Paintings without Frames: The Role of Augmented Reality in Art Galleries

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PAINTINGS WITHOUT FRAMES:
THE ROLE OF AUGMENTED REALITY IN ART GALLERIES
This thesis means to question the role of mixed reality technology that is changing our perception of space and how we as architects can design these virtual spaces. Augmented reality (AR) is a tool that can be implemented within art galleries to provide context, manipulate and add to the perception of artworks, as a means of way-finding, and as a tool to allow visitors to curate their own gallery experiences.

The first phase of this project gathers research from art and augmented reality precedents and uses this research to organize the potential of augmented reality in architecture into six categories: enhancing perception, manipulation, custom-experiences, providing additional information, way-finding, and spatial modification.

The focus of this thesis are the Modern and Contemporary Art Gallery rooms in the Syracuse University Art Gallery. Three paintings and a series of study cabinets were used for investigations in the second phase of study, which tests the six categories defined in the first phase. The final phase uses Poetry of K. Koch by Larry Rivers as a case studies for augmentation and uses virtual reality to simulate two augmented reality experiences.

These investigations aim to pose potentials for how these technologies can evolve the discourse of architecture by utilizing how augmented reality can continue to affect the way we view and move through space. By taking the artworks off the walls, and delaminating them from their frames, we can begin to understand how augmentation and the virtual can allow us to occupy spatial experiences in a new and compelling way. Virtuality will continue to exist in our environment and it is at the agency of the architect that space and ways of seeing should be designed.

We can apply these ideas of augmented artworks to architecture, where surfaces are no longer static, but become occupiable in new and novel ways. We can adopt these technologies as our own to allow the virtual to support the physical.
PAINTINGS WITHOUT FRAMES:
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Art galleries strip artworks from their original context and intentionally provide “neutral” backdrops for art that allows for them to be viewed both on their own, and with their artificial neighbors.

This thesis means to question the role of mixed reality technology that is changing our perception of space and how we as architects can design these virtual spaces. Augmented reality (AR) is a tool that can be implemented within art galleries to provide context, manipulate and add to the perception artworks, as a means of way-finding, and as a tool to allow visitors to curate their own gallery experiences.

In Architecture from the Outside: Essays on Virtual and Real Space, Elizabeth Grosz says: “The concept of virtuality has been with us a remarkably long time...we can only live in the real insofar as it is continually [re]inhabited, reinvested, and reinvented by virtuality.” Though we typically equate this term with computers and technology, Grosz makes the point that this overlay on the real has existed since the advent of writing. “It is a coherent and functional idea already in Plato’s writings, where both ideas and simulacra exist in some state of virtuality.” The virtual has always been there, it is up to us as architects to design through these existing conditions to attempt to answer the question: how might augmented reality help us to greater understand the spatiality of a painting and allow us to blur the boundaries between the painting and the frame and the occupiable space of an art gallery?

“There seems to be two different ways of conceiving of virtuality in architecture: (1) as an entirely new technology developed through the use of computers, a technology that can or should somehow be incorporated into the way that buildings work...and (2) as an entirely new way of seeing, inhabiting, and designing space.”
-Elizabeth Grosz

2 Ibid
3 Ibid
These art examples are blending the boundaries between art and space. This focal point facilitated the idea of what forms augmentation in art galleries could take. These images are meant to be provocations of artworks that are breaking away from the wall and the frame, and showing potentials of what this technology would allow us to see, inhabit, and design. They served both as the inspiration for some of the following investigations, and also other directions these iterations could take. These images also helped to define the categories of potentials of augment reality in architecture.
ARTIFICIAL INTELLIGENCE PRECEDE conjents

