Craft Notes: My Prototype Book

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Preface

The seed of my interest in traditional craft was planted during my childhood. I spent a great deal of time traveling with my family in China, visiting different regions, and meeting local communities. These early experiences offered more than just exposure to new places, they gave me a window into diverse ways of living and making. I was especially drawn to the way people worked with their hands, how tradition was embedded in their everyday practices, and how these customs were passed down through generations.

At the time, I did not fully realise the impact these experiences had on me. It was only later, after moving to New Zealand and studying fashion design, that the influence of those early encounters began to take shape. That foundational seed started to grow as I gained the tools to explore, question, and create. Fashion school provided a structure for refining my interests and helped me begin to understand the creative direction I wanted to follow. Looking back at the projects I have undertaken, whether experimenting with QR code textiles or designing volunteer uniforms using traditional pattern-cutting methods, I now see a clear thread running through my work. Many of my ideas consistently circle back to one core theme: the presence, relevance, and quiet power of traditional crafting techniques.

This prototype book is an outcome of my PhD research. Throughout my research journey, my core interest always centred on the intersection of tradition and technology, and, just as importantly, on finding ways to share what I have learned with others. However, the idea of creating a book was not something I envisioned from the beginning. My research process was deliberately designed to be open-ended and exploratory, without a fixed destination or outcome in mind. This openness, while enriching, was also challenging. It required resilience, vulnerability, and a willingness to navigate uncertainty, all of which are qualities that are not commonly associated with scientific research but essential for creative exploration. For a long time, I struggled to find the right format through which to communicate my journey. It was only in the later stages, that I came to the realisation that a book could be the most meaningful and accessible way to share both my learning and my deep affection for traditional techniques. It also became something I could continue to grow beyond the PhD. It is an evolving archive, a shared resource, and an invitation to others to engage, adapt, and carry these practices forward.

The significance of this prototype book lies not in the time it took to produce it, but in the path that led me to understand it as the right medium. It is more than a collection of ideas; it is a reflection of the process, the uncertainty, and the insights that shaped my research. It offers a space where I can express the complexity and beauty of traditional crafts in dialogue with contemporary technologies, and in doing so, invite others into that conversation. It is also a way of passing the knowledge on. This book is for makers, those who are curious about traditional crafts and their possibilities when combined with modern technology. It is for readers who want to read my journey, reflect on it, and perhaps take it further in their own way. It is not a traditional craft manual. Rather, it serves as a personal record of exploration, a space where I document my experiences, experiments, and reflections. Through sharing my journey, I hope this prototype book becomes a place where you can begin to shape your own story with traditional techniques, seeing them not as fixed relics of the past but as living practices with the potential to evolve and connect with new tools, materials, and ideas.

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The Reason Behind This Book

Traditional techniques are fading across the world, for many reasons, fewer people are willing to learn them, many skilled practitioners are aging, and in most cases, it is difficult to make a sustainable living from these crafts. It also seems increasingly difficult to preserve these techniques in their original form, meaning they are practiced exactly as they were, using the same materials, tools, and methods, without adaptation to modern technologies or contexts. As the world evolves, so do people's interests, and younger generations, raised in an era dominated by digital technologies, often struggle to connect with practices they perceive as outdated or irrelevant. Rather than trying to freeze traditional techniques in time, I became interested in finding ways to make them more appealing and relevant to today's world. I began to ask myself: how can these beautiful, skillful practices be transformed or reimagined to resonate with younger people who are immersed in digital culture? How might material craft practices find new life when placed in dialogue with emerging materials and technologies?

My first attempt to connect traditional craft with e-textiles was during the fourth (Honours) year of my undergraduate fashion degree. The three textile samples shown below were part of the project that combined embroidery, screen printing, and hotfix Rhinestone to create a functional QR code. When scanned, the QR code directed users to a blog where they could read the story behind the work. This project helped me realise that traditional craft and contemporary technology are not incompatible. In fact, they can enrich each other, creating something new and exciting. That project was the spark that made me want to develop hybrid practices that blend traditional crafts with e-textiles or modern materials in a way that invites wider engagement and renewed appreciation, which ultimately morphed into the present PhD research.

Merging traditional crafts with modern technology, however, is far from straightforward. It requires more than creative experimentation; it requires cultural sensitivity, historical awareness, and deep respect for the techniques and communities involved. It is not enough to mimic the appearance of a craft, one must understand its origins, meanings, and the lived experiences of the people who sustain it. For that reason, I began each project by learning and replicating the technique as faithfully as possible. Only then did I begin to experiment, introducing new materials, tools, and technologies through iterative sampling and hands-on exploration. This allowed me to observe how structure, form, and function can evolve while still retaining the essence of the original technique.



Figure 1 Embroidered QR Code on Textile Surface



Figure 2 Puff Screen-Printing QR Code on Textile Surface

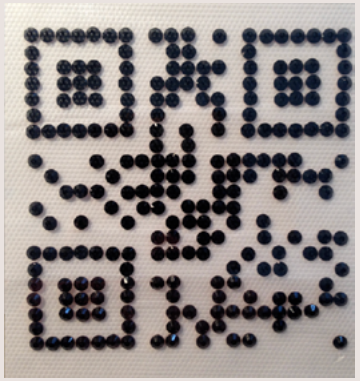


Figure 3 Hotfix Rhinestone QR Code on Textile Surface

At the beginning of this journey, I imagined that the outcome of my PhD would be an exhibition, a showcase of final pieces. But as my practice deepened, I realised that what I truly wanted to share was not just the outcomes but the process itself. I wanted to show how decisions emerged through making, and how each step influenced the next. A turning point came during a field trip to a remote village in Vietnam where I saw just how challenging it is to learn traditional techniques without someone there to guide you and how few visual records existed for preservation. I realised that if this knowledge is not documented and passed down, it risks disappearing altogether.

This experience influenced the direction of my project and led to the idea for this prototype book. As you turn its pages, you will find not only written reflections, but also photographs, video references, and step-by-step documentation of my projects and the selected techniques. This is because I did not want the book to be merely a summary of my research. It needed to be a resource, a living archive, a space for knowledge to be shared, sustained, and reimagined. This prototype book is not just about final results; it is about a journey of learning, unlearning, and transformation. It is about finding harmony between craft and technology, not replacing one with the other, but letting them grow together. In doing so, I hope to keep traditional practices alive not by preserving them in isolation, but by enabling them to evolve and remain meaningful in new, connected, and interactive ways.

How to Read This Book:

Introduction

This prototype book is designed to be both a reference and a source of inspiration. It offers a collection of projects, insights, and reflections that can be explored in any order. Each section stands independently, providing the flexibility to dive into specific areas of interest or follow the journey from beginning to end.

Ways to Engage with This Book

Begin at Any Point

Each project stands alone, so there is no fixed sequence to follow. You are welcome to start with whichever project captures your interest. Whether you prefer to work through the projects systematically or jump between them based on your curiosity, the structure is flexible and open-ended.

Navigating Projects

Projects can be accessed individually through the Table of Contents, which lists them by title. Each title reflects the project's theme or focus, enabling readers to gain an initial understanding without needing to consult other sections. For readers interested in particular materials or techniques, the Material List and Techniques Used sections serve as helpful guides to identify projects that feature those elements, making it easier to trace patterns or revisit areas of interest.

Project Structure

Every project includes the following segments:

- About This Project: introduces the background, context, and motivation, providing insight into the ideas and inspirations behind the work.
- Visual Demonstration: presents photos and videos showcasing the final outcome and, where relevant, how the project functions or is experienced.
- Material List and Techniques Used: details all materials and techniques involved, spanning traditional crafts and emerging technologies.
- Making Steps: documents the process with photos, diagrams, and commentary to guide readers through the project's development.
- Tips: offers practical advice, problem-solving notes, and discoveries to support future makers or researchers.
- Reflection: provides a personal and critical evaluation, highlighting learnings, challenges, and contributions to the broader research.

Material and Technique Guides

Before starting any project, it is recommended to explore the Material and Technique Guide sections. These guides provide essential background on the tools, materials, and methods used throughout the book, building a foundation for confident and creative engagement. Each project clearly lists the materials and techniques involved, offering two key benefits:

- Allowing you to easily refer back to the relevant technique guide sections whenever needed.
- Helping you identify whether the techniques or materials you are interested in feature in a particular project.

If you prefer a more intuitive approach, you are also welcome to begin with any project that catches your interest.

Inspiration and Experimentation

This prototype book aims to spark curiosity and inspire your own creativity. Feel free to experiment with the ideas and concepts presented, adapting them to your own projects and interpretations. It is not only about following instructions but about engaging with the process and discovering your own path.

Tips and Reflections

Each project includes a Tips and Reflections section, offering insights gathered during the making process. These sections provide practical advice, highlight common challenges, and suggest approaches to working with the techniques more confidently and effectively. Reading these alongside your making journey is highly recommended, as they may provide shortcuts, alternative methods, or thoughtful reminders that enrich your experience and make the process more enjoyable.

Resources and References

After the project section, a comprehensive Resources and References section is included. It features visual guides and descriptions of the materials and tools used throughout the projects, along with links to tutorials, blogs, and online communities for further learning and exploration. The section also presents a curated list of books, artists, and researchers relevant to the themes explored, offering opportunities for deeper reading. Information is provided on where to purchase materials and tools, both internationally and within New Zealand. In addition, step-by-step guides and background information on the traditional techniques used in this book are included to support learning and adaptation.

Ultimately, this prototype book is about exploration and creation for both the reader and the creator. There is no right or wrong way to read it; the journey is yours to shape.

Project Journeys

Introduction

This section marks the beginning of a journey where ideas, techniques, and materials come together through the act of making. It presents eleven creative projects that explore how traditional craft techniques can be meaningfully combined with contemporary technologies and materials. The projects are grouped to reflect different approaches to reimagining tradition; some honour and preserve the essence of traditional techniques while incorporating modern materials, others push the boundaries through experimentation and innovation, transforming the form and expanding the potential of the original craft.

The collection begins with two projects exploring the centuries-old technique of tin embroidery, reimagined through the use of modern materials such as conductive threads. This section also includes experiments with temperature-sensitive threads and weave stitches, resulting in textile samples that respond to changes in temperature. These projects retain the essence of the traditional method while introducing new design possibilities. While the techniques remain rooted in tradition, the materials are entirely contemporary, offering subtle yet meaningful transformations. The journey then progresses into a series of four beaded embroidery experiments, where beads take on both decorative and interactive roles, acting as components for touch or stroke sensors. Here, the form of the technique begins to shift. While grounded in traditional principles, these works introduce variations in execution and incorporate conductive materials, expanding the functionality and aesthetics of the craft. The final group consists of five projects inspired by personal memory and my research trip to Vietnam. These include pieces influenced by childhood toys, the landscapes of Vietnam, and the colour-shifting nature of tea fields. In these works, craft becomes a vehicle for reflection and storytelling, using material and form to bridge the past and the present in deeply personal ways.

Each project includes:

- A brief introduction to its concept and background
- A materials list
- The techniques applied
- Step-by-step instructions with accompanying photographs
- A video to demonstrate how the completed piece functions

Rather than presenting polished final outcomes, the projects emphasise exploration and experimentation, uncovering the possibilities that emerge when traditional techniques meet modern technology. They invite you to step into a space of curiosity, trial and error, and creative discovery. Whether you are a maker, a student, or simply someone interested in how tradition and technology can meet, these projects offer practical starting points and inspirational models.

For additional guidance such as where to find materials, how to try specific techniques, or where to connect with online communities, please see the Resources and References section at the end of this book. This section was created to support your own explorations and to encourage further play at the intersection of craft, culture, and innovation.

Part One: When Traditional Techniques Meet Modern Materials

Project One – Tin Embroidery

About This Project

Tin embroidery is one of the most distinctive techniques I was drawn to, and I spent a significant amount of time exploring how it has been traditionally practiced. Unfortunately, my planned research trip to China was cancelled due to the impact of COVID-19. A subsequent textile trip took me to a remote village in Vietnam, near the border with China, where we encountered communities that had migrated from China. However, we were unable to find any artisans who still actively practiced the technique. As a result, the version presented in this project is a reinterpretation developed by me, based on extensive review of available online resources including documentaries, photographs, and written descriptions. It is both a response to the limitations of access and a creative reconstruction rooted in respect for the tradition.

Tin embroidery is a traditional craft practiced by certain minority ethnic groups in China, particularly the Miao and Yao communities. The technique begins with an embroidered base pattern stitched onto cloth, most often using threads that match the fabric so the stitching remains invisible. Strips cut from handmade tin sheets are then carefully attached along these stitches. The resulting patterns are not only decorative but also carry cultural meaning, often conveying information about the wearer. Today, however, the practice has become increasingly rare, with only a few artisans still maintaining the tradition (see technique guide for further detail).

This project explores the fusion of traditional tin embroidery with contemporary e-textile elements, specifically through the integration of conductive threads to form a soft circuit. Tin embroidery is a highly distinctive craft technique that already incorporates conductive material, thin sheets of tin, as a core element. With a strong desire to honour and preserve the foundational principles of the technique, I made an intentional decision to maintain both its original form and its signature material. Rather than modifying the structure, I worked within its traditional framework, preserving its visual and material integrity while extending its function into the area of interactive textiles.

Each individual tin element in the piece was meticulously cut from thin tin sheets into stripes, threaded, and anchored using traditional embroidery stitches, forming a modular pattern across the textile surface. The creative innovation lies in the strategic placement of these metal components. By positioning the tin pieces to form intentional gaps and contact points, the work becomes more than ornamental, it becomes responsive. When certain segments are pressed or bent to touch, these contact points close the circuit, activating the interactive response. Beyond exploring soft circuits, this project also experiments with alternative conductive materials. Alongside the tin sheets, I also experimented with zinc sheets along the edges of the work, offering a subtle contrast in colour and surface quality. The slightly yellow tint of the zinc sheet introduces a warmer hue compared to the cooler tone of tin, enhancing the visual richness of the piece while broadening the palette of conductive materials explored.

Through this project, I aim to reveal how heritage craft techniques can be reimagined through contemporary materials and technologies with minimal alteration. The result is a textile interface that retains the cultural and structural integrity of its traditional origins while offering new functional possibilities, bridging the past and present through thoughtful design and experimentation.

Visual Demonstration

The following Figure 4 and the accompanying video provide a visual overview of the sample.

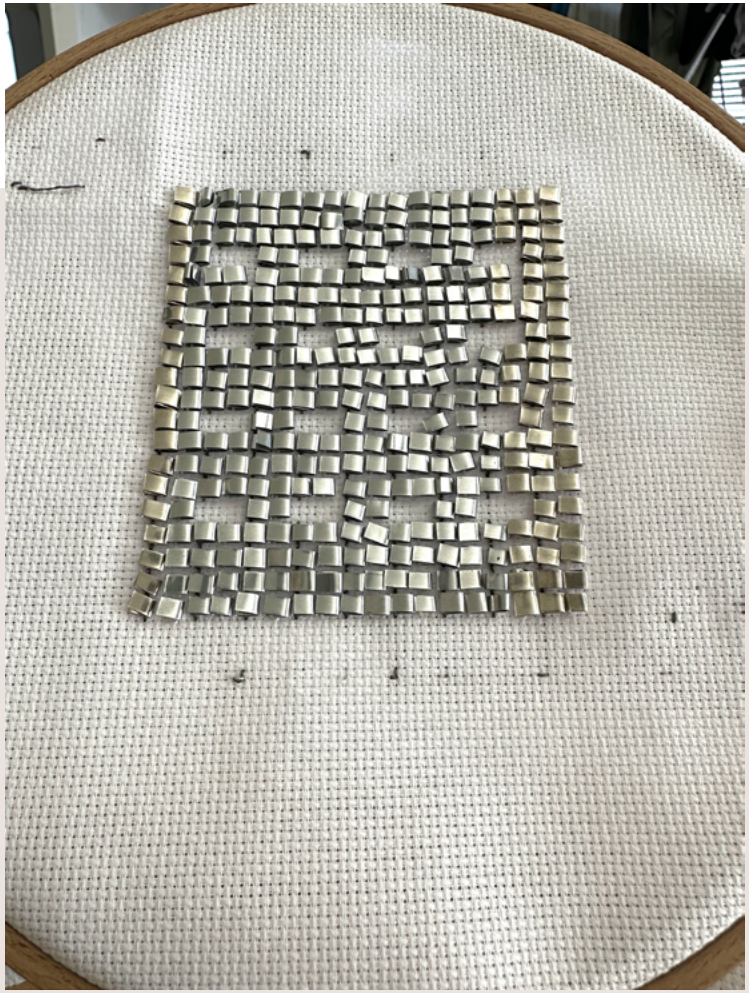


Figure 4 Tin Embroidery Sample Photo



Video 1 Tin Embroidery Sample Demonstration A [Video]

How It Works

This video demonstrates how the textile piece functions as an interactive circuit. Each tin element is stitched onto the fabric with small gaps between them, allowing for subtle movement and flexibility. As the textile is gently moved or manipulated, certain tin pieces may come into contact with one another. When this contact occurs at specific points, the circuit is completed, and an LED light is activated.

The interaction is intentionally unpredictable because the movement of the fabric and the placement of the tin pieces are not fixed, the LED turns on and off in response to chance connections. This creates a playful and dynamic experience where the textile responds to touch, motion, and positioning. The piece invites the viewer to explore its tactile and responsive qualities, blurring the line between decorative embroidery and functional soft circuitry.



Video 2 Tin Embroidery Demonstration B [Video]

Material List

Textiles & Threads

- Conductive thread – Grey
- Standard embroidery threads
- Tin sheets (0.1 mm)
- Zinc sheets (0.1 mm)
- Cross-stitching fabric

Electronic Components

- Battery holder
- Coin battery
- LED

Tools

- Tapestry needle size 16-20
- Fabric marking pen
- Scissors
- Embroidery hoop
- Optional: Embroidery hoop stand

Techniques Used

Tin embroidery

Making Steps

1. Design the Circuitry

The first step involves carefully planning and designing the circuit layout directly onto the fabric. Cross-stitch fabric or fabric with clearly defined gridlines would be an easy starting point. Since the aim of this particular project is to build a circuit that activates only when certain parts of the tin pieces are touched, it is important to divide the positive and negative terminals into distinct sections, each playing a specific role in completing the electrical circuit.

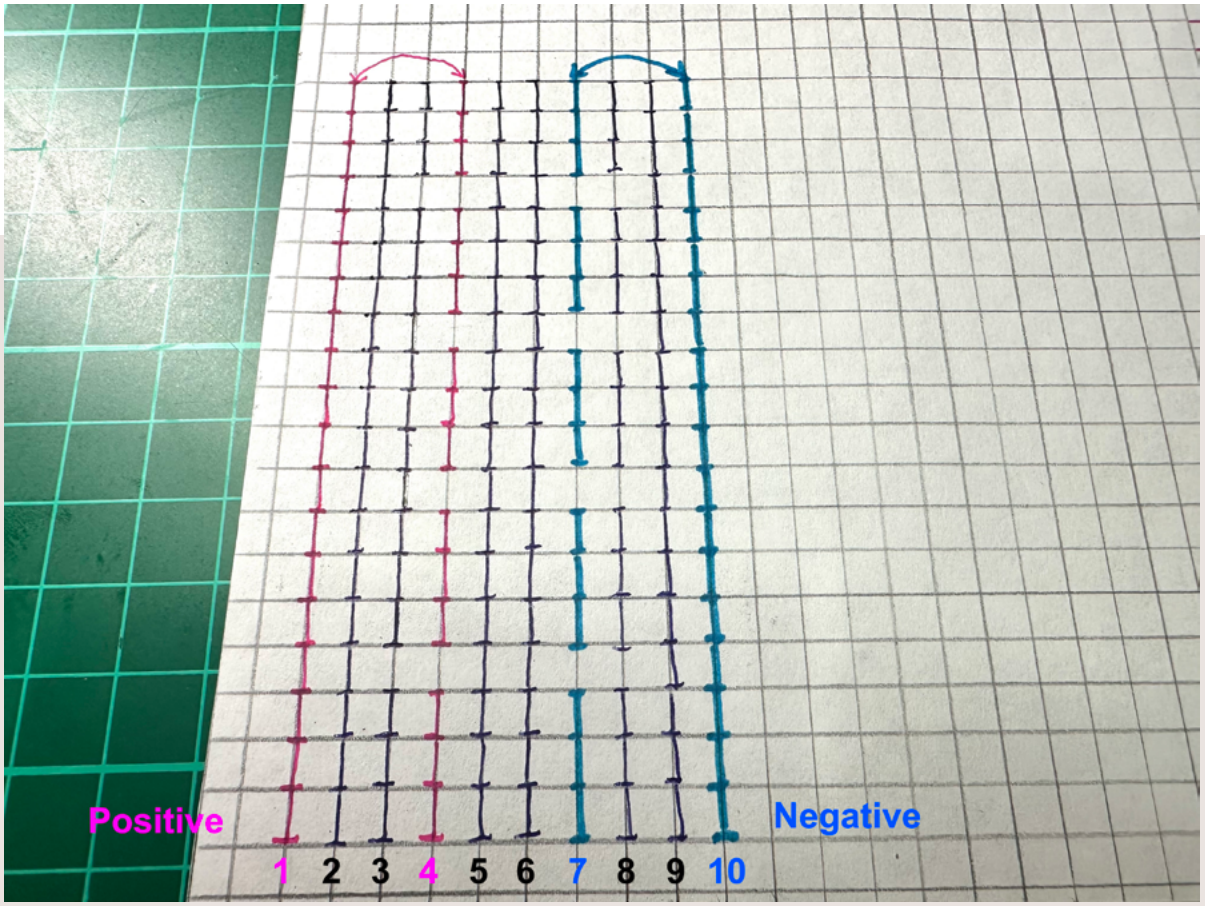


Figure 5 Design the Circuitry

In the diagram:

- The pink section represents one terminal (positive), using conductive thread as the base stitching to carry current.
- The blue section represents the opposite terminal (negative), also stitched with conductive thread.
- The black section is stitched with regular (non-conductive) embroidery thread. This zone helps separate the conductive parts but still has tin or zinc pieces embroidered on top. While these metal pieces remain conductive, they only complete the circuit when they physically touch both the pink and blue zones.

