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Materialising the imagination: An exploration of sensing through textiles and tactility.

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Art is a reality beyond now.

An imaginative reality that we need.

The reality of art is the reality of the imagination.

(Winterson, 1996, p. 148)

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ATTESTATION OF AUTHORSHIP

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the Acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Signature

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Materialising the imagination: An exploration of sensing through textiles and tactility.

ABSTRACT

To stimulate engagement and interaction within one's imagination, this research explores the aesthetic potential of tactile and sensory materials. This practice-based inquiry explores and combines different textile design methods, materials, and technologies to enhance a sensory engagement via an internalised dialogue between the practitioner and her childhood imaginary friend. The practitioner has developed the material outcomes that are considered and contextualised based on the theories of embodied cognition and creativity. The use of colour and the theory of play has a significant effect on the engagement with interactive art. The significance of tactility and sensory engagement, to the imagination of both the creator/researcher and the audience, present a key focus of the project. While there is a body of technical research on the quantification of textile feel and tactility (the texture and handling of cloth), textile design research tends to focus on visual aesthetics. This project contributes to the articulation of textile expression through tactile and other sensory modes. The outcome of the research practice is realised through a series of sensory textile art installations that allow people to be able to engage with them as an experience that evokes the imagination, though touch and movement.

INTRODUCTION

This research explores the aesthetic potential of tactile and sensory materials to stimulate engagement and interaction. This practice-based inquiry explores and combines different textile design methods, materials, and technologies to enhance sensory engagement. The processes developed, and the material outcomes produced, are considered, and contextualised in relation to the theories of embodied cognition and creativity. The materialising of the practitioner's personal imagination, as the ability of the mind to be creative, has developed in the form of textile sculptures that focus on tactile and interactive practices that enable engagement. A key focus of the project is the significance and importance of tactility and sensory engagement as they relate to the imagination of both the creator/researcher and the audience. While there is a body of technical research on the quantification of textile feel and tactility (the handling of cloth), textile design research has tended to focus on the visual aesthetics. This project contributes to the articulation of textile expression through tactile and other sensory modes. The sculptural forms that were explored are involved with creating and developing three dimensional textiles. To achieve this the practice-based research has been conducted utilising a range of different textile production methods, technology combinations (digital, mechanical, and hand-made) and material combinations. A vocabulary of distinctive, imaginative modes of textile expression has been extended through experimentation with non-garment form as sculptural artifacts, and through strategies of play and interaction utilising e-textile and embodied strategies.

The outcome of the research practice has been realised through a series of sensory textile art exhibitions that allow people to engage with the work as a sensory experience that evokes the imagination, through touch and movement. Being able to bring the intangible through the tangible within a sensory space has been considered and explored with a deepening understanding of the way the textiles work as interactive tactile objects. Different textile technologies, such as digital knit, wet felting, tufting and e-textiles have been used to create the physical work, creating a textile landscape that has engagement points and allows people to interact with the work in playful and imaginative ways. The use of the theory of play and wonder allows anyone from adults to children to interact with the work and stimulate their imagination. The aim of the research has been to allow people, the space to be playful and have that sense of wonder.

While the research is presented as an exegesis and an exhibition of practice the thesis is intended to be presented as a holistic thesis. This exegesis is comprised of three parts. Firstly, the literature review considers the aesthetics of touch and how it is relevant to art. This involves the way we experience the world including how we can use touch to explore the world of interactive art in relation to textiles and creating textile landscapes. It can create a sense of wonder and inspiration for the imagination. Secondly, the design research methods are practice-based and use tools, such as drawing and rapid experimentation to create textiles that can be used in a tactile and interactive art exhibition. Thirdly, it leads to the practical development of the textiles and the final creation of the art exhibition.

PERSONAL STATEMENT

My creative practice is based on an intuitive approach and influences that came from growing up. As a child I explored an imaginary world. My fascination with my imaginary friend Bill made me question space, dimensions, colour, conformation, and the interactions between them. Bill was my constant companion between the age of four and six. I spent hours in this imaginative space with Bill, painting, chatting and exploring the unknown. As I grew up, even though I distanced myself from Bill, my approach became more experimental and creative as I moved between my imaginary world and the real world. In my imagination, I have continued drawing, painting, and creating from this other world.

This work is very much a personal project that shows the world in my imagination. These textiles landscapes/interactive art exhibition have been developed to explore the playful and colourful way that I see the world. It allows the textiles to speak on my behalf. Through this process of making and creating I have developed a space that has been materialised through my imagination.

CHAPTER ONE:
LITERATURE REVIEW

LITERATURE REVIEW

The topics that articulate the reasoning behind this work are discussed in the literature review. The research into the aesthetics of touch develops a contextual framework for the research. While immersive art and sensory experience engage with the research as it relates to the user experience, the tactile aspect of fabric and cloth is focused on the sense of touch. The review further investigates the way the various elements can affect someone's imagination. All these aspects work together in different ways to contextualise the research that is presented in this thesis.

THE AESTHETICS OF TOUCH

The exploration of touch and its senses are critical to the way we understand our world, we use them to create and experience things around us. This is called the sensory matrix (Zino, 2020) and is explained as a network of nerves in our body that makes up our sensory system. This allows us to situate ourselves in these experiences (Ratcliffe, 2008). By using textiles to create goods and gear that are going to engage and evoke based on this system, I have created work that encourages the connection between hand and fabric to prompt a sensory experience. We live in a world where value, built through the time and resource intensity of its material and manufacturing processes, has been taken out of cloth, where it was at one time, and has moved it into the realms of commodity and technology. Within this world we have given more importance to the visual senses, and we have disregarded the other four. Juhani Pallasmaa (2012), architect and architectural theorist, says that the status of sensory hierarchy has been changed by the "technological and consumer culture" in which we reside. Juhani states that the side effects of "the suppression of the other sensory realms, has led to an impoverishment of our environment causing a feeling of detachment and alienation" (Pallasmaa, 2012, pg.22).

Touch is something that humankind uses every day. However, there are many areas and situations where touch is considered inappropriate or inconsiderate. In the context of the Covid 19 pandemic, touch has become dangerous and abject. Museums and art galleries are typically seen as places where sight is the only sense that we use to engage with the art. Film theorists, for example, Laura Mulvey (1989) recognised a way that this sort of distancing between the viewer and the art object, which she describes as 'spectatorship', that prioritises looking over which equates to the passivity of being looked at.

Madalina Diaconu (2006) questions the theory that we must stand back, detached, and observe what the artist is trying express to the viewer. She poses the question:

> "Why are the visitors not permitted to follow the artists gestures with their own hands? There is a knowledge that is waiting to be awoken at the tip of out fingertips and museal prohibitions of touch inhibits natural cognitive impulses." p.5.

The idea that as observers we can visually explore and navigate artwork through touch and go further on a journey with the artist as maker, is something I believe should be explored. While many people enjoy viewing beautiful art, there is another level of connection that can be achieved if you physically touch art. This idea of being able to interact with art is something that people rely on, such as those with sensory differences, for example, the visually impaired.

Theorist Jane Bennet has written about the "vital materiality" that runs through and across bodies, both human and nonhuman. In 'Vibrant Matter: A Political Ecology of Things' (Bennet, 2010) Bennet recognisees the vitality of material formations as 'thing power'.This concept resonates with my approach based on my imagination and the interest I developed in childhood as it relates to making things. Bennett writes:

> Thing-power perhaps has the rhetorical advantage of calling to mind a childhood sense of the world as filled with all sorts of animate beings, some human, some not, some organic, some not. It draws attention to an efficacy of objects in excess of the human meanings, designs, or purposes they express or serve (2010, p.20).

Bennet recognises the power of things beyond human use and meaning and the complex relationships between human and non-human bodies. While art is created to be touched, it enables a completely different relationship between the artwork and the 'observer'. Sight is no longer the only mode of engagement. The importance of multi-sensory exploration within the arts is something that contributes to the inclusion of many observers. The exhibition Sensory: Please touch the art, was focused on presenting work that was going to be engaging and interactive for people who are blind or are visually impaired. Every aspect of the exhibition was considered. This sort of interaction with all aspects of art brought a new concept of art and what it could be (Johnson, 2018). To be able to use this sort of thinking to create and work solely with my hands means that I'm able not only to create work that is accessible to everyone it also allows people to connect with their senses again. Being able to touch and feel and go on a journey with the artist gives people a chance to step away from their screens. These ideas of touch within the context of art have been the key motivations for the focus and approach I have taken in this project, and they help develop the context of the research.

IMMERSIVE ART AND SENSORY EXPERIENCES

Immersive and interactive art installations that use different elements of sensory engagements such as touch, sight, and sound, have the potential to spark the imagination and create a sense of wonder. It has been recognised that using all three of these senses has helped to heighten the intended experience. Psychologist and professor Paul Piff states that "awe arises in evanescent experiences" (Piff, 2015. p.897) and then goes on to explain that this may serve an important social function by enabling people to perceive the world as greater than and/or outside of one's own reality. This could introduce more valuable, interconnected experiences within today's society. The ability to use textile art as a way of doing this means that we can get people to access more of that which is intuitive, and it connects us to one another and other things in the world. In David Howes Anthology entitled The Empire of the Senses he states that:

> The human sensorium . . . never exists in a natural state. Humans are social beings, and just as human nature itself is a product of culture, so is the human sensorium. . . Tastes and sounds and touches are imbued with meaning and carefully hierarchized and regulated so as to express and enforce the social and cosmic order. This system of sensory values is never entirely articulated through language but is practiced and experienced (and sometimes challenged), by humans as culture bearers. The sensory order, in fact, is not just something one sees or hears about; it is something one lives (as cited in Driscoll, 2020, p.15).

Inspired by this information, I want to help us reconnect with a more natural state. The reason we go to a museum or an art gallery, is to learn something, to challenge ourselves and to look at beautiful works of art. Likewise, as with other forms of art, we can look with awe, and we can also engage. Textile or fibre art has often been considered a minor art in the art world, nevertheless textile art offers a different sense of engagement. We live in world where textiles and fabrics are extremely important in our day-to-day existence. They are practical, we use them to create clothing that keeps us warm in cold weather and cool in warm weather. While these functions are important the aesthetic appreciation for textiles has disappeared over the years. It could be industrialisation, mass production and consumption, one way or the other we have lost our appreciation for textiles as works of art.

TACTILITY OF CLOTH

Textiles and the world in which textile designers create their work is deeply rooted in the way that the textiles feel. We live in a world where textiles and fabrics are everywhere. We use them to keep us comfortable. We wear them. They play a central part in our everyday lives. Sometimes we even take them for granted. The tactility, textuality and interactivity of cloth is central to this inquiry.

The feel of a textile is described as the 'handle' of cloth. This word 'handle' implies the haptic sensing of the hand to ascertain sensations, such as stiffness or limpness, hardness or softness, roughness or smoothness and drape. Even though new technologies and systems are being developed for the objective measurement of the aspects of the handle of a fabric (Pierce, 1930) the textile industry still relies on the expertise of people who use their hands to determine textile quality and type through feel, through the handle. This relationship between textiles and the senses involves interaction, connecting with the textile and its material sensations through the senses (Peirce, 1930).

The sensory experience that we have with fabrics has been considered and reconsidered by many textile designers, to understand the relationship between textiles, tactility, and interaction. This way of looking at textiles can create and develop a better understanding and reconnection with the world around us. In our digital and virtual world, reconnecting with the material world around us makes for a more interesting interactive textile world. Textile designers create a world where people want to connect with art and create important conversations, it is fundamental to the development of society (Schoeser, 2003).

The semiotics of texture: from tactile to visual (Djonov and Van Leeuwen, 2011), explains the six different ways the tactile senses read different textiles. These include viscosity, temperature, relief, density, rigidity, and complexity factors, such as change, consistency and composite textural qualities (Djonov and Van Leeuwen, 2011). These are all important elements that allow textile designers to be able to look at and develop their textiles further. I have reflected on these textual elements while I have been developing the design of the textiles in this project.

The two elements I have focused attention on are ‘relief’ and ‘complexity’ since they involve such factors as change, consistency, and composite textural qualities (Djonov and Van Leeuwen, 2011). These two elements convey the message of touch and interaction and extend it further. These elements are critical to the tactile aspects of designing that are important as the visual elements to help enhance the interaction that people will have with the textiles as presented in the context of art installation. The use of colour, scale and abstract forms will help invite people to reach out, touch and engage with these interactive art installations.