These research images show ways that art and augmented reality have worked together to create new methods of visualizing and deploying works of art. Among the projects is an example designed by Cuseum for the Perez Art museum in Miami titled *Invasive species* (image 27). This allowed visitors to visually project artworks onto the gallery space. Other projects include a project that visually restores stolen artworks to their frames (image 23), ways of animating static art (image 25), way-finding applications for navigating through a gallery (image 31), and most recently an AR art experience for Coachella music festival goers (image 30). Though many of these precedents are exploring new ways of seeing or understanding art, they primarily deal with 2D paintings that remain on the wall, or are static in space.
This chart organizes this precedent research by comparing projects that are using augmented reality in museums or to deploy art in the world. The chart identifies the audience that is being targeted for the project or application, the aim of work, and lastly a series of categories these fall under. The categories identified for these projects include additional information, manipulation, education, way-finding, enhancing perception and spatial manipulation.
This diagram expands the six categories identified in research diagram 1: enhancing perception, manipulation, custom-experiences, providing additional information, way-finding, and spatial modification and shows how they might be implemented in an art gallery setting, as well as specific examples within the Syracuse University Art Gallery. These categories came from the groupings that emerged while sorting precedent examples, and others that arose during the following phases of augmented reality iterations.
The methodology for this thesis has been an iterative series of explorations and experiments using the Modern and Contemporary rooms in the Syracuse University Art Gallery as a test bed for how architects might use augmented reality to design additional gallery experiences. The case studies for these investigations were limited to only looking at art specifically in the SU Art Gallery for several reasons. Visitors are going to art galleries with the intention of viewing and perceiving artworks – allowing these investigations to expand upon this intentional visual focus. The SU Art Gallery was also chosen for itsproximity and the opportunity for investigations that the space provided. As Brenda Laurel says in *Computers as Theater*: "Artistry is deployed within the constraints of the medium, the tools, and the formal and structural characteristics of the kind of thing that one is trying to create."^4^ The Modern and Contemporary art gallery rooms provided a parenthetical set of inputs that allowed for a variety of experiments and investigations within the categories defined in diagram 2.

The SU Art Gallery is broken down into its kit of parts, which is broken down into three main components. The first includes typical architectural elements — the display walls, doors, and floors. Secondary elements are applied to the primary components; these are outlets, signage, and art objects. The last aspect of the art gallery is the implied element of the visitor path of travel and the space that the visitor can occupy.
The typical art gallery can be broken down into three vertical zones: zone 1 is the area the visitor occupies, zone 2 is unoccupiable space, typically 36-48” from the artwork, and zone 3 is the display wall showing the art object. In some art museums and galleries there are physical barriers, ropes and bars, that prevent the visitor from getting too close to the artworks. In other cases, there are security guards that warn museum-goers when they are getting too close to artworks. Owing to these restrictions, gallery visitors have the learned behavior of not getting too close to art, even when no physical barrier or security measures exist. In a horizontal section the gallery is separated into three bands, where zone 2 is the space where the artwork exists and zones 1 and 3 are unoccupiable wall space. There is a distinct separation of how these zones are occupied and function.
Our perception of objects and spaces changes given the physical distance from the subject. In art galleries, there is an invisible, and sometimes a physical barrier, that prevents us from getting too close to the artwork. Augmented reality gives us the tools to look at artworks in different capacities. This section began with exploring paintings, seeing how highlighting or visually eliminating certain aspects of an artwork can focus our perception of a work.

As with many of the precedent studies, these investigations stayed confined to the wall and ultimately the frame of the work. Though they may have narrowed the viewer’s visual perception, they did not fully utilize augmented technology.
PHASE 2.1 AUGMENTING ART

IMAGE 35: HIGHLIGHTING POETRY OF K.KOCH, LARRY RIVERS

IMAGES 36-38: VISUALLY SEPARATING NIGHT DRIVING BY ROBERT BIRMELIN
PHASE 2.1 AUGEMENTING ART

Colonel Jack L. Warner was one of the Warner Bros. of Hollywood.

He disliked this portrait of himself so much that it hung in his dog’s kennel until it was sold to SU Art Gallery.

This truncated tomb is seen as a memento mori, a symbol as a reminder of death.


Andy Warhol Pop-Art

Media 1: The Dali Filter Still
PHASE 2.1 AUGMENTING ART

These two images digitally reintroduce the context that the white cube of the art gallery eliminates.

Image 40 shows the companion piece to Salvador Dali’s painting *Col. Jack L. Warner*. The painting titled *Portrait of Mrs Jack Warner* was commissioned first and elicited the second portrait. The painting of Ann Warner currently resides in the Morohashi Museum of Modern Art in Fukushima, Japan.5 This example of augmentation allows us to see the paintings displayed side-by-side, as they were likely intended by the artist.