Section breakdown by lane:

- Pink Conductive Section (Positive): Lane 1 and Lane 4
- Blue Conductive Section (Negative): Lane 7 and Lane 10
- Black Non-conductive Section: Lane 2, 3, 5, 6, 8, and 9

When the fabric is at rest, there is space between the lanes. While some metal elements may touch across neighboring lanes, it is uncommon for the pink and blue terminals to make direct contact simultaneously. However, when the fabric is manipulated—through bending, folding, or pressing, the chances increase that a tin piece in pink Lane 4 may come into contact with a tin piece in the black zones (e.g., Lane 5 or 6), and subsequently touch a piece in the blue zone (e.g., Lane 7). This completes the circuit and activates the LED.

2. Apply the Tin Embroidery Technique Following the Circuit Pattern

To apply the tin embroidery technique according to your circuit pattern, refer to the Technique Guide for detailed instructions.

Once your circuit design is finalised, carefully measure and cut tin strips to fit your layout. Using pre-measured and cut tin strips, carefully thread and secure each piece onto the fabric base along the conductive and non-conductive thread sections. Accuracy in placement is crucial; each tin piece must align precisely to form the necessary contact points that allow the circuit to function effectively. The embroidery stitches not only anchor the tin elements in place but also preserve enough flexibility to enable movement and interaction, which are essential for activating the soft circuit. Regularly check the placement and connections to confirm the circuit works as intended.

Tips

1. Start with a Small Test Section (Demonstration 3 and 4)

Before committing to a full design, it is helpful to begin with a small test section to understand how the circuit behaves. In this project, I started by experimenting with just seven tin pieces to explore how the soft circuit could function in practice.

There are various ways to arrange the tin pieces, but the key principle remains the same. You need both a positive and a negative side, and they must remain separated, not in constant contact. The goal is to design a layout where the pieces can momentarily touch when the fabric is moved or pressed, thereby completing the circuit.

The first mini version, featured in the videos on the right, was set up as follows:

- Three tin pieces on the left, stitched with conductive thread (positive side)
- Three tin pieces in the middle, stitched with regular thread (non-conductive section)
- One tin piece on the far right, also stitched with conductive thread (negative side)

As shown in Videos 3 and 4, when the fabric is touched, bent, or otherwise manipulated, the movement can cause all seven tin pieces to make contact, completing the circuit and triggering the LED. This small-scale trial allowed me to understand the interaction dynamics before scaling up to a more complex design.



Video 3 Tin Embroidery Test Piece A [Video]



Video 4 Tin Embroidery Test Piece B [Video]

2. Test Continuously During the Process

This project involves combining conductive threads and tin pieces to form a soft, responsive circuit, so it is essential to test frequently as you work. The behaviour of the circuit can vary depending on materials, placement, and stitching, so do not wait until the end to check functionality; troubleshooting early will save time and effort.

3. Maintain Consistent Tin Piece Sizes

For both aesthetic and functional reasons, try to keep all tin pieces uniform in size. Inconsistent sizing can lead to uneven contact points and affect the overall performance of the circuit. Likewise, ensure that the size of each embroidery stitch matches the tin strip size. Avoid using large stitch gaps with small tin pieces, as this can cause the metal strips to slide around or sit loosely, reducing accuracy and connection reliability.

4. Adjust Circuit Design Based on Test Results

If you are experiencing poor connectivity where the circuit does not complete, consider expanding the conductive areas by replacing some of the black (non-conductive) sections with additional pink or blue (conductive) sections. On the other hand, if the circuit is always on, it likely means there is too much conductive overlap. In this case, add more black stitching areas to better isolate the conductive parts. Always ensure that the pink and blue sections remain isolated from each other unless intentional contact is meant to occur.

5. Consistent Tin Wrapping Direction

When threading and wrapping your tin strips, make sure all tin pieces are wrapped in the same direction. This consistency helps maintain visual order and structural integrity, and it can also increase the predictability of the circuit's behavior by ensuring uniform contact and response when the fabric moves.

6. Pre-Tin Testing

Test the conductivity of each tin sheet with a multimeter before cutting it into strips. This step helps identify any coating, oxidation, or defects that may interfere with conductivity, preventing wasted effort on non-functional strips.

7. Mark Conductive Pathways

It can get visually confusing once multiple threads, and tin elements are stitched in place. Use fabric-safe chalk or erasable pens to lightly mark out the pathways of conductive threads and contact zones before sewing. This will help prevent accidental overlap and shorts.

8. Secure Loose Ends

After sewing with conductive thread, secure the thread ends tightly to prevent unravelling as this could cause intermittent connections. You can use clear nail polish or fabric glue to secure the ends.

Reflection

This piece retained the original structure and method of traditional tin embroidery. I deliberately chose not to alter the core technique; instead, the innovation lies in reconfiguring the layout and adapting the base materials to integrate e-textile components such as conductive thread. The tin pieces are still applied using the same threading, wrapping, and securing methods seen in traditional practice. Through the process of working on this project, I began to reflect more deeply on the different ways traditional craft techniques can interact with modern technologies. It became clear to me that there is not a one-size-fits-all approach but that each traditional craft presents its own opportunities and limitations when it comes to the integration of contemporary elements like e-textiles.

Some craft practices offer greater flexibility in terms of structure and material. In several of the later projects, for instance, I was able to modify the layout, substitute materials, or even adapt the construction method without compromising the integrity or visual essence of the original technique. These practices lent themselves well to experimentation and hybridisation. However, tin embroidery presents a different kind of challenge. The technique is defined by its rigid metal materials, repetitive structure, and precise handcrafting process. It has a strong visual identity and technical discipline that does not easily allow for drastic structural changes. Through trial and error, I realised that instead of trying to force modern components into the technique, the more respectful and effective approach was to preserve its core principles, maintaining the original process while subtly integrating conductive elements through layout changes or material substitutions in the base.

This approach made me consider that there may be multiple pathways for merging traditional and contemporary practices, each depending on the nature of the craft itself. For crafts like tin embroidery, the key may be to maintain the authentic method with minimal changes. In other cases, more radical transformations may be possible or even necessary. Ultimately, this project has taught me to look at tradition not as something fixed, but as a framework that can adapt, provided the adaptation is done with care and understanding.



Project Two - When Threads Remember Touch

About This Project

This textile sample explores the intersection of traditional Chinese embroidery and responsive materials by combining weave stitching (织绣), a heritage technique practiced by the Miao minority, an ethnic group primarily residing in the mountainous regions of southwest China, including Guizhou, Yunnan, and Sichuan, with thermochromic (heat-sensitive) thread. At the heart of this project is the traditional weave stitching method, where threads are interlaced over tin sheets or metallic warps to form intricate, raised patterns (see technique guide for further detail). In this reimagined version, thermochromic thread is used as both warp and weft. When touched or exposed to body heat or a warm object, the thread temporarily changes colour, revealing a hidden layer of interaction.

This embroidery method shares similarities with tin embroidery in its strong visual identity and structural logic. Because of that, I made a conscious decision to preserve the technique in its original form while experimenting with new materials. It is also one of the least documented techniques I have encountered. My research uncovered only limited references, including a few photos and descriptions found in a book. No detailed online records or tutorials were available, which made this experiment both challenging and rewarding.

The result is a fabric that behaves like a heat-reactive drawing surface, a kind of textile equivalent to paper. Users are invited to “draw” or “write” with body heat or heated tools, encouraging a playful, intuitive interaction with the material. This piece is both a technical and conceptual exploration. It challenges conventional definitions of interactivity in textiles by relying on soft, analogue responses rather than digital sensors. It also asks how traditional handcraft can be revitalised through the use of contemporary materials and sensory experiences.

This sample demonstrates just one possible application of this technique. Through hands-on practice, I have come to believe that if the goal is to create a larger heat-reactive surface, weaving on a loom using thermochromic threads would be much faster and more efficient. However, if the design calls for detailed patterning or aims to combine modern threads with traditional tin strips for soft circuitry, then this hand-embroidered weaving technique offers unique advantages in precision and expression.

Visual Demonstration

The following Figures 6 and 7 provide a visual overview of the sample.



Figure 6 When Threads Remember Touch Sample Photo A

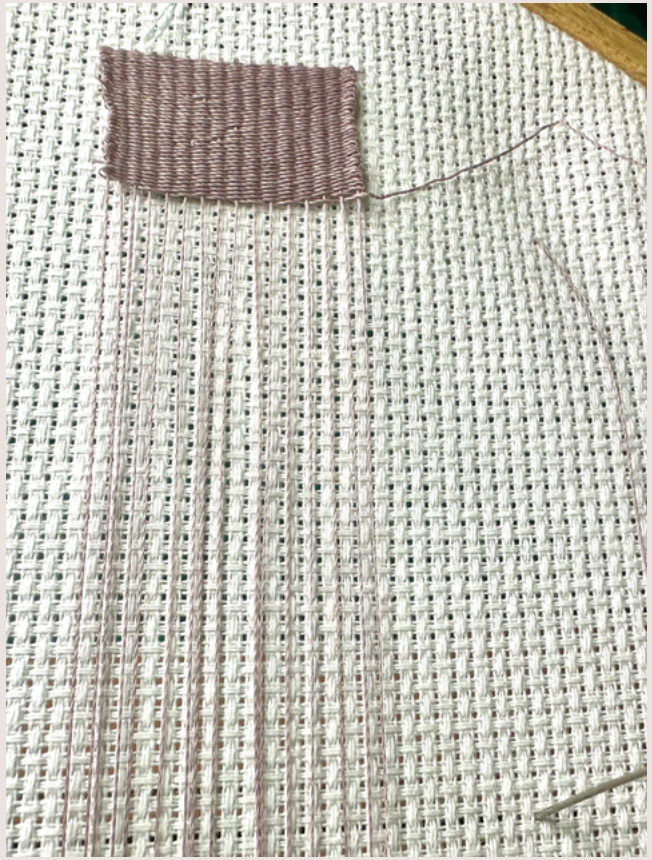


Figure 7 When Threads Remember Touch Sample Photo B



How It Works

This video demonstrates how the weaving samples respond to heat. There are two fabric strips shown side by side, each designed to explore the visual effect and material behaviour of thermochromic (heat-sensitive) threads.

Left Sample – Dual-Colour Thermochromic Threads

The piece on the left is woven using thermochromic threads in two colours: jade and dark green. These threads begin to change colour when exposed to temperatures above 28°C, gradually turning white as they react to body heat or warm objects. This setup highlights how different coloured threads can shift simultaneously, creating a soft, fading effect when touched.

Right Sample – Density and Visibility Test

The sample on the right was created to test how pattern density affects the visibility of the colour change. Initially, I assumed a dense weave would be necessary for the thermochromic effect to be noticeable. For this reason, the sample on the left was woven using heat-sensitive threads for both the warp and weft, with a plain weave structure to achieve consistent and uniform coverage. However, as demonstrated in the video, this experiment revealed even a single thread of thermochromic yarn can produce a clearly visible colour change. This insight revealed that full thread coverage is not always required. The material is sensitive and responsive enough to react visibly with minimal application. This comparison helps to establish how different weaving densities can impact the visual outcome of thermochromic textiles, and it opens up new possibilities for designing with lighter structures while still maintaining interactivity.

Video 5 When Threads Remember Touch Demonstration A [Video]



Material List

Textiles & Threads

- Thermochromic thread (activates at 28°C)
- Cross-stitching fabric

Tools

- Tapestry needle size 16
- Scissors
- Embroidery hoop
- Optional: Embroidery hoop stand

Techniques Used

- Weave stitching

Making Steps

1. Refer to the Technique Guide for Detailed Instructions on How to Perform Weave Stitching

This video demonstrates how to create the Dual-Colour Thermochromic Threads sample introduced earlier. The sample was made using the weave stitching technique outlined in the Technique Guide, with both the warp and weft threads constructed from thermochromic (heat-sensitive) thread. This allows the entire textile surface to react visibly to touch or warmth, creating a dynamic, responsive pattern.

2. Prepare Your Base Fabric

Choose a sturdy but stitchable fabric as the foundation. Traditionally, cardboard was used in Miao embroidery, but fabric allows for greater flexibility and layering. In this sample, an even-weave fabric such as cross-stitch canvas was used for easier alignment and stitching precision.



Video 6 When Threads Remember Touch Demonstration B [Video]

3. Set Up the Warp Threads

Begin by stitching down parallel vertical lines of thermochromic thread onto the surface of the fabric. These lines act as the warp, mimicking the structure of a loom. Leave enough space between the threads to allow easy weaving later. Maintain even tension for consistent spacing.

4. Begin Weaving the Weft (Figure 8)

With a second strand of thermochromic thread, begin weaving horizontally across the warp threads. Using a needle as a shuttle, pass the thread over and under the warp lines from one side to the other (e.g., right to left), then pull the thread through.

5. Alternate Direction for Next Row (Figure 9)

Move down slightly and weave the next row in the opposite direction (e.g., left to right), this time alternating the over-and-under sequence to mimic a woven structure. This creates the interlaced grid effect central to the weave stitching method.

6. Continue Weaving Until the Area Is Filled

Repeat the weaving process row by row until the desired area or pattern is completed. As more rows are added, a woven surface of thermochromic thread, which changes colour upon contact with body heat or a warm object, begins to form.

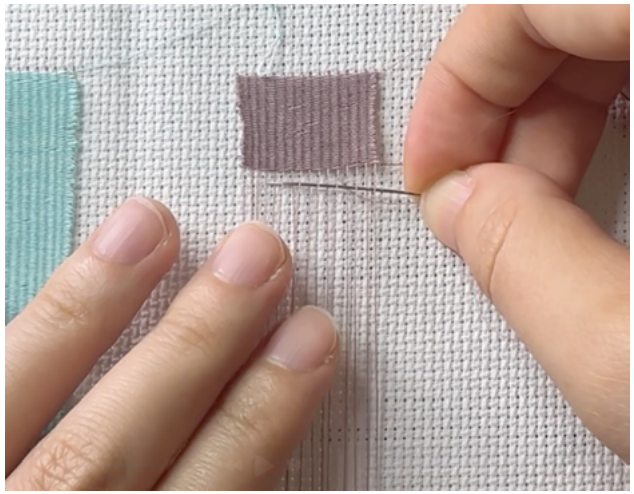


Figure 8 When Threads Remember Touch Demonstration A

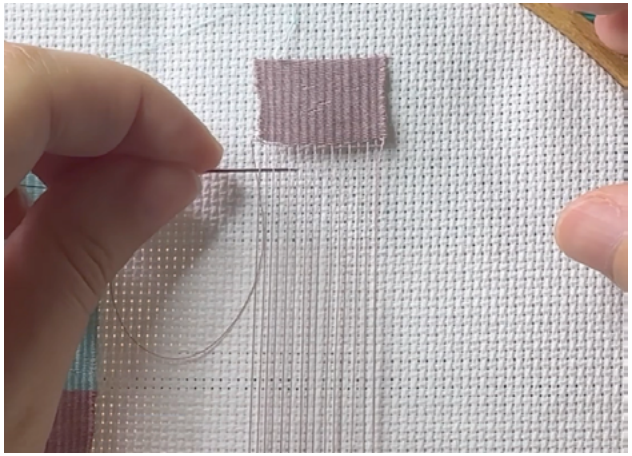


Figure 9 When Threads Remember Touch Demonstration B

Tips

1. Use Your Needle as a Beater

Unlike loom-based weaving, this hand-stitched method does not have a beater to tighten the rows. Instead, use the side or flat edge of your needle to gently push each woven row upward, tightening the weave and ensuring even spacing.

2. Choose the Right Needle

Better to use a ballpoint needle rather than a sharp one. Thermochromic thread has a delicate, coated surface that can be easily damaged by sharp points. A ballpoint needle glides between fabric fibers without cutting the threads, reducing the risk of fraying or breakage.

3. Understand Thermochromic Activation Temperatures

Many thermochromic threads on the market are advertised as responsive to body temperature, but in practice, most do not perform as expected. While you might assume that threads activated at 36°C would react to body heat, my experiments have shown that these often require a stronger heat source, such as a hair dryer or direct heat, to trigger a visible change. Through testing various brands and activation points, I found that the temperature at which the thread changes colour depends not only on the type of thread but also on the surrounding environment. In warmer seasons, threads with an activation temperature of around 31°C (approx. 88°F) are more likely to respond effectively to body heat. In colder seasons, however, threads with a lower activation point, around 28°C (approx. 82°F), are better suited for touch-based interaction. To achieve consistent results, it is important to select thermochromic threads based on your local climate and intended use.

4. Know the Colour Change Limits

Thermochromic threads typically shift from a coloured state to white when heated. Currently, there are no options that change from white to a different colour, which may limit certain design possibilities.

5. Proper Storage Is Essential

Store thermochromic threads or your work in a cool, dry, and dark place. Prolonged exposure to light, heat, or humidity can cause premature fading or degrade the thread's ability to change colour effectively over time.

6. Handle with Care During Weaving

Thermochromic thread tends to have a plastic-like texture, making it more rigid and less pliable than traditional cotton or wool threads. Weave slowly and deliberately to avoid tangles or thread tension issues. Be patient; it is normal for the material to feel different from what you may be used to.

Reflection

This project is a meaningful exploration of traditional weave stitching combined with modern thermochromic thread, which presented both technical and creative challenges. Working without a loom meant the weaving had to be done entirely by hand which requiring patience, control, and precision. Thermochromic threads have an unusual texture, feeling more like plastic than traditional fiber, which made them very difficult to handle. I had to adjust my technique to accommodate their structural stiffness, reduced flexibility, and smooth surface. Each row of weaving required careful attention to spacing, tension, and thread behaviour. In fact, I found this material even more difficult to work with than conductive thread.

One of the biggest challenges and most time-consuming challenges was sourcing the right thermochromic thread with a suitable activation temperature. As mentioned in the Tips section, many products advertised as “body heat responsive” were unreliable. For instance, threads claiming a 36°C activation point required a heat source like a hair dryer, while those at 32°C would only react after prolonged skin contact. Based on my experiments, threads that activate at 28°C or 31°C offered the best response for touch-based interaction, depending on the room or seasonal temperature. Throughout this process, I discovered that even small adjustments such as selecting the right needle or slightly altering the spacing of the warp could significantly impact the outcome. It became clear that hands-on experimentation and responsive making were key to working with this material. Although the process was often unpredictable, the moment when the fabric shifted colour in response to touch felt almost magical. That fleeting transformation made all the effort worthwhile.

On a conceptual level, this project prompted me to rethink textiles as interactive surfaces. Touch became a way of drawing; colour became ephemeral. It showed how traditional handwork techniques can be reimagined as a means to craft sensory and responsive experiences, merging analogue skills with digital-like outcomes. This project invites us to see fabric not just as static, but as something alive, changeable, and emotionally engaging; as something capable of responding to human presence. There is still much more to explore. I believe this sample holds a great deal of potential. For instance, it would be interesting to test different weaving patterns and scales, or to transform the work into a three-dimensional structure instead of keeping it flat. The possibilities are exciting and far from exhausted.



Part Two:
When Traditional Techniques Take a New Shape

Project Three – To Be Touched

About This Project

This project marks the first time I began altering the structural form of a traditional textile technique. Drawing inspiration from the seed stitch (see technique guide for further detail), I chose not to rely solely on thread. Instead, I integrated tubular beads directly into the stitch structure. In this project, the beads are placed at the base, while the seed stitch secures them from above, creating both a textural and structural variation on the original technique. By combining conductive threads with non-conductive beads, this sample builds on the same conceptual foundation as the tin embroidery explored in Part One. The concept behind this project is that the conductive threads and beads are used to create a sensory experience that is activated by touch: when specific beads are pressed, the contact completes a circuit, triggering a response.

