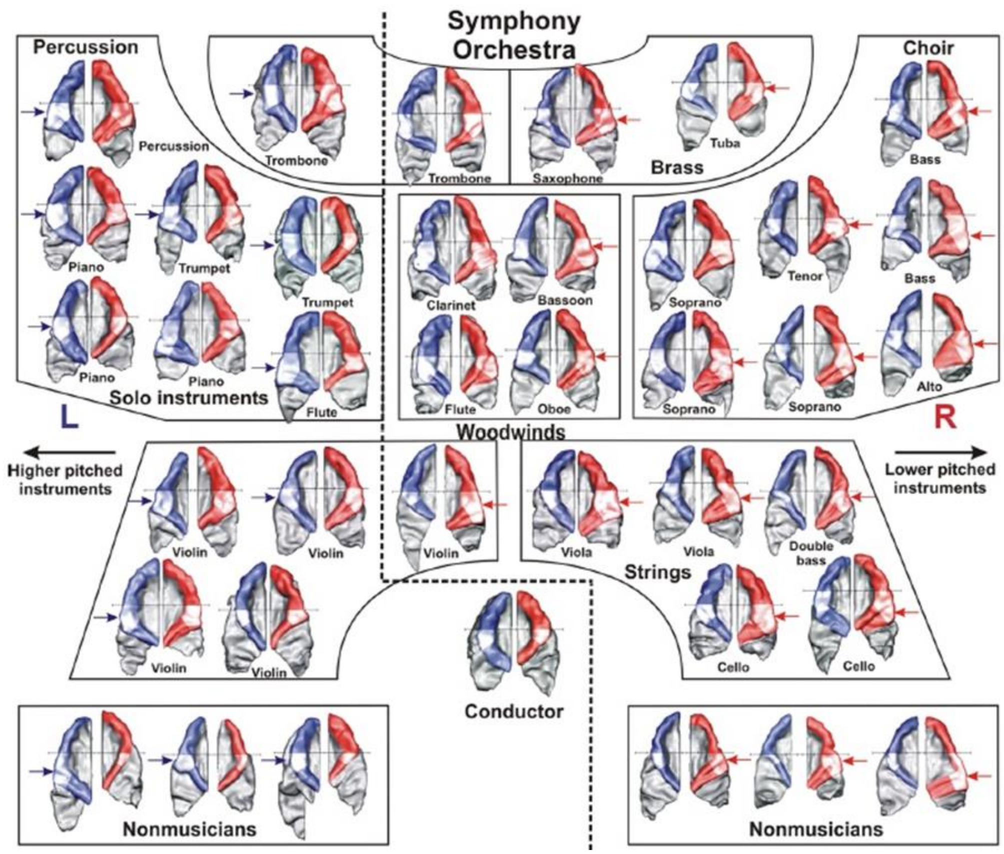

Figure 32 A visual layout of how the brains are seated in an orchestra (right side blue) (left side red)

Image courtesy of Brain's Idea, attributed, Schneider et al., 2005

So, seating the higher instruments on the left side makes complete sense because musicians on stage tend to hear higher tones coming from their right. *(See Fig.35))* However, from the point of view of the audience, this not a good idea because as their right ear advantage is not taken into account. (Kurten, 2013) According to Deutsch, orchestra seating arrangements are not favoring the hearing of the audience or the conductor, but instead the musicians. The right ear advantage for high tones is even mirrored in musicians' brains. We know that the right ear projects mostly to the left auditory cortex, and vice versa for the left ear. So, one would expect that people who play high instruments have trained their right ear / left auditory cortex the most when they practiced their craft. These training effects should be mirrored in differences in cortex size, meaning that people sitting on the left in an orchestra have bigger left auditory cortices. In a fascinating article Schneider and colleagues showed that professional musicians who play high instruments or instruments with a sharp attack (e.g., percussionists, piano players) tend to have greater left auditory cortices than right auditory cortices. (Kunert, 2013) The orchestra seating arrangement mirrors not only the listening biases of most human ears, but on top of that the brain differences between musicians. By and large, the orchestra is organized according to biological principles, thus, not all cultural conventions – like the seemingly arbitrary seating arrangement of orchestras – have their roots in historical accidents. According to cultural oddities are sometimes merely down to biology. (Schneider, 2005)