As well as occurring as a pair, artworks can sometimes appear as an image in a series. Image 41 shows the painting *American Hi-Fi* in the series *Facades* by Robert Cottingham. The wall plaque next to this painting tells the viewer: “these paintings feature American scenes that were quickly disappearing from urban landscapes, but, according to the artist, were such an important part of the culture that he felt they needed to be preserved for posterity.”6 While the visitor is informed through the art gallery signage that this image is part of a series of twelve images, she is unable to view the painting on the wall within the larger context of the array.

Through augmented reality, the visitor can better understand the context in which the artwork was created and how it originally would have been thought about by the creator. The gallery-goer is able to view a work both individually within the white cube of the art gallery, and as a collective in a larger context.

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6 Wall text for *American Hi-Fi*, by Robert Cottingham. Syracuse University Art Museum, New York.
PHASE 2.2 AUGMENTING ARCHITECTURE

The second phase of iterations involved augmenting the existing architecture of the SU Art Gallery. Art and architecture define one another – the way that we could move through an art gallery is defined by the architectural space that has been created, but the actual direction of travel is dictated by the art itself.

The first experiment with the existing architecture involved a way of overlaying way-finding onto reality. In images 43 and 44 we see how augmented reality would help a visitor navigate through the space of the gallery to find a specific artwork.

Other ways of utilizing these tools would be in creating custom tours, where visitors would be able to able choose the time they wanted to spend in the gallery, the medium, genre, and collections they wanted to view (image 42). These tours would then be created throughout the gallery, allowing the visitor to view their intended interests while following the directional overlay.

Another iteration of augmenting the existing architecture was working with the study cabinets that were present in the Modern and Contemporary art gallery rooms. The study cabinet goes against the rules of the art gallery. In an environment where you can look, but not touch, the visitor is invited to go against this instinct and transform the gallery space by opening the doors to the additional pieces that lay beyond. In working with the SU art gallery, one area that they have a difficult time with is encouraging the visitors to explore beyond the walls. Images 45-47 show provocations that would invite the visitor to see beyond the wall, by identifying the study cabinets, showing a figure opening them, and showing what they would look like once they are open.

These initial investigations into way-finding were successful in the way that they augmented how a gallery visitor might navigate through and interact with the existing architecture of the gallery. These iterations took the Cuseum precedent (image 31) and augmented the path of the viewer, rather than solely providing step by step directions for how to reach a series of artworks.

While way-finding is one potential for how augmented reality can work within architecture, these investigations merely overlayed digital information onto the space of the gallery and failed to augment the space of the gallery itself in more provocative ways. The focus on way-finding in architecture shifted too far away from the investigations of 2.1, which focused on augmented artworks, creating a divide between augmenting the art and augmenting the architecture.
PHASE 2.2 AUGMENTING ARCHITECTURE

IMAGE 42: CUSTOM ART GALLERY TOURS

IMAGE 43: WAY-FINDING THROUGH A GALLERY

IMAGE 44: ARRIVING AT DESTINATION
PHASE 2.2 AUGMENTING ARCHITECTURE

IMAGE 45: IDENTIFYING STUDY CABINETS

IMAGE 46: SIMULATED VISITOR OPENING STUDY CABINETS

IMAGE 47: OPEN STUDY CABINETS
The last section of phase 2 involved attempting to augment both art and architecture through spatial modification. In John Berger’s *Ways of Seeing* he describes what happens when a painting is shown on a television screen. “The painting enters each viewer’s house. There it is surrounded by his wallpaper, his furniture, his mementos.” In this example, a visitor could augment the neutrality of the white cube by adding wallpaper or alternate backgrounds. Images 48-50 start to take away the neutral backdrop of the art gallery by adding additional backdrops in which to view the artwork, similar to the way a visitor might understand the paintings if they were to be moved into their own spaces.

In *Inside the White Cube: the Ideology of the Gallery Space*, Brian O’Doherty says “the relation between the picture plane and the underlying wall is very pertinent to the esthetics of surface…the easel painting is not transferable to the wall, and one wants to know why. What is lost in the transfer? Edges, surface, the grain and bite of the canvas, the separation from the wall.” So what happens when we move the painting to the wall itself? Not only does the painting now become part of the architecture, but we can understand it in different ways. Images 51-52 merge the painting and the wall and provide examples of the context of the painting subjects.