This project explores the potential of beads as active components within interactive textile design. What may first appear as a delicate arrangement of threads and tubular beads reveals a hidden layer of functionality, an embedded, touch-sensitive circuit that responds to human interaction. When the grey-tipped ends of the beads make contact, whether through intentional touch or incidental movement, the circuit is completed, triggering a response. In this system, the tubular beads are not merely ornamental; they act as conductive bridges, simultaneously defining the structure and enabling electronic connectivity. By blending form and function, this piece continues an ongoing exploration into how soft, flexible materials like fabric, thread, and beads can be used to create interactive, sensory-driven experiences.

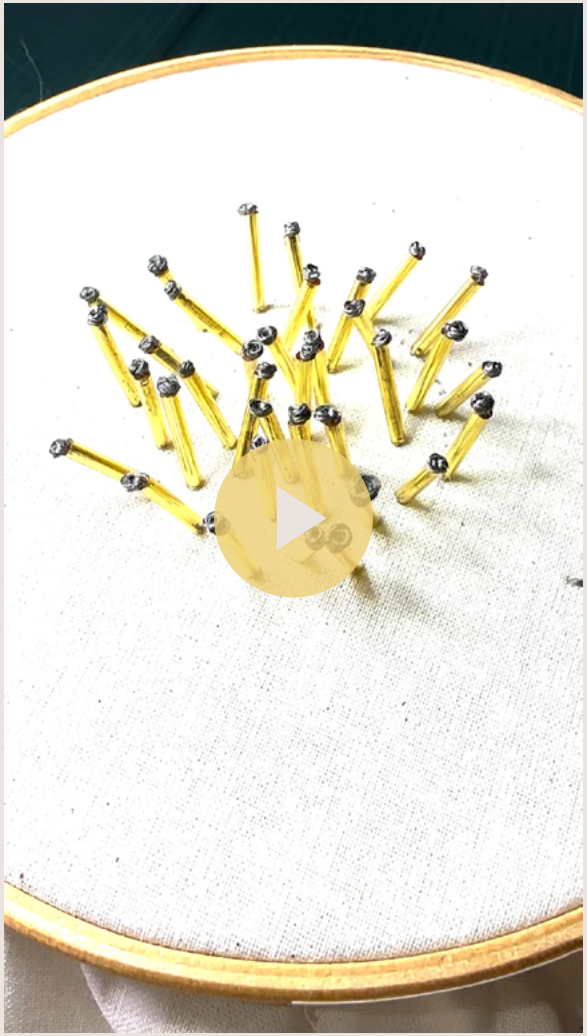
In contrast to the projects in Part One, this project also reflects a subtle but significant shift from preserving traditional techniques to restructuring them with new materials and purposes, opening up possibilities for innovation without abandoning the essence of the original craft.

Visual Demonstration

The following Figure 10 and the accompanying video provide a visual overview of the sample.



Figure 10 To Be Touched Sample Photo A



Video 7 To Be Touched Demonstration A [Video]

How It Works

This video demonstrates how the sample functions. By gently moving my hand and touching the vertical beads, the beads shift and occasionally make contact with one another. When the correct beads touch, the circuit completes and the light turns on; when they separate, the light turns off. As shown in the video, the connection is somewhat unpredictable, sometimes the light remains stable, other times it flickers or dims. This intentional irregularity is due to the positioning of the beads and the alignment of the positive and negative conductive sections. During the creation of this sample, my primary focus was on exploring interactivity. I imagined how this technique could be applied to specific areas of a garment where the textile surface could respond to body movements, activating and deactivating based on motion and touch.



Video 8 To Be Touched Demonstration B [Video]

Material List

Textiles & Threads

- Conductive thread – Grey
- Medium Bugle Beads
- Fabric base - Calico (plain woven cotton)

Electronic Parts

- Battery holder
- LED

Tools

- John James hand needle set - assorted 25
- Fabric Marking Pen
- Scissors
- Embroidery hoop
- Optional: Embroidery hoop stand

Techniques Used

- Seed Stitch (打籽绣)

Making Steps

This section begins with instructions on circuit design, followed by a step-by-step guide on how to execute the technique.

1. Design the Circuitry (Figure 11)

The first step involves carefully planning and designing the circuit layout directly onto the fabric. The layout is divided into distinct sections, each playing a specific role in completing the electrical circuit.

In the diagram:

- The diagram illustrates a flat layout of the circuit design.
- The red section represents the positive terminal, created using conductive thread to carry the current.
- The blue section indicates the negative terminal, also stitched with conductive thread.
- These two sections must be fully isolated from each other. It is essential to ensure that the thread ends do not touch, and there should be a minimum gap of 3–4 mm between them to prevent short-circuiting.
- This layout is just one example. There are many possibilities, as long as the positive and negative terminals remain properly separated. The circuit is activated when any conductive knot on a bead along the blue path comes into contact with a knot on the red path.

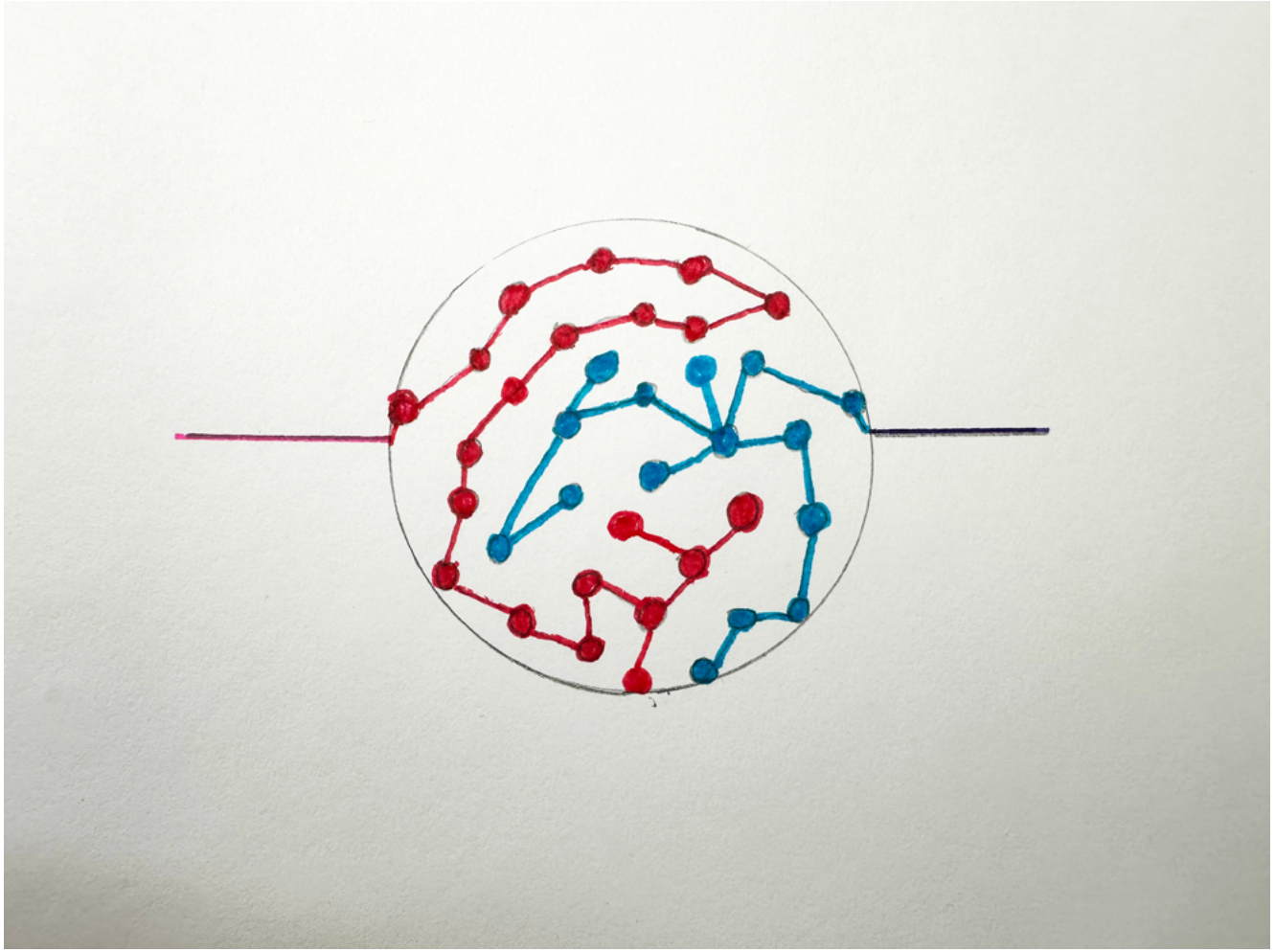


Figure 11 To Be Touched Circuitry Design

In the photo (Figure 12):

- This photo demonstrates how the circuits function in a three-dimensional way.
- Both the blue and red sections are conductive, but they are isolated from each other on the underside of the fabric. The bugle beads, which are non-conductive, serve as a barrier between the two sections on the surface. A connection is only made when the red (positive) tips come into contact with the blue (negative) tips.

When the fabric is at rest, there should be a gap between the red and blue sections to prevent accidental contact. As shown in the photo and video, the beads are not standing upright, this is intentional. I avoided pulling the thread too tightly in order to maintain flexibility, allowing the beads to move slightly when touched.

However, because the beads are not firmly secured, they tend to tilt in various directions, which introduces a degree of unpredictability. For this reason, it is important to design your layout with enough space between the positive (red) and negative (blue) sections to avoid unintended connections. It is also crucial to test your circuit regularly during making process to ensure reliable performance.

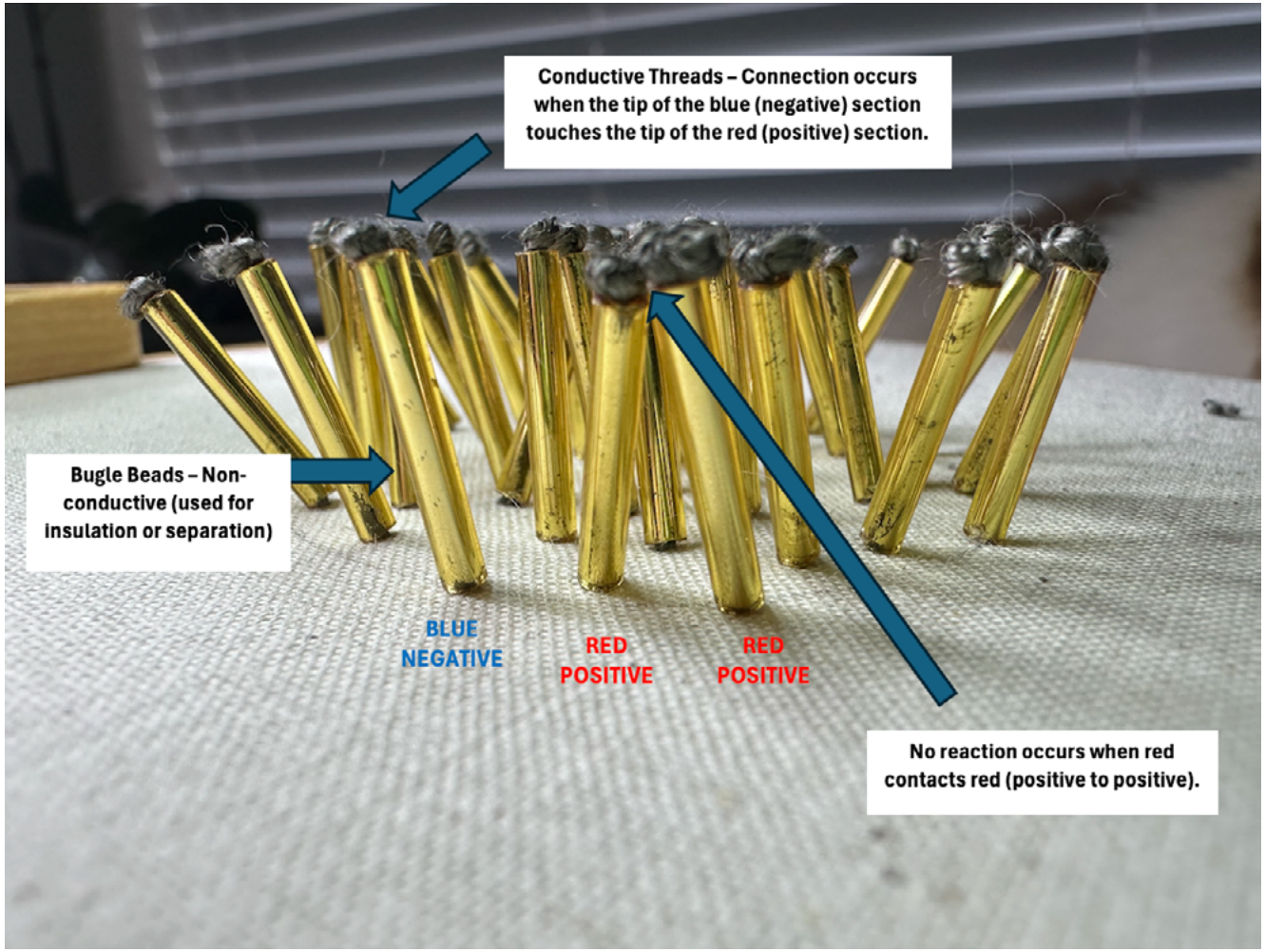
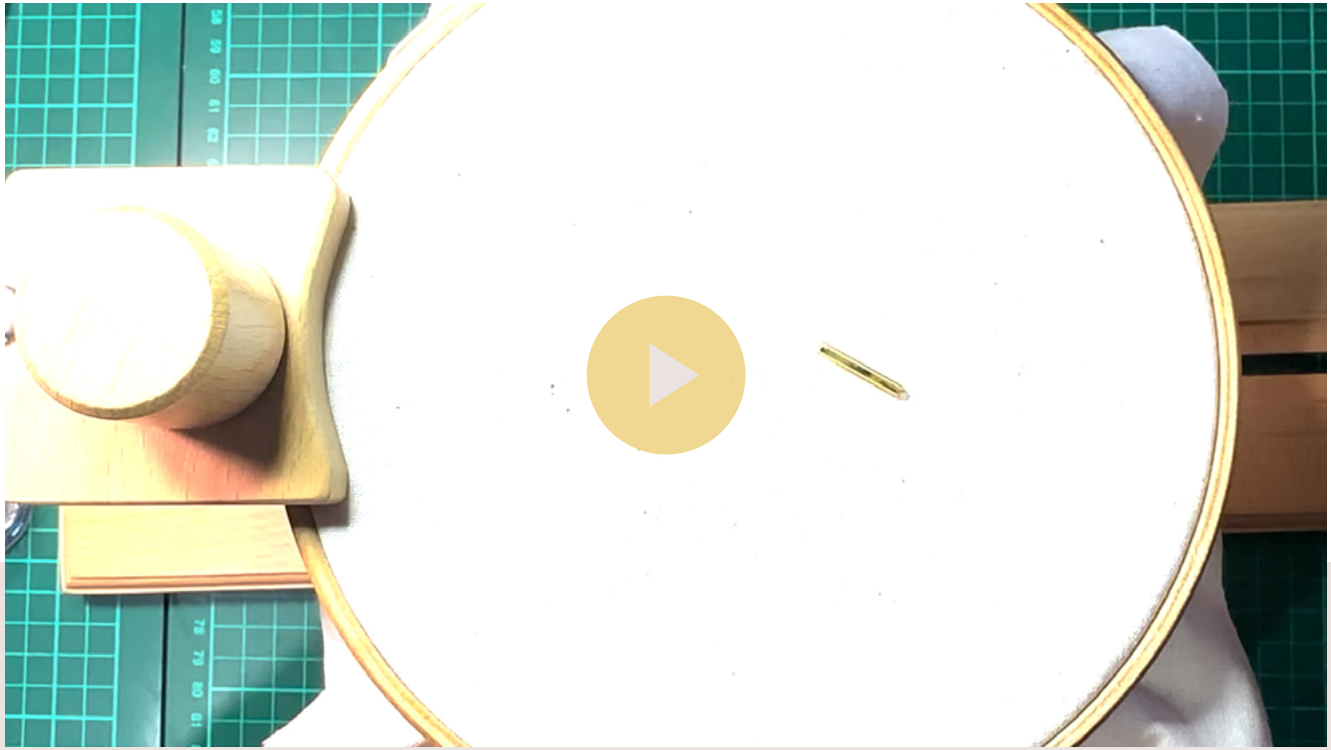


Figure 12 To Be Touched Detailed View

The following section provides a step-by-step photo and video tutorial on how to practice the variation of the seed stitch, incorporating beads into the structure.

To proceed with this section, it is important to first understand how the traditional seed stitch is performed. For detailed instructions on the original seed stitch technique, please refer to the Technique Guide.



Video 9 To Be Touched Demonstration C [Video]

1. Mark the Beading Area

Begin by drawing the area where the beads will be placed. In this prototype, a circle was drawn to represent the entire area for the beads, with the beads randomly arranged within that circle.

2. Thread the Needle and Begin Stitching (Figure 13)

Thread a needle with conductive thread and bring it up through the fabric from the underside to the surface at your desired starting point.

3. Add the Bead (Figure 14)

Slide a bead onto the conductive thread and position it vertically on the fabric surface where it will be secured.

4. Form the Seed Knot Stitch (Figures 15–16)

Using the seed stitching method, wrap the conductive thread around the needle three times. Then insert the needle through the bead and fabric to secure it with a knot.

5. Complete the Stitch (Figure 17)

Pull the thread through to finish the seed knot stitch. You have now anchored one conductive bead in place. Repeat the process for each additional bead in your layout.

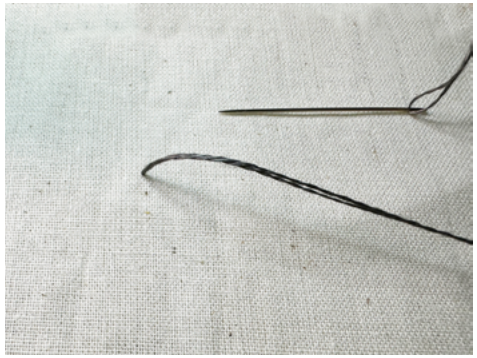


Figure 13 To Be Touched
Making Step 2

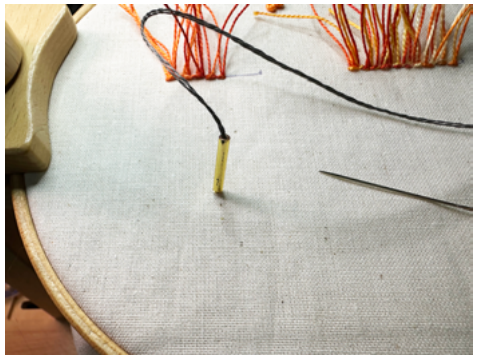


Figure 14 To Be Touched
Making Step 3

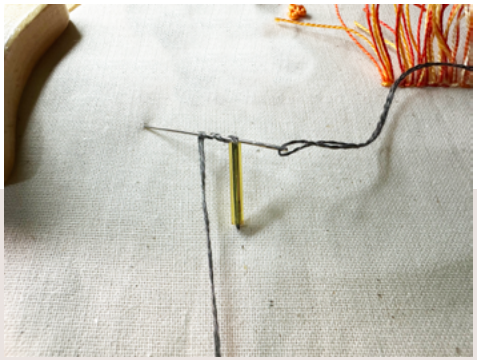


Figure 15 To Be Touched
Making Step 4A

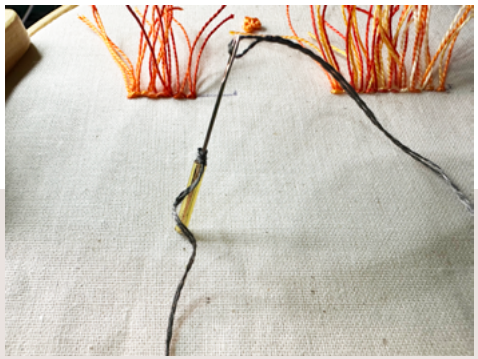


Figure 16 To Be Touched
Making Step 4B



Figure 17 To Be Touched
Making Step 5

Tips

1. Test Your Needle with the Beads First

Before starting, always check that your needle is the correct size by passing it through the beads. This ensures smooth stitching without damaging the beads or needle.

2. Test Your Beads

Since some beads such as metal ones are conductive, always test your beads before beginning embroidery to ensure they suit your project.

3. Make the Knot Large Enough to Secure the Beads

Ensure the knot at the top of each bead is big enough to prevent it from slipping through. Adjust the knot size by varying the number of wraps around the thread or the thickness of the threads.

4. Use Short Lengths of Conductive Thread

When embroidering, work with short pieces of conductive thread to minimise tangling and maintain control.

5. Isolate Conductive Threads on the Reverse Side

Make sure the ends of conductive threads on the reverse side of the fabric do not touch each other. Proper isolation is key to preventing unintended connections. This can be achieved by using insulating tape, fabric glue, or a layer of non-conductive fabric to cover exposed thread ends and maintain a clear separation between the positive and negative paths.

