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**Three Hundred and Sixty Degrees:
A Celebration of Costume Technology**

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**Three Hundred and Sixty Degrees:
A Celebration of Costume Technology**

by

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Thesis

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Abstract

Three Hundred and Sixty Degrees: A Celebration of Costume Technology

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The University of Texas at Austin, 2015

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Three Hundred and Sixty Degrees: A Celebration of Costume Technology was an immersive theatrical installation piece that integrated physical costume pieces, three hundred and sixty degree projection mapping, digital storytelling, and an original musical composition comprised of sounds found in a costume shop. The purpose of the story was to give an artistic overview of the essential steps in a garment's creation. It allowed the audience to view and experience the evolution of how a theatrical costume is constructed, beginning with the designer's rendering, then moving into the muslin half-drape, the paper pattern, the fitting, the pattern pieces cut in real fabric, and ending with the completed garment. The installation also focused on the role played by historical undergarments (created here in half scale) as the building blocks of costume construction.

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Project Overview

The purpose of this thesis is to explore and celebrate the art of the costume technician, bringing the process of costume construction to the forefront, and placing a spotlight on the story of a costume's construction. To this end, I collaborated with Jared LeClaire, second-year MFA Candidate in Integrated Media, to create an installation piece entitled *Three Hundred and Sixty Degrees: a Celebration of Costume Technology*.

The elements of this installation included a full-scale 1860s crinoline style dress (custom made to work as a projection surface), and ten half-scale historical undergarment recreations, supported by thermoplastic half-scale dress forms and lit from within by LED lightbulbs. The full-scale dress served as the surface for projection mapping, the projections telling the story that the theatrical audience rarely sees: a costume's life from conception (the designer's rendering) to completion (the fully realized garment seen on stage), and all of the steps it takes to get there. Three hundred and sixty degree projection mapping facilitated this by allowing the audience to walk around the dress and view it from all angles.

To further illuminate another largely unseen aspect of the costume construction process, I endeavored to explore the role of historical undergarments in the development of a costume. Before the draping process begins, it is of paramount importance to ensure that the foundation of the period silhouette is correct. If the foundation is flawed, the garment will be ill supported and the design may suffer. I view these foundation garments as the bones — the beginning of the story — and wanted to illustrate the integral role

they play in providing support, structure, and shape, by surrounding the projection dress with them.

Chapter 1: Recreating Historical Undergarments in Half-Scale

As a costume technician, historical garments and undergarments have always fascinated me. I am a lover of history, and each period in history tells its story through its clothes. The materials used, the silhouette preferred, and the way in which they were constructed (bespoke, homemade, mass produced) provide a snapshot of a moment in time. I chose to recreate undergarments, for the simple reason that they are the basic building blocks in the development of a costume. The proper foundation garments, or lack thereof, can make the difference between a successfully executed costume and one that looks to have been an afterthought. Within the scope of my installation, I wanted to highlight the importance of historical undergarments in order to further elucidate the construction process.

I decided to recreate these historical undergarments in half-scale, that is 50% the size of an average human form, as this would allow me to create a larger number of pieces in a short period of time. This technique is used mainly by fashion designers and some theatrical drapers, as a means to save fabric and time in the pattern making process. Specially made half-scale dress forms can be purchased in sizes correlating to those of full-scale dress forms — 2, 4, 6 etc (see Figure 1).



Figure 1: Half-scale dress form

A draper can then drape or pattern using the half-scale form and measurements, then simply scale the pattern up after it has been perfected in muslin on the half-scale form. This eliminates a great deal of waste in the draping process, and creates a miniature garment that is not only perfectly charming, but of practical use as well.

Working in half-scale

Originally, my ideal build list consisted of some two dozen pieces, encompassing a range of 400 years — from the 1550s - 1950s. However, I wanted to ensure that I would have enough time to fully invest myself in each piece, and revised that list to ten pieces that I felt were good representations of the transitions in historical silhouette. These

pieces included: a Spanish Farthingale, an Elizabethan bum roll, a French/Wheel Farthingale (worn with the bum roll), 1740s full panniers, 1760s bucket panniers, an 1830s corded petticoat, an 1840s small hoop-skirt, Victorian bloomers, an 1870s bustle cage, and an 1888 reticulated bustle cage (see Figure 2).



Figure 2: Half-scale undergarments completed summer 2014

In terms of research, my main points of reference were texts focusing on either historical costuming techniques or period accurate silhouettes, such as *Corsets and Crinolines*, *The Tudor Tailor: Reconstructing 16th-century Dress*, *Period Costume for Stage & Screen: Patterns for Women's Dress 1500-1800*, *Period Costume for Stage & Screen: Patterns for Women's Dress 1800-1909*, and *The History of Underclothes*. These texts were vital to my research, and allowed me to compare different patterns and construction techniques. I also spent a great deal of time researching the original fabrics and materials used during each period, and strove to discover which, if any of the products used historically were still currently available and, if not, what suitable replacements currently exist.

I wanted to make all of the half-scale undergarments out of the same materials, so that the end result would be a cohesive “set” of costumes. I chose a crisp, lightweight, bleached cotton muslin, which (though used commonly for hundreds of years) was not always the historically accurate fabric of choice for the undergarments I was recreating. However, in order to create the aesthetic I wanted, I opted to use the same fabric for all of the undergarments. I also chose to diverge from historical accuracy in my decision to use 1/4” plastic rigilene boning as my standard hooping material for this project, as I preferred the flexibility it provided when working in half-scale. More historically accurate materials would have been steel boning (still widely available), cane/reed boning (still available, but time consuming to prepare), or whalebone (no longer available) (Malcolm-Davies 121).

Having decided upon which patterns or hybrid of patterns I planned to use, I began drafting them in half-scale, and created mock-ups of each undergarment before moving into real fabric. Once the fabric was purchased, pressed, and rolled, my patterns made and mock-ups tested, I began to cut and assemble the undergarments. In order to ensure that each piece could stand on its own, not only as a garment but as a lighted piece of art, each piece had to be impeccable: no raw or serged edges on any garment, each seam fully finished or bound in some way, and each pattern piece traced out in white pencil. I wanted these half-scale undergarments to be pristine, leaving no perceptible trace that they had ever been marked, so that when illuminated from within, they would simply glow.

Utilizing the Historical Collection

Though I had originally intended to fully utilize the historical costume collection maintained by the University of Texas at Austin, I eventually decided to focus on one artifact, which I would recreate in half-scale. Unfortunately, over the years as the collection has continued to grow, the space in which it is housed has not. The room in which the collection resides is literally overflowing: wardrobes, boxes, and drawers are full of beautiful items piled one on top of the other, and every corner is occupied by bags, boxes, and museum dress forms. This wonderful store of primary historical artifacts is rarely seen, and a majority of the department has no knowledge of its existence. The organizing, cataloguing, and curating needed to transform the collection into a serviceable resource would have been a thesis project in its own right.

That being said, I still wanted to take advantage of the opportunity I had of actually examining, with my own two hands, a real piece of costume history, instead of relying on photographs, schematics, or written description. Because most bustle cages, hoop skirts, and panniers are routinely recreated and well documented in reference materials, I chose to analyze an item that is not usually reproduced: a reticulated bustle cage from 1888 (see Figure 3).