Lastly, this section takes the idea of the “white cube” of the art gallery and push this concept further by visually eliminating walls and floors (image 53), or everything but the painting all together (image 54).

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PHASE 2.3 AUGMENTING ART AND ARCHITECTURE

IMAGE 49: USE OF WARHOL COW WALLPAPER AS BACKDROP

IMAGE 50: USE OF FLAMINGO WALLPAPER AS BACKDROP
PHASE 2.3 AUGMENTING ART AND ARCHITECTURE

IMAGE 51: TILED MURAL

IMAGE 52: PROVIDING POTENTIAL CONTEXT FOR THE SUBJECT BACKGROUND
PHASE 2.3 AUGMENTING ART AND ARCHITECTURE

IMAGE 53: VISUALLY ELIMINATING FLOOR AND CEILING

IMAGE 54: EXPANDING THE WHITE CUBE
Media 2 shows an animated simulation of what the augmented reality overlay in the Syracuse University Art Gallery could look like. Upon entering the gallery, the visitor is prompted with a variety of interactive overlays that allows gesture to modify the painting and the space of the gallery. The first interactive element that the visitor changes is through spatial modification of the wall of the gallery. As in the previous examples, we see how the space changes when we take away the white cube of the gallery space, allowing it to become a part of the art and seeing it clashing with the existing paintings.

The next augmentation allows the viewer to see American Hi-Fi in the context of its original position in an array of twelve images. This action reverses the contextlessness of the art gallery by showing the painting as a set rather than one individual image.

The Dali filter is a playful way to learn about genres of art and see the painting of Col. Jack L. Warner differently. It allows the visitor to view what Salvador Dali’s painting might look like if it was painted in the style of impressionism, pop art, paint by number, graffiti street art, or pointillism. This educational tool allows the viewer to visually compare different artistic genres while seeing the Dali painting in different and fun ways.

The last augmentation allows the visitor to see the open study cabinets. As mentioned in section 2.2, augmented reality can be used to allow visitors to understand other ways that they might interact or change the space of the gallery, in this case through opening the doors of the study cabinets and exploring beyond the walls.

Though these outcomes showed potential for how art might begin to bleed into the space, but they still did not thicken the space or change it in anyway. Like many of the augmented reality precedents, these iterations remained largely confined to the frame and still kept the art within the display zone, without expanding out into the other zones of the gallery, shown in many of the art precedents.
Lastly, this section takes a deep dive into the painting titled *Poetry of K. Koch*, a collaboration between the artist Larry Rivers and the poet Kenneth Koch in 1961. David Joel from the Larry Rivers Foundation noted that this painting “fits other collaborative works they were doing at that time. The painting imagery is very similar to other paintings Larry did in 1961 based on Shoes... they did this together, where Larry would paint the image and Kenneth would write the words, in that case there probably isn’t a separate poem. It was more of a spontaneous creation between the two.” The two men took turns writing and painting on the canvas. “The handwriting on the [canvas] is unmistakably Kenneth’s.” The words that appear on the canvas are often obscured under layers of paint.

The aptly titled “picture-poem” was chosen as a case study because of its potential for a series of spatial investigations within augmented reality. The complex layering of the painting, along with hidden words, lends itself to the AR potential categories of enhancing perception, modification, and spatial modification in order to understand the painting in greater depth.

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9 David Joel (Larry Rivers Foundation), email message with author, February, 5, 2019.  
10 Jordan Davis (representative of the Larry Rivers Estate), email message with author, February, 6, 2019.  
POETRY OF K.KOCH CASE STUDY

IMAGE 56: PAINTING AS GALLERY TEXTURE

IMAGE 57: HEIGHTMAP BASED ON COLOR
This diagram shows how diagram 5 changes when an artwork is delaminated into the space of the visitor. The painting moves from only being displayed in zone 3, to occupying the previously unoccupiable spaces of zones 1 and 2. By expanding the zone of the painting, we can understand it through a different perspective. The painting begins to become more spatial, similar to the art precedents seen in images 2-21. The painting not only starts to bleed into the other zones of the art gallery, but begins to break away from the frame since it is no longer confined to the wall.
These three iterations show axonometrics of different logics of how these layers of the painting might be organized. On the left is the approximate order of how they appear on the canvas, the middle has been arranged according to color, and lastly, a composition that relies purely on the spatial relationships between the different layers.
ROOM-SCALE PERSPECTIVES

Images 61-63: Room-scale perspectives
Virtual reality was used to simulate augmented reality to be able to view what the augmented reality simulation might look like from a first-person perspective without the limitations of location.