6. Loosen Your Grip if the Needle Feels Stuck

If the needle gets stuck while pulling it through to form a knot, it may be due to tight thread tension. Loosen your grip slightly to allow smoother movement.

7. Avoid Passing the Needle Back Through the Same Stitch Hole

Instead of re-entering the exact stitch point, pass the needle near it. This keeps the knot secure and prevents it from slipping through to the fabric's underside.

Reflection

To Be Touched explores the integration of traditional seed stitching with interactive functionality not only by combining embroidery techniques with conductive materials, but also by subtly altering the structure of the stitch itself. In this experiment, seed stitches were placed not on fabric but directly on top of beads. Conductive thread is used to create a circuit-like structure, transforming the piece into a tactile surface that functions similarly to a touch or strike sensor. Working with conductive thread required both patience and practice. Unlike regular embroidery threads, conductive threads are stiffer, less flexible, and prone to tangling, which made maintaining precision more challenging. The thread available to me only came in one thickness, so selecting appropriately sized needles and beads became especially important to ensure smooth stitching. These limitations underscored the need to work slowly and intentionally, paying close attention to thread tension and handling throughout the process.

Planning was also critical. Because this piece functions as a sensor, each bead's placement needed to be carefully mapped out in advance to determine circuit paths and ensure electrical isolation where necessary. Without clear planning, it was easy to run into problems with unintended connections or signal interference. There were also unexpected discoveries, such as the beads tilting in random directions because they were not firmly secured to the fabric surface, or the need to keep the positive and negative threads at least 3–4 mm apart to avoid unintended connections. These are the kinds of insights that only emerge through hands-on making. To me, this is the beauty of projects that combine traditional techniques with modern technology: they invite experimentation and encourage learning through the process itself.

Despite these challenges, the outcome revealed new possibilities for using decorative techniques to serve interactive functions. This project demonstrated how a small, traditional technique like seed stitching could be adapted in new contexts, adding both aesthetic texture and technical potential to e-textile work.

Project Four – To Be Touched: Through Movement

About This Project

This project builds upon the previous work, *To Be Touched*. In that earlier piece, the beads were attached directly to the base fabric, which restricted their movement even when the fabric was manipulated. I tried to increase bead flexibility by loosening the stitching; however, this could only be done to a limited extent, as overly loose stitching would cause the beads to become unstable. For Project Four, I aimed to introduce more flexibility by placing a round bead underneath each tube bead. With a rounded surface at the base, the tube beads are no longer fixed; they shift and wobble in response to fabric movement. While this creates some unpredictability in the direction the beads lean, I see this as a strength rather than a limitation. The randomness adds a dynamic, playful quality that makes the technique especially suitable for garments where the natural movement of the body causes the beads to bounce and react spontaneously.

What I especially appreciate about this project is that many of its discoveries emerged organically through the making process itself. By first immersing myself in the traditional skill, I was able to develop a solid foundation. From there, I introduced my own manipulations and adaptations, gradually evolving the technique into new variations. This journey felt like a true learning experience, one where I absorbed the essence of the traditional craft, transformed it through experimentation, and ultimately created something uniquely my own. It is a rewarding process of both honouring tradition and pushing creative boundaries.

Visual Demonstration:

The following Figure 18 and the accompanying video provide a visual overview of the sample.



Figure 18 To Be Touched: Through Movement Sample Photo



Video 10 To Be Touched: Through Movement Demonstration A [Video]

How It Works

The video below demonstrates how the sample functions. The circuitry design of this textile sample operates in the same way as the previous project. When I gently touch or move the beads, the conductive negative seed stitching on top comes into contact with the positive seed stitches, completing the circuit and activating the design. The key difference between this project and the previous one, *To Be Touched*, is the addition of a round bead beneath the tube bead. This modification provides greater flexibility and allows for more dynamic movement.



Video 11 To Be Touched: Through Movement Demonstration B [Video]

Material List

Textiles & Threads

- Conductive thread – Grey
- Medium Bugle Beads
- Round glass beads
- Fabric base - Calico (plain woven cotton)

Electronic Parts

- Battery holder
- LED

Tools

- John James hand needle set - assorted 25
- Fabric Marking Pen
- Scissors
- Embroidery hoop
- Optional: Embroidery hoop stand

Techniques Used

- Seed Stitch (打籽绣)

Making Steps

The following sections start with the stitching structure, followed by a step-by-step guide to executing the technique.

For details on circuitry design, please refer to the instructions provided in the previous project.

In the photo (Figure 19):

- This photo demonstrates how the circuits function in a three-dimensional way.
- Both the blue and red sections are conductive, but they are isolated from each other on the underside of the fabric. The bugle beads and the glass beads, which are non-conductive, serve as a barrier between the two sections on the surface. A connection is only made when the red (positive) tips come into contact with the blue (negative) tips.

The key difference between this sample and the previous one is the addition of a round glass bead at the bottom. Since the bugle beads are no longer resting on a flat surface, they move around much more, which is an advantage for flexibility. On the downside, the beads also tend to lean directly against the fabric rather than standing upright.

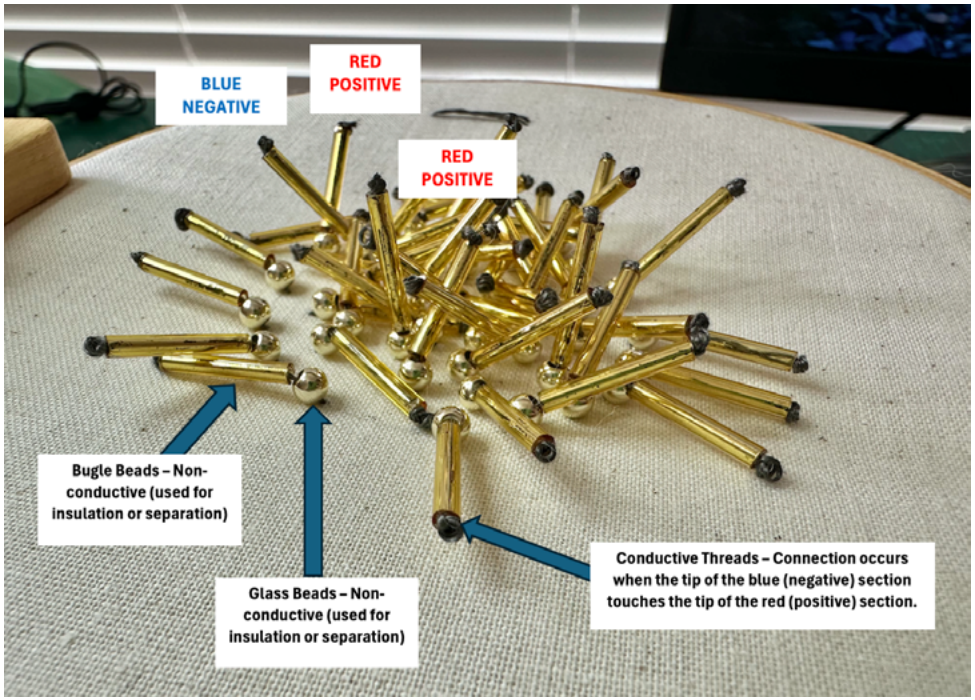


Figure 19 To Be Touched: Through Movement
Detailed View

The following section provides a step-by-step photo and video tutorial on how to practice the variation of the seed stitch used for this project, which incorporates additional round beads into the structure.

To proceed with this section, it is important to first understand how the traditional seed stitch is performed, as well as the electrical concepts introduced in Project Three. For detailed instructions on the original seed stitch technique, please refer to the Technique Guide.



Video 12 To Be Touched: Through Movement Demonstration C [Video]

1. Prepare the Circuit

This piece uses the same technique and circuit design as the previous project, with one key difference: each stitch now includes an additional round bead at the base. This addition provides enhanced flexibility and movement in the beaded structure.

2. Begin Stitching (Figure 20)

Thread the needle with conductive thread and insert it through the fabric, pulling it from the bottom to the top to begin your first stitch.

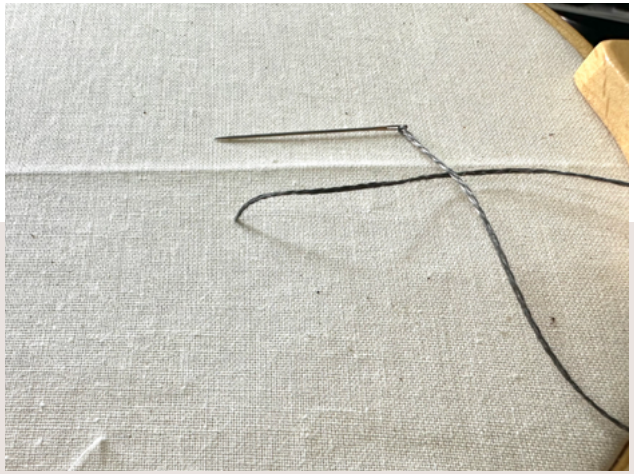


Figure 20 To Be Touched: Through Movement Making Step 2

3. Add the Round Bead (Figure 21)

Thread the round bead onto the needle with the conductive thread. This bead will sit at the base of the stitch, providing support and enhancing movement in the final structure.

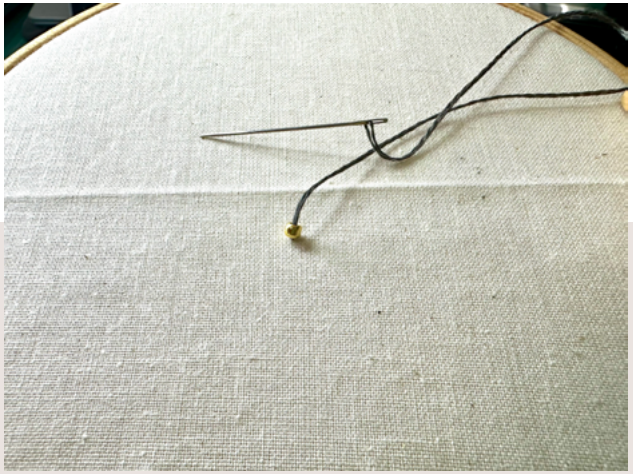


Figure 21 To Be Touched: Through Movement Making Step 3

4. Add the Tube Bead (Figure 22)

Thread the tube bead onto the needle with the conductive thread and position it vertically on top of the round bead. This arrangement helps create a raised, movable structure that will respond to touch.

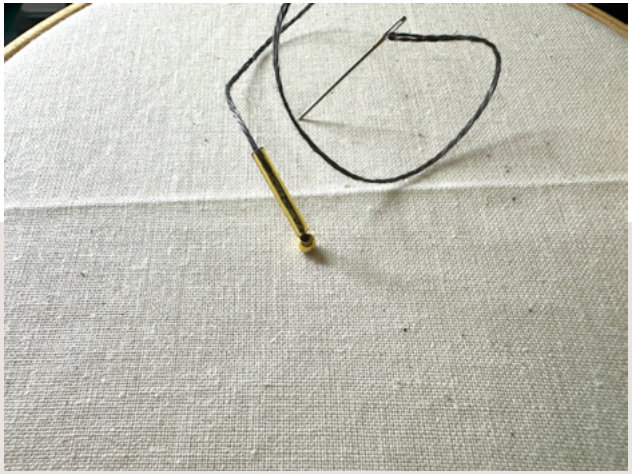


Figure 22 To Be Touched: Through Movement Making Step 4

5. Form the Seed Stitch Knot (Figure 23 & 24)

Using the seed stitching technique, wrap the conductive thread around the needle three times. Then, insert the needle downward through the tube bead, the round bead, and the fabric to form the knot. This secures the beads in place while maintaining conductivity.

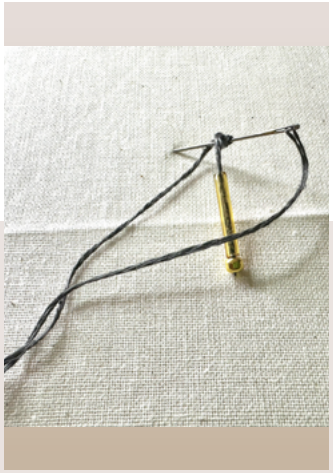


Figure 23 To Be Touched: Through Movement Making Step 5A

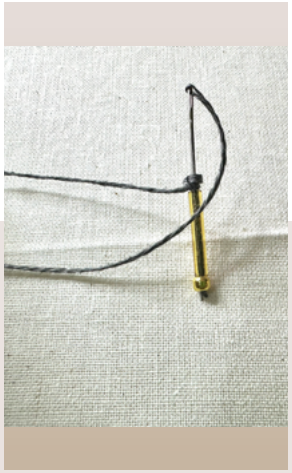


Figure 24 To Be Touched: Through Movement Making Step 5B

6. Complete the Stitch (Figure 25)

You have now completed one seed knot stitch using both a round bead and a tube (bugle) bead. This forms a secure and conductive unit. Repeat the process for each bead in your layout.

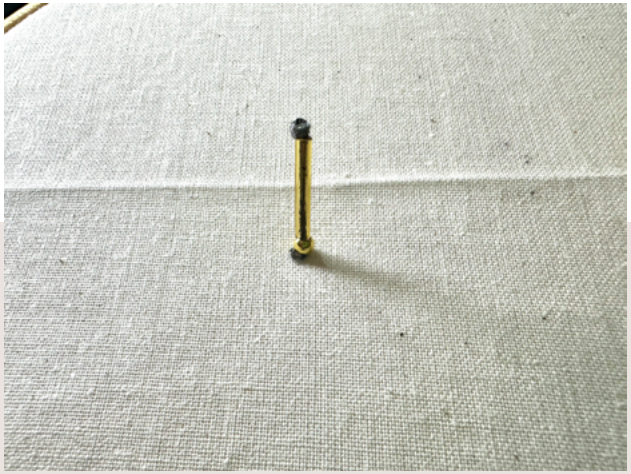


Figure 25 To Be Touched: Through Movement Making Step 6

Tips

1. Match Bead Sizes

Ensure that the round beads and tube beads are the same size. If one is too large or too small, they will not fit together properly or function effectively.

2. Plan and Test Your Circuit Layout

Before starting, carefully plan your circuit layout. Test connections regularly as you work to prevent unintended contact. Maintain a gap of 3–4 mm between each conductive path, stitching too close can cause accidental connections.

3. Avoid Stitching Too Loosely

In Project Three, I intentionally stitched the beads loosely to enhance flexibility, so I applied the same approach here. However, the results showed that this project requires tighter stitching; with a loose stitch, the beads tend to collapse onto the fabric instead of standing upright. The direction in which you pull the thread also influences the angle at which the bead leans, so it is important to control both tension and stitch direction during making.

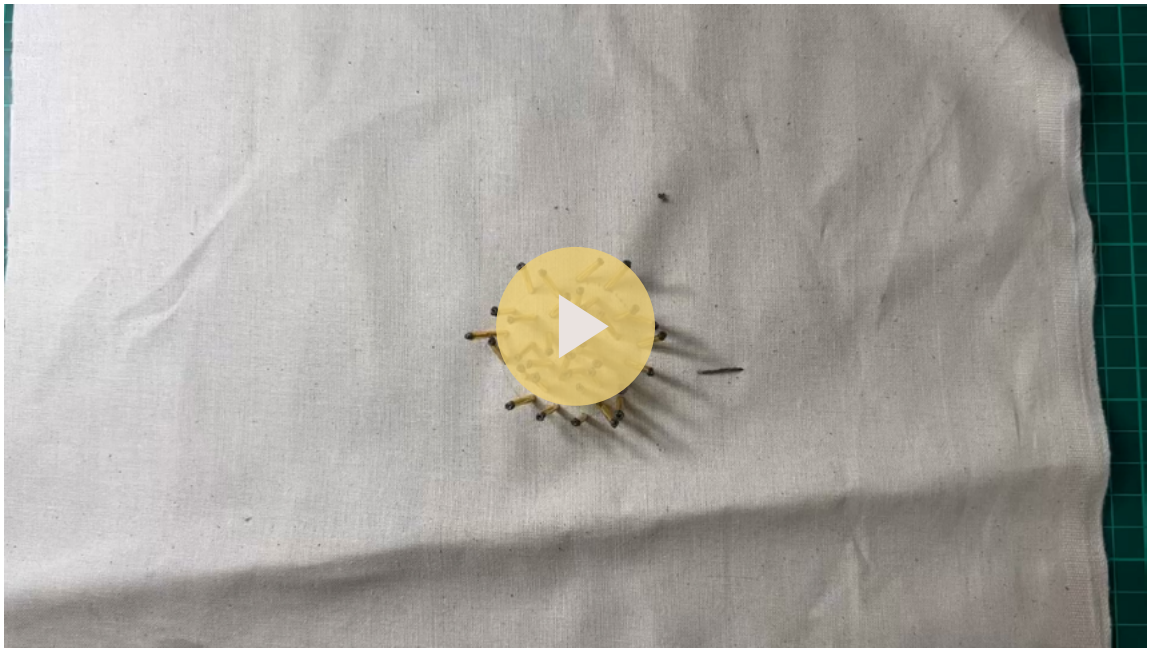
Reflection

After completing this project, I recorded the differences in movement between Project Three and Project Four.

Here is the demonstration video.

It is clear that the new sample offers significantly more flexibility compared to the one developed in Project Three. The addition of round beads at the base for Project Four significantly enhanced the flexibility and responsiveness of the design compared to Project Three. In the original version, the fixed placement of the beads created a more static interaction, relying solely on direct touch to activate movement. This new approach introduces a subtle but effective shift. The beads now respond to motion in the fabric itself, rather than requiring direct contact. I found this change particularly exciting, as it brings a sense of liveliness and unpredictability to the piece. The way the beads shift, tilt, and bounce with even slight fabric movement makes the interaction feel more organic and intuitive. This randomness, while initially unexpected, adds character and reinforces the playful, interactive nature of the design.

Overall, I feel the inclusion of round beads at the base of the tubular bead strengthens the project conceptually and visually. This subtle innovation enhances movement and responsiveness, opening up new possibilities for wearable applications, where natural body movement could bring the textile surface to life without any need for deliberate interaction. Also, both *To Be Touched* projects explore alternative ways of using traditional stitching techniques, experimenting with how they can function beyond their conventional decorative or structural roles. By integrating conductive threads and strategically placing beads, the stitching not only retains its cultural and aesthetic value but also takes on a new role as an active participant in creating movement, interaction, and electronic response. This approach allows for a meaningful dialogue between heritage craft practices and modern technology, highlighting the potential of embroidery as a medium for innovation.



Video 13 To Be Touched: Through Movement Demonstration D [Video]

Project Five – To Be Touched: Padding the Surface

About This Project

After completing Project Four, I continued to reflect on the potential of three-dimensional structures. Since the bead arrangement itself already possesses a three-dimensional form, I began to wonder, what would happen if I stitched them onto a surface that is not flat? This curiosity became the foundation for my next project.

The idea was to explore how beads, both round and tubular, would behave when applied to a padded, sculptural surface. Instead of working on a flat fabric base as I had in previous projects, I decided to add padding beneath the fabric to create a raised, cushioned form. This change introduces softness, volume, and unevenness, all of which may affect the movement of the beads and the way they interact, especially in the context of circuit functionality and textile flexibility.

The aim of this project is to investigate how the dimensionality of the base fabric alters bead dynamics. By observing how bead movement, orientation, and connectivity respond to a non-flat surface, I hope to gain insights into the possibilities of integrating bead-based e-textile components into more sculptural or body-contouring textile applications.

Visual Demonstration:

The following Figure 26 and the accompanying video provide a visual overview of the sample.