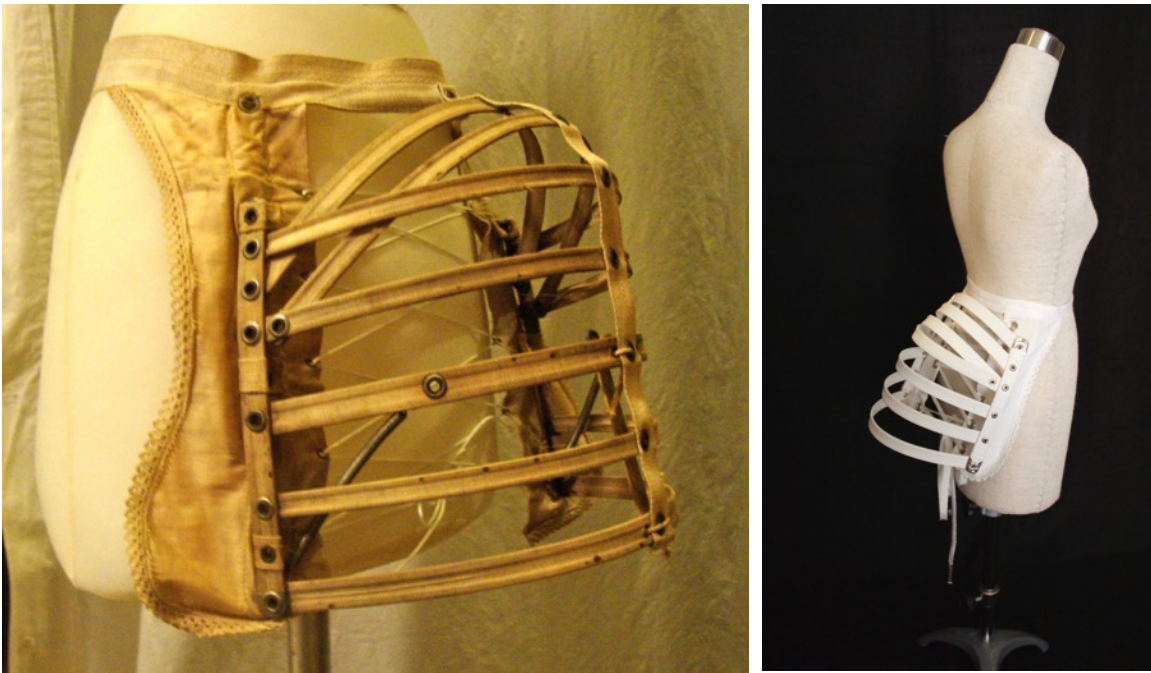


Figure 3: Reticulated bustle cage from 1888 (left) and my reproduction (right)

After examining the historical artifact, I discovered that the base of the bustle cage (worn closest to the body) was made out of a slightly coarse linen fabric, and trimmed in a small-scale cotton lace. The structure of the bustle consisted of buckram covered steel hooping, held together with a series of fabric tapes and rivets. After taking several hours to scrutinize the design, form and function of this beautiful piece of history, I began my

technical analysis, taking a series of extremely detailed measurements and creating a rough sketch of the bustle cage, pattern pieces and seam lines.

In keeping with my design aesthetic, I used the same bleached cotton muslin that I had created my other half-scale understructures from to make the base, and a white cotton lace of the proper scale. I used white twill tape for tapes, and purchased appropriately sized rivets to connect the buckram-covered steel hooping to the base. This style of hooping is most commonly used in the creation of hoop skirts, and is one of the most sturdy forms of hooping available, which made it perfect for creating the rigid and unyielding structure of the reticulated bustle cage.

Custom Dress Forms

The decision to illuminate the half-scale dress forms from within added another challenge to the project. Regular miniature forms commonly used in fashion design and costume shops are manufactured from layers of solid materials that render them completely opaque. I needed to find a material that would allow light to shine through, while providing enough structure to support the undergarments and withstand being suspended. Therefore, I decided to create my own dress forms out of thermoplastic. This allowed me to retain greater control over my design aesthetic. Instead of traditional solid cloth and cardboard dress forms, utilizing a thermoplastic material allowed me to create dress forms that were lighter, more easily suspended from a rigging system, and able to be lit from within. In order to light the forms, I used LED candelabra bulbs (see Figure

4), which provided enough light to create a soft glow, without producing excessive heat or distorting the thermoplastic forms.



Figure 4: LED candelabra bulbs

After researching the various types of thermoplastics currently available, I found myself drawn to a product called Worbla for two reasons. First, Worbla's physical composition is quite lovely as it is a light golden brown color, with small dark flecks and a slightly grainy texture (see Figure 5) that glows gold when viewed from a distance.



Figure 5: Worbla texture

These textural attributes of Worbla reminded me of the brown butchers paper used in one of the fundamental aspects of costume construction: pattern making. Second, I find myself constantly striving to find more environmentally friendly, non-toxic, and sustainable products for use in the fields of costume technology and costume crafts, and the fact that Worbla can actually be re-used, that nothing goes to waste, was very appealing. According to Worbla's website, the product is:

Non-toxic and doesn't need special tools. You use hot air, water or steam to shape the plastic however you want. There's no waste because your scraps can be conditioned and 100% re-blended. These leftovers can be molded to act just like putty, and many artists use Worbla like a form of clay... One side of Worbla is

the 'glue' side that means when heated, it can be attached to other layers of Worbla or other surfaces without needing additional glue ("Worbla's Finest Art"). Once cool, Worbla is hard, just like plastic, and can be sanded, textured, and painted if desired, and is also durable enough to be suspended.

Before creating my dress forms, I first completed a series of tests, familiarizing myself with how Worbla works, how much heat it needs, how much texture it picks up from the surface it is applied to, whether it would stick to/harm the half-scale dress form I would be using as my mold etc. After discovering that the adhesive side of the Worbla neither adhered itself to, nor damaged the dress form, I began by cutting eighteen rectangles of Worbla (one would create the front half of the dress form, the other the back), and began molding the thermoplastic over the naked dress form (see Figure 6).



Figure 6: Molding the Worbla dress forms

I set up two half-scale forms, molding the front on one form, and the back on the other form, as the front cooled. Though I had originally marked out the side seams and bottom of the dress forms using style tape, I soon discovered that this was not necessary as the slightly dimensional side seams of the dress forms themselves were visible in the Worbla once it was formed over them. I used these as my guidelines for trimming off the excess, leaving a 1/4" of seam allowance on both side seams. I then heated the adhesive side of the front half and attached it with a 1/2" of overlap to the back half, smoothing the lines with my fingers as I worked. All that remained from this point was to run the hanging lamp base (purchased at Ikea) through the dress forms, attach the bulb converters to the LEDs, and suspend them from the rigging system (see Figure 7).



Figure 7: Worbla dress form hanging lamp base and E12 adapter for candelabra socket

Chapter 2: The Projection Dress

The Projection Dress was the central piece of the installation. A full-scale, slightly modified recreation of an 1860s evening dress upon which the story was projected. As the dress would act as a projection surface, our main concern was finding the appropriate fabric. In order to create the best possible surface for projections as well as to allow ample flexibility for the actual construction, we began our search with the following criteria for the fabric: fairly opaque, tightly woven, and dyeable. We tested a medium weight cotton twill, cotton sateen, cotton batiste, and a silk taffeta, projecting color bars (see Figure 8) onto them and judging how well the colors read.



Figure 8: Example of color bars

In the end, we decided that the medium weight cotton twill worked best for our purposes. The twill would dye easily, was the correct opacity, reacted positively to our projection tests, and would drape well. In order to create the most effective projection surface, the fabric also needed to be a light grey. This would help to boost the contrasts of the projected imagery, without influencing the color of the content. I was unable to find a fabric that was both the correct weave and color, therefore I decided that dyeing the fabric to the desired color was our best option. I performed multiple dye tests with the cotton twill, using different dye recipes and resulting in grays both cool and green, dark and light (see Figure 9).