IMAGINATION/WONDER/TRANSPORTING

As creators we find inspiration in many aspects of our lives. Viewing the colour of the morning light coming into your room while drinking coffee could create many different inspiration points and could help bring two ideas together to create one. Being able to experience the world phenomenologically is a way of being in the world, an approach which is core to my artistic practice (Becker, 2018). This phenomenology "involves a different way of knowing the world. Whereas theory 'thinks' the world, practice 'grasps' the world—it grasps the world phatically" (van Manen, 2007, p. 20). Being able to look at the world in this way creates a way of academically accrediting the practice, and it also allows the practitioner to become a part of the work. These aspects of life allow you to look at everyday life experiences to create art. It is based on a sense of wonder. In other words, by using your imagination to create something that was not there you can formulate it into something that other people can experience. The imagination has been studied for years. The philosopher Jean-Paul Sartre suggests that as humans we have the power to create the life that we desire, that it all comes from the imagination, and he states this is also where the creative process comes from (Sartre, 1948). If the imagination is so powerful within the creative world, why then is it sometimes seen as child's play? Sigmund Freud used a metaphor about child's play to explain the creative process. Play and practice work hand in hand and serve as a place for imaginative activity to take place. Play is an important part of the creative process and Freud goes on to say, "the opposite of play is not what is serious but what is real" (Freud as cited in Popova, 2017, para. 2). The process of creating necessitates that we keep that spark or sense of wonder alive within ourselves, so others can experience that sense of wonder.

The way of using textiles and art to be able to transport your mind and move forward even if you are stuck at home or have minimal movements as it offers the chance to distract from everyday life. My hopes for this work are to create an art installation that allows people to be energised by engaging with the art. During Covid19 lockdowns, I found I had so much time, I was on the phone for hours at a time. I not only felt disconnected I was obsessed with life online. Returning to creating and working with my hands again, stopped me thinking about everything online. It really pulled me out of a place of sadness. I want to be able to create 'out of this world' textile art that allows people to experience the same sort of relaxation and escape, that exploring the world of textile art can provide.

ARTIST MODELS

In this section I will articulate the artist's inspiration for this work as well as different forms of inspiration. During the development of this research project, I began to change the way that I would usually view the project because my background is in textile design and within this field there was a real push for functional design artifacts like clothing or homewares. This research project provided an opportunity to expand the way that I use and design textiles. I was able to create and develop ideas for an artistic outcome. This has been exciting, and demanding, as I was crossing into a new disciplinary domain. In this context the work of other artists has been informative and inspiring.

An example which speaks to this is the work of Malin Bobeck: Tactile Refuge (2017), an interactive installation that creates an 'escape to an alternative reality; a world shaped by touch' (Bobeck, 2017). Tactile Refuge uses textiles that change colour and create movement with colour if touched. The centrepiece sculpture that has been created is made to be able to register human touch and it reacts to the touch by changing colour. This then affects the whole installation and intensifies the immersive light in the fabric. The interaction is collaborative so that the user can make the reaction even stronger, changing the atmosphere of the entire space. The collaboration of colour, tactility, and humans in a digitally enabled immersive and analogue environment centred around sense, offers this research an opportunity to reflect on how one world can be transposed onto another in a playful way. "Art does not reproduce the visible but makes visible" (Klee as cited in Ingold, 2009, p.91). This suggests that an artist can use her imagination to create and develop work that is seen in her mind or imagination and then bring it to life. This artist demonstrates balances between interactive art and textiles.

Sculpture in relation to textiles has been a form of art that I found very interesting. Anthony Caro, an artist who works with sculpture and creates art, really helped to open my mind. Caro considers the space and the areas where sculpture can be placed, moving it off the traditional pedestal and into the space. His work and commitment in terms of placing sculpture directly on the ground, without the guaranteed status or space, apart from the viewer's own space, is unique. I really connected with (See figure one). In the image Caros' work is made from steel in contrast to my work in textiles. However, the use of space and colour combined with the scale and proportion of the objects was inspiring.

Figure One: Steel & aluminium, painted magenta, orange & green

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Eva Hesse, another artist who works in this interesting blend of sculpture and materials, is a sculpture artist who works with materials including latex, plastic, and fiberglass. She also had an interesting way of displaying her work and she created draped forms that I found intriguing. As she worked with textiles in a visual and art context, I realised that there is a way to create interesting forms from non-traditional materials and textiles as seen in figure two. Both artists are mentioned in Rosalind Krauss's seminal book 'Passages in Modern Sculpture' where she talks about the change in the way that the sculpture was being made and viewed. Being able to create work that could be made from multiple mediums, opened the art world to a new area of sculpture.

In this literature review, I was able to contextualise my research and situate the work within an academic context. Based on a mix of theoretical and artistic work allows the work to draw from a collection of knowledge in multiple areas. The review also helps situate this research project with the research methods that will be discussed in the next chapter.

Figure Two: Photo inside Eva Hesse Studio

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CHAPTER TWO: RESEARCH METHODOLOGY

RESEARCH METHODOLOGY

This chapter discusses the research framework, and the research design and methods that were used to conduct this research project that is practice-based. It includes a discussion of practice-based research and the process that was used to develop insights through making, reflection and developing the works of art. The process of including drawing as a method to work through the ideas and create textiles has been integral to the project. The method that has been used involved exploring different possibilities to develop momentum. It included an integration process that involved rapidly making and creating the textile samples.

PRACTICE-BASED RESEARCH

Referring to practice-based research Candy states “If a creative artefact is the basis of the contribution to knowledge, the research is practice-based” (Candy, 2006, p.1). In this project the design practice has guided and directed the process and choice of creative methods, leading the practitioner through the research process. This involved an iterative process of making and reflection. The process of reflective practice has enabled insight, change and development, through reflecting in and on action (Schön, 1987; Scrivener, 2002). This methodological approach has been used extensively in art and design research, as research through practice has resulted in new insights, methods, and original artefacts (Cleveland, 2018; Jones, 2011; Smitheram, 2016; Stephen, 2016).

The limitations of practice-based approaches have been raised by some design researchers who wanted to develop generalisable design theories, criticised a practice-based approach where findings relate to a single case and are not generalisable (Friedman, 2003). On the other hand, my research seeks to explore, expand, and articulate the creative potential of sensory textiles and the imagination. Individual creative exploration is a valid means of exploring this field and communicating an approach that would otherwise remain tacit (Frappaolo, 2008). The findings of this research articulate and reflect on this inquiry and the process, insights and outcomes that may be of interest and value to other textile artists. The research does not intend to develop a generalisable theory, but to develop processes, possibilities and better articulate an approach to interactive textile design, and its expressive potential.

Figure three is a representation of the way this practice-based project has been conducted, with the process moving backwards and forwards between theory and the research question, through the various phases of the textile practice. This has allowed the work to change and develop. Candy talks about the way practice-based research is developed through research and creative practice (Candy, 2011). This breaks down the relationship between active, practice-based research and the theory and how it works within the research. Candy states that in terms of practice-based methodology, the artefact is a major outcome, as it embodies or demonstrates the research findings. This form of research differs from creative practice as the research is conducted to augment knowledge, rather than to just to produce an artefact or solution. It is critical to recognise this distinction between research that might inform a project or practice, and research and discovery conducted through practice. The creative works generated through this research process and presented along with this written exegesis are integral to the thesis.

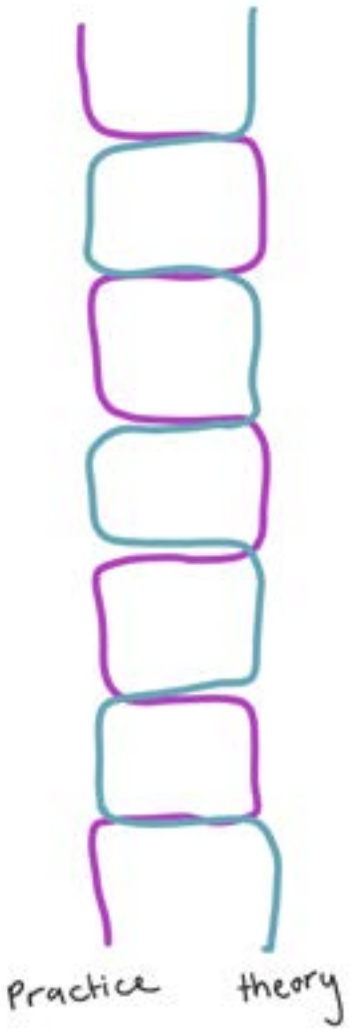


Figure Three: Drawing of practice and theory graph

RESEARCH METHODS

The inquiry has taken an experimental approach, not as a scientific experiment, to systematically prove or disprove a theory, but as form and material experimentation in terms of the creative design and it involved the making of three-dimensional artefacts. The following section identifies and details the experimental approaches using methods of drawing and prototyping and scenarios for interaction. It is followed by a section on analytical methods, that discuss reflection in and on action, and documentation.

DRAWING OUT IDEAS

During this research the development of forms and shapes explored through drawing has been a core process. Linda Jones (2011) explains that although one often assumes that design ideation begins with sketching, this process begins with:

> Conceptualisation generally occurs as a form of mental visualisation. In this regard, silhouettes, forms and the potential 'feel' of a garment begin to take form in my 'mind's eye'. As this visualisation gains substance, I enter into an interior, dialogic process through forms of drawing (p.32).

This explanation of drawing and practice is relevant to the contextualisation of my research method of drawing. Gully (2010) describes the research method of sketching/drawing as putting "your mind on paper" (p.2). She suggests that "spontaneous and rapid production of ideas means no editing in the head; getting it on paper; then going back to it later for scrutiny" (p.2). This process allows for the creation of many different quick design iterations that have no restrictions as they are conceptual. Through iterations of the method, ideas can be quickly developed and worked through to see if they have further potential or not. However, working on the drawings can then feed into the development and rapid creation of the textiles, as these drawings can give the designer more direction.

It has been extremely productive to draw and to be able get ideas out on to paper. Drawing has also been helpful to plan out the textiles I wanted to create. Through this process the shapes and forms to be developed, can be identified. Being able to conceptualise the designs and develop the shapes and forms early in the practice gives the project a chance to move through many different design ideas rapidly. This ensures that time is not lost on ideas that are not going to further the research. The most appropriate description of how drawing works alongside the creative process and creative researchers is given by Mäkelä, Heikkinen and Nimkulrat (2014):

> Drawing, like dancing, is an exploratory, sense-making process where the observer, and the thing or idea observed, are inextricably bound together in a physical, material space/time relationship. Drawing is both an active and subjective engagement, valued by artistic researchers, not only for what may finally be encrypted in the drawing, but more significantly for the access provided through drawing to thinking that is close to the unconscious. Because of the complex nature of drawing activity and its wide applications, the value of drawing as a research method has only recently been acknowledged. This has resulted in fruitful and profound discussions, that are taking place currently both inside the art and design academic community as well as outside in the wider scientific communities (p.4).

Being able to create a physical space for ideas, on paper, has been critical to my design process and also to the productivity of the project as it has externalised ideas. This process of iterative drawing is an established part of my creative practice that allows me to physically represent ideas to refer to at later stages of the design and making process. Because the creative process isn't a linear one, this has allowed me to move back and forward, to and from concepts quickly and visually.

Using an iPad for the drawing has been helpful. While drawing on paper is simple and easy, being able to create drawings digitally meant that I was able to experiment with and change colour and texture more easily. Research has been conducted comparing drawing on paper to digitally creating drawings. Evan and Aldoy (2016) suggest that while drawing on a personal computer (PC) requires more error corrections than paper, there is evidence that using the undo tool allows designers to be more adventurous. For me, these techniques allowed a lot more creative freedom while I have been creating and developing ideas further.

MOOD BOARDS

Mood boards are collections of images that designers use for personal inspiration and communication during the design process (McDonagh and Storer, 2004). They have been a critical part of my research process, particularly in relation to the development of colour palettes and abstract forms. Being able to place or set drawings I have created alongside images and textures that begin to visually articulate the look and feel of the work-in–process has been central to the hands-on way I work.

EXPERIMENTATION THROUGH PROTOTYPING

Rapid making and creating textile samples and models in practice has been a method used to explore possibilities and develop momentum. There are many different types and uses of prototyping recognised in design literature (Houde and Hill, 1997; Lim, Stolterman and Tenenberg, 2008). For example, Gordon and Bieman (1995) identify the value of prototyping as a time-compression technique; a method that allows for work to be reviewed and then developed with a faster turnaround. However, in this design research project the process of prototyping is seen as a means of inquiry (Wensveen and Matthews, 2014). The prototype is developed as a way of exploring various material, formal and/or technical possibilities. The prototyping process is analysed, critically assessed, documented, and written up. The research contribution is tied to the way the artefact was crafted, how it behaved and how it led onto further iterations and developments (Wensveen and Matthews, 2014).