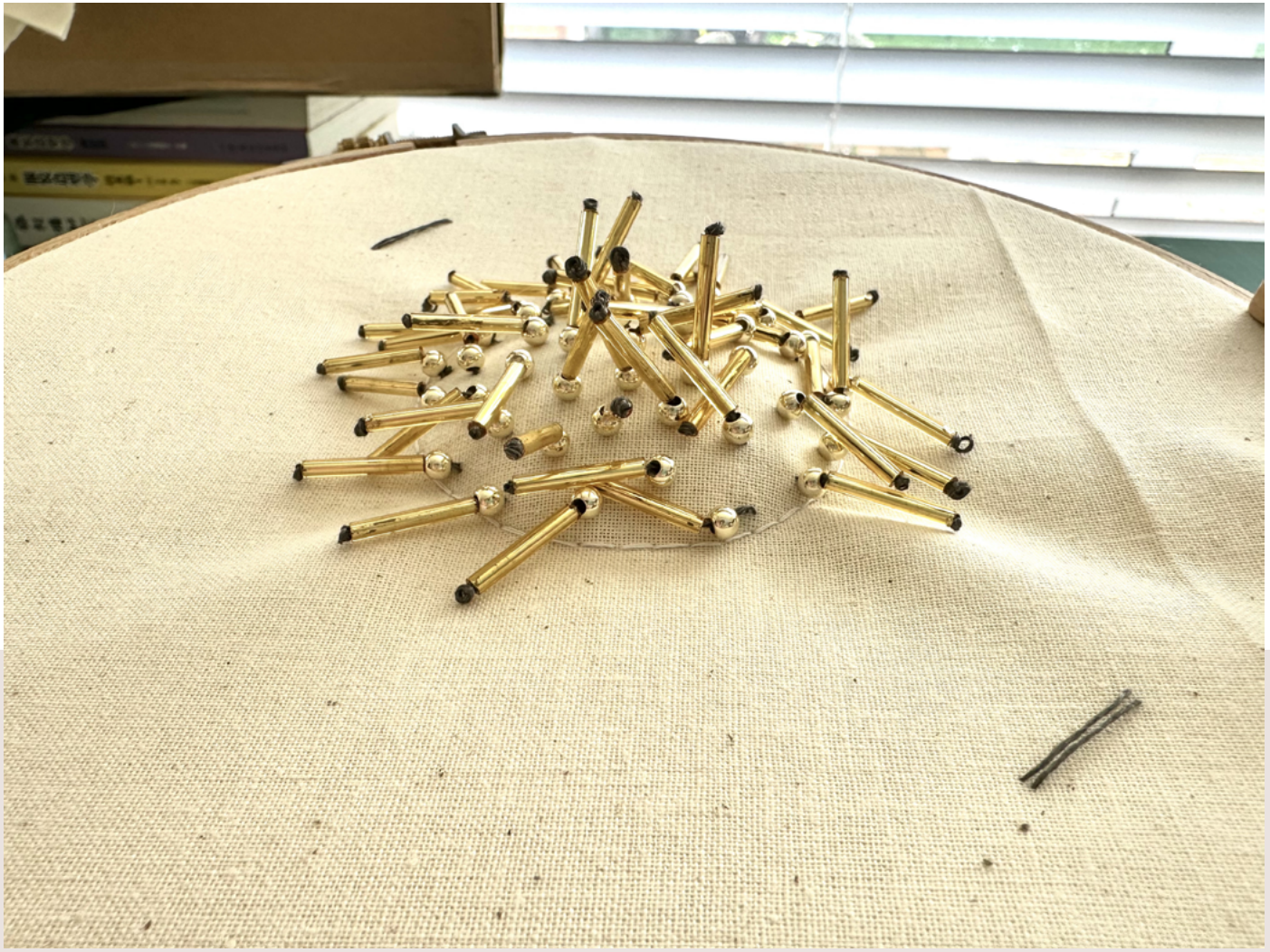
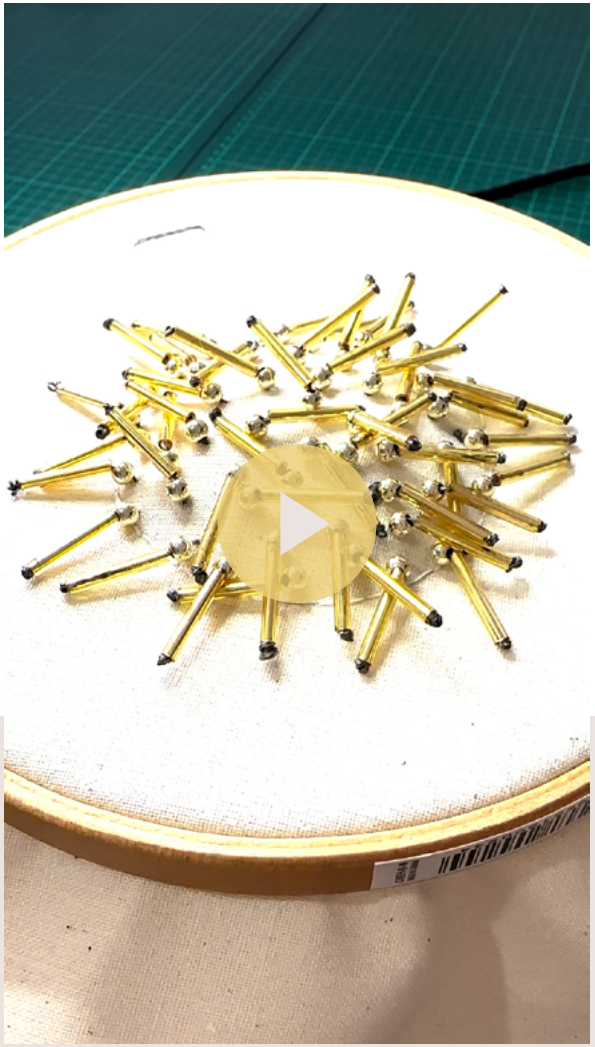


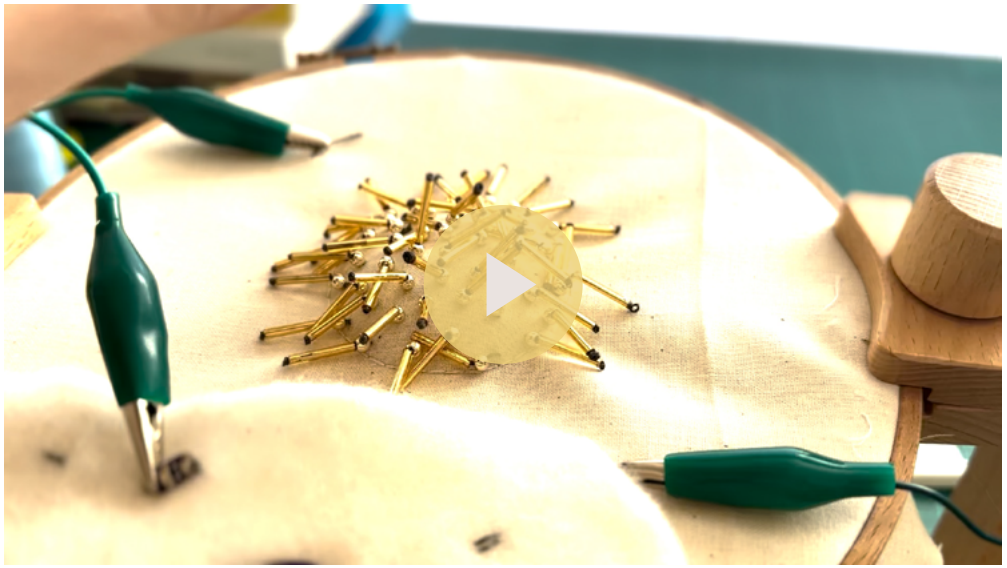
Figure 26 To Be Touched: Padding the Surface Sample Photo



Video 14 To Be Touched: Padding the Surface Demonstration A [Video]

How It Works

This videos demonstrate how the sample functions in motion. It builds on the same principles used in Project Four but introduces a key difference: the fabric has been padded to enhance its three-dimensional quality. By adding this volume, the piece moves away from a flat textile surface and begins to engage more actively with sculptural form and soft structure. As with the previous project, the interaction relies on the movement of the beads. The addition of padding affects how the beads shift and settle, potentially altering the points of connection and the responsiveness of the circuit. This experiment helps to explore how volume and surface texture influence the functional behaviour of e-textile components.



Video 15 To Be Touched: Padding the Surface Demonstration B [Video]



Video 16 To Be Touched: Padding the Surface Demonstration C [Video]

Material List

Textiles & Threads

- Conductive thread – Grey
- Medium Bugle Beads
- Round glass beads
- Wool
- Fabric base - Calico (plain woven cotton)

Electronic Parts

- Battery holder
- LED

Tools

- John James hand needle set - assorted 25
- Fabric Marking Pen
- Scissors
- Embroidery hoop
- Optional: Embroidery hoop stand

Techniques Used

- Seed Stitch (打籽绣)

Making Steps

The following sections start with the stitching structure, followed by a step-by-step guide to executing the technique.

For details on circuitry design, please refer to the instructions provided in Project Three.

In the photo (Figure 27):

- This photo demonstrates how the circuits function in a three-dimensional way.
- Both the blue and red sections are conductive, but they are isolated from each other on the underside of the fabric. The bugle beads and the glass beads, which are non-conductive, serve as a barrier between the two sections on the surface. A connection is only made when the red (positive) tips come into contact with the blue (negative) tips.

The primary difference between this sample and the one in Project Four lies in the use of a padded surface. While the stitching structure and bead layout remain the same, the underlying fabric has been modified to introduce volume and a more sculptural quality. The stitching was completed first, and then the circular area was padded underneath to create a raised, three-dimensional surface.

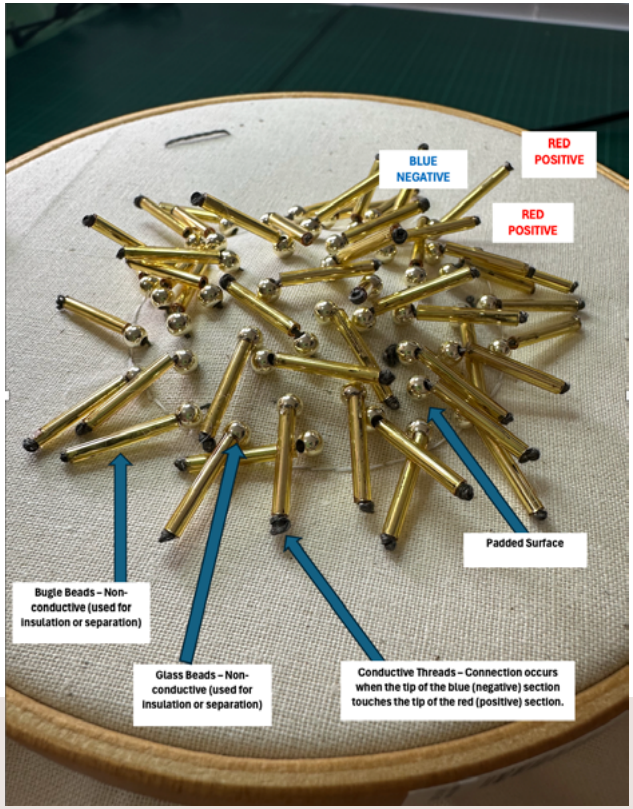


Figure 27 To Be Touched: Padding the Surface Detailed View

The following section provides a step-by-step photo tutorial on how to pad the fabric.

To proceed with this section, it is important to first understand how the traditional seed stitch is performed, as well as the concepts introduced in Project Four. For detailed instructions on the original seed stitch technique, please refer to the Technique Guide.

1. Reuse the Circuit Design

This project uses the same technique and circuit design as Project Four: *To Be Touched: Through Movement,* maintaining the stitched conductive pathway to activate interaction through touch.

3. Repeat and Prepare for Padding

Repeat step 2 as needed until the entire design is complete. Once all bead units are stitched in place, mark the section of the fabric where the padding will be applied. Figure 28 shows two bead structures, with a circle indicating the area designated for padding.

2. Attach the Beads

Mark the area on the fabric where the beads will be placed. Thread a needle with conductive thread and insert it from the underside of the fabric, pulling it through to the top. Slide a round bead onto the needle, followed by a tube bead, positioning the tube bead vertically on top of the round bead. Using the seed stitching technique, wrap the conductive thread around the needle three times, then insert the needle back down through the tube bead, round bead, and fabric to form a secure knot.

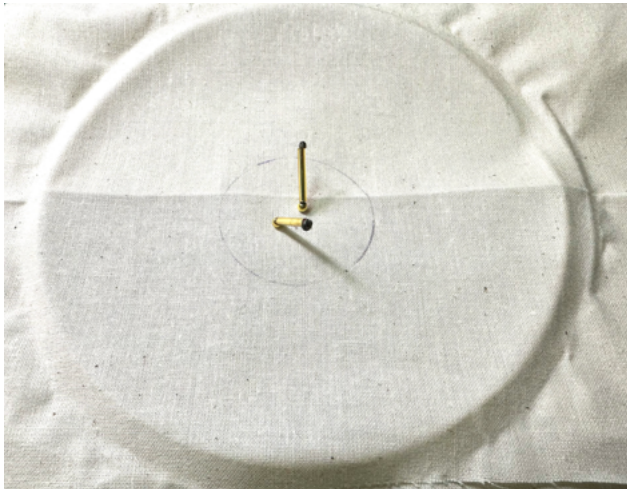


Figure 28 To Be Touched: Padding the Surface Making Step 3

4. Add Fabric Layer (Figure 29)

Place an additional layer of fabric beneath the fabric with the bead structures embroidered. The wool fibre will be inserted between these two layers later to create the padding.



Figure 29 To Be Touched: Padding the Surface Making Step 4

5. Sew Fabric Layers Together (Figure 30)

Using a running stitch, sew along the marked line to join the two fabric layers together. Leave a small opening unstitched to allow for the insertion of the wool padding.



Figure 30 To Be Touched: Padding the Surface Making Step 5

6. Insert Padding and Close Opening (Figure 31)

Insert the wool padding through the opening between the fabric layers. Once filled, stitch the gap closed to secure the padding in place.



Figure 31 To Be Touched: Padding the Surface Making Step 6

Tips

1. Adjust Top Layer for Padding

The padding method used in this project causes both the top and bottom fabric layers to bulge. To prevent this, either add extra fabric to the top layer or pre-shape the top layer so it can accommodate the padding without affecting the bottom layer's flatness.

2. Avoid Bead Placement at Padding Edges

Beads positioned near the edge of the padded area are more likely to collapse due to uneven support and gravity. Place beads closer to the centre of the padded section for better stability.

3. Control Stitch Tension

The tension of each knot affects the flexibility of the bead structure. If the seed stitch is pulled too tightly, it restricts movement and reduces flexibility. Keep the tension consistent but slightly loose to maintain responsiveness.

4. Consider Padding Material Choice

Different padding materials (e.g., foam, batting, felt) will behave differently under pressure. Choose a material that offers enough structure to support bead movement without being too rigid or too soft.

Reflection

In contrast to the previous project, which centred around experimenting with the technique itself, this project shifts the focus to the base fabric. By changing the fabric's structure and exploring how it interacts with the beads and padding, the project uncovers new possibilities for creating interactive designs. This concept of manipulating the fabric introduces a fresh element to consider when combining traditional techniques with e-textiles. This alteration impacts how the beads move and respond, demonstrating how even subtle changes in the fabric can transform the behaviour of the design and offer fresh creative directions.

In developing this sample, I applied lessons learned from Project Four, for instance by tightening the stitching to improve stability and bead alignment. However, despite this adjustment, this design still experiences some collapse. This instability is largely due to the uneven shape and distribution of the padding. Because the padding is not uniform, the beads tend to shift and collapse downward, especially near the bottom edge of the padded area where the support ends. This creates a cascading effect in which the beads lose their upright posture, affecting both the visual impact and the functional interaction between conductive threads. This observation highlights the importance of consistent padding in maintaining bead structure and performance. It also opens up new considerations for how form, texture, and material distribution can affect the behaviour of interactive textile surfaces.

For future experiments, it would be valuable to explore a variety of padding shapes and materials to better understand how these factors influence the behaviour of the bead structures on top. Different shapes such as domes, ridges, or asymmetrical forms could introduce new movement patterns and affect how the beads align, shift, or collapse. Similarly, experimenting with various padding materials, such as foam, felt, batting, or even layered textiles, may reveal differences in softness, resistance, and flexibility, all of which can impact the responsiveness and stability of the beads.

Project Six – Beaded Circuitry Series

About This Project

This project series continues my exploration of the intersection between traditional craft techniques and modern e-textile technologies. It specifically focuses on the use of seed stitching with conductive thread and crimp beads to create interactive textile surfaces. Drawing inspiration from the aesthetics and structure of seed stitching, this iteration builds on the foundations laid in the *To Be Touched* series, further integrating the concept of strike sensors into densely stitched surfaces.

In this project, each stitching structure functions as either a conductor or an insulator, depending on the materials used and the way the stitch is constructed. This layered approach enables the embroidery to act as a responsive interface. When a viewer or participant touches specific zones of the stitched surface, the seed knots and beads shift slightly, this subtle movement can either complete or disrupt an electrical circuit. The result is a richly textured, tactile surface that transforms physical touch into functional interaction. The embroidery no longer serves purely decorative purposes but instead becomes a soft, intuitive interface that invites users to engage through touch. The densely packed stitching enhances both visual complexity and sensor sensitivity, reinforcing the connection between material, movement, and response.

Three samples were created as part of this series, all using the same foundational stitching technique, but each designed to explore different variables. These include variations in stitch and bead size to examine how scale influences flexibility and electrical contact, the use of different thread types to compare conductivity, texture, and stitch definition, and the incorporation of various bead materials to assess how their shape, weight, and conductive properties affect both functionality and aesthetics.

Visual Demonstration:

This sample serves as the foundational design for the series, establishing the core stitching technique, material choices, and initial structural elements that guide all subsequent experiments. The following photographs and video present the sample from multiple angles, allowing detailed observation of its construction methods, surface texture, and the way the beads interact with the fabric. These visuals also demonstrate how the sample responds to different lighting conditions and viewing perspectives, revealing subtle variations in texture and movement. Together, they offer a comprehensive understanding of the design's functional and aesthetic qualities.



Figure 32 Beaded Circuitry Series Sample Photo



Video 17 Beaded Circuitry Series Demonstration A [Video]

How It Works

This video demonstrates how the sample functions when integrated with an LED circuit. As I move my finger across the beaded surface, the beads shift slightly in response to the pressure and direction of the touch. The circuit is designed so that when a bead carrying a positive conductive thread comes into contact with a bead connected to a negative thread, the circuit is completed and the LED light turns on. Once the contact is broken, when the beads separate due to movement or the release of pressure, the circuit is interrupted, and the light turns off. This simple yet effective interaction showcases how physical touch can activate or deactivate the circuit, highlighting the potential of this technique for creating responsive, touch-sensitive textile interfaces.



Video 18 Beaded Circuitry Series Demonstration B [Video]

Material List

Textiles & Threads

- Conductive thread – Grey
- Standard embroidery threads
- Crimp beads
- Fabric base - Calico (plain woven cotton)

Electronic Parts

- Battery holder
- LED

Tools

- John James hand needle set - assorted 25
- Fabric Marking Pen
- Scissors
- Embroidery hoop
- Optional: Embroidery hoop stand

Techniques Used

- Seed Stitch (打籽绣)

Making Steps

The following sections begin with instructions on circuit design, followed by a step-by-step guide on how to execute the technique.

1. Design the Circuitry (Figure 33)

This is a flat diagram illustrating the layout of the circuit.

In the diagram:

- Each dot represents a single seed stitch.
- The red section represents one terminal (positive), using conductive thread as the base stitching to carry current.
- The blue section represents the opposite terminal (negative), also stitched with conductive thread.
- The black section is stitched with regular (non-conductive) embroidery thread. This zone helps separate the conductive parts.

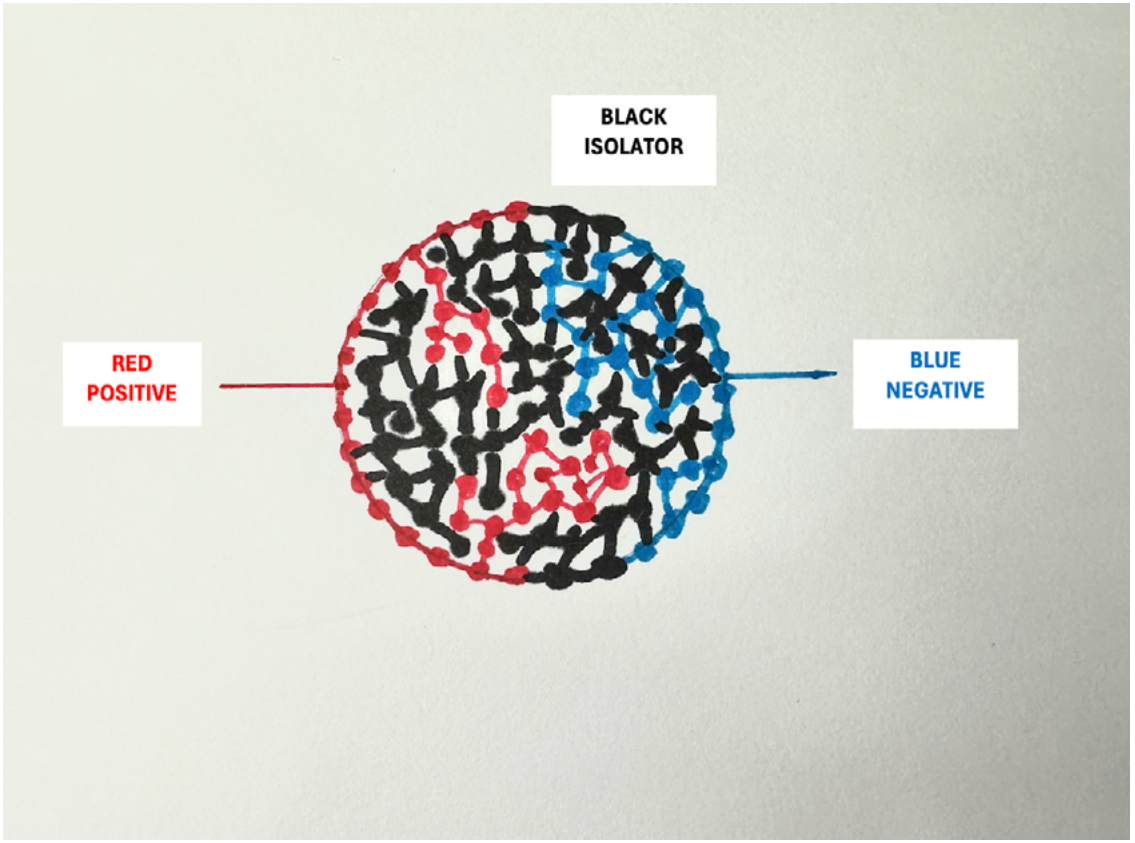


Figure 33 Beaded Circuitry Series Circuitry Design

In the photo (Figure 34):

- This photo demonstrates how the circuits function in a three-dimensional way.
- Both the blue and red sections are conductive, including the grey seed stitching at the top and the path through the beads at the bottom.
- The areas with gold seed stitching and the beads beneath are not independently conductive. However, the beads themselves are made from conductive material, allowing them to create electrical connections when they come into contact under specific conditions such as movement, pressure, or alignment.