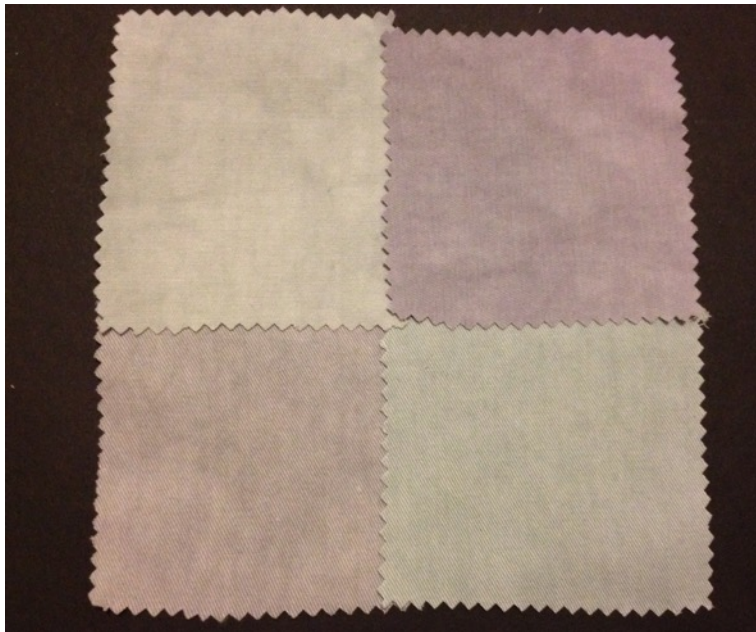


Figure 9: Sample dye swatches for the projection dress

Jared and I then tested them again by projecting the color bars onto the swatches, determining the shade of grey that would allow the projections to “pop” the most.

Choosing the Silhouette

I drew my inspiration from several existing historical dresses from the collection held at the Metropolitan Museum of Art (see Figure 10), then generated my own design to accommodate the project.



Figure 10: French Dress by Mme. Olympe circa 1865 and Visiting Dress circa 1865-8 from the Metropolitan Museum of Art (“Mme. Olympe” and “Visiting Dress”)

While most dresses of the period featured gathers, pleats, shirring, ruching and all manner of surface trims and appliqués, the projection dress needed a completely smooth surface. The ideal end product was a dress that would have no physical texture whatsoever, as texture would be created with the projections. Therefore, instead of a pleated skirt, the

projection dress was made with a gored skirt which created a smooth silhouette, while still providing adequate volume. The sleeves were a challenge, and ended up deviating somewhat from historical accuracy. A three-quarter length pagoda sleeve, or simple long two-piece sleeve would cast too much of a shadow on the rest of the dress; a more formal gathered and puffed sleeve would create too many ridges and shadows for the projections to fill successfully. The sleeve needed to be both short and smooth, and I found several historical examples of fairly simple short sleeves, which I used as the basis for my modified sleeve. One of the adjustments I made, was to alter the slope of the sleeve, which would greatly restrict movement on an actual human form. This modification was necessary to serve our purposes as a projection surface, while maintaining a shape similar to the period silhouette.

The simplest part of the entire process, for me, was the actual construction of the projection dress itself. Working from my rendering, and the research I had accumulated, I draped, patterned, mocked-up, and built the dress over the fall 2014 semester.

Chapter 3: The Story

One of the most fulfilling and the most challenging aspects of this project, was collaborating with artists unfamiliar with the technical terms used in costume technology, especially when communicating ideas about the visual story that the projections would tell. To facilitate this, I created a physical model box (see Figure 11), a simple visual storyboard (see Figure 12), and a written story, in order to more easily convey the narrative of costume creation.