The use of prototyping within a creative pathway allows conclusions to arise that sitting at a desk will not generate. The use of prototyping allows the practitioner to actively work through many different ideas and physical aspects of the work, being able to see how they function and then reflect on whether that helps to answer their research question (Wensveen and Matthews, 2014). This process has been beneficial for this research because within textile design there are many interrelated aspects that must be considered including texture, colour, form, and composition (Studd, 2002). The technical aspects involved with integrating all the different aspects so they work together requires a design and creation process that accommodates these diverse factors. During the practice, prototyping was used as a way of materialising my sketches. A relationship was created between my digital drawing and experimental making. The process is a type of visual thinking and materialisation through prototyping.

EXPLORING INTERACTION THROUGH TECHNOLOGY, PLAY AND THE SENSES

Interactive art responds to audience, environmental or other external forms of engagement. Interaction design tends to involve computers, interfaces and sensors that react to inputs, such as motion, pressure, or environmental data. Interaction also involves unmediated forms of human/object engagement, through tactile, kinaesthetic, and performative engagement, as sensory design. Lupton and Lipps, (2018) suggest sensory design is embodied since it:

> Activates touch, sound, smell, taste, and the wisdom of the body. The sensory design supports everyone's opportunity to receive information, explore the world, and experience joy, wonder, and social connections, regardless of our sensory abilities (p. 9).

This project has involved both electronic and embodied interaction design approaches. The development of interaction in the creative works was an iterative process that evolved along with considerations of form, colour, texture, configuration, and scale. Initially my intention was to create soft textile sculptures that were fun. As the works evolved, they prompted play and interaction. For example, in the work (chapter three, Appendages, p. 59) once the tubes were made, I found that because of the length of the tubes I was able to move them around. Consequently, I wanted to extend this aspect of the work by creating a system where the tubes could be repositioned, so I experimented with and employed magnets as a way of holding and being able to reconfigure the work.

This state of mind where we are questioning and being inquisitive of our world is characterised as being in a state of play (Brown, 2009). The points of interaction and areas that were investigated during this research focused particularly on materials and play. There was an emphasis on creating fabrics and textiles that would encourage touch, either through the development of tactile elements or through the shape of the textile forms themselves. The theory of play has informed this approach to the interaction creating a sort of bridge between play as a child and the space for being able to play as an adult. Research in Neuroscience suggests that positive play can transform our mood and this can affect the rest of our everyday existence (Sutton-Smith, 2008). In the book Play: How it Shapes the Brain, Opens the Imagination, and Invigorates the Soul (Brown, 2009) talks about how play is an activity that humans enjoy in everyday life, it is a primal need to constantly problem-solve, to question the world around us. These ideas have informed and supported this research by engaging the imagination through interactive textile art and exploring this world in a playful way.

REFECTION AND DOCUMENTATION

Reflection on the creative process has informed and guided the development of the project. This reflective approach has been utilised in analysing and gaining insights through the research practice. Extensive research has been conducted in reflective thinking within the design discipline (Richardson and Maltby, 1995). Donald Schön was one of the first people to consider reflection and practice (1983). Schön describes how writing and thinking changed how professionals looked at the way we reflect on practice, describing three different ways of reflecting. Firstly, 'reflection in action', where the reflection happens during the action/ making. In this way you are thinking about what you are doing to make changes along the way if needed. Secondly, 'reflection on action' can happen after the designer has had a chance to reflect and think back about the work they have previously developed allowing for more considered reflection. Thirdly, as 'reflection on practice', is achieved from learnt mistakes, the designer can make changes based on learnings from past projects (Schön, 1983).

Schön's definitions are helpful to contextualise the different types of reflection in and on action, and on practice, employed iteratively across different stages of the research process. Even though all three types of reflection were used across my project, there was a focus on reflection action. By taking time to hold and work with the textiles while I thought about the process, I could then write down my reflections.

During the process of making the textiles and creative works, the use of reflection through the format of a visual diary was critical to move forward. Using the visual diary as a place to stop, think and analyse my practice helped me to make the most of reflection-on-practice. This process has been critical. The visual diary was also used to record and document the process. In addition to the diary as a physical space to reflect, it has helped to document my progress with images and reflective comments as shown in figure four.

During the design process the thoughts that I had about the work were noted in the diary. The notes could include what I was thinking about while I was making the item or sometimes it could be notes about what I was thinking about the exact moment I was looking at the image of the textiles. This is a mix of both reflection-in-action and the reflection-on-practice that Schön (1983) proposed.

To aid the reflection process I developed relevant questions. For example, in relation to textile prototypes there were three questions that I asked myself to guide the reflection. What feeling is the touch of this fabric evoking? What is the depth of the tactile fabric, is there enough difference between surfaces? And does this choice of textile encourage interaction?

These questions guided the project along a specific path that emphasised the tactile aspects of the textiles, as one of the most important aesthetic considerations of the research. This mode of reflection helped me make sure that I asked the right questions to continue developing and working to achieve the aims of the research.

Figure Four: Image of visual diary

MAPPING THE PRACTICE BASED RESEARCH

Below is a holistic representation of the way that this research was conducted. Creative practice is not linear. Being in the flow helped me to conceptualise and articulate a visual example of the way that I work. It has helped me to understand my process of research through my creative practice and to show and discuss this process with others.

Creating this graphic allowed me to step back from my work and view it from another perspective. These non-verbal expressions/ drawings are a way for ideas and concepts to be communicated very quickly. Schön considered verbal and non-verbal expressions as analogous: drawing and talking are parallel ways of designing, and together make up what he calls the" language of design" (1983, pp. 80-81). This idea that you can explore ideas and different processes with a mix of verbal and non-verbal communications, such as drawings has been central to my approach. Schön also talks about how drawing reveals different qualities that wouldn't have been imagined beforehand, noting that the actions of hands can function as experiments (Schön, 1983, p. 157).

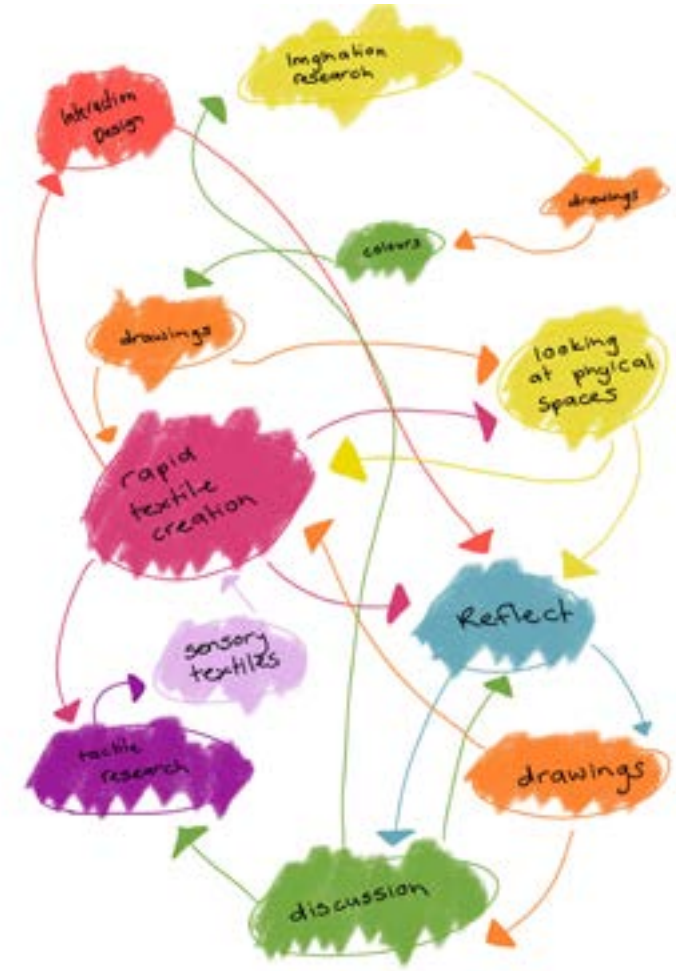


Figure Five: Drawing of creative process

This method of creative reflection and discussion is used by many practitioner/researchers as a way of allowing practitioners to work creatively and develop knowledge within an academic setting. An important area of this graph is the green section where the discussion is located. It has been helpful to be able to talk and discuss ideas and works-in-progress. This dialogue, with both my peers and my supervisors, has helped me gain different perspectives on my work and it has also stimulated different areas of inquiries. While supervisor meetings are extremely beneficial and imperative to the development of the project, peer discussion allowed more freedom to talk through multiple ideas in a different context. Through discourse, ideas can be developed, considered, and changed over time.

Incorporating iterative processes of drawing, reflection and making helped me to conceptualise, experiment, develop and refine the creative work presented in this thesis and consider it in relation to relevant theoretical ideas. In relation to the processes of making, I have utilised both traditional and new textile technologies, along with a range of natural and synthetic fibres and fabrics, and electronic componentry. The textile methods used, are detailed in the section below, along with material choices, such as fibre types, that are intrinsic to the physical structures, textures and the aesthetic expression of the textiles produced.

TECHNICAL METHODS

There are many different elements to the work created in this research project. This section describes the different techniques and methods used in making the creative works.

Digital textile printing – This method of fabric printing is produced from a digital source as a digital image. While this is typically carried out in a manufacturing context to create large rolls of fabric, as a digital process, it can also be used to produce small print runs for custom creations. Most digital textile printers use inkjet technology to print colorants onto fabric. The digital prints in this project were produced on a Mutoh Valuejet roll-to-roll digital printer. It prints with water soluble reactive dyes onto pre-treated natural fibre materials, such as cotton, linen, silk, and hemp. The fabrics are steamed after printing to chemically bond the dye to the fibres. The final process involves wet finishing to remove any loose dye and to remove the pre-treatment solution before drying and pressing.

Digital textile printing allows the designer to use a wide gamut of colours, without the limitations of earlier forms of textile printing, such as screen printing. There are certain important features of this technology that I utilised throughout the project. They include the extended colour palette along with the immediacy of producing print samples. Digital print has been used to allow for more control of my own imagery and the colours within the research project.

Digital knitting – Over the past 40 years, digital knit technology has replaced earlier mechanical knit systems. Digital knit systems include a design system and knitting machines. I designed the digital knitting in this research on a Shima Seiki Apex 3 Design System. This system provided design, pattern making, 3D visualisation and knit programming software. The Apex 3 is regarded as one of the most advanced knit design systems on the global market.

The Japanese company Shima Seiki produces a range of knitting machines capable of specific types of knit production including jacquard, intarsia, inlay and WholeGarment® (seamless) knitting. However, a 10-gauge SWG 041 (WholeGarment ® accessory) machine was used for this research (Textile Design lab. n.d.). Using digital knitting within this project meant that I was able to develop and control the tactile depth of the work, to create completely customisable textures and knits.

Wet felting - Felt is a technique that produces a textile material by matting, condensing, and pressing fibres together. The process of wet felting is done by rubbing wool fibres together with warm water and soap. This causes agitation within the fibres which allows them to mat together. The wet felting process not only produces a textile it also allows for shaping textile forms through casting or draping the wet matted fibre. Wet felting allows me to work with my hands while being able to create very organic 3-dimensional textile forms that can also be customised to different requirements.

Tufting - Tufting, is a traditional carpet making process used to produce rugs. The yarn is fed through a hollow needle at the end of a tufting gun. The yarn penetrates a piece of fabric that has been stretched taut over a frame, the yarn is pushed and knotted through the fabric. Typically, there are two different types of tufting, cut pile and loop pile. For this project, the tufting gun that was used for rug making was a cut pile gun. The process of tufting and making rugs allowed the space on the floor to be utilised and completely customisable within the space where I worked.

E-textiles - Electronic textiles or e-textiles are fabrics that enable digital components, such as a battery, a light, or other electronic components to be embedded into them. Integrating soft and flexible textiles capable of being conductive, such as silver and copper fibres can replace traditional rigid wires and sensors. This means we can incorporate or embed technology into soft and flexible textiles. This research uses soft conductive fabrics and fibres and incorporates small sewable electronic componentry, such as PIR sensors (passive infrared sensors), servo motors and Lilypad microcontrollers. These technologies have been used to make the textile forms more expressive, by involving movement and they respond to audience interaction. Electronic textiles allow for the incorporation of different electronic componentry that can be programmed to produce interesting interactions for people.

These various technologies and processes, utilised within a practice-based framework, supported the development of imaginative textile expressions through colour, texture, form and interaction. They have informed the process and discussion of creative practice in chapter three.