Empathic Design

In my project I have a wide target audience that reaches to everyone all ages. For example: the classical piece of music I chose and the new style of video filming. These choices were made to grab attention of the audience and give them a soothing type surreal feel within the installation, this all being under the direction of a well-planned empathic design. Empathic design is a user centered design approach that pays attention to the users' feeling toward a final production or product. Hospitals must be designed for the empathic, in that, the majority of clients that are there are in a reluctant state because their surroundings directly influence mood and emotion. The same with my project, I must think of the design in what appeals to the viewer and what they can connect with. In this case I believe the user mostly will connect with the experience, which includes everything from the audio, visuals and how the installation is laid out. I took a great deal of time in the decision of the song and reference this interview by Ben Weinlick in 2009. In relation to music some artist are questioned with these empathic theory writing and how the listener will react. (Weinlick, 2009) In the Interview with Greg Saunier, of the band Deerhoof, Greg makes a good point concerning design (or in his case writing music) for the emphatic in mind. Greg points out that the best creative ideas arise from an artist in isolation from others, and he also suggest how important it was for his creativity to try to see from the perspective of other people. Greg said, "Even when I am in isolation by myself working on a song or mix, I still have a kind of cast of imaginary characters in my mind that are somewhat based on real people that I've known over the years. I try to hear through their ears, I ask myself things like, what would a 5 year old think of this? What would a 70 year old think? What would someone who only listens to top 40? Or someone who only listens to noise? A lot of times that's a creative thing for me to do. Of course we also have the good fortune of being a band that goes on tour, so at a certain point I don't have to imagine a listener. The listener is there. And it's not about doing what others want, because surprise is key. It's not about doing what someone thinks they want, it's about listening to their reaction, trying to sense it and then find a thrill in an unexpected place. Like find their ticklish spot and attack it when they least expect it."(Weinlick, 2009)

Conclusion

Will reality be augmented or virtual or some hybrid of the two? In any case, reality will no longer be the only game in town. – Ced Kurtz

My project is an exploration of possibilities of a Hybrid Reality. It explores the engagement between human interaction and the digital medium. The choices one would make it given the opportunity to manipulate the environment that a hybrid or mixed reality poses. With the introduction of virtual reality and the mixture of physical environment we present new challenges for artists and designers to create and educate users in new experiences. Even though, the project is a time based narrative based on music and movement, it allows users to choose the path of their choice to finish, reconstruct or leave incomplete. What sets this project apart from a virtual reality engagement is that there is no confinement or dedication required to engage, but simply walk around at one's leisure and then feel the want to react and engage.

Reflection

Again, Music brought me here.

The big takeaway from this project is to give the user the feel of present engagement and the feeling of "being in the moment." The same way I wanted to be a musician in a band and engage with the musicians when I was younger. The installation will see how different people will react and reconstruct the visual and audio at different points. With the music and visuals to drive the engagement throughout the narrative and the empathic sense to understand how the user will respond to the quirks of the technology, making adjustments along the narrative to compensate or relieve the tension in the user. (Kurian 33) In the past we have advanced as a society by educating of the impact that creating a world with a hybrid environments can do for use. This projects opens all doors to all ages to learn to engage in thee advancements and we choose how far we want to go.

Works Citied

Aarseth, E.: *Cybertext: Perspectives on Ergodic Literature*. Johns Hopkins University Press, Baltimore (1997)

Adriana de Souza e Silva; Daniel M. Sutko. *Digital Cityscapes: Merging digital and Urban Play Spaces.* New York: Peter Lang Publishing, Inc. (2009)

AGO. Art Gallery of Ontario. Janet Cardiff: Whispering Room. AGO website installation preview. www.ago.net

Anderson, Jill. *The Benefit of Interactive Learning*. Article. Harvard Graduate School of Education. November 17, 2014. www.gse.harvard.edu

Ascott, R.: *The Construction of Change*. Cambridge: Cambridge Opinion 41, 37–42 (1964)

Činčerová, Alena. *Kinoautomatic, The World's First Interactive Film*. www.kinoautomat.cz

Cooper, Zoe. *The Future of Art: Digital Installations and Interactive Spaces*. Article. Architzer. Published July 2, 2015.

Conn, Steven. *Museums and American Intellectual Life, 1876-1926*. Chicago: University Of Chicago, 1998. Print.

Elburz, Sorkhabi. *Introduction to Touch Designer*. N-Void Art Tech Limited. 2012

Grimes, Gerlinda. *Who popularized the term "Virtual Reality*" www.howstuffworks.com August 2012Grosz, Denis. UC Berkley. Question and Answer Forum. Founder CEO WiseGeeK.Com. 2003

Hamit, F. *Virtual Reality and the Exploration of Cyberspace*. Sam's Publishing.1993

Hass, Jeffery PhD. *Introduction to Computer Music: Volume One* (Chapter Five: Digital Audio) Indiana University Jacobs School of Music Center for Electronic and Computer Music 2013

Hicks, Jesse. *The Idea Factory': How Bell Labs invented the future*. The Verge Book Review. Www.theverge.com. March 21, 2012

Irvine, Martin. *What Experience Is More Real: That of a Virtual Museum or an Institutional Museum? The Google Art Project and the Guggenheim Museum Bilbao*. Weblog post. *CCTP748 Media Theory and Cognitive Technologies*. Martin Irvine, 1 Sept. 2014. Web. 15 Nov. 2015.