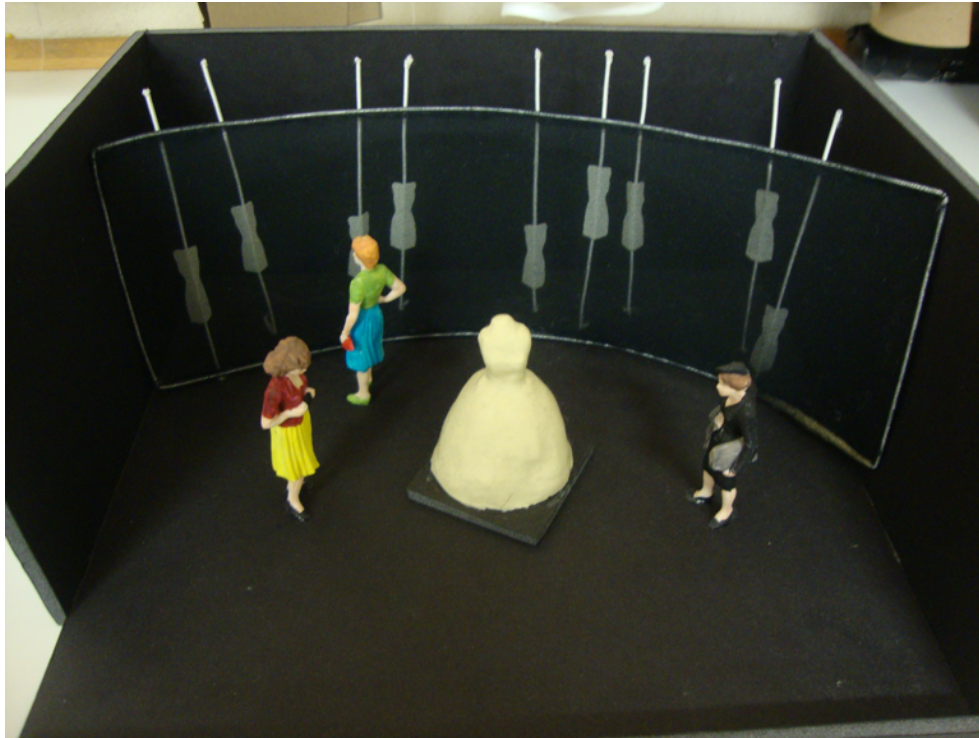


Figure 11: Original installation model box

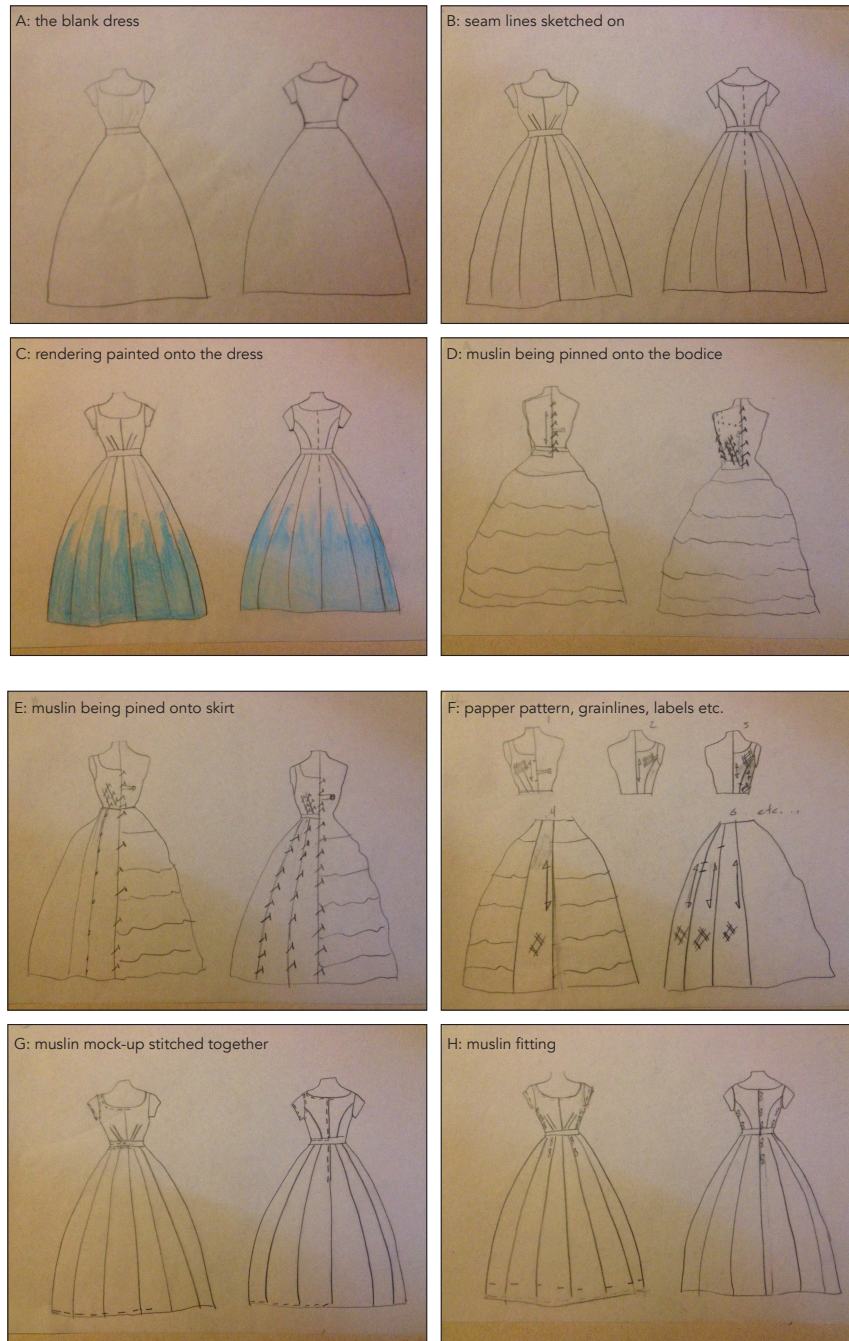


Figure 12: Simple visual storyboard

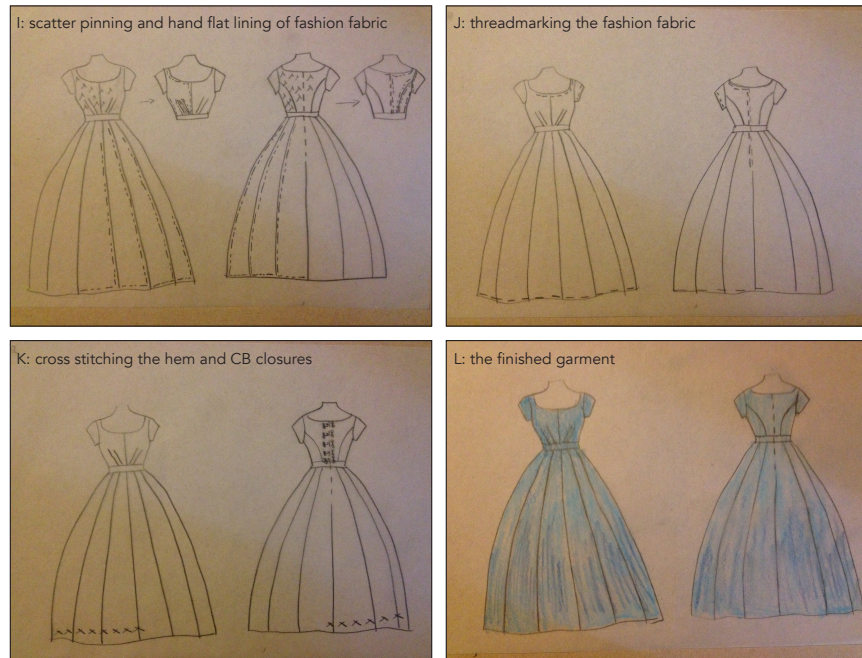


Figure 12 continued: Simple visual storyboard

Sharing these with both Jared and Jon Fielder (our composer), helped familiarize them with terminology and the costume construction process.

From the beginning, our goal was to provide a whimsical take on a process usually viewed as strictly technical, instead of creating a sterile, purely informative experience. Jared and I were interested in experimentation. We chose three styles of animation to explore: capturing the artists hand, animated paper-cut artwork, and manipulating pre-existing images to form to the dress.

We were greatly influenced by the work of Lotte Reiniger, a german paper-cut artist and filmmaker responsible for “transforming a technically and esthetically bland genre to a recognized art form” over the course of her sixty year career (Starr). Her work

is intricate, precise, and creates a sense of the fantastic. Another early influence for us in regards to animation style was “The Icebook.” Created by Davy and Kristin McGuire, it is “the world's first projection mapped pop-up book, a theatrical installation depicting a silent fable through a combination of paper pop-ups, projection mapping and music” (McGuire & McGuire). We wanted to bring some sense of this magic to our project, and decided to incorporate paper-cut artwork into our animation, mainly in the form of stitches, straight pins, and other tools/textures applied to the dress over the course of the story.

In addition to the somewhat standard practice of taking pre-existing imagery (in our case flames and outer space), and mapping it to the structure we had created, Jared and I were also interested in the idea of actually seeing the artists hand on the dress itself. Watching the lines of a costume rendering sketched on in thick pencil lines, seeing the strokes of watercolor dry, as the artists hand darts here and there completing it's work. We hoped that viewing this process from the artist's perspective, would allow the audience to see the work that goes into an artifact (like a theatrical costume or costume rendering), instead of viewing only the finished product. As in the time-lapsed videos of puppeteers painstakingly moving stop animation characters' limbs a millimeter at a time.

Costume Design

Due to the fact that the map/2D flat would be an unusual shape and require some familiarity with the process, we asked second year scenic design MFA candidate Teena Sauvola to act as our costume designer. Not only a talented designer and artist, Teena also

had experience with the softwares used to create both the 3D model and 2D flat, which meant that her work could flow more intuitively. The design itself was somewhat unusual already, in that the silhouette was created before the designer set pencil to paper. The work of the costume designer was now reactionary to that of the costume technician — illustrating the content after it had been created. We asked Teena to create a rendering/design based on historical research, and supplied her with a series of images of the dresses from the Metropolitan Museum of Art’s collection that I had used as inspiration for the design of the silhouette. Jared set up a camera directly above Teena’s workspace, and recorded her rendering process (see Figures 13 and 14), then used the footage to create the time-lapsed sequence for the opening “rendering” scene of the projected story.