The crimp beads are the key component that enables this sample to function. They play a dual role, acting both as insulators and as conductive elements depending on how they are used and the conditions applied. In this design, two types of seed stitching and crimp bead structures are incorporated.



Figure 34 Beaded Circuitry Series Detailed View

The first type consists of conductive seed stitching combined with crimp beads, which is used to establish the main positive and negative conductive pathways. The second type involves non-conductive seed stitching paired with crimp beads, which serves a dual purpose. It isolates the conductive lines while still allowing for potential electrical connection under specific circumstances. Because crimp beads are rounded in shape, even when stitched closely together, small gaps naturally form between each bead structure. These gaps create a built-in layer of insulation, preventing unintended contact between the positive and negative pathways. However, when the fabric is manipulated, either by touch or movement, these crimp beads can shift or tilt slightly. In doing so, they momentarily bridge the gap and act as conductive connectors, allowing electricity to pass through and complete the circuit.

The following section provides a step-by-step photo tutorial on how to replicate this sample.

To proceed with this section, it is important to first understand how the traditional seed stitch is performed. For detailed instructions on the original seed stitch technique, please refer to the Technique Guide.

1. Sketch the Beaded Area

Begin by sketching the overall shape of the area you plan to cover with seed stitching. In this example, I chose a circular shape to resemble a button. Defining the shape early helps guide the layout of both conductive and non-conductive sections during the stitching process.

Figure 35 shows the layout, including the positive and negative stitching zones, along with the gold thread used as a non-conductive isolator between them.

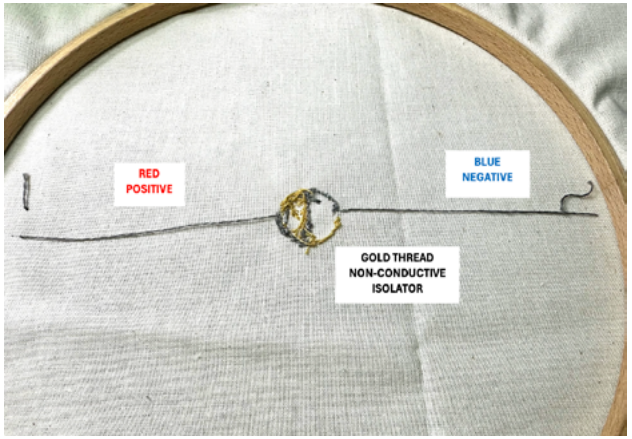


Figure 35 Beaded Circuitry Series Making Step 1

2. Stitch the Conductive Thread Section First

Start by working on the sections that will use conductive thread for seed stitching. There are many possible layout variations, but the essential principle is to ensure that the conductive paths remain isolated from each other. In Figure 36, I began by building the conductive zones, carefully stitching seed knots with conductive thread while leaving intentional gaps between paths. Once the conductive section was completed, I filled in the surrounding areas using regular thread seed knots to act as insulators and to visually blend the design.



Figure 36 Beaded Circuitry Series Making Step 2

3. Use Crimp Beads for Isolation or Connectivity (Figure 37)

Crimp beads can be used strategically in two ways, either to create isolation or to enhance conductivity. One common issue in densely stitched areas is unintentional circuit closure, where the conductive threads touch continuously, resulting in a permanently connected circuit. To prevent this, I adopted a technique which is also used in the *To Be Touched* projects, placing a seed knot directly on top of a crimp bead. The rounded shape of the crimp bead naturally elevates the knot, introducing small gaps between stitches and helping to maintain separation between conductive lines.

At the same time, metal crimp beads can also be used to enhance conductivity. In areas where stronger or more reliable electrical connections are needed, metal crimp beads can act as conductive nodes. When integrated thoughtfully, they can boost signal flow while maintaining the aesthetic integrity of the piece.

Continue stitching until all gaps are completely filled.



Figure 37 Beaded Circuitry Series Making Step 3

Variation One: Scaling Up the Pattern

Scaling up the overall pattern involves increasing the size of both the seed knots and crimp beads. This adjustment affects not only the visual aesthetics but also the electrical functionality of the piece. A larger scale allows for a more spacious layout, which helps isolate conductive paths and reduces the risk of unintentional connections. It also makes the technique more suitable for larger applications, such as garments or installation-based textile interfaces. Additionally, working with larger components improves handling and stitching efficiency, making the embroidery process faster and more accessible, especially for beginners or larger-scale production.

The following Figure 38 and the accompanying video provide a visual overview of the sample.



Figure 38 Beaded Circuitry Series Variation One Sample Photo



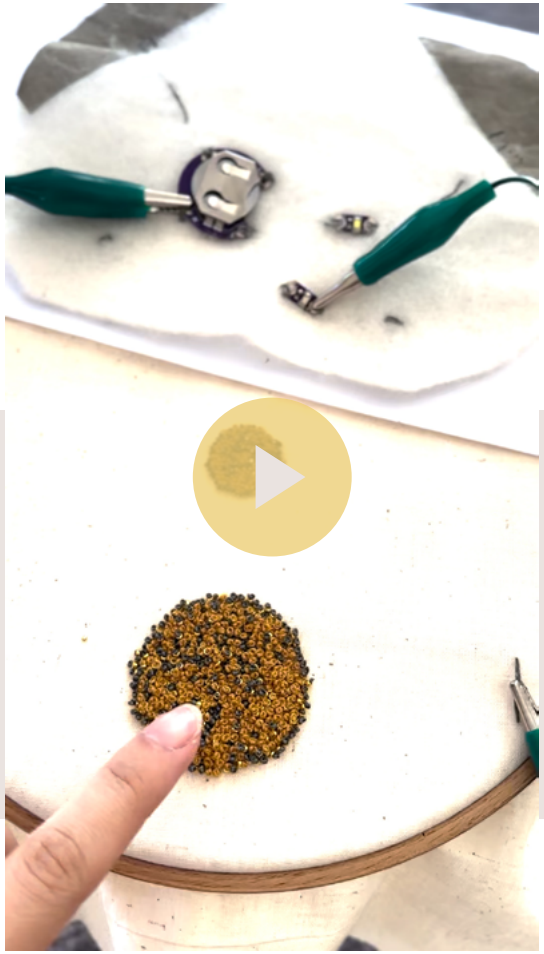
Video 19 Beaded Circuitry Series Variation One Demonstration A [Video]

How It Works

This video demonstrates how the second sample functions in comparison to the first. When designing the layout for this piece, I intentionally included fewer conductive sections, and unlike the first sample where conductive areas were more tightly grouped, here they are more dispersed across the circular surface. As shown in the video, this results in a less responsive circuit, when activated, the LED lights appear dimmer than in the previous sample.

This reduced conductivity is due to two key factors. First, the scattered placement of conductive zones makes it less likely for the circuit to be completed consistently during movement or touch. Second, the use of larger beads in this sample creates greater spacing between elements, which increases the physical distance between beads, making conductive contact less likely to occur. As a result, there are fewer opportunities for the positive and negative pathways to connect.

This observation suggests that when working with larger beads, it may be necessary to increase the number of conductive sections or reposition them more strategically to maintain consistent interaction. This experiment highlights the importance of bead size, layout density, and conductive material placement in designing effective e-textile circuits.



Video 20 Beaded Circuitry Series Variation One Demonstration B [Video]

Variation Two: Testing Different Threads and Colour Palettes

This variation explores the use of thick, textured tapestry wool threads combined with a range of orange tones. The aim is twofold: first, to examine how different thread types, particularly those with greater volume and texture, affect the tactile quality and structural behaviour of the embroidery; and second, to investigate how colour variation influences the overall visual impact of the design.

The following Figure 39 and the accompanying video provide a visual overview of the sample.



Figure 39 Beaded Circuitry Series Variation Two Sample Photo



Video 21 Beaded Circuitry Series Variation Two Demonstration A [Video]

How It Works

Just like the other samples, this one is also activated by touch. The use of wool thread introduced a softer, more sculptural quality to the surface, giving the embroidery a raised, tactile presence. The variation in orange tones added visual richness and warmth, enhancing the depth and rhythm of the stitched pattern. In this variation, beads are not used, as the larger structure of the wool seed knots naturally creates sufficient spacing between stitches. This spacing helps maintain circuit separation without the need for additional components. This variation highlighted how choices in material, both in texture and colour, can influence not only the visual aesthetics but also the functional and interactive behaviour of the textile interface.



Video 22 Beaded Circuitry Series Variation Two Demonstration B [Video]

Variation Three: Exploring Alternative Structures

This variation adopts a more structured and layered approach while maintaining the core stitching technique used in previous variations. The embroidery is constructed using tube beads at the base, crimp beads in the middle, and seed knot stitching on top to secure all components. This three-layer configuration introduces a vertical dimension to the surface, enhancing both its tactile feedback and visual complexity. A striped layout alternates rows of conductive thread with rows of non-conductive thread, creating a pattern that is both functional and decorative. Electrical connectivity relies on the interaction between the conductive thread and the metal crimp beads; when touched or pressed, these elements can close the circuit and activate an LED or other electronic component.

The following Figure 40 and the accompanying video provide a visual overview of the sample.



Figure 40 Beaded Circuitry Series Variation Three Sample Photo



Video 23 Beaded Circuitry Series Variation Three Demonstration A [Video]

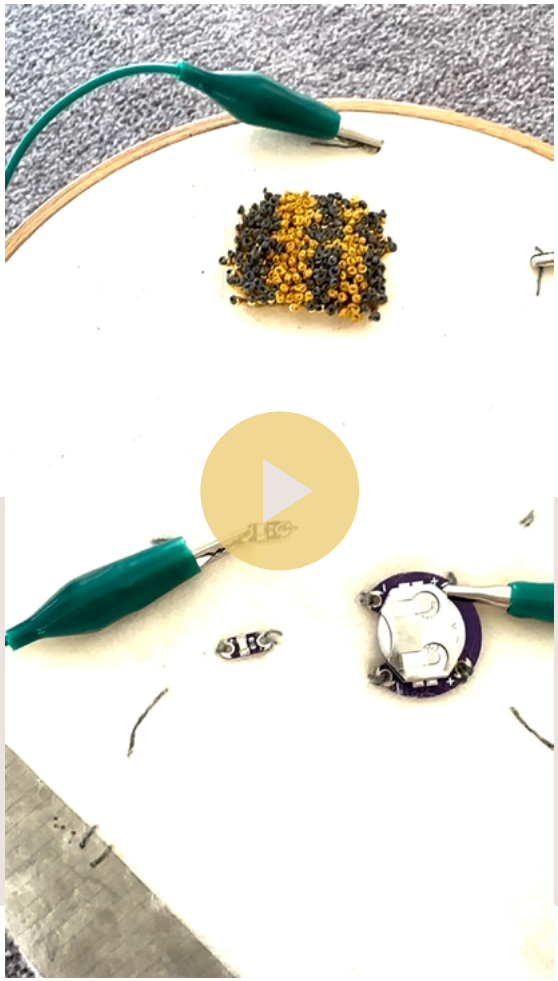
How It Works

Unlike the previous samples that respond primarily to light touch, this one is more effectively activated through movement specifically actions like squeezing or pushing. This difference is largely due to the layout of the circuit, which is arranged in a striped pattern.

In this design, the grey sections on either side function as the positive conductive paths, while the grey section running down the centre acts as the negative path. Between them, the gold sections serve a dual role. They act as both insulators and conditional conductors depending on the pressure applied.

When the textile is squeezed or compressed, the crimp beads positioned in the positive zones shift and come into contact with the crimp beads embedded in the central row under the non-conductive stitching. Although the gold-stitched area is not actively conductive on its own, the beads themselves are made of conductive material. Once contact is made, especially under pressure, the crimp beads can transfer electricity from the positive path through the gold section to the negative path, thereby completing the circuit and illuminating the LED.

This behaviour emphasises how both circuit layout and interaction method influence the effectiveness of soft electronic components. In this case, the striped pattern and spacing between paths make movement-based activation more reliable than passive touch.



Video 24 Beaded Circuitry Series Variation Three Demonstration B [Video]

Tips

1. Isolate Thread Ends Properly

Always ensure that the start and end of any conductive thread are securely isolated on the backside. Unintended overlaps or contact can cause short circuits or malfunction.

2. Plan Circuit Layout Ahead

Sketch your circuit before stitching to clearly define conductive and non-conductive zones. A well-planned layout helps maintain both functionality and visual clarity.

3. Test as You Go

Perform regular circuit tests throughout the stitching process. Early testing helps catch issues before they become harder to fix.

4. Match Crimp Bead and Seed Knot Size

Choose crimp beads that fit your seed knots securely. The seed knot should be slightly larger to hold the bead in place; otherwise, the bead may slip or fall off.

5. Use a Hoop or Frame for Tension

Keep your fabric taut while working. This provides stability and allows for more precise stitching, especially with layered beads and conductive thread.

6. Mark Conductive vs. Non-Conductive Areas

Use chalk, temporary thread, or fabric-safe markers to label zones clearly. This reduces the chance of stitching errors in complex layouts.

7. Select a Supportive Base Fabric

For optimal results, use heavyweight fabrics like canvas, felt, or interfaced cotton. These provide better structure for beadwork and consistent stitch tension.

Reflection

This project represents a broad exploration of seed stitching as both a decorative and functional element in e-textile design. Rather than working toward a single finished outcome, the focus was on experimentation and testing how variations in layout, thread type, stitch size, and structure could affect both the aesthetic and interactive potential of the piece. Each iteration was approached as an open-ended inquiry, with no guarantee of success, sometimes resulting in surprising breakthroughs, and other times in complete failure. This uncertainty became a core part of the process, reinforcing the idea that learning through making often requires embracing unpredictability and allowing space for “happy accidents.” By experimenting with different thread and stitching structures, I was able to better understand the relationship between material, structure, and conductivity. The project not only advanced my technical understanding of seed stitching and conductive elements but also deepened my appreciation for the role of making and experimentation in textile design.

Part Three:
When Traditional Techniques Meet Interactivity and Memory

Project Seven – Stitching Landscapes: A Soft Circuit Inspired by Vietnamese Landscapes

About This Project

During a study trip to Vietnam, I was captivated by the patterns of rice and tea fields stretching across the landscape. Seen from above, through drone photos and videos, they resembled patchworks of green fabric, stitched together by narrow paths and dividing lines. After returning from the trip, the imagery stayed with me, and I began to wonder if I could translate that vivid memory into a piece of textile, much like how the traditional Miao people recorded their history and life events through embroidery on their garments.

I wanted to capture that feeling in thread, while also exploring new elements. I began experimenting with embroidery techniques combined with conductive thread to create a soft circuit landscape. I first selected a range of greens that matched the shades I remembered, then sketched out a layout inspired by the fields and divided the textile into sections accordingly. Each area featured a different green to add depth and richness, while conductive threads acted as boundaries between the fields. To enhance the texture, I incorporated seed stitching with green beads for an added sense of layering.

The process of making this piece was incredibly meaningful. It felt like I was recreating my memory through my hands, transforming a personal moment into something tangible to share. Immersing myself in the making allowed me to slow down and simply enjoy the act of creation. It became a space for reflection, a way to relive and celebrate the beauty of an experience that left a lasting impression on me.

Visual Demonstration:

The following Figure 41 and the accompanying video provide a visual overview of the sample.



Figure 41 Stitching Landscapes: A Soft Circuit Inspired by Vietnamese Landscapes Sample Photo



Video 25 Stitching Landscapes: A Soft Circuit Inspired by Vietnamese Landscapes Demonstration A [Video]

How It Works

Each field section contains conductive threads buried beneath the densely stitched surface, while the dividing lines are stitched using seed stitches with conductive thread. These two elements, the buried threads and the stitched lines, are intentionally isolated and do not touch each other. To complete the circuit, a conductive object is needed to bridge the gap. In this case, I used a magnet. In video 26, I held the magnet in my hand and slowly moved it across the different fields. When the magnet touched both the buried conductive threads and the stitched dividing lines at the same time, it completed the circuit, transforming the landscape into a functional soft circuit. After this, I also experimented further by placing another magnet underneath the textile and moving it around. The magnet on top would respond and move along with it, which opened up possibilities for interactive, playful designs.



Video 26 Stitching Landscapes: A Soft Circuit Inspired by Vietnamese Landscapes Demonstration B [Video]

Material List

Textiles & Threads

- Conductive thread – Grey
- DMC Pearl 12 Thread – Green (various shades)
- Mill Hill Glass Beads Size 6
- Fabric base - Calico (plain woven cotton)

Electronic Parts

- Battery holder
- Magnets
- LED

Tools

- John James hand needle set - assorted 25
- Fabric Marking Pen
- Scissors
- Embroidery hoop
- Optional: Embroidery hoop stand

Techniques Used

- Seed Stitch (打籽绣) - used to create the divider lines between fields
- Satin Stitch - for filling in the green patches
- Running Stitch - basic circuit with conductive thread

Making Steps

The following sections begin with instructions on circuit design, followed by a step-by-step guide on how to execute the technique.

1. Design the Circuitry (Figure 42)

The first step involves carefully planning and designing the circuit layout directly onto the fabric. The layout is divided into distinct sections, each playing a specific role in completing the electrical circuit. In the following section, I will first show a photo of the layout without any stitching, followed by a photo with the stitching applied.

In the photo:

- The diagram illustrates a flat layout of the circuit design (without any stitch).
- Each section indicates a green field. Different green thread colours should be used.
- The pink lines represent the positive path, created using conductive thread to carry the current.
- Some of the pink lines are in different directions which indicates the directions of the threads.
- The black boarder indicates the negative terminal, also stitched with conductive thread.
- The small black gate in each field is the area that needs to be left open for the conductive object to pass through.
- The pink lines and the black boarder must be fully isolated from each other. It is essential to ensure that the thread ends do not touch, and there should be a minimum gap of 3-4 mm between them to prevent short-circuiting.
- This layout is just one example. There are many possibilities, as long as the positive and negative terminals remain properly separated and the conductive object used can bridge the gap between them.

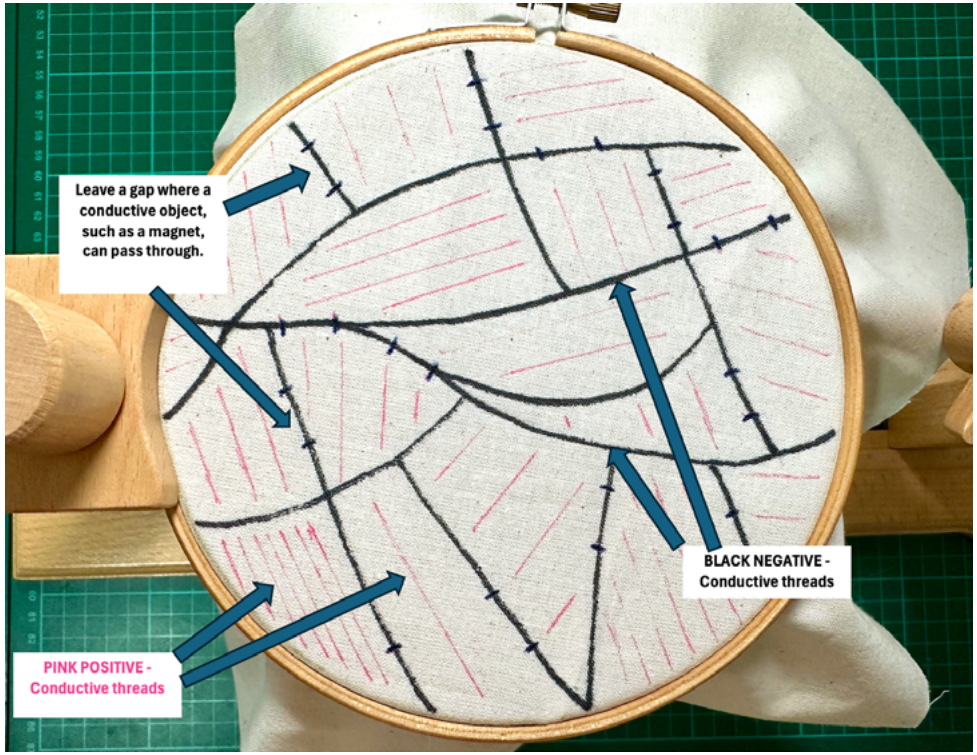


Figure 42 Stitching Landscapes: A Soft Circuit Inspired by Vietnamese Landscapes Circuitry Design

In the photo (Figure 43):

- This photo shows the sample with stitching applied.
- The pink positive conductive threads are now covered with green embroidery threads.
- The field borders are stitched using conductive threads with the seed stitch technique. I combined conductive and dark green threads to help the grey conductive threads blend more seamlessly into the piece.
- A small gap was left in each field to allow the conductive object to pass through easily.
- Two layers of beads were added using a seed stitch structure to enhance texture and depth. Each stitch secures a bead at the base, with seed stitching on top to hold it in place. I used a mix of round and tube beads to create variation in height. These beads are non-conductive and serve no electrical function.
- Both the pink positive and black negative sections are conductive, but they are isolated from each other on the underside of the fabric. The regular green threads covered on top of each field and the regular dark green threads used for seed stitching for the divide line serve as a barrier between the two sections on the surface. A connection is only made when the pink (positive) section come into contact with the black (negative) section via magnets.