Jerald, Jason, Ph.D. *The VR Book Human-Centered Design for Virtual Reality*. ACM Books.2016

Jones, Brett PhD. *The Illustrated History of Projection Mapping*. University of Illinois at Urbana-Champaign www.Projection-mapping.org. 2012

Koenitz, Hartmut. *Towards a Theoretical Framework for Interactive Digital Narrative* Georgia Institute of Technology, School of Literature, Communication and Culture, 686 Cherry St., Atlanta, Georgia 30332

Kurian, Shaun. A *Jimmy's Ghost, A virtual reality Cinema Study in Digital Humanities*. North Carolina State University. May, 2016

Kurnert, Richard. PhD. International Max Planck Research School. *The Biological Basis of Orchestral Seating.* Brain's Idea. March 28, 2013. Article www.brainsidea.wordpress.com

Kurtz, Ced. "Ced Kurtz's Techman Texts: Virtual reality is waiting in the wings", *Pittsburgh Post-Gazette*, December 13, 2016

Manovich, Lev. *The Language of New Media*. The MIT Press Cambridge.2002

Mann, S., & Fung, J. *Video Orbits on Eye Tap devices for deliberately diminished reality or altering the visual perception of rigid planar patches of a real world scene*. Proceedings of the Second IEEE International Symposium on Mixed Reality, March 14–15, 2001.

Mayra, Frans & Lankoski, Petri. Play in Hybrid Realty. Alternative Approaches to Game Design. Digital Cityscapes. Peter Lang Publishing. New York2009

McKay, Alison*. Affective Communication: Towards the Personalization of a Museum Exhibition Co Design* 3.1 (2007): 163-173.

Murray, J. *Inventing the Medium: Principles of Interaction Design as a Cultural Practice*. MIT Press, 2011.

Naimark, Michael. M.S. Visual Studies and Environmental Art, Massachusetts of Technology, 1979. Official site – www.naimark.net

Nitsche, Michael. Hye Yeon Nam*. Interactive Installations as Performance: Inspiration for HCI*. 8th International Conference on Tangible, Embedded and Embodied Interaction. CHI 2007, April 28–May 3, 2007, San Jose, California, *USA*.

Ramesh Raskar, Greg Welch, Matt Cutts, Adam Lake, Lev Stesin, Henry Fuchs. *The Office of the Future: A Unified Approach to Image-Based Modeling and Spatially Immersive Displays*. Computer Graphics Proceedings Annual Conference Series Siggraph.Orlando.1998

Riordan, Aimee. Microsoft’s Cube debuts at Decibel, creating a one-of-a-kind digital dance party. Interview. September 24, 2014. Microsoft.com

Reno, Lucia A. *Presence and Mediated Spaces: a Review*. PsycnNologyJournal, 2005

www.psychnology.org/File/PNJ3(2)/PSYCHNOLOGY_JOURNAL_3_2_RENO.pdf

Schneider P, Sluming V, Roberts N, Bleeck S, & Rupp A (2005). *Structural, functional, and perceptual differences in Heschl's gyrus and musical instrument preference*. Annals of the New York Academy of Sciences

Seo, Jinsil Hwaryoung. *Aesthetics of Immersion in Interactive Immersive Installation*: Phenomenological Case Study. ISEA Proceedings on the 21st International Symposium on Electronic Art. . Texas A&M University.2015

Soifer, Dan. *Transforming Education through Digital and Blended Learning* .Lexington Institute. January, 2015. http://lexingtoninstitute.org/wp-content/uploads/2015/02/Transforming-Education-Through-Digital-and-Blended-Learning.pdf

Stanton, Jeffrey. *Experimental Multi-Screen Cinema*. Blog. 1997. 10 Sep 2015.

Weinlick, Ben. Interview Greg Saunier. Think Jar Collective .2009

Wiener, N.*: Cybernetics or Control and Communication in the Animal and the Machine*. The MIT Press, Cambridge (1948)

Visnjic, Filip*. Connected Worlds-Interactive Ecosystem* for NYSCI by Design I/O. Article Creative Applications Network Open Frameworks. Published on 24/06/2015. www.creativeapplicationsnetwork.net