Figure 13: Jared’s set-up to record Teena’s rendering process

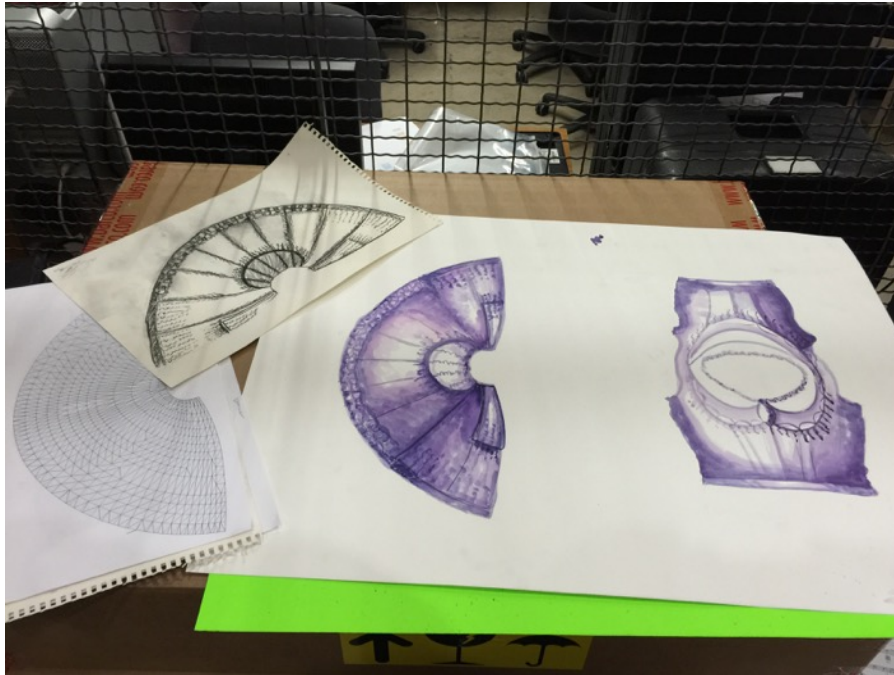


Figure 14: Teena's 2D costume rendering

Paper-Cut Art

While the shapes and movement of paper-cut art may appear elementary, their form and function are actually quite complex, much like the construction of an outwardly plain garment. Using the storyboard as a guideline, I compiled a list of pieces that needed to be cut out of paper, including notches, grain line, various sized stitches, hook and bar, etc. Reducing these images to their simplest forms, I used an X-Acto blade and nail scissors to cut the shapes out of black card stock (see Figure 15).

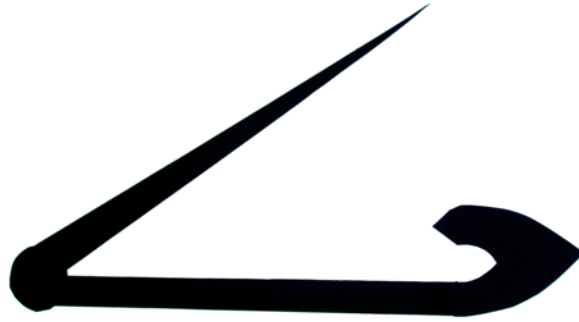


Figure 15: Example of paper-cut artwork

Photographing the the paper shapes came next, so that they could be cut out in Photoshop and added into the animation. In order to get the clearest and cleanest images possible I photographed each paper cut piece on a light box, (backed by a sheet of plain white paper), using a Cannon Rebel T3i camera.

Creating the 3D Draft

As Jared explained to me when we first began this process, there is a very important distinction to be made in regards to 3D projection mapping. Namely, the difference between mapping projections to fit the curves and shape of a specific object (in our case, a dress) versus simply projecting an image onto a dimensional object (a technique commonly used on buildings). Because we were mapping a 3D object that would be viewed from multiple angles and use multiple projectors, making sure that the model of the the dress created in Vectorworks/Blender matched the physical dress was extremely important. This meant considering the positioning of the projectors, their lenses, and the the dress itself, both in the mapping software and in the physical space of

the installation. Just as starting with the correct undergarments is integral in costume making, so is creating an accurate 3D model when working with projection mapping.

Once the projection dress had been constructed, I photographed it from all angles, and took measurements that would allow Jared to create a 3D replica that resembled the dress as closely as possible, so that he could begin the mapping process. Important measurements included dress height, skirt width and length, bodice width and length, sleeve angle, width and length etc. Jared then created a 3D model of the dress using Vectorworks, and a free, open source 3D modeling software called Blender — commonly used for animating films, creating video games, and visual effects (“License”).

The 3D model was then able to be unfolded into a 2D flat (see Figure 16), resembling a page from a coloring book.

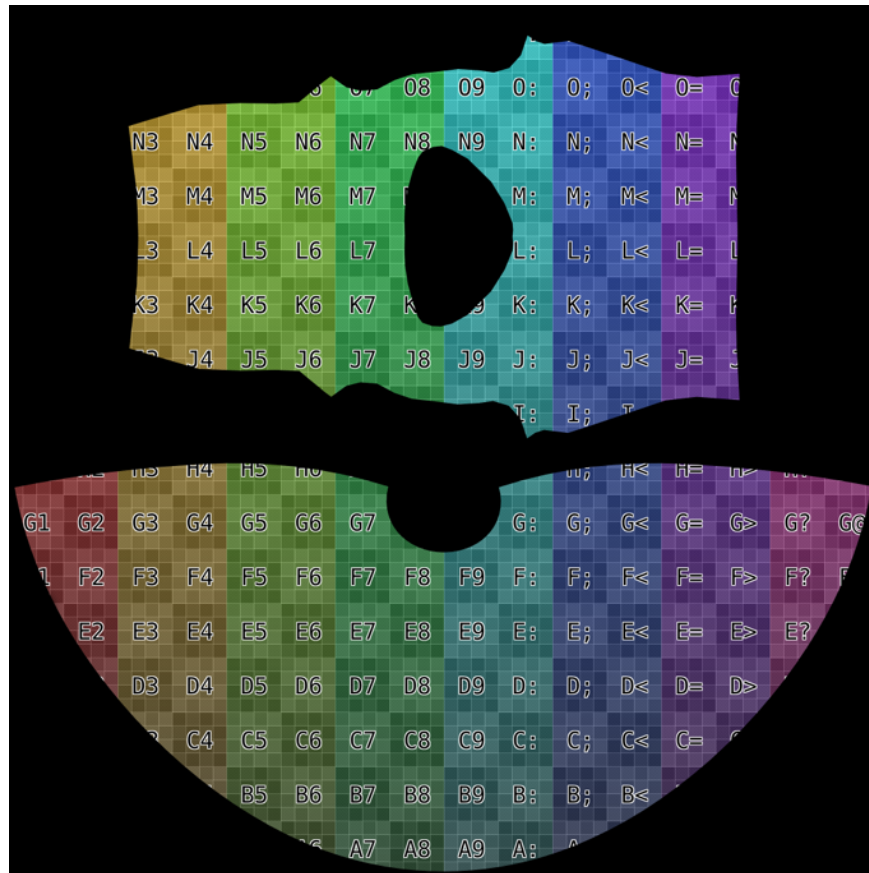


Figure 16: UVW/Texture map of the projection dress

This process is referred to as UVW, or texture mapping, which is:

The process of making a 2D representation of a 3D object. Think of a cube, which has 6 sides. In order to have control over the scaling, aspect ratio, and look of imagery on each side of the cube it must be unfolded and laid flat to work on. The UV map is that 2D representation. It is a 2D canvas that we can create on without having to worry about the form of the object (LeClaire).

Once made, we could then work directly on the 2D map, adding imagery, textures, and animation.

Each look from our storyboard was created by building a series of layers over the UVW map in Photoshop and After Effects — “a software application for creating video compositions, animations and special effect” (Adobe). Jared and I spent many long hours in his studio working through each look, adding in the paper-cut shapes, the fabric textures we had photographed, and placing everything in the appropriate order. We then used a playback software called Pandora’s Box to analyze each look, check scale, and make sure it was wrapping around the dress correctly (see Figure 17). After the ground work was completed, Jared could begin animating the content and finessing the details.