Figure 43 Stitching Landscapes: A Soft Circuit Inspired by Vietnamese Landscapes Detailed View

The following section offers a step-by-step photo tutorial on how to create this sample.

- In order to complete this project, it is important to first understand the traditional seed stitch and its variation that incorporates beads.
- For step-by-step instructions on the basic seed stitch technique, please refer to the Technique Guide.
- For guidance on the beaded seed stitch variation, please see Project Three, *To Be Touched*.

1. Sketch Your Field Layout

Start by sketching the overall layout of your fields directly onto your fabric. Think about how rice or tea fields look from above, irregular patches with small pathways dividing them. Keep it loose and organic as illustrated in Figure 44 below.

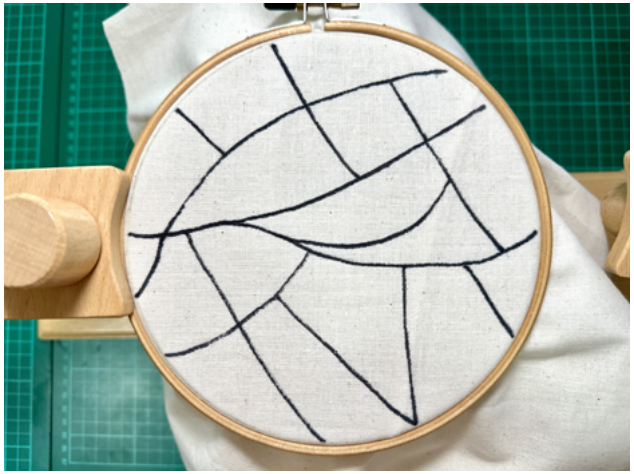


Figure 44 Stitching Landscapes: A Soft Circuit Inspired by Vietnamese Landscapes Making Step 1

2. Plan Your Conductive Pathways

Next, decide where your conductive thread will go and the direction of your embroidered field patches. I used a pink pen to mark this out (as shown in Figure 45 below) to make the stitching plan easier to follow.

- For a stronger electrical connection, add more lines of conductive thread (see section A in the photo).
- For a softer on/off effect or a touch-triggered response, reduce the number of conductive stitches (see section B).

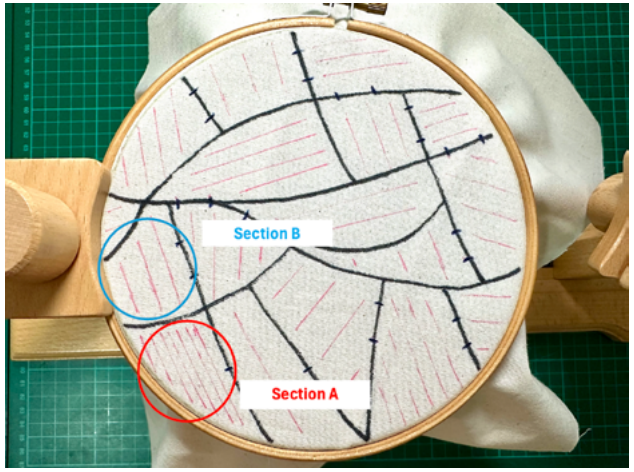


Figure 45 Stitching Landscapes: A Soft Circuit Inspired by Vietnamese Landscapes Making Step 2

3. Stitch the Positive Conductive Path

Using conductive thread, follow the marked pink lines and stitch along your planned pathway, as shown in Figure 46.



Figure 46 Stitching Landscapes: A Soft Circuit Inspired by Vietnamese Landscapes Making Step 3

4. Add Field Dividers Using Seed Stitch

Use the seed stitch technique with a combination of conductive thread and normal thread to create the divider lines between each field. These divider lines form one part of the circuit. It's important to keep the conductive path (marked in pink) separate from the divider lines. The circuit is designed so that the magnet or a conductive object only completes the connection when it touches both the pink path and a divider line at the same time. In Figure 47, I intentionally used normal thread alongside the conductive thread in the divider lines to prevent the circuit from staying on continuously. This way, as the magnet moves along the divider, it creates an on-and-off interaction rather than a constant connection.

5. Embroider the Field Patches

Fill in each field patch using regular embroidery thread and the running stitch technique, as shown in Figures 48 and 49.

Feel free to experiment with different shades of green to bring the landscape to life and add a sense of depth and variation.



Figure 47 Stitching Landscapes: A Soft Circuit Inspired by Vietnamese Landscapes Making Step 4



Figure 48 Stitching Landscapes: A Soft Circuit Inspired by Vietnamese Landscapes Making Step 5A



Figure 49 Stitching Landscapes: A Soft Circuit Inspired by Vietnamese Landscapes Making Step 5B

6. Add Beads to Create Different Texture (Optional)

Add different types of stitching and beads to create texture and give the design a more three-dimensional effect. For guidance on the beaded seed stitch variation, please see Project Three, *To Be Touched*.

7. Test & Play

Repeat the steps above until the entire embroidery field is complete. Once finished, connect the embroidery to test the circuit. While this project uses an LED as an example, other components can be used instead. Move the magnets around to connect different sections of the field and complete the circuit.

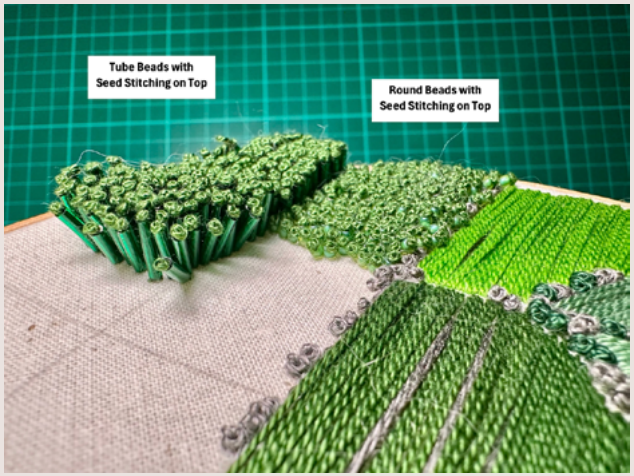


Figure 50 Stitching Landscapes: A Soft Circuit Inspired by Vietnamese Landscapes Making Step 6



Figure 51 Stitching Landscapes: A Soft Circuit Inspired by Vietnamese Landscapes Making Step 6 Detailed View

Tips

1. Test Your Needle with the Beads First

Before starting, always check that your needle is the correct size by passing it through the beads. This ensures smooth stitching without damaging the beads or needle.

2. Vary the Stitch Sizes

Try using a mix of smaller and larger seed stitches along the field borders. You can achieve this by experimenting with different warp counts or thread thicknesses. This variation adds texture and depth to your design, giving the embroidery a more organic and lifelike appearance.

3. Mix Threads for Visual Interest

At the field borders, I combined conductive thread with regular embroidery thread to balance both design and function. The regular thread acts as an insulator, allowing the field divider to appear visually continuous without extending the electrical connection. This is especially useful in areas where I do not want the magnet to trigger the circuit, even if it touches the pink conductive path. For example, in sections where I wanted visual continuity but needed to prevent the circuit from staying on, I used regular thread in the divider line. This way, the magnet will not be able to complete the circuit until it touches both the pink conductive path and a conductive seed stitch on the divider line.

4. Test as You Go

As you work, test the circuit periodically by moving the magnet around. This helps ensure your connections are working properly and prevents surprises at the end.

5. Get Creative with Beads

Beads can add a rich, tactile dimension to your piece. Use different shapes and sizes, like round and tube beads, to introduce variation in height and texture.

6. Direction Matters

Varying the direction of your stitches in each field section adds movement and texture, mimicking the natural variation seen in real landscapes. It makes your design feel more dynamic and layered.

7. Leave a Gap for the Magnet

Make sure to leave a small opening in each field section for the magnet (or conductive object) to pass through. These gaps are essential for allowing the conductive object to move freely across the textile and complete the circuit. Be sure to mark these openings clearly during the layout stage.

Reflection

This project emerged from a research trip to Vietnam, drawing inspiration from the country's distinctive landscapes, especially the layered, terraced rice fields that shape much of the rural terrain. It also draws from the traditions of the Miao ethnic group, who historically embroidered scenes from their surroundings, including landscapes witnessed during migration journeys, onto their textiles.

Building on these ideas, Project Seven explores not only traditional embroidery techniques but also reimagines how landscapes and personal memories can be expressed through the medium of e-textiles. Using stitched textures and soft circuitry, the work experiments with translating topographical forms into embroidery, not just as decorative motifs, but as functional, interactive surfaces. This piece is an inquiry into how storytelling and embroidery can evolve when combined with new technologies. By integrating conductive threads into the stitched landscape, the embroidery becomes more than a visual representation. It becomes responsive, tactile, and alive with potential for interaction.

Unlike the samples in Part One, which preserved traditional techniques but experimented with new materials, and Part Two, which altered the structural form of those techniques, this project explores how the use of traditional crafting techniques can be used to embed personal narratives into textiles. It asks how a textile piece can carry deeper meaning and emotional value, transforming it from a decorative object into a vessel for memory and shared experience.

Project Eight – Stitching Landscapes: Colour Shifting Tea Fields



Figure 52: Cleveland, P. (2022, November). Tea Fields from My Vietnam Trip [Photograph]

About This Project

This project was inspired by tea fields captured through drone footage during a trip to Vietnam (see Figure 52) and also built on ideas explored in Project Two, *When Threads Remember Touch*. This embroidery piece reimagines the landscape using stitched textures and shifting shades of green with thermochromic threads. The work combines standard green embroidery threads with thermochromic threads that change colour when touched or warmed. As warmth is applied, parts of the stitched fields fade to white, evoking a quiet transformation, like light moving across hills or the land slowly breathing.

Unlike the other projects that incorporate electronic components such as batteries, conductive threads, or LED lights, this piece relies solely on textile materials. It is activated entirely by human touch, using thermochromic threads to create a responsive, interactive experience without the need for any electronic circuitry.

The embroidery features both seed stitches and turkey stitches, mimicking the layered, organic patterns of cultivated fields. The result is an interactive surface that invites touch and curiosity, blending traditional handcraft with responsive textile technology. This living stitched landscape in flux exemplifies how thread can carry both memory and movement.

Visual Demonstration (Original Colour):

The following Figure 53 and the accompanying video provide a visual overview of the sample in its original colour.



Figure 53 Stitching Landscapes: Colour Shifting Tea Fields Original Colour Sample Photo



Video 27 Stitching Landscapes: Colour Shifting Tea Fields Demonstration [Video]

Visual Demonstration (Colour Change Activated by Heat):

The following Figure 54 and the accompanying video provide a visual overview of the sample when activated by heat.



Figure 54 Stitching Landscapes: Colour Shifting Tea Fields Activated by Heat Sample Photo



Video 28 Stitching Landscapes: Colour Shifting Tea Fields Activated by Heat Demonstration A [Video]

How It Works

This embroidered field is created using a combination of thermochromic threads and standard embroidery threads. The thermochromic threads are heat-sensitive, with an activation temperature of approximately 31°C, making them responsive to human touch. When the surface is touched or exposed to warmth, the thermochromic threads gradually shift from their original colour to white.



Video 29 Stitching Landscapes: Colour Shifting Tea Fields Activated by Heat Demonstration B [Video]

Material List

Textiles & Threads

- DMC Pearl 12 Thread – Green (various shades)
- Thermochromic threads – Different Shades of Green (activates at 31°C)
- Fabric base - Calico (plain woven cotton)

Tools

- Hand stitching needle size 10
- Fabric Marking Pen
- Scissors
- Embroidery hoop
- Optional: Embroidery hoop stand

Techniques Used

- Seed Stitch (打籽绣) - used to create the divider lines between fields
- Turkey Stitch (绒毛绣) - adds a soft, raised texture to parts of the tea fields, giving them a fuller, more tactile appearance

Making Steps

The following section provides a step-by-step guide for making this sample.

To move forward with this section, it is important to first understand the turkey stitch and the traditional seed stitch.

For step-by-step instructions on the turkey stitch and basic seed stitch technique, please refer to the Technique Guide.

1. Sketch the Tea Field Layout (Figure 55)

Begin by lightly sketching the overall layout of your tea fields directly onto your fabric. Think of how the fields look from above: irregular patches of green separated by narrow paths or ridges. These natural shapes do not need to be perfect; in fact, a slightly uneven or organic layout will make the final piece feel more lifelike and textured.

Use a fabric marking pen or pencil that is easy to see but will disappear or wash out later. This sketch will act as your guide for where to place different stitches, textures, and threads including both the standard embroidery and the areas where heat-reactive threads will go.

2. Test Your Thread

Once your tea field layout is ready for embroidery, test your thermochromic thread before you begin stitching. If your goal is to create a colour-changing effect through touch, gently press the thread with your fingers to see if it reacts. If it changes colour, you are good to start stitching. If not, you may need to source a different thread that responds to body heat. Since the thread is heat-sensitive, you may notice it changing colour during the embroidery process as your hands warm it. Don't worry, this is temporary. The original colour will return once the thread cools down.



Figure 55 Stitching Landscapes: Colour Shifting Tea Fields Making Step 1

3. Stitch Your Tea Fields

Now it's time to bring your landscape to life with thread. Begin filling in each tea field using a mix of standard embroidery thread and thermochromic (heat-sensitive) thread as shown in Figure 56. Feel free to experiment with different shades of green to capture the layered richness of the fields, darker greens for shadows, lighter tones for highlights, or fading areas with heat-reactive thread to mimic the effect of changing light across a hillside.

Use a variety of stitching techniques to build texture. Seed stitch (打籽绣) can give a dotted, textured feel that mimics closely planted bushes, while Turkey stitch (绒毛绣) adds dimension and fluffiness to certain patches, almost like dense, lush vegetation. Mixing stitch types not only adds visual interest but also helps differentiate the patches, making the overall landscape feel dynamic and alive. There is no single right way to stitch your fields; follow your sketch as a guide but let your creativity shape how the terrain unfolds.

You can also combine regular embroidery threads with thermochromic threads to introduce more colour variation. I experimented with this approach in this sample to enrich the visual texture. However, I found that the two types of threads do not blend seamlessly. Thermochromic threads have a more plastic-like appearance and a different texture, while regular embroidery threads are softer and have a more vivid, natural colour. This contrast can make the combination appear less cohesive.

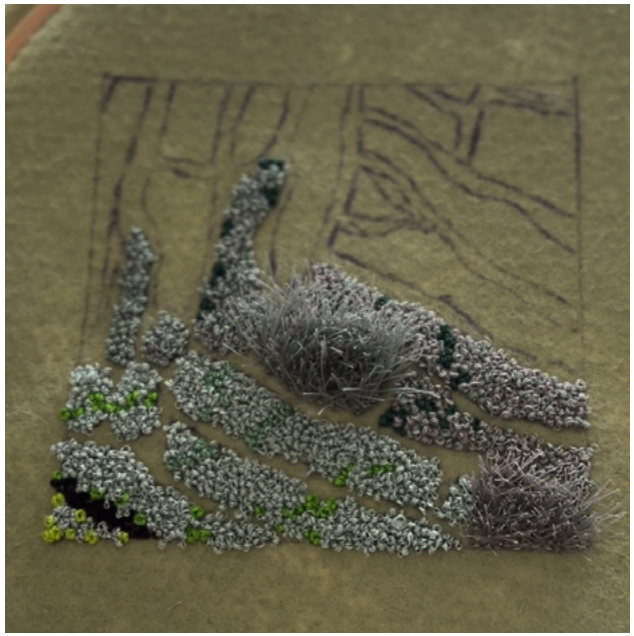


Figure 56 Stitching Landscapes: Colour Shifting Tea Fields Making Step 3

Tips

1. Vary the Stitch Sizes

Changing the size of your seed stitches can add depth and texture to your design, making the overall piece feel more dynamic, detailed, and lifelike.

2. Mix Different Threads for Texture and Contrast

Blending thermochromic (heat-sensitive) threads with regular embroidery threads can enhance the visual appeal of your design, but it is important to carefully select threads with compatible colours and textures to ensure a cohesive result. Variation in colour and texture creates visual interest, while the thermochromic thread adds an interactive element that responds to touch.

3. Understand Thermochromic Thread Behaviour

Most thermochromic threads activate between 33°C and 37°C, which is technically below body temperature, but environmental conditions affect how well they work. In cooler climates, body heat may not be enough to trigger the colour change.

- In winter, threads with a lower activation point (around 28°C) respond better.
- In summer, threads around 31°C tend to perform most reliably.

4. Plan Around Limited Colour Options and Synthetic Finish

Thermochromic threads often change from a colour to white, and available colour choices are limited. Their texture also tends to be more synthetic compared to natural cotton threads. Plan your design carefully from the start to ensure the colour transitions and overall look align with your vision.

5. Care and Storage Matters

To preserve the quality of your embroidery, store it in a cool, dry place away from direct sunlight. Prolonged exposure to heat or UV light can cause thermochromic threads to fade, discolour, or undergo permanent changes in colour response. If you plan to display the piece, consider using UV-protective glass or placing it in a shaded area.

Reflection

This project is an extension of both Project Seven, *Stitching Landscapes: A Soft Circuit Inspired by Vietnamese Landscapes* and also Project Two, *When Threads Remember Touch*. Drawing inspiration from a photograph taken during a field trip to Vietnam, the piece explores how landscape and memory can be reinterpreted through the use of thermochromic threads. The aim was to translate the shifting qualities of natural scenery into a dynamic embroidered surface, where interaction with the material activates a transformation in colour.

Several challenges emerged during the making process:

Limited colour options: The initial plan was to closely match the hues in the original landscape photograph, especially the subtle gradients of green found in the rice terraces and foliage. However, thermochromic threads currently available on the market offer a very limited colour range - only three shades of green which varied greatly and lacked the subtlety needed for effective layering were available at the time. To compensate, normal embroidery threads were introduced to expand the palette. Unfortunately, the texture of traditional embroidery thread differs significantly from thermochromic thread, making it difficult to blend the two materials seamlessly.

Directional colour change: Another idea was to reverse the colour change effect, starting with a white landscape that would gradually turn green with body heat or touch, enhancing the sense of emergence and growth. However, all commercially available thermochromic threads at the time were designed to transition from colour to white, and the reverse option was not available.

Despite these limitations, the project opens up exciting possibilities for future exploration. Experimenting with UV Light sensitive threads could offer a broader colour range, including white to colour transformations, present one potential alternative. Additionally, experimenting with dyeing thermochromic threads or twisting them together with conventional embroidery threads could lead to more cohesive material integration. Such approaches could allow for more nuanced colour transitions while preserving the interactive qualities central to this work. Ultimately, this project highlights both the creative potential and material constraints of working with emerging e-textile technologies. It invites further experimentation, not only in expanding technical capabilities, but also in finding better ways to bridge sensory interaction with craft-based storytelling.

Project Nine - Map of Beads

About This Project

Before developing the concept for this project, I had already spent time exploring tin embroidery techniques. Even now, I am still amazed whenever I see the base stitching on its own, without the tin overlay. It stands out so distinctly from other embroidery styles. A simple repeated pattern as shown in Figure 57 can give rise to endless design variations, which I find truly fascinating. I am especially drawn to the way tin embroidery is laid out as it often resembles a map or maze. This visual quality sparked a connection to my bead experiments in Part Two. Together, these elements reminded me of a childhood toy I once had, a red, round plastic maze with tunnels and a small metal ball inside, similar to the one shown in Figure 58. To move the ball through the maze, you need to tilt the toy, much like navigating the paths in tin embroidery.