CHAPTER THREE: CREATIVE PRACTICE

INTRODUCTION TO CREATIVE PRACTICE

This chapter discusses and describes the application of the methodological framework through the research practice. It analyses and reflects on the making process and the artefacts produced. It begins by discussing the initial experimental textile practice, the development of textiles through the process of drawing and the evolution of the mood board and colour palette. It then moves through the practice using the three textile artworks as a series of individual making processes. Although the development of the three physical outcomes is discussed in a linear fashion, to provide coherence in the exegesis, it is important to note that the works were developed simultaneously. The approaches to the practice, such as experimentation, drawing, reflecting, discussion, interaction design, and sensory textile development are discussed throughout the chapter.

The development of the creative practice was a very personal one. There was a sense of realising the world that I saw in my childhood imagination. This included the voice of my muse, my imaginary friend, and it brought back memories of our early connection, interactions and the colourful world we shared and explored together. The creation of the textile artifacts was based on my childhood memories. There was a desire to tap into that playful part of myself that I explored as a child with my favourite imaginary friend. I was able to capture some of our conversations while I was creating. As I grew up and continued to create in my imagination the dialogue shifted slightly so I developed ways to consider the internal dialogue we had. My muse had a bold and blatant opinion about everything in our shared world, playfulness and happiness were always encouraged. The environment was bright, colourful, and engaging. It may seem enchanting and magical that Bill still had an influence on me and my work. I was delighted to carry on communication through my imagination. This form of communication was mainly portrayed through the artwork that I developed directly from my imagination.

Figure six: Collection of Six drawings

EARLY DESIGN DEVELOPMENT

The initial practice involved cycles of rapid drawing and physically realising these drawings through textile expressions. Early drawing took inspiration from my own imagination combined with early research into tactility and ways of evoking the senses (Ingold, 2009; Pallasmaa, 2012; Djonov and Van Leeuwen, 2011). The relationship I have with drawing is spontaneous and largely impromptu and instinctive. I allow myself to draw without limitations or expectations. This spontaneous unstudied nature of rapid drawing means I have fewer restrictions as the ideas are purely conceptual (Gully, 2010). See figure six for examples of these early drawings. The process of drawing was done with Apple Pencil and iPad. I use an app called Procreate®. This allows me to manipulate the drawings and add or remove sketches or manipulate the compositions and colours, see figure seven. Perhaps most fascinating is the relationship between my 2-dimensional digital drawing and the development of my 3-dimensional textile experimentation. Most of my textile making starts from a digital drawing. At this stage I began manipulating the existing textiles in my studio and creating new textiles to represent the feeling, scale, colour, texture, or shape of the drawing. See figure eight to visualise this process. This process, a step between my imagination and the physical making process, has benefited my creative process. For example, in developing the spot patterned, knitted textile in figure nine, I used 2-dimensional digital drawing as a medium to communicate what I saw and felt in my imagination, see figure ten, evoking different senses, and then using the drawings as maps or creative diagrammatic representations for generating and fabricating 3-dimensional textile forms. In a way the textiles extend my drawings into tangible material forms that are fully dimensional.

Figure Seven: Example of layers being removed from drawing

Figure Eight: Drawing to textile comparison

Figure Nine: Orange knit and silk comparison

Figure ten: Orange circle drawings

I am also able to take some of the newly created textile experimentations and reverse them into a drawn form. This process results in cycles of drawing, making, reflecting in the moment, and reflecting on the making and back to drawing. One example of this can be seen in the development of knitted textiles, where the pattern, texture and colour started as a digital sketch, see figure eleven. A textile was developed from this that was able to capture the physical nature of the sketch, for example, the shaped silk bubbles that were made by heat setting silk over rocks and steaming them. The textile then holds the light in a 3-dimensional bubble form, see figure tweleve. However, I again returned to the drawing process while I digitally captured the new silk texture, see figure thirteen. After capturing the essence of the textile in the drawn form I then explored ways to redevelop the textile in a way that would exaggerate the tactile depth of the fabric and accentuate the bubbly form, using the process of digitally knitting with Pemotex yarn on the SIG Shima machine. Pemotex is made using 100% polyester, therefore if you apply heat to it, the yarn itself shrinks and becomes hard. Once the yarn has stiffened it cannot be reversed. Using heat on Pemotex yarn enables the manipulation of the textile form and shrinkage of the fabric. In this example seen in figure fourteen, I have manipulated the knitted textile over an object and steamed it to attempt to make a 3-dimensional rounded shape. This process was extended by intentionally knitting sections with and without Pemotex. The Pemotex yarn was used in one section of the knitted sample, the other section used a 2/20 maize coloured cotton. Steam was used to contract the yarn making the Pemotex harden and become dense causing the non Pemotex yarn to wrinkle, this can be seen in figure fifteen. The yellow yarn has become rather three dimensional because there was no space for the yarn to go once it had been steamed. Depending on the knit pattern you can control the shape (shrink) of the textile dynamically. This produced a very tactile and interesting textile. The change in the tactile depth of the textiles exaggerated the 3-dimensional form.

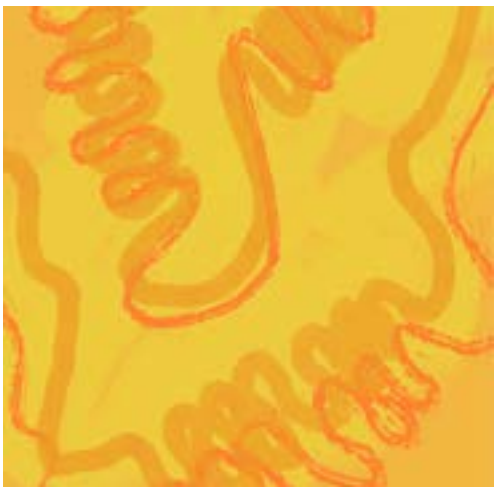


Figure eleven: Yellow and orange texture drawing

Figure Twelve: Yellow Heat set silk

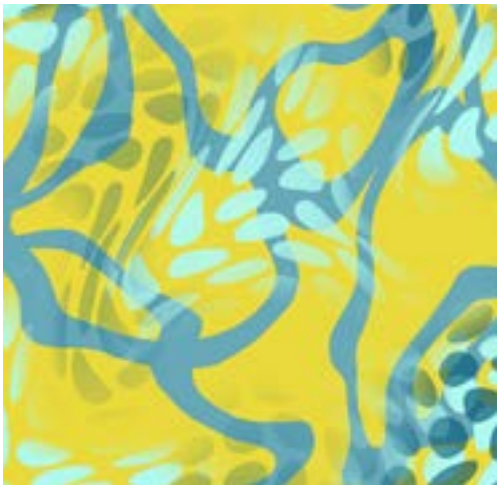


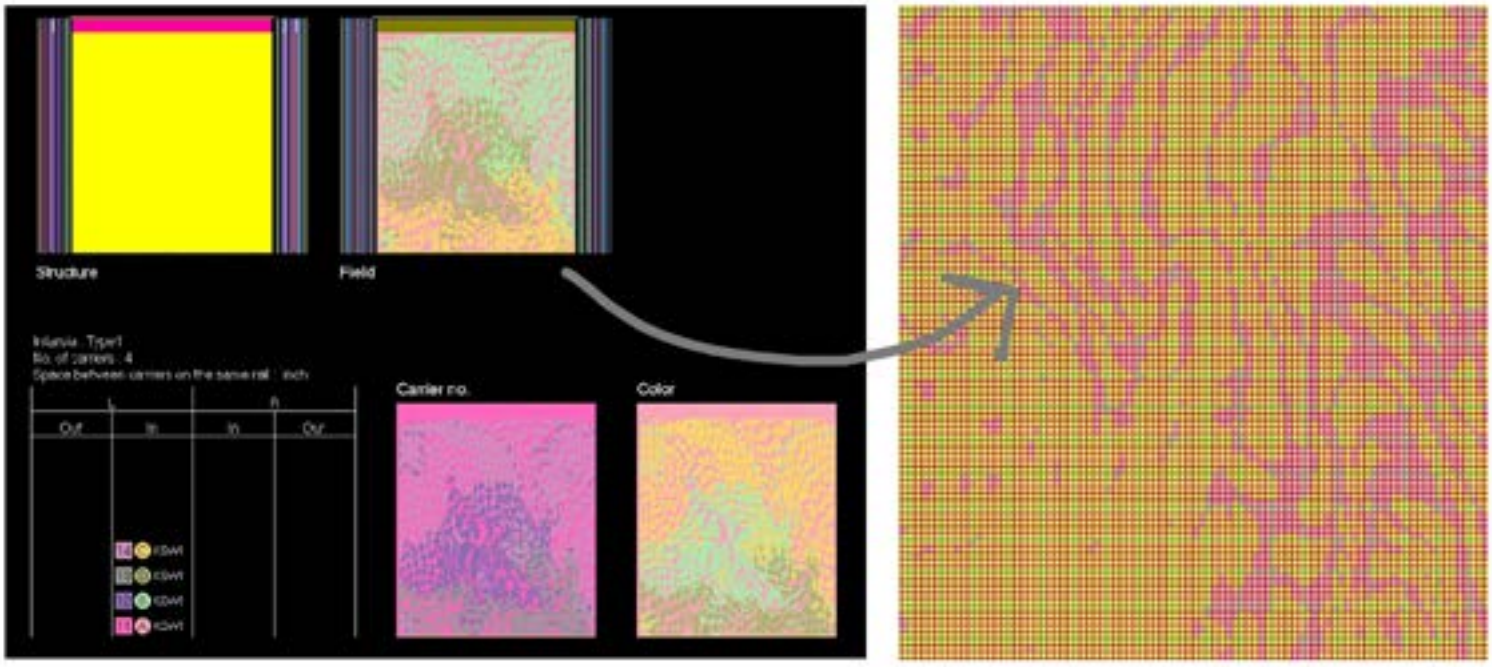
Figure Thirteen: Yellow and blue texture drawing

Figure Fourteen: Blue Pemotex heatset

Figure Fifteen: Yellow Pemotex Knit

It was interesting that these new materials developed using Pemotex inspired new methods of experimentation around shaping and form. This sparked an interest in ways to create shape, changing forms by developing 3-dimensional knitting without Pemotex. I began with digitally drawing and creating a pattern with an element of movement (see figure seventeen). I then worked on the Apex digital knit machine software to develop the pattern. I was able to move the drawing as a JPEG (Joint photographic experts' group) file over on to the Apex system where I then selected colours. During this stage, I also experimented by adding a small section of different coloured dots to add some interest. Then I was able to take it through the automatic software to convert it to a knit file, this is called a .000 which holds all the knit data (see figure sixteen). Being able to create these digital drawings on my iPad and then be able to convert them into the Apex digital knit machine software creates an incredibly seamless transition. Unexpectedly, some of the areas gathered because as the knitting machine is knitting with one colour on the front, there are also two colours being held on the back bed making it unbalanced. This causes the knit to gather and create ridges on the back. The resulting textile clearly illustrates the movement from the digital drawing (see figure eighteen). This approach to making through drawing and textile experimentation is further discussed through the development of the series of individual works.