Figure 17: Checking animation on the 3D model in Pandora’s Box software

Chapter 4: Aural Atmosphere

As Jared and I continued to discuss the overall visual and spatial feel of our installation, we began thinking more about the aural atmosphere. We did not want any spoken narration that would draw focus from the projection dress, but wanted something that complimented our story without overwhelming it. Inspiring us was the *Sewing Machine Orchestra* — a project by Canadian composer Martin Messier — which consists of eight vintage Singer sewing machines, controlled by Meissier using a combination of software and micro-controllers that created a unique musical composition (Palop). We hoped to find a collaborator who could create a piece of music that would not only support the story, but immerse the audience in the world of the costume shop.

Seeking a Sound Designer

In October of 2014, Jared and I had our first meeting with Jon Fielder, a Doctor of Musical Arts candidate in the school of electronic music. Dr. Bruce Pennycook from the Butler School of Music, referred Jon to us as someone who might be interested in collaborating on a project that involved “found sound” or “sound objects.” During our initial meeting, Jon explained his interest in using non-instrument sound objects, and that he had been looking to collaborate on just such a project. Jon was also interested in the three hundred and sixty degree nature of our project, and broached the possibility of orchestrating the sounds so that they followed the story’s action with the animation around the dress.

Recording

After sharing our project details, storyboard, and timeline with Jon, we set up two recording dates for the following month. One where I would bring any portable costume shop tools to the recording studios located in the Butler School of Music (to record in a controlled environment), and a second in the costume shop, using portable recording equipment to capture sounds from costume shop items that could not be moved (i.e., sergers and sewing machines).

During our first session in the recording studio, Jon and I focused on sounds like the ripping of fabric (heavyweight muslin, silk taffeta, polyester chiffon), the crumble of a discarded paper pattern piece, the slice of freshly sharpened scissors, the quick snap of spring loaded snips, the scatter of push pins onto brown paper, and the all important sound of a pencil drawing a thick dark line. We did several takes of each sound, Jon making subtle adjustments to the recording levels and microphone position between each take to ensure that we achieved the best possible quality of sound.

Our second session took place on a Thursday morning in the Texas Performing Arts costume shop, located in the F. Loren Winship building. Working before the costume shop staff and students arrived, allowed us more control over ambient noise in a non-studio atmosphere (see Figure 18).



Figure 18: Jon Fielder and Emily Robertson recording an industrial sewing machine

Moving through the shop, we captured sounds such as the whirl of the industrial sewing machine switching on, the steady beat as it sews a straight seam, the groan of the boiler iron heating up, followed by steam billowing out of the iron, the aggressive hum of the industrial serger biting through muslin, and the mechanical click and thump of a dress form being raised and lowered.

Jon's Composition

Once our recording sessions were completed, Jon began the process known in layman's terms as "cleaning up." This involved removing any unwanted background noises and:

Enhancing/reducing certain frequencies that might have been lost, reduced or unnaturally enhanced during the recording process. Editing the recordings was

essential so that the sounds could come across to the listener as if they were physically happening in the room and didn't sound like a recording coming out of a speaker (Fielder).

After the initial editing process, Jon could choose to either use the sounds as they were, or distort them into something more synthesized. His choices resulted in a haunting composition, that truly brought the entire installation together.

Chapter 5: The Installation

The culminating event of this project was the installation itself, which took place on the B. Iden Payne stage in the F. Loren Winship Drama Building over the course of two days (open for four hours each day) in April 2015. The installation consisted of two main parts, that could be experienced both separately and as a unit: the projection dress and the illuminated half-scale undergarments. As the audience members began their journey from the lobby down the dimly lit stairs which led to the stage, the eerie sounds of Jon's composition marked their first interaction with the space. Upon the stage itself, stood the installation. The projection dress was fixed as the central figure, surrounded by the half-scale undergarments suspended at different heights and glowing golden along the perimeter of the dress's enclosure (see Figure 19).



Figure 19: The Installation on stage

Audience members then walked directly onstage, and chose their first interaction with the space: they could either begin with the projection dress, or examine the half-scale undergarments surrounding it.

The structure, within which the projection dress was housed, was designed by Jared and I, and constructed from lengths of PVC pipe to which swathes of primitively pleated grey cheesecloth were fixed, creating a semi-transparent octagonal structure with a single entry point at the center front. Within the enclosure, the projection dress stood directly in the center, distanced from the audience by a strand of LED string lights wrapped in additional cheesecloth, which provided a barrier between the dress and the audience (see Figure 20).



Figure 20: The projection dress enclosure

We wanted to ensure that the audience could walk all the way around the dress without getting too close and obstructing the projections. This left an additional four feet of space around the dress for the audience walkway, and from this perspective they could focus on both the projected story, which ran on a four minute loop (synced with the music) in the center of the enclosure, and look through the cheesecloth at the illuminated half-scale undergarments. The audience was also able to exit the enclosure and explore the half-scale undergarments surrounding the dress (see Figure 21).



Figure 21: Illuminated half-scale undergarments

Chapter 6: Reflections

Three Hundred and Sixty Degrees: A Celebration of Costume Technology was a project nearly two years in the making. It pushed me to explore my role as a generative artist, learn about a technology I previously knew nothing about, and collaborate with artists working in fields that were foreign to me. It allowed me to express my fascination with historical garments and my love for costume technology. The resulting installation, though not yet perfected, was exactly what it was always intended to be — a celebration. This collaborative piece of art thoroughly immersed the audience in the world we had devised for them. We created a world of digital storytelling, tactile history, and familiar, yet indescribable sound, where the audience was given the freedom to choose their path through the experience, examining and exploring at their own pace.

The collaborative process was truly one of the most rewarding aspects of this thesis project, and I am so grateful for the time, effort and beautiful artistry shared by all of our collaborators. Without Jon's composition and Teena's costume rendering, the project would not have been nearly as evocative, and without Jared's dedication to this project, it would not have existed at all. As a costume technician, the majority of my working collaborations are with costume designers or other technicians; my work is therefore typically reactionary rather than generative. Here I was able to step outside of my usual role, acting not only as a costume technician but, along with Jared, also helping to develop the storyboard, the animation styles, the scenic layout, the lighting, the promotional materials, and the management of the entire project. I learned more about

projectors, photoshop, 3D modeling software, and the fly system in the Payne theatre than I ever thought possible. I believe that Jared and I found success as collaborators because we not only trusted in one another and in our work, but took the time to educate one another about our respective fields.

In hindsight, although playing with different animation styles was a wonderful learning opportunity for both Jared and I, in the end we both agree that what resonated with us most were the segments at the beginning of the animated loop — Teena's hand drawing the lines of the rendering on the dress itself. This effectively brought the artists hand into view in a not-so-subtle manner that attracted both of us. Should we remount this project in the future, we plan to re-do the rest of the animation in the same style, showing my hand either placing pins and running stitches, or sketching them in.

As far as future plans for the installation, Jared and I would leap at the opportunity to remount it. Feedback from our viewers was extremely positive, so we would love the chance to present it to a larger audience, and improve on our first run. Personally, I am interested in continuing my exploration of how advanced technologies, such as projection mapping, can enhance and inform historical themes and artifacts, especially in a museum setting. We have also been contacted by several people from the Blanton Museum of Art, who are interested in discussing our installation, and the possibilities for integrating projection mapping into museum exhibits. I greatly look forward to that conversation.

Most importantly, *Three Hundred and Sixty Degrees: A Celebration of Costume Technology* allowed me to explore myself as an artist. This project gave me the time to reflect on what I love about the art form I practice, and the freedom to analyze where my technical skills blend with my artistic aesthetic. Through this project, I have come to realize that they are one in the same.