Two augmented reality simulations through VR provide two unique viewer experiences. The first allows the user to walk or teleport around the Modern and Contemporary rooms of the SU Art Gallery. It maintains the architectural space of the gallery. The user is able to pull the trigger button on the HTC Vive controllers to view how Poetry of K. Koch would look when it is expanded out into the space of the gallery. The experience of delamination allows the user to view the different layers and parts that make up the composition separately.

The other experience takes the delaminated layers of the painting and rescales them at the scale of occupiable space with sound, creating what Brenda Laurel would call a “Direct, multi-sensory representation” which has “the capacity to engage people intellectually as well as emotional, to enhance the contextual aspects of information, and to encourage integrate, holistic responses.” The viewer is able to see how each of the part of the composition might look at a room-scale. The background of the art gallery has been removed entirely in this simulation. The aspect of sound creates more of an immersive experience.

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Deconstructing these artworks might beg the question of its appropriateness however, these investigations were a testbed to show how augmentation can be designed to make static objects dynamic and not confined to a single surface. With artists and architects, once a project is produced, despite the initial intention, it is at the mercy of the user to interpret or inhabit these works.

By limiting these investigations to one case study painting, it allowed for a series of explorations at an in-depth level but were restrained by the levels of augmentation that are shown.

Another limitation was my lack of experience with augmented reality software, however, when the thesis was brought in virtual reality it played to my strengths, having previously worked in this software. The VR experience was one of the biggest successes of the project since it allowed the user to simulate what the augmented reality experience would be like in a convincing way. It showed just a small glimpse into how this process could be replicated for other artworks or types of augmentations. It also combated some of the parameters that the current AR technology has. For example, visually eliminating the art gallery in the second VR experience is not feasible with the current AR technology. This allowed for a more projective provocation of what augmented reality technology might be capable of in the future. The future of this project would be to bring these projective provocations in augmented reality, to test these simulations in a real-world environment, therefore utilizing the full potential of the current technology.

An expected outcome was the role of primary research and how it focused, categorized, and inspired this thesis. The art and augmented reality precedent studies served as launch pads for the phases and iterations of this thesis, acting as both inspiration and areas to be expanded upon or critiqued. It helped define the situation and questions for these studies.

My original thesis proposal was very broad and attempted to do too many things at once. One unexpected outcome in this thesis was learning how to adapt to the successes and limitations that changed or dictated the direction of this project. The most productive moments motivating the direction of the thesis were in frustrating times where I was limited by the technology or time-constraints. The last phase of this project narrowed the focus to study a single artwork and this concentration lent itself to a more succinct study that shows the potential for how this could be replicated and its implications for a larger contribution to architecture.

The ability of these iteration to enhance a visitors understanding of artworks varied throughout the phases and investigations. The process of delamination was the most successful at breaking down an artwork so the visitor can better understand the elements that make up the painting in order to perceive it as a whole. When these investigations were brought into the immersive space of virtual reality, it allowed the visitor to experience the spatiality of the artwork. Other iterations, such as the melting of the painting out of the frame, the heightmap based on the use of color, or the changing of wallpaper, changed how a visitor could view a painting, but were less successful in terms of enhancing the viewer’s understanding of an artwork.
CONCLUSION

These investigations aim to pose potentials for how these technologies can evolve the discourse of architecture by utilizing how augmented reality can continue to affect the way we view and move through space. By taking the artworks off the walls, and delaminating them from their frames, we can begin to understand how augmentation and the virtual can allow us to occupy spatial experiences in a new and compelling way. Virtuality will continue to exist in our environment and it is at the agency of the architect that space and ways of seeing should be designed.

We can apply these ideas to architecture, where surfaces are no longer static, but become occupiable in new and novel ways. We can adopt these technologies as our own to allow the virtual to support the physical.


Davis, Jordan (representative of the Larry Rivers Estate), email message with author, February, 6, 2019.


Joel, David (Larry Rivers Foundation), email message with author, February, 5, 2019.


1, 34-63, diagrams, and media images by author