Figure Sixteen: Images of Knit Programming on Apex



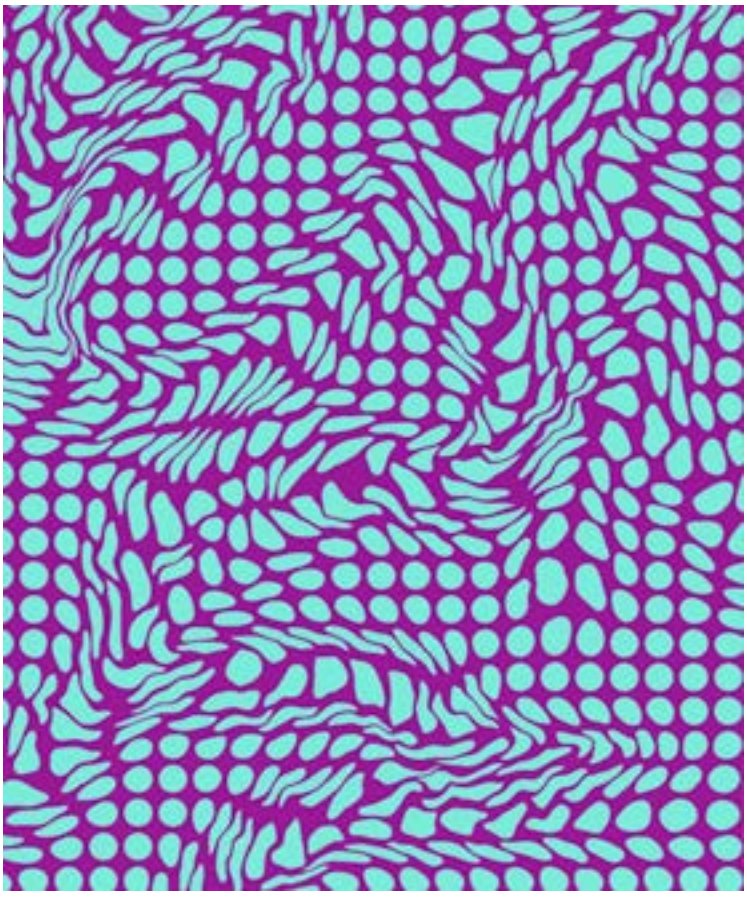


Figure Seventeen: Drawing of distorted dots

Figure Eighteen: Image of Digital Knitted distorted dots

MOOD BOARDS

During this initial stage of the research a mood board was also developed. This was used as a way of collecting my thoughts, drawings, and concepts together. It allowed me to visually see and communicate my ideas and conversions that I was trying to portray from the perspective of my imaginary world. It was a type of visual thinking (Arnheim, 1997). I iteratively collected, collaged, reformed, and refined the board to evoke the essence of an imaginative and playful world. Additionally, I used the process to gather my contextual research and inspiration from other designers or artists who work in a similar way. For me the mood board is never static, it shifts and reconfigures throughout the practice. For example, in figure nineteen, I used the board to gather inspiration about textiles as sculpture. Whereas further on in the research I was able to start to add images that I had drawn and prints that I had developed, see figure twenty. In the third mood board, see figure twenty-one, I experimented with ways of expressing the difference between the world I live in, literally the landscape outside my studio window, and the world I see in my imagination. The photograph is the view outside my studio. Using another digital drawing technique, I reimagined this environment with colour and pattern (figure twenty-two). This mixed media approach allowed me to explore blending my two worlds and attempt to materialise the imaginary world that I envisioned. These refined versions show the development of the concepts and communicate the playful imaginative world I was trying to create.

Figure Nineteen: Collection of images of Aesthetics research

Figure Twenty: Concept Mood board

Figure Twenty-one: Final mood board

Figure Twenty-two: Colourful drawing done over Auckland Cityscape

COLOUR

I want people to experience the expressive and bright colours that I see in my imagination. Standard colour theory explains how colour can change your mood (Wheeler, 1980) and in fact, colours can affect a human's wellbeing (Thorsteinsson, 2012). The colours have been chosen because I believe they convey emotions such as happiness, fun and playfulness. The boldness of the colour palette also encourages people to engage with the textile work and embrace colour in a playful way. As a designer I have always been interested in colour and texture, this comes from the desire to create a colourful world that reminds me of the happy child inside me that associates colour with Bill that I so fondly remember. I am fascinated by the complexities of colour, hue, tones, and the influence they have on design. I am interested in the convergence of textures and colours, and while they may not appear to work together immediately, I continued to create an unusual layering of the two design elements, to bring the textile to life. This use of bright colour in textile design challenges the standard practice of using colour trends to inform the design process. Supporting this notion Adam Furman states that "Design education "brainwashes" students into rejecting colour, pattern and ornament" (Furman as cited in Jordahn, 2020). He suggests that new designers can overcome this bias and move away from modern society's use of "white and beige tones" (Furman as cited in Jordahn, 2020).

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Furman's New London Fabulous design movement showcases bright and expressive colours (see figure twenty-three) to create other worlds and spaces that people can step into and develop from (Furman as cited in Jordahn, 2020). As a designer this is a factor I really resonate with. I have a desire to create and materialise a colourful world I can see and dream about living in. Like Furman, I developed a colour palette with colours that demand to be seen and I also wanted to entice people to touch and interact with the textiles. Additionally, I used some shades within this colour range to add depth. See figure twenty-four for an image of the final colour palette.

Figure Twenty-three: Adam Nathaniel Furman images of New London Fabulous

Figure Twenty-four: Final colourway

RAPID EXPERIMENTATION

Part of the early design development was a considerable amount of rapid experimentation. This rapid amount of work in a short amount of time allows the designer to problem solve a lot faster and develop ideas rapidly (Houde and Hill, 1997; Lim, Stolterman and Tenenberg, 2008). I have used this process for many years and found it to be the best method for creating work in a way that enabled me to simultaneously develop multiple ideas and techniques. It also helped me to build momentum at a time if I was not sure of the direction of the research. As colour and tactility were at the foreground of the making, I worked to develop shapes and forms creating different textures and tactile sensations (See figure Twenty-five). At this point of the work, I was creating textiles that evoked the sense of touch.

As I created, I surrounded myself with the work engulfing my studio in the hybrid quality of drawing, textiles, and sculpture. In a way my environment became an extension of my mood board (See figure twenty-six). For me this was another form of visual thinking (Arnheim, 1997) that happens throughout my practice, allowing me to reflect while in the process of making and reflect on my experimental textiles. It was around this time that something unexpected happened, other practitioners and designers sharing the studio space began to interact with and manipulate the textiles. This was the start of exploring dynamic sculptural forms. I was motivated to leave forms out in the studio and see how people would be inspired to choreograph or arrange them (See figure twenty-seven).

Figure Twenty-five: First image of wall

Figure Twenty-six: Photograph of second wall

Figure twenty-seven: Three examples of tube set ups

CREATING INTERACTIVE OBJECTS IN A 3-DIMENSIONAL SPACE

Working within a space to create an interactive form meant that I was working at a different scale. I was now considering the textile and the sculptural form. During this process I again used digital drawing. I was able to navigate the look and feel of the shape, balanced with function and interaction (see figure twenty-eight). I was exploring aesthetic function, people, the experience of the textural environment and the use of space (Suwa and Twersky, 1997).

This presented an opportunity to develop the idea from something psychological to something tangible. Bridging this gap between imaginary and physical allows the creative process to be a personal artistic expression of the practitioner rather than merely a research project.

This process of drawing and continually developing the idea has been beneficial. The extended mood board allowed the constant flow of ideas to visually change in front of me. Allowing for this within the space where I was creating has been an invaluable tool to help keep all my ideas together as I could see them very quickly on my studio walls. It added a sense of wonder to be able to create spaces that incorporate multiple textile technologies to enhance the use of the imagination in people viewing and interacting with these textiles. This has been accomplished with digital knit, digital print, wet felting, and tufting. This evolution of my experience and my imagination into a physical space through the creative process was challenging balancing what seemed right and creating what people would want. Furman states that "visual culture is the embodiment of identity" (Furman as cited in Jordahn, 2020). Furman's view and engaging with his work was monumental to this research as it affected the way I approached my practice. I changed the way I was looking at my work. I started to focus more on creating work I could see based on my imagination and not what I thought others wanted to see. This shifted my practice and led to the clear delineation of three pieces.

Figure Twenty-eight: Concept drawings of possible ideas

PROTOTYPE AND DEVELOPMENT OF THREE ARTEFACTS

The direction of three individual series of making started to emerge. This was a culmination of both allowing myself to create textile sculptural forms inspired by my imagination combined with anecdotal affirmation revealing how people interacted with the work in the academic studio. I was able to critically reflect on the work and materialise a world full of textile landscapes. The three artefacts are referred to as, appendages, personified rocks, and kinetic stalactites.

APPENDAGES

Appendages is a collection of digitally knitted tubes. The shape emerged from exploring ways in which I could create 3-dimensional knitted forms. Inspiration was drawn from my digital drawings of my early textile experiments where I had explored 3-dimensional form. I started the process by using the automatic software within the Apex design system. This enabled me to create 3-dimensional knit files. These were tubes 50cm in length and 10cm in width at the top tapering down to 5cm at the end. I then filled them with hobby fill and experimented with connecting all five of them together in different orientations (Refer to figure twenty-nine). At this point I had left them on a small display plinth in the studio. Interestingly, other users of the studio began to manipulate the tubes and rearrange them into different positions (Refer to figure twenty-seven).

The simple folded and twisted prototype had tempted people to engage with it. Although the single knit tubes were not tactile, they became tactile as objects once people interacted with the tubes. At this point I experimented with the scale of the tubes, developing a prototype that was double the length and wider at the top end. These tubes were 120cm long, 25cm wide at the top, tapered to 5cm at the bottom. As you can see from figure Thirty. The tubes started to come alive in a sense. The large scale created this sort of tentacle tube formation. When the tubes were manipulated, they became very personified in nature (Refer to figure Thirty-one). During the prototyping I also explored different colours, including colour change throughout the length of the tube. Using two yarns at the same time I was able to create a marled effect. Knitting with two different colours into a single yarn resulted in the appearance of a two-toned or mottled effect This was effective in adding some dimension to the tubes.

Figure Twenty-nine: Knitted tube prototype

Figure Thirty: Long appendages stuck together

To encourage people to manipulate the appendages, connecting and disconnecting them, I started to explore the idea of incorporating some sort of inter-changeable fastening such as domes, Velcro and magnets. Ultimately the use of magnets was incorporated as they were easy for the user to manipulate. It allowed people the chance to develop their own forms and shapes quickly by snapping different tubes together. Some rapid prototyping was done to consider how to best incorporate the magnets. These included the integration of the magnet and fabric, the user interaction, and the elements of tactility and aesthetic. Balancing the force and resistance of the magnets was interesting. I developed ways to use textiles to hide the magnet, such as wrapping them in yarn and hand felting wool around them. In addition, adding obvious bright colours delineated obvious contact points for interaction. It was exciting the way the magnets would attract each other or repel away. The coloured, raised felted bumps at the end of the appendages seemed to have a playful sense of their own (Refer to figure thirty-two and thirty-three).

While these forms are interesting and allow people to be intrigued by the strange appendages, there are small and seemly insignificant aspects I included to entice the element of touch, such as the inclusion of brightly coloured embroidery to join the shapes together. This was applied in a way so that the stitching, a simple whipstitch, was visible while joining two pieces of fabric. This was effective because it added depth to the joins of the material and encouraged touch.

Figure Thirty-one: Manipulated appendages

Figure Thirty-two: Yarn resistance for magnet

Figure Thirty-three: Felted prototype to hold magnet.

PERSONIFIED ROCKS

Personified rocks are a landscape of multi-sensory, responsive, and interactive textiles. In designing interactive objects for a 3-dimensional space it became clear I wanted to include the floor as part of that space. This artefact involved a combination of textile technologies, tufting, digital print, dry and wet felting techniques, and e-textiles.

TUFTING

Traditional flooring techniques such as carpet were considered as a means of engaging the floor of the given space. Carpets are often made using a technique called tufting. During this phase I purchased a tufting machine. The tufting was done by hand with the help of the tufting gun. In addition, I fabricated my own frames to hold the carpet backing cloth. To lock the yarn into the fabric I positioned the gun in the desired direction onto the cloth backing and inserted the stitches through (See figure thirty-four). As the technical process of tufting was new to me, considerable contextual research and practical sampling became part of my ongoing practice.

Figure thirty-four: Back of the tufting process

I started with a small test to explore different shapes, colours and effects that could be achieved through tufting (See figure thirty-five). Because tufting works by penetrating the backing fabric, I needed to consider the thickness of the yarn that could be used. I tested several types of yarn including acrylic and wool and in different thicknesses including 8 ply and 4 ply. It was determined 8ply yarn, the thickest yarn that could go through the gun, typically the gauge used in handknitting, worked best as it achieved a thicker density and lush textural pile. Acrylic yarn was chosen as acrylic yarn could be sourced easily (See figure thirty-six).

Figure Thirty-five: Yarn test for tufting

Figure Thirty-six: Yarn Testing for tufting

At this stage I was able to work on the design of the rugs. To start the making process, I began by digitally drawing my ideas (See figure Thirty-seven). This process involved going back and forth multiple times, testing different patterns and compositions. In addition to the rug composition, I needed to consider the composition of the rugs on the frame (See figure thirty-eight). I was able to fit two small rugs on the frame at one time and I added some extra blobs or tiny rugs to fill the backing fabric. I experimented with many abstract patterns for both the rug shape and the surface of the rugs (See figures thirty-nine and Forty). During the rug development phase I also explored ways to contour the pile on the carpet using shaving and cutting techniques. In doing this I was aiming to create contours to alter the depth of the textile pile. It was during this process that I started to explore 3-dimensional ball shapes to move around on the contours.