Appendix A: List of Collaborators

Artistic Team

Artistic Director/Content Creator/Story Writer

Emily Robertson

Co-Artistic Director/Projection Specialist/Technical Director

Jared LeClaire

Composer

Jon Fielder

Lighting Consultant

Andrew Carson

Image Production

Compositor/Animator

Jared LeClaire

Paper-Cut Artwork for Projected Media

Emily Robertson

Costume Designer for Projected Media

Teena Souvela

Costume Artifacts

Draper/Patternmaker/Designer/Stitcher/Dyer/Crafts

Emily Robertson

Supporting Faculty

Graduate Advisor

James Glavan

Thesis Committee Members

James Glavan

Michelle Habeck

Sven Ortel

Appendix B: Initial Written Storyboard by Emily Robertson

PROJECTION DRESS STORY BOARD 12/18/14

- The seam/sketch lines run up the dress starting at the CF hem and moving up and around the dress counter clockwise.
- The designer's rendering is drawn onto the dress.
-
- Color and trim (watercolor) wash up the dress from the hem.
- The design slowly fades away again, the color draining to the bottom.
- The dress is white again, a clean slate.
- Style tape lines appear on the left side of the bodice.
- The first pattern piece is pinned on (muslin with red grain lines).
- One pin and then another are pinned from the neckline down.
- The darts close and are pinned as well.
- The CB panel is pinned first, down the CB then along the SB.
- All of the bodice seams are now pinned together.
- Pencil dots mark the CF neckline, shoulder, armscye and waistline.
- The CB panel is pinned first, down the CB, then pencil dots at neckline, armscye, waistline.
- The SB of the CB panel is then pinned down, then dots at waistline and armscye.
- The SB panel is then pinned down, then dots at waistline and armscye.
- The skirt is pinned first down the CF, then moves to the SF, SS, SB, CB clockwise this time, around the left side of the dress only. These are all pinned together.

- The muslin sleeve appears.
- TRANSITION > PAPER
- The paper pattern appears on the bodice CF, then SS, then CB.
- The pattern pieces appear first, then grain lines in red, notches, and finally the label.
- The paper pattern for the skirt then begin, CF, SF, SS, SB, CB.
- The pattern pieces appear first, then grain lines in red, notches, and finally the label.
- TRANSITION > MUSLIN
- The muslin mockup is stitched, and thread-marked.
- Sleeve is safety pinned on.
- The dress is safety pinned together at the CB closure of bodice and skirt.
- TRANSITION > GARMENT
- The dress is a blank white slate again.
-
- Scatter pinning on bodice starting at CF and CB and meeting at the SS.
- At the same time, flat lining stitches begin to run up the skirt panels, counter clockwise hem and right side of panel. Once it gets back to the CF, the left side begins.
- The scatter pins disappear, and the flat lining stitch begins on the bodice, starting at CF and moving around counter clockwise.
- Thread marking at the hem, neckline, sleeve opening, CB opening.
- Hem is cross stitched (2 ½" up from the actual hem).
- Hooks and bars appear at CB starting at the top and working down - hooks first, then bars.

- The dress is now complete and the designers rendering washes onto the dress again.
- TRANSITION > CREATIVE
- From here we transition into fire - the unpredictable nature of our field - any moment a garment several months in the making may be cut.
- Finally, space.