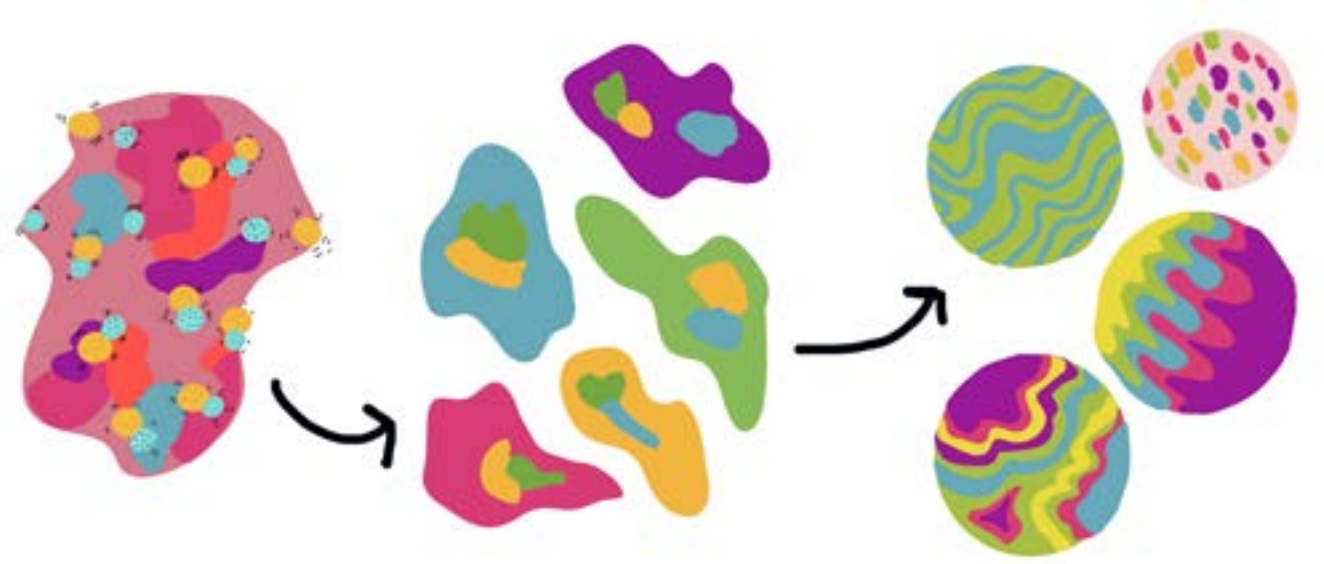


Figure Thirty-seven: Rug concept drawings

Figure Thirty-eight: Rugs on the frame

Figure Thirty-Nine: Rug concept drawing

Figure Forty: Final drawing of rug design

FELTED ROCKS

To form the textile balls, I used several textile processes. Step one was to design and print a digital silk. In my initial rapid experimentation, I had developed some prints that captured movement (See figure forty-one). At Auckland University of Technologies (AUT), Textile Design Lab, I used the FeltLOOM® (needle Felter) to laminate the silk and the wool bat together (See Figure forty-two). A bat of wool is a sheet of combed or carded wool. The needle action locks the wool and the silk together into one new textile. The textile, at this point is still 2-dimensional. To form 3-dimensional shapes I used the wet felting process. This is achieved using soap, hot water, and agitation to shrink and lock the fibres together. During this process, the wool goes through water, temperature fluctuation, soap, and agitation. This causes the wool to bond together and form a more solid and durable fabric. During this wet felting process, the textile has been moulded around a balloon to create a sphere shape. The agitation and change in temperature naturally shrink the wool fibres together into a denser fabric. However, the silk cannot shrink, and this causes the silk to gather and wrinkle which creates an interesting tactile texture (See figure forty-three).

I started by felting balls with digital print around the sphere. However, during this process, I had to cut some edges off where it was too thick. There were many small pieces that I found could be used again. Utilising the waste, another rock was formed that only had small sections of the digital print. Once they had dried and were placed on top of the tufted rugs, there was a sense they needed to move over the tufted rug terrain.

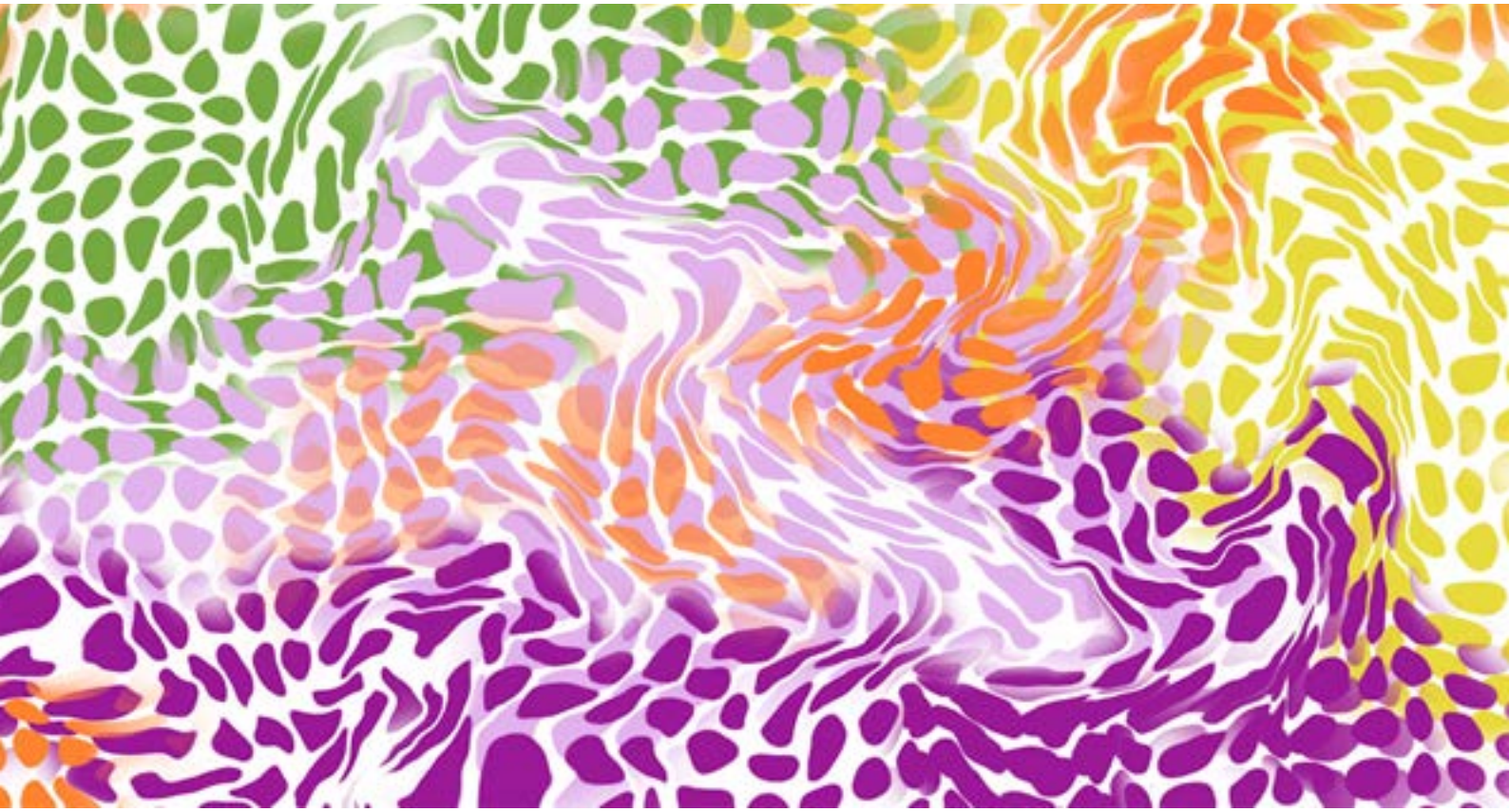


Figure Forty-one: Digital Print design

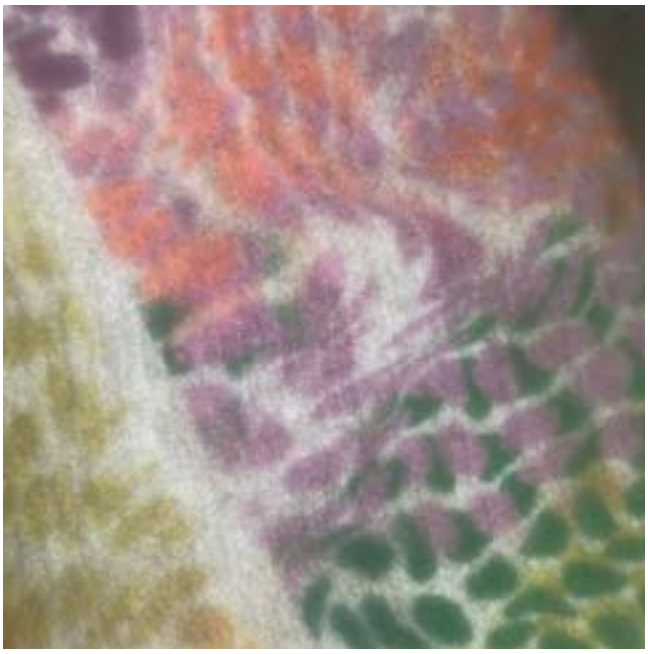


Figure Forty-two: Image of digitally printed silk on wool fibres

Figure Forty-three: Wet felted ball with digital printed silk on top

E-TEXTILES

Inspired by an E-Textiles workshop held at AUT I began to consider ways to integrate some soft textile sensors or electronic textile components into my making process, in particular, ways to have the felted rocks moved around the tufted rugs. The process began by trialling sensors and servo motors as mechanisms to move the felted rocks. Servo motors had the capacity to make the rocks turn. Ultimately, small digital Futaba servos were used as they were discrete enough to fit inside the felted rock and also had enough torque to get the balls to move (See figure Forty-four). The servos needed to be controlled by a LilyPad Arduino. A LilyPad is a programmable, sewable, electronic system that is used predominately in e-textiles. In a way this creates a bridge between the textiles and the interactive art. Some prototyping was conducted to find the best way to create the movement in the ball. Initially this was tested with thread by sewing the servo into the ball, however this did not offer enough movement. Then a small 15cm x 3cm piece of plastic was added to the top of the servo and then to the inside of the ball. This armature was effective and gave enough strength to the inside of the ball for it to move (See figure Forty-five). The next step was to connect the ball to the rug. During the testing it became apparent that the servos were not going to stay in one place. At this stage, a 3D printed base was designed to cradle the servo (See figure thirty-seven). The 3D printed base was made with tabs on the side to stitch it into the base of the rug, essentially a 3D printed, sewable cradle (See figure thirty-six).

Figure Forty-four: Futaba servo

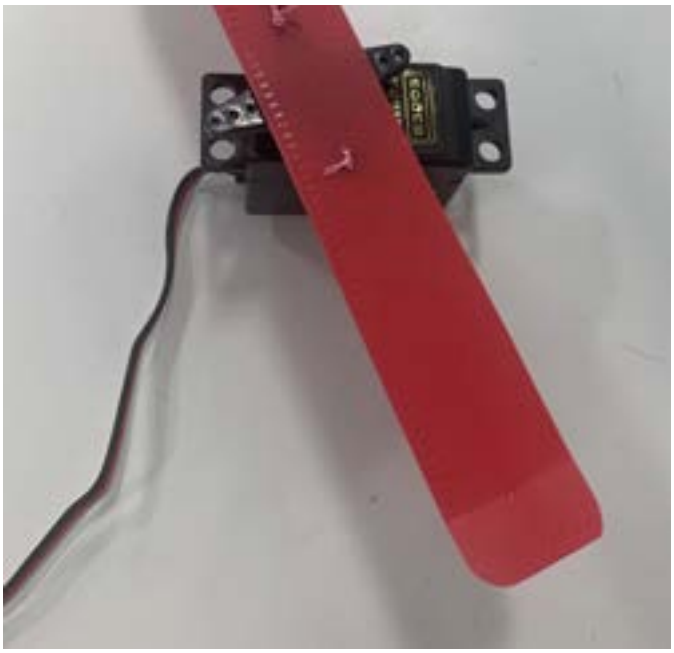


Figure Forty-five: Servo with armature

Figure Forty-six: Felted balls connected to servos and lilypad

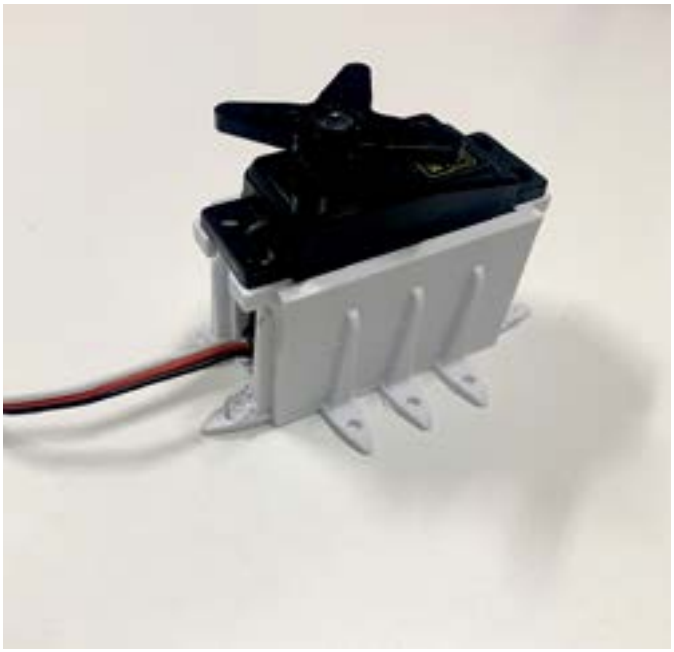


Figure Forty-seven: Servo inside 3D printed mount

Once the rocks were connected to the servo, the programming of the LilyPad was able to be done. The first time the programmed rocks were connected and turned on the reaction was unexpected. In early tests it seemed the rocks would turn back and forth however the way I had connected the servo to the rock meant one of the rocks rocked and the other contorted itself. In a way they started to take on a life of their own. They appeared to communicate with one another (See figure Forty-eight) . Initially I had been unsure about the sound the servos made if moving, it was a mechanic gear meshing noise. However, after watching them interact the mechanical sound gave the rocks some personality. I started to refer to the balls as personified rocks. They had a certain worldly personality that enhanced the idea I was trying to portray with the textile sculptures.

Figure Forty-eight: Balls Moving with servo

Figure Forty-nine: Photograph of Pressure sensor

Figure Fifty: PIR sensor

The next step involved creating a way for the rocks to interact and so they were not always on or always off. Potential sensor options explored included a pressure sensor that someone could touch, a PIR motion sensor that could sense movement and a stroke sensor that would sense if someone touched the carpet (see figures Forty-Nine and Fifty). The PIR sensor was ultimately used as it engaged the user without the person realising it. The PIR sensor sensed if someone was close to the work and would then send a message to the LilyPad to activate the servos to move. The aim was that this part of the exhibition would draw people in to explore the textile landscape.

KINETIC STALACTITES

Through the process of making the connected tubes (appendages) discussed earlier, I had explored adding weight to the ends of the knitted tubes using some stones to see how it felt to move them around. While this ultimately did not work for the connected tubes as it was too heavy, I did observe that during a discussion with my supervisors, while we were holding one of the weighted tubes, it was picked up and dropped again. The interaction was kinetic and produced an interesting and engaging sound. This sparked a series of making knitted tubes that could be pulled down and hit the ground with a more organic and kinetic movement. The use of the non-mechanical sound was interesting and from there I explored other types of weighted options such as marbles, sand, and rocks.

Through the process of digitally knitting on the SWG 401 machine with the elastic and 2/20 cotton yarn, I was able to knit some test lengths to see how the knitted elastic sections would stretch and flex with the weights in the ends of the tubes. Early testing found that the machine was not able to create the right structure to allow for enough movement in the elastic sections. However, knitting with a 2x2 (figure Fifty-one) knit structure meant that there was an even amount of the knitted elastic that was distributed. Unlike the structures that were predominately cotton yarn which did not distribute there was an even amount of yarn for it to have enough stretch.

Figure Fifty-one: Close up of knit with elastic

Even though this version worked well in terms of the elasticity, it was still too small and needed further refinement to the digital programming to get it to be flexible on a larger scale (see figure Fifty-two). This became a fine balancing act between having enough elastic, achieving the length required if it was pulled and not compromise on the use of elastic. An interlocking rib section was added to the top of the tubes which allowed the knit to move but not to over stretch (see figure Fifty-three). In addition, this change in design meant more colour could be knitted into the top section. Simultaneous to this was exploring ways to mount the pull-down parts as this also affected the way in which the stalactites could be kinetic (see figure Fifty-Four) for Images of the test pull down knits.

Figure Fifty-Two: 2x2 elastic and cotton

Figure Fifty-three: Interlocking rib

Figure Fifty-four: Whole kenetic Stalactites

ARCINTEX EXHIBITION

At this stage in the prototyping, I had an opportunity to present my work in progress at the Future Living Environments Symposium and Exhibition hosted by AUT (Whittaker, 2021). This was an opportunity to explore how the work could be set up in the space and how people would interact or engage with the textile sculptures (See figure Fifty-five). Anecdotal evidence of user interaction was valuable in further developing the work for the final examination of practice and exhibition. Setting up the work in a space that was not my studio offered me a different insight particularly with the scale of the pieces in a large room. Something that I knew I wanted to change was the size and shape of the rugs. At this point I had a conversation with some peers about what would create a sense of more or larger rugs. The larger and more circular dots were more successful in achieving this and still meant I could keep the patterns on the rugs more abstract. At this point the mechanics in the rugs were not developed and the feedback was that people wanted to touch everything so they could ascertain if the sculptures were interactive or kinetic. In addition, the colour meant people were enticed into the exhibition. Some people mentioned they only came into the exhibition after seeing my work from the gantry window and they wanted to engage with it further.

ArcInTex brought together researchers, academics, and postgraduate students from around the world to discuss current issues, research, and opportunities for collaboration around the theme of Future Living Environments. I presented my work in progress in a physical exhibition in WZ111, Ngā Wai Hono building, AUT and in the online exhibition with an associated live forum to discuss the work in the exhibition. The programme was published on the website https://www.futurelivingenvironments.org/

Figure Fifty-five: Image of work at ArcInTex

FINAL EXHIBITION

For the development and planning of the final exhibition there were certain obstacles that I was faced with, such as the space that I was required to show my work in. This was a space that had been chosen by my cohort, as a space where we would be able to showcase our work together. Because I wanted people to be able to interact with my work, I felt this space would be beneficial as I would be exhibiting my work with five other master's students. So, I thought they could interact with my work. The main limitation was the setup of the kinetic stalactites. Because of health and safety at AUT I wouldn't be able to hang any of my work from the structure of the building. In addition, this was not an option because the height of the room exceeded five meters.

Considering the different elements that had to be worked around, multiple floor plans and set ups were considered. In terms of creating and planning, it was done mainly through drawing and allowing multiple ideas to be considered and constructed. Being able to develop and think through these ideas in the same way as the design process allowed for the same thought process to happen. As seen in the collection of drawings in figures fifty-six and fifty-seven it is evident that this has been an iterative process. Developing and ideating the different perspectives that I wanted to create was important for the overall feel of the experience. One aspect that was imperative for the exhibition was to make it feel like the viewer was stepping into an experience since I didn't want it to feel like it was to be viewed from the outside. I found it was easier to group the work in clusters and create a path in and around the artifacts.

Figure Fifty-six: Drawing of layout

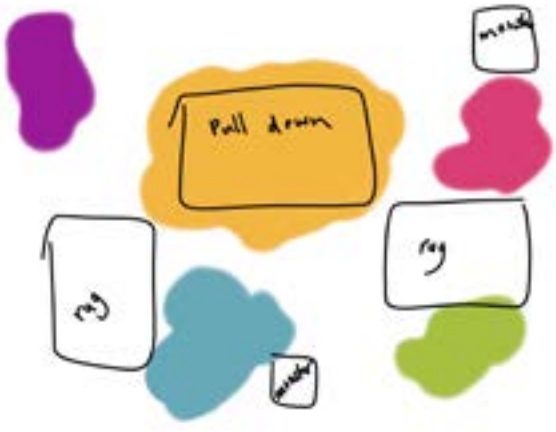


Figure Fifty-seven: Drawing of second layout

Creating the height that was needed for hanging the stalactites was important because without that the viewers' engagement with the movement wouldn't be the same. The frame was two meters high, it was accessible from all sides. A flat wood panel with 2cm holes in a grid was added to the top of the frame to organise a stable area for the knit to hang from. This can be seen in figure Fifty-eight. This also allowed for the stalactites to be changed and moved around based on how many were needed. If there had been more time and if this exhibition was going to be made for a larger scale room another two frames would be ideal to add more points of contact. It will also allow it not to feel as if there is one centre piece because your eye is drawn to the one frame because it is so large.

In terms of integrating the rugs on the floor, four circle rugs were to be positioned around the frame in the original plan, however this felt very plain, and since it needed a greater range of scale, therefore smaller rugs were added that allowed attention to be drawn to the other rugs. Due to the height of the frame that held the hanging kinetic stalactites, the contrast to the rugs was quite dramatic and it seemed disconnected. By including two low plinths that were about 10cm off the two rugs the frame could be situated on top, this allowed the rugs to have some depth visually.

During the setup there were many different ideas about what to do with the appendages and because of the nature of the tubes they tended to be heavy, so it needed something that would be able to hold the weight that would also allow for it to be at a height that would invite people to touch and create their own forms as this was an important aspect of this specific work. The final decision involved creating a frame to match the others. This was done so that all the frames were cohesive and could be used as mode of presenting rather than as part of the exhibition pieces.

Figure Fifty-Eight: Image of hanging knitting

CONCLUSION

This project set out to explore the aesthetic potential of tactile and sensory textiles to stimulate engagement and interaction. This was accomplished through experimental practice and the development of a body of creative works that form an interactive textile art exhibition. These works were created using different textile technologies, including hand and machine processes. These technologies and tools have been used to create textile sculptures that are a materialisation of my imagination. Moving away from a traditional, applied approach to textile design, into the field of textile sculpture, provided the opportunity for me to work more freely with different forms of textile expression, with new and unexpected combinations of textile techniques, by shaping new forms, unrestrained by the norms of designing textiles for homewares or garments.

The textiles from which the sculptures are made are tactile and colourful. These qualities help to stimulate the imagination of the audience viewing the work, and prompt sensory engagement. In addition, some of the pieces include interactive elements that utilise electronic textiles as well as devices like magnets and weights that enable more kinetic embodied engagement. This illuminates an interesting interaction point where people don't know what is going to happen, as unexpected action and re-action sparks a sense of wonder, and it starts to engage people further in the work. Whereas the work involves forms of electronic and mechanical interaction, the project also works with more organic and kinetic interactive movements that involve audience participation by moving and reconfiguring certain elements in some of the works. This approach allows for different experiences to occur, one that is akin to play. While electronic and mechanical approaches have a predetermined action and outcome, processes that involve audience participation, through haptically exploring texture or through reconfiguring elements of a work, are more open in terms of behavioural engagement. These interactive and textural approaches are a response to the research question of how to materialise the imagination of the creative practitioner, and that of the audience engaging with the work. Using the theory of play and a sense of wonder to guide and create an interactive textile art exhibition invites the imagination to engage and extend the artform. Being able to create tactile artwork that is made for people to touch and interact with has helped me further develop my skills personally. This is an achievement for a creative practitioner and researcher in the physical manifestation and materialising of her imagination. The creation of these different textile sculptures have come together to create mini features that have extended into interactive tactile landscapes for people to view and experience alongside me.

Extending from this project there are aspects of the work that could be altered, augmented, enhanced or extended to allow for more dramatic or complex forms of interaction. One approach could be to develop more simplified versions at an even larger scale, for example by using rugs as a single installation to create simple yet effective floor work that would allow people to interact with the work somewhat unexpectedly.

These textile sculptures have created a direct connection between my own personal imagination, that only I can see and experience, and to be able to delight and engage the imagination of the audience. The three-dimensional textiles forms translate this experience and act as gateway between the viewer and the artist. This creates an intersection between my imagination and the people around me. It allows and invites people to experience textile forms that have been developed from the practitioner's personal experience and imagination to fascinate the viewer.

Through this work I have been able to draw from my imagination and experience and bring it into real life, materialising ideas through drawing and experimentation with tactile textiles. It is about translating intangible concepts and bringing them to life in our tangible world. The motivation for this research is to answer the question about how to translate and build a bridge between idea and imagination, by creating tangible forms that imaginatively engage, entertain, amuse and charm the audience. The exhibition of the interactive art works is the realisation and confirmation of this process.

REFERENCES

Arnheim, R. (1997). Visual thinking. University of California Press.

Becker, C. D. (2018). A Sense of Wonder: An A/r/tographer's Musings on Seeing and Being in the World/Un sentiment d'émerveillement: réflexions d'un a/r/tographe sur l'observation d'un monde et sa place en ce monde. The Canadian Review of Art Education/Revue canadienne d'éducation artistique, 45(1), 108-128.