Appendix C: Software Used for Projected Media

Aftereffects

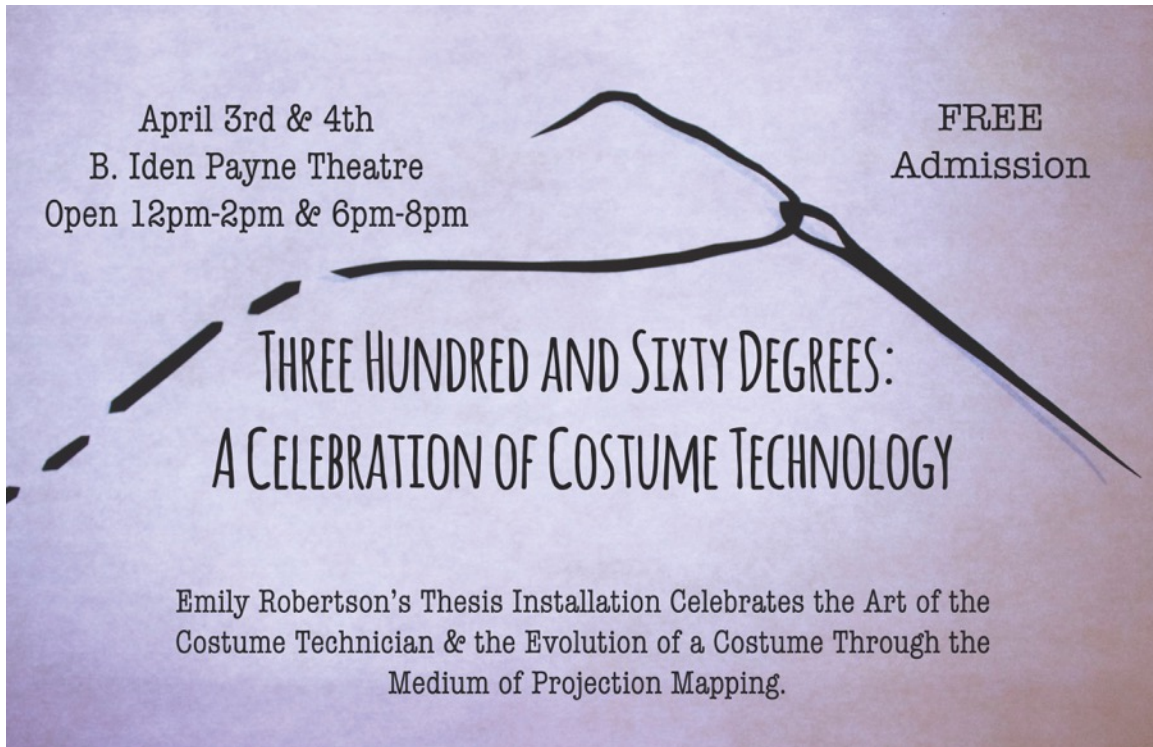
Blender

Pandora's Box

Photoshop

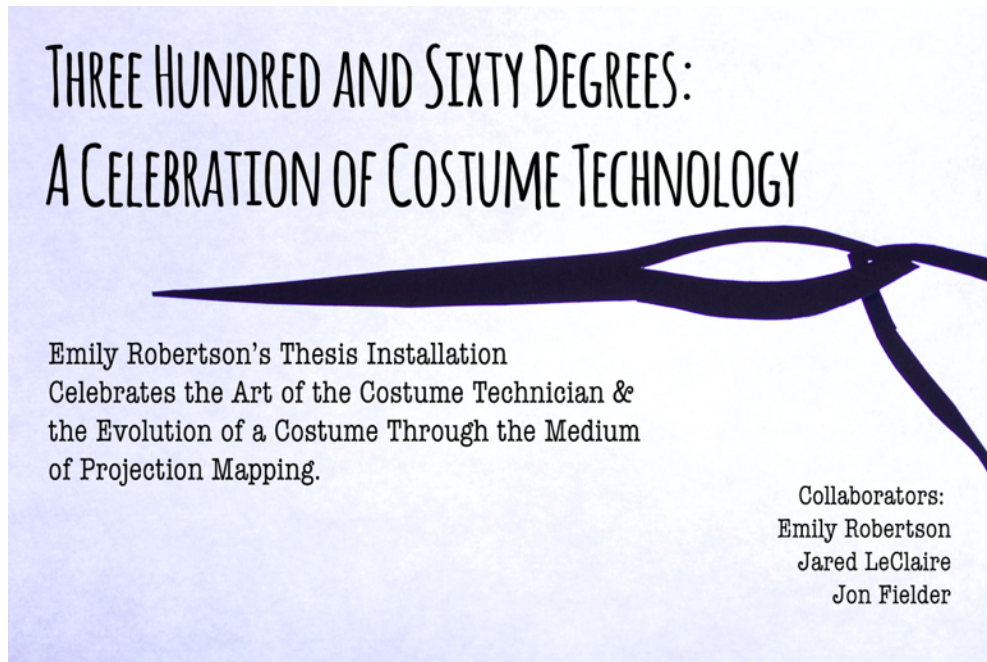
Touchdesigner

Appendix D: Promotional Poster

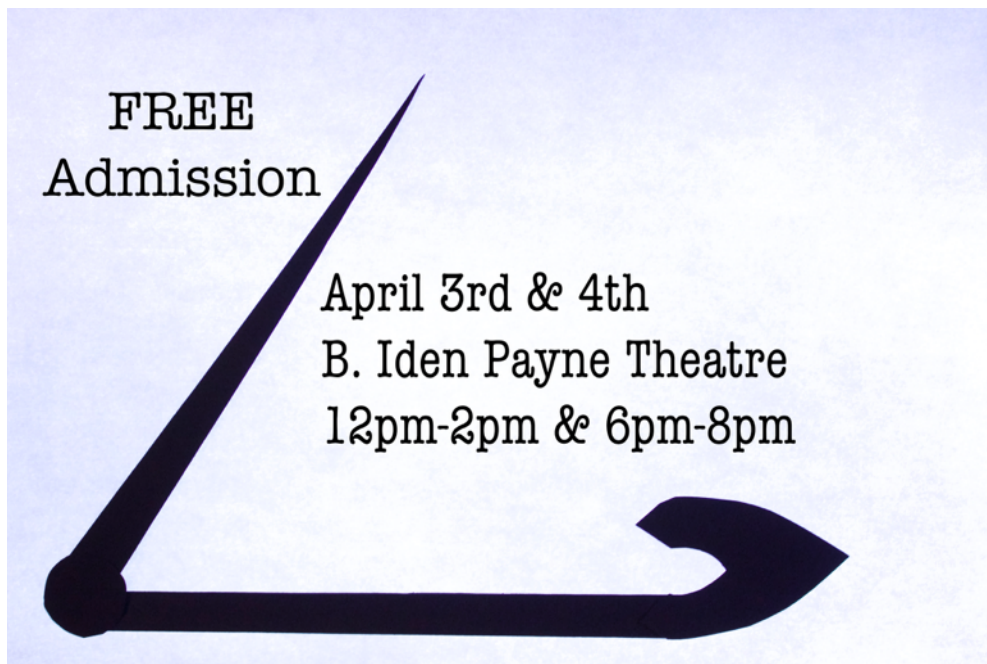


Design and artwork by Emily Robertson

Appendix E: Promotional Postcard



Design and artwork by Emily Robertson (Postcard Front)



Design and artwork by Emily Robertson (Postcard Back)

Bibliography

- "360 ° 3D Mapping Projection with Rabarama." YouTube. YouTube, 18 June 2011.
Web. 11 September. 2013.
- "Adobe After Effects Overview." Adobe After Effects Overview. Media College, n.d.
Web. 2 Jan. 2015.
- "Appendix K: Curatorial Care of Textile Objects." NPS.Gov. NPS Museum Handbook,
Part 1, 2002. Web. 1 Nov. 2013. <<http://www.nps.gov/museum/publications/MHI/Appendix%20K.pdf>>.
- Armstrong, Helen Joseph. *Patternmaking for Fashion Design*. New York: Harper & Row,
1987. Print.
- Arnold, Janet. *Patterns of Fashion 1: Englishwomen's Dresses & Their Construction C.
1660-1860*. [London]: Macmillan, 2002. Print.
- Arnold, Janet. *Patterns of Fashion 2: Englishwomen's Dresses & Their Construction, C.
1860-1940*. New York: Drama Book, 1977. Print.
- Bradfield, Nancy Margetts. *Costume in Detail: 1730-1930*. New York: Costume &
Fashion, 1997. Print.
- Cunnington, C. Willett, and Phillis Cunnington. *The History of Underclothes*. New York:
Dover Pub., 1992. Print.
- Fielder, Jon. "Terminology Question." 06 Jan. 2015. E-mail.
- "Franck Sorbier Couture Fall/Winter 2012/13 - Projection Art in Paris | FashionTV."
YouTube. YouTube, 15 July 2012. Web. 16 October. 2013.

- Hunnisett, Jean. *Period Costume for Stage & Screen: Patterns for Women's Dress 1500-1800*. London: Bell & Hyman, 1986. Print.
- Hunnisett, Jean. *Period Costume for Stage & Screen: Patterns for Women's Dress 1800-1909*. London: Unwin Hyman, 1988. Print.
- Kennedy, Randy. "For City Opera Costumes, Lofty New Roles." *The New York Times*. *The New York Times*, 20 Oct. 2009. Web. 12 Aug. 2013. EV DAY suspension etc.
- "License." *Blender.org*. N.p., n.d. Web. 12 Jan. 2015.
- McGuire, Davy, and Kristin McGuire. "The Icebook." *The Icebook*. N.p., n.d. Web. 23 Feb. 2015.
- Mikhaila, Ninya, and Jane Malcolm-Davies. *The Tudor Tailor: Reconstructing 16th-century Dress*. Hollywood, CA: Costume and Fashion, 2006. Print.
- "Mme. Olympe | Evening Dress | American by Designer: Mme. Olympe (American, Born France, 1830)." *Mme. Olympe*. Metropolitan Museum of Art, n.d. Web. 10 Aug. 2014.
- Palop, Benoit. "How Sewing Machines Were Transformed Into An Orchestra." *The Creators Project*. N.p., 15 Oct. 2013. Web. 06 Jan. 2015.
- "Projection Mapping 3D Sculpture Bear." *YouTube*. *YouTube*, 10 June 2013. Web. 1 Nov. 2013.
- Russell, Douglas A. *Period Style for the Theatre*. Boston: Allyn and Bacon, 1980.
- "Sewing Machine Orchestra / Martin Messier (14 Lieux)." *YouTube*. *YouTube*, 24 Nov.

2012. Web. 09 Sept. 2014.

Starr, Cecile. "Reiniger, Lotte." *International Dictionary of Films and Filmmakers*. Ed. Sara Pendergast and Tom Pendergast. 4th ed. Vol. 4: Writers and Production Artists. Detroit: St. James Press, 2000. 714-716. Gale Virtual Reference Library. Web. 13 Jan. 2015.

Ulmer, Sean M. *Uncommon Threads: Contemporary Artists and Clothing*. [Ithaca, N.Y.]: Herbert F. Johnson Museum of Art, 2001. Print.

"Visiting Dress | British 1865-68." *Visiting Dress*. The Metropolitan Museum of Art, n.d. Web. 8 Aug. 2014.

Waugh, Norah, and Margaret Woodward. *The Cut of Women's Clothes, 1600-1930*. New York: Routledge/Theatre Arts, 1994. Print.

Waugh, Norah. *Corsets and Crinolines*. New York: Routledge/Theatre Arts, 1991. Print.

"Worbla's Finest Art: Home Page." *Worbla's Finest Art*. N.p., n.d. Web. 08 Jan. 2015.