Bennett , J. (2010). The Agency of Assemblages. In Vibrant Matter: A Political Ecology of Things (pp. 20-38). Durham; London: Duke University Press. doi:10.2307/j.ctv111jh6w.6)

Bobeck, M. (2017). Tactile refuge. Retrieved from https://www.malinbobeck.se/optical-fiber-textile/tactile-refuge/

Brown, S. L. (2009). Play: How it shapes the brain, opens the imagination, and invigorates the soul. Penguin.

Candy, L. (2006). Practice based research: A guide. CCS report, 1(2).

Candy, L. (2006). Practice Based Research: A Guide. Creativity and Cognition Studios Report. 1. Retrieved from https://www.researchgate.net/publication/257944497_Practice_Based_Research_A_Guide

Candy, L. (2011). Research and creative practice. Interacting: Art, research, and the creative practitioner, 33-59.

Cleveland, D. (2018). Transformational Cloth: Weaving the Undervalued Threads of Textile Waste into a Value-Added Change Model [PhD thesis]. http://hdl.handle.net/10292/12002

Colourful "New London fabulous" movement is challenging minimalism. (2020, June 4). Dezeen. https://www.dezeen.com/2020/05/26/new-london-fabulous-design-movement-adam-nathaniel-furman/

Deana Mcdonagh & Ian Storer (2004) Mood Boards as a Design Catalyst and Resource: Researching an Under-Researched Area, The Design Journal, 7:3, 16-31, DOI: 10.2752/146069204789338424

Diaconu, M. (2006). Reflections on an Aesthetics of Touch, Smell and Taste

Driscoll, R. (2020). The sensing body in the visual arts: Making and experiencing sculpture. Bloomsbury Publishing.

Emilia Djonov and Theo Van Leeuwen, "The Semiotics of Texture: From Tactile to Visual," Visual Communication 10, no. 4 (November 2011): 541–64. https://doi.org/10.1177/1470357211415786

Evans, M., & Aldoy, N. (2016). Digital design sketching using the tablet PC. The Design Journal, 19(5), 763-787.

Frappaolo, C. (2008). Implicit knowledge. Knowledge Management Research & Practice, 6(1), 23-25. https://doi.org/10.1057/palgrave.kmrp.8500168 763-787.

Friedman, K. (2003). Theory construction in design research: Criteria: approaches, and methods. Design Studies, 24(6), 507-522. https://doi.org/10.1016/s0142-694x(03)00039-5

Friedman, K. (2003). Theory construction in design research: Criteria: approaches, and methods. Design Studies, 24(6), 507-522. https://doi.org/10.1016/s0142-694x(03)00039-5

Gordon, V. S., & Bieman, J. M. (1995). Rapid prototyping: lessons learned. IEEE software, 12(1), 85-95.

Gully, r. (2010). Why Designers Talk to Themselves: drawing as improvisational dialogue in design studio.

Houde, S., & Hill, C. (1997). What do prototypes prototype? In Handbook of human-computer interaction (pp. 367-381). North-Holland.

Howes, David. Empire of the Senses : The Sensual Culture Reader. Sensory Formations Series. Oxford: Berg, 2005.

Ingold, T. (2009). The textility of making. Cambridge Journal of Economics, 34(1), 91-102. https://doi.org/10.1093/cje/bep042

Johnson, Jeremy. “Sensory: Please Touch the Art.” Art Education 71, no. 1 (January 2, 2018): 12–15. https://doi.org/10.1 080/00043125.2018.1389580.

Jones, L. E. (2011). Raincoat: a creative consideration of urban rainwear (Doctoral dissertation, Auckland University of Technology).

Jordahn, S. (2020, May 22). Live interview with Adam Nathaniel Furman as part of Virtual Design Festival. Dezeen. https://www.dezeen.com/2020/05/22/adam-nathaniel-furman-screen-time-vdf/

Lim, Y and Stolterman, E and Tenenberg, J. (2008). The anatomy of prototypes. ACM Transactions on Computer-Human Interaction. 15. 1-27. 10.1145/1375761.1375762.

Lupton, E. and Lipps, A., (2018). The senses. s.l.: New York: Cooper Hewitt, Smithsonian Design Museum.

Mäkelä, A. M., & Nimkulrat, N. (2011). Reflection and documentation in practice-led design research. Nordes, (4).

Mäkelä, M and Heikkinen T, and Nimkulrat N. (2014). Drawing as a research tool: Making and understanding in art and design practice. Studies in Material Thinking. 10. 1-12.

Page, T., Thorsteinsson, G., & Ha, J. G. (2012). Using colours to alter consumer behaviour and product success. International Journal of Contents, 8(1), 69-73.

Pallasmaa, J. (2012). The eyes of the skin: architecture and the senses. John Wiley & Sons.

Paul K. Piff et al., “Awe, the Small Self, and Prosocial Behavior,” Journal of Personality and Social Psychol- ogy 108, no. 6 (2015): 883–99.

Peirce, F.T. , The “Handle” of Cloth as a Measurable Quantity, J. Textile Inst. 21, 377-416 (1930).

Popova, M. (2017, May 6). Freud on creative writing and daydreaming. Brain Pickings. https://www.brainpickings.org/2012/10/15/freud-creative-writers-and-day-dreaming/

Ratcliffe, M. (2008). Touch and situatedness. International Journal of Philosophical Studies, 16(3), 299-322.

Reymen, I. M. (2003). Research on design reflection: overview and directions. In DS 31: Proceedings of ICED 03, the 14th International Conference on Engineering Design, Stockholm (pp. 33-34).

Richardson, G., & Maltby, H. (1995). Reflection on practice: Enhancing student learning. Journal of advanced nursing, 22(2), 235-242.

Sartre, J. (1948). The psychology of imagination. Citadel Press.

Schon, D. (1983). The Reflective Practitioner (Neww York, Basic Books). Schon The Reflective Practitioner1983.

Scrivener, S. (2002). The art object does not embody a form of knowledge. Working Paper. Working Papers in Art & Design - Volume 2. Retrieved from https://ualresearchonline.arts.ac.uk/id/eprint/783/1/WPIAAD_vol2_scrivener.pdf

Scrivener, S. (2002) ‘Characterising Creative-production Doctoral Projects in Art and Design’, International Journal of Design Sciences and Technology, 10(2), 25-44.

Smitheram, M. (2016). The Hand of the Cloth: An Ontological and Aesthetic Unfolding Through Digital and Virtual Materiality [PhD thesis]. http://hdl.handle.net/10292/10621

Stephen, C. (2016). Digital Dynamics: An Interactive Design Process for Generating Knitted Textiles [Master’s thesis]. https://openrepository.aut.ac.nz/handle/10292/10129

Studd, R. (2002). The textile design process. The Design Journal, 5(1), 35-49.

Sutton-Smith, B. (2008). Play Theory: A Personal Journey and New Thoughts. American Journal of Play, 1(1), 80-123.

Textile Design lab. (n.d.). Knit. Textile and Design Lab - Textile and Design Lab. https://tdl.aut.ac.nz/our-services/knit

Tripp, S. D., & Bichelmeyer, B. (1990). Rapid prototyping: An alternative instructional design strategy. Educational Technology Research and Development, 38(1), 31-44.

Unpublished paper, Drawing Out Conference, 2010.Royal Melbourne Institute of Technology (RMIT).

Van Manen, M. (2007). Phenomenology of practice. Phenomenology & Practice, 1(1), 11-30.

Volume 4. Retrieved from https://www.researchgate.net/publication/298813482_Reflections_on_an_Aesthetics_of_Touch_Smell_and_Taste

Wensveen, Stephan and Matthews, Ben (2014). Prototypes and prototyping in design research. In Paul A. Rodgers and Joyce Yee

(Ed.), Routledge Companion to Design Research (pp. 262--276) London: Routledge.

Wheeler, L. (1980). Color and Human Responses: Aspects of Light and Color Bearing on the Reactions of Living Things and the Welfare of Human Beings by Faber Birren. Leonardo, 13(4), 334-335.

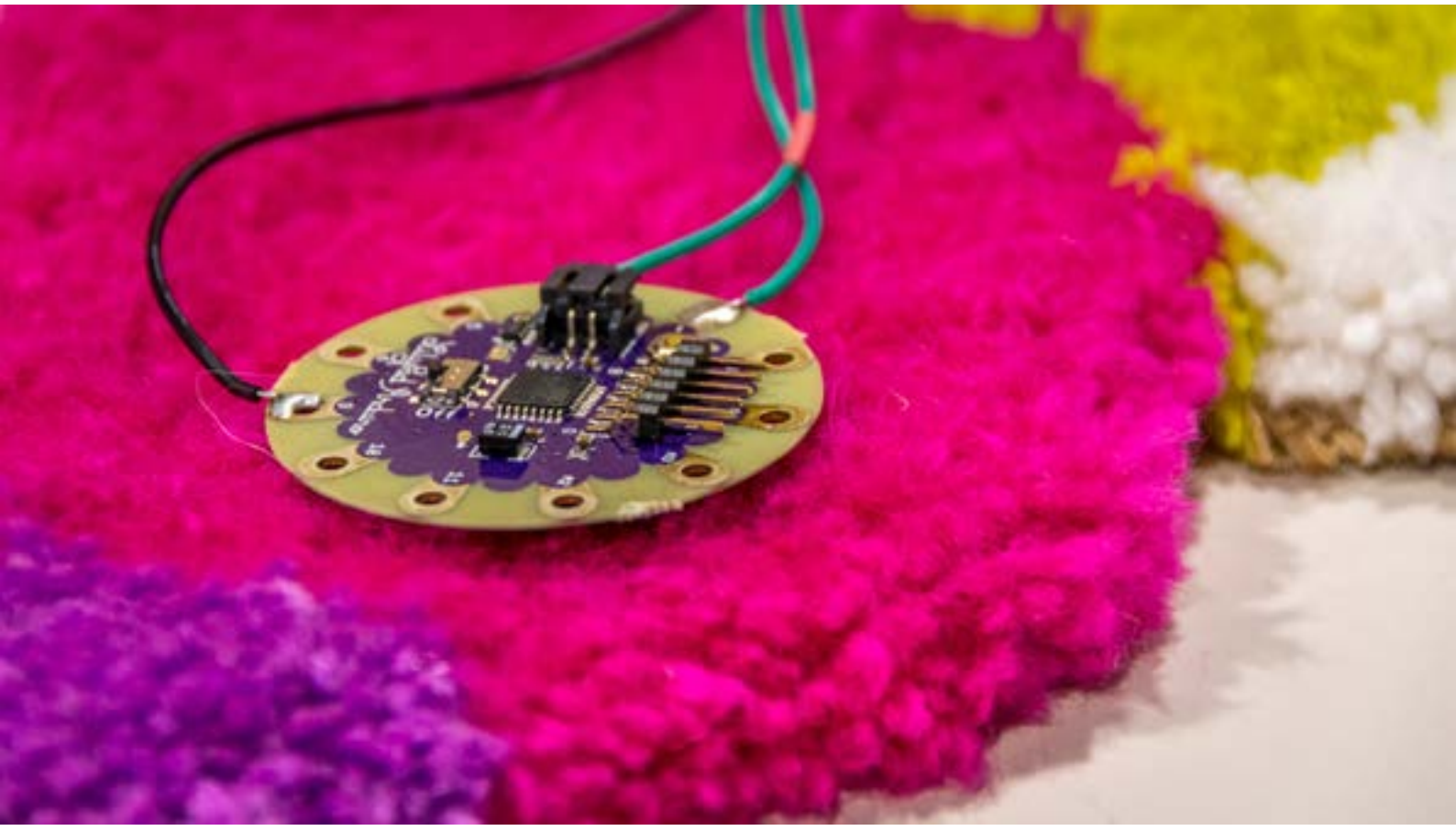
Zino, I. (2020). The Materiality of Winter (Doctoral dissertation, Auckland University of Technology).

APPENDIX ONE

EXHIBITION

The work materialising the imagination was presented as a part of the Master of Creative Technologies graduate exhibition, The Materiality of What?. This event was held on the 9th of July 2021 in the WZ building, room 111 at AUT. The setup of the different textiles was set out intentionally because it was done to allow the viewers to come in the space and interact with the different textile elements. It was done in a way that it allows the viewer to step into a space that has been created and inspired directly from my imagination.


The
Materiality
of
What?
Materialising the Imagination:
An exploration of sensing through textiles and tactility.




Master of Creative Technologies
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WHAT?