Map of Beads is an exploratory textile experiment that draws inspiration from both the intricate, map-like motifs found in traditional tin embroidery and the nostalgic mechanics of the childhood metal ball maze toy. The structure is composed of beads meticulously arranged to form a wall-like surface that evokes the appearance of a map. A small metal component, reminiscent of the metal ball from the maze toy, can be moved along these pathways, completing circuits at key points. The project explores how fabric movement, personal memory, and e-textile elements can be woven together, creating an interactive textile piece.

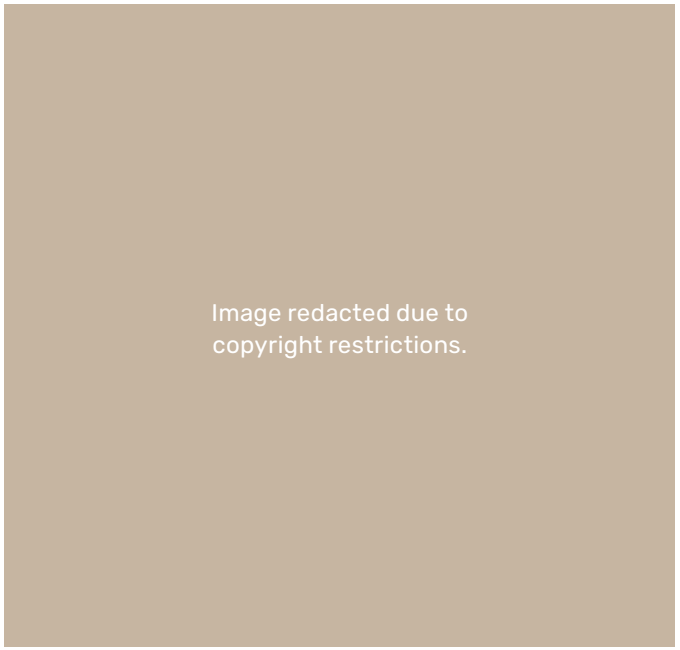


Figure 57 Lyster, S. T. (n.d.). Base cloth with completed anchor stitches [Image]. Retrieved from https://www.thetextileatlas.com/craft-stories/miao-tin-gimp-embroidery-in-zhanliu-china

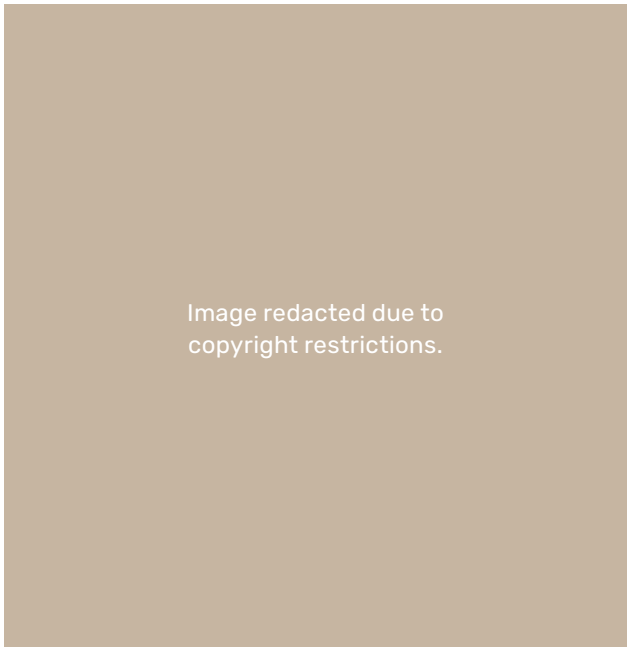


Figure 58 Printables. (n.d.). Circular Maze [Image]. Retrieved from https://www.printables.com/model/591640-circular-maze

Visual Demonstration:

The following Figure 59 and the accompanying video provide a visual overview of the sample.



Figure 59 Map of Beads Sample Photo



Video 30 Map of Beads Demonstration A [Video]

How It Works

As shown in video 31, there is a wall-like structure formed using non-conductive beads. On the inner side of this wall, I have stitched lines of conductive threads to create the positive path. In the centre of the structure, there is a stitched square, also made with conductive thread, which forms the negative path. These two conductive areas are kept separate, but when a conductive object bridges them, the LED lights up. The idea is for someone to either move the conductive object around to complete the circuit, or manipulate the fabric itself to create the connection.



Video 31 Map of Beads Demonstration B [Video]

Material List

Textiles & Threads

- Conductive Thread - Grey
- Standard Embroidery Threads
- Medium Bugle Beads
- Conductive Object - It can be anything that is conductive, I used a metal button I sourced from my Vietnam trip
- Fabric base - Calico (plain woven cotton)

Electronic Parts

- LED
- Battery Holder
- Battery

Tools

- John James hand needle set - assorted 25
- Fabric Marking Pen
- Scissors
- Embroidery hoop
- Optional: Embroidery hoop stand

Techniques Used

- Basic stitching to secure the beads down to the fabric surface

Making Steps

This section offers a step-by-step guide to creating this sample.

It starts with an explanation of the circuitry layout, followed by a demonstration video of the technique, and then photos with detailed descriptions.

The circuitry is constructed using non-conductive beads, standard embroidery threads, and conductive threads. The stitched square in the centre represents the positive path. The shape of a square is not a must for this project; any shape or shape-combination could work as long as the threads from the positive and negative paths do not come into contact with each other.

The negative path is created by spaced-out stitches that run along the inner edge of the beaded wall. To make the circuit more sensitive and responsive, use denser stitching for the negative path. For a more intermittent, on-off interaction, keep the stitching looser or more widely spaced.

When a conductive object is placed within the wall and touches both the positive and negative paths, the circuit is completed, and the LED will turn on. If it only touches one side, the circuit remains open and the LED stays off.

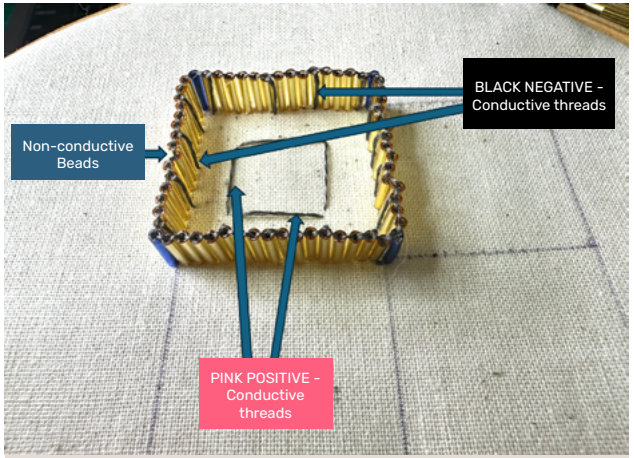
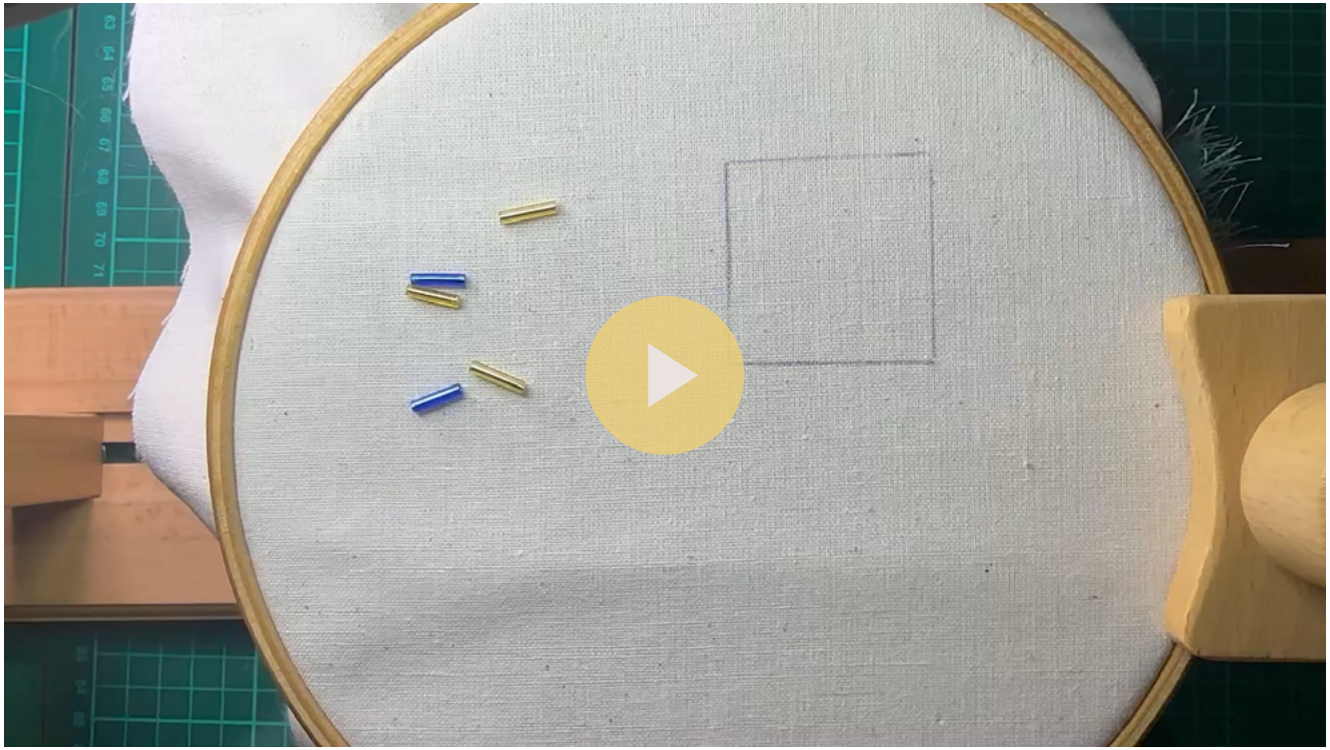


Figure 60 Map of Beads Detailed View

Technique Demonstration:



Video 32 Map of Beads Technique Demonstration [Video]

1. Sketch Your Wall or Map Design

Start by lightly sketching your wall or map layout directly onto the fabric using a fabric-safe marker or chalk. Think of pathways, blocks, or borders, whatever shapes best suit your concept. Do not worry about making it perfectly symmetrical; an organic, hand-drawn feel will add character to the final piece.

2. Start Your First Stitch

Thread a needle with standard sewing thread and bring it up from the underside of the fabric to the surface. This will be the starting point of your stitched outline.

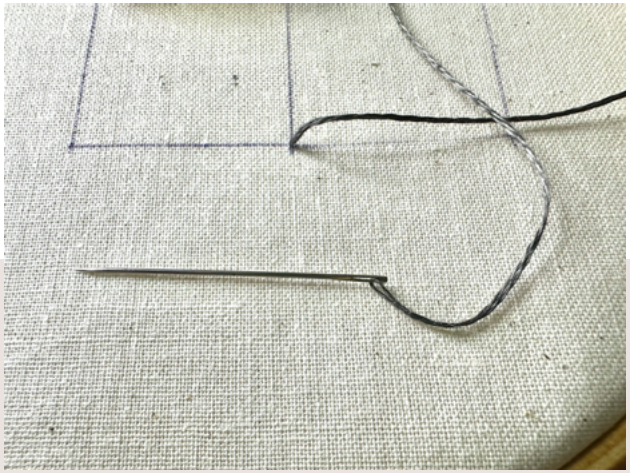


Figure 61 Map of Beads Making Step 2

3. Add Your First Tube Bead

Slide one tube bead onto the needle. Let it rest against the fabric where your stitch begins. This will become the first building block in your bead structure.

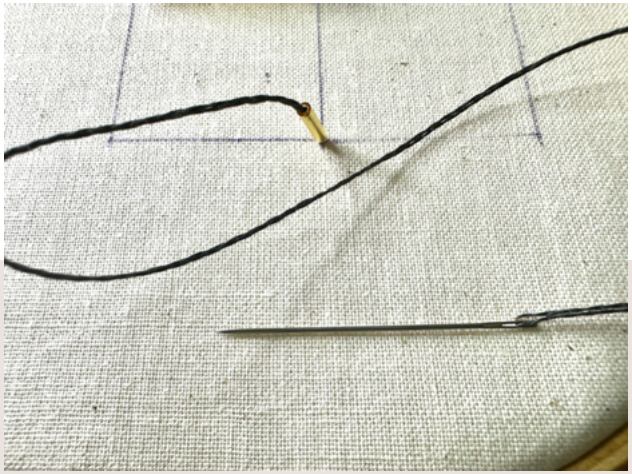


Figure 62 Map of Beads Making Step 3

4. Add the Second Tube Bead

Thread a second tube bead onto the needle, positioning it next to the first. This begins to create a line or wall-like structure.

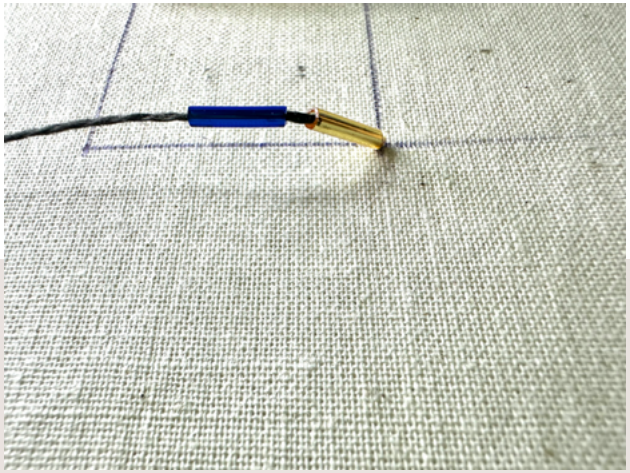


Figure 63 Map of Beads Making Step 4

5. Secure the Beads in Place

Insert the needle back down through the fabric, just beside the first bead. This anchors both beads firmly to the fabric, keeping them aligned and stable as you continue building your design.

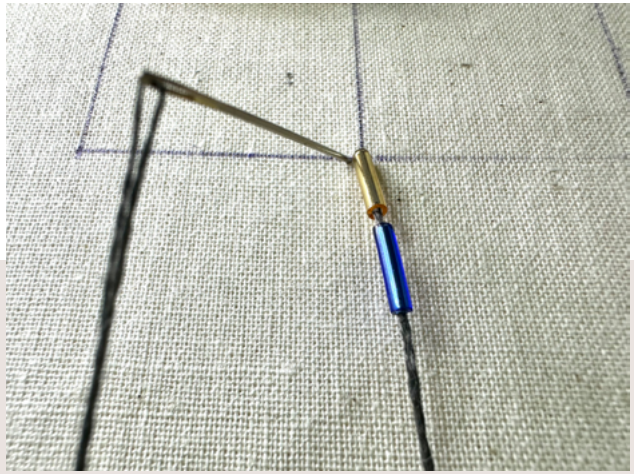


Figure 64 Map of Beads Making Step 5A

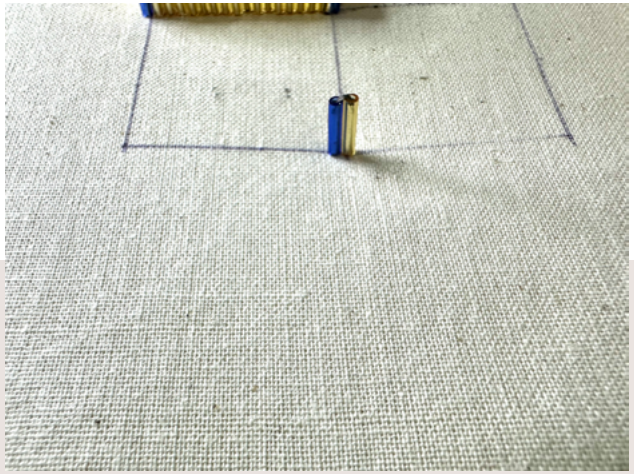


Figure 65 Map of Beads Making Step 5B

6. Position the Needle for the Next Bead

Bring the needle up from the underside of the fabric, placing it just beside the second bead. This sets you up to add the next bead in your sequence smoothly and accurately.

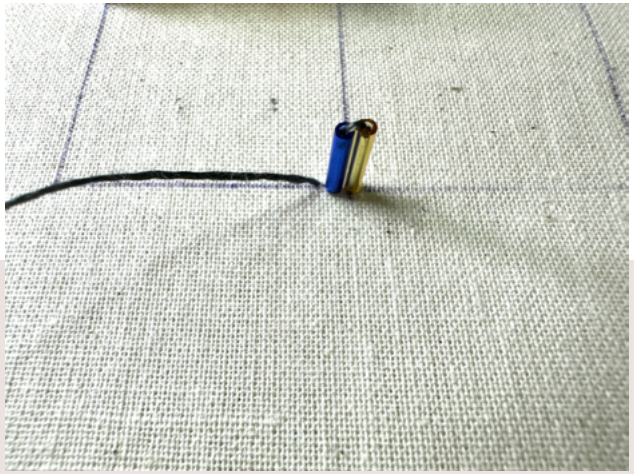


Figure 66 Map of Beads Making Step 6

7. Add the Third Tube Bead

Thread a third tube bead onto the needle, ready to continue extending your beadwork along the design.

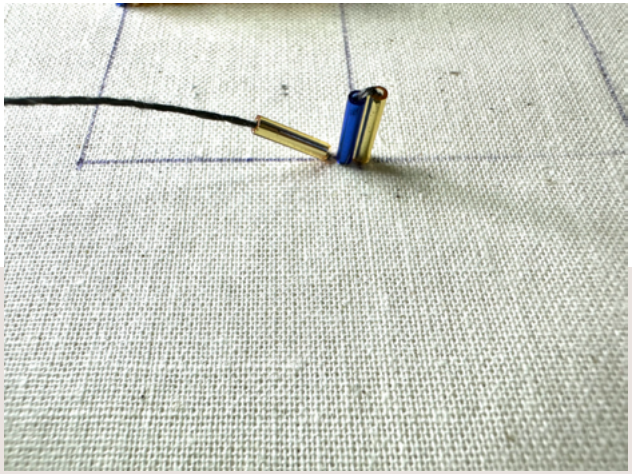


Figure 67 Map of Beads Making Step 7

8. Secure the Bead

Insert the needle back down through the centre of the second bead to firmly anchor the third bead in place.

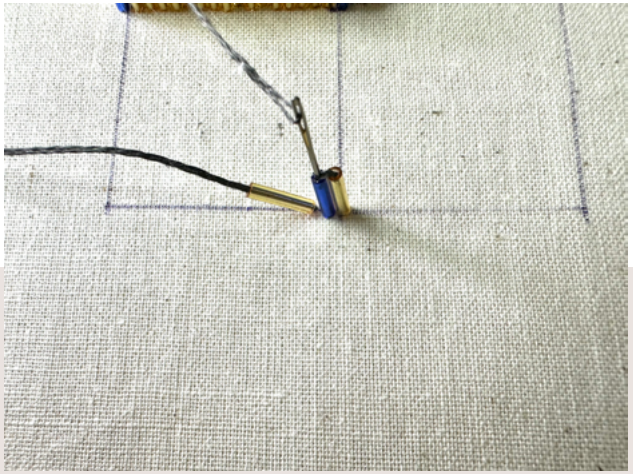


Figure 68 Map of Beads Making Step 8

9. Continue Building the Beaded Wall

Repeat steps 6 to 8, adding beads and securing each one, until your wall or map design is fully formed.

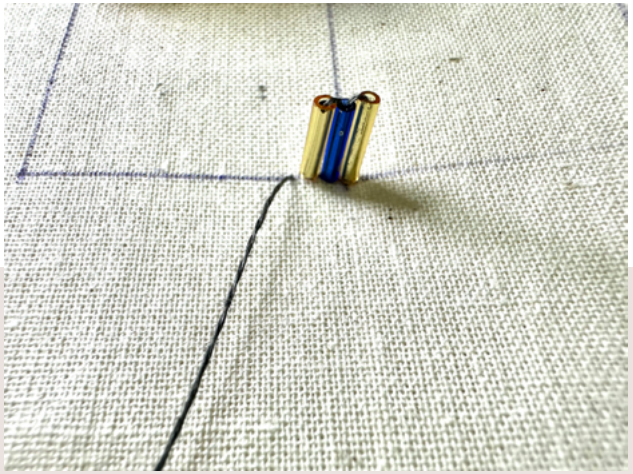


Figure 69 Map of Beads Making Step 9

10. Stitch the Positive Path

As you complete the beaded wall (Step 9), stitch a square pattern, or any other shape, in the centre of the beaded wall using conductive thread to form the positive patch. Make sure this positive path is clearly separated from the negative path running along the beaded wall. The two should not touch, as the circuit is designed to be completed only when a conductive object, such as a magnet, bridges both paths simultaneously.

Tips

1. Choose the Right Needle

Make sure your needle is the appropriate size and can easily pass through the centre of your beads. A needle that is too thick may damage the bead or prevent smooth stitching.

2. Use a Guideline for Accuracy

Stitching beads in a straight line can be tricky at first. To help with alignment and consistency, draw a light guideline on the fabric before you begin stitching.

3. Keep Your Stitches Tight (Figure 70)

Ensure each stitch is pulled snugly against the previous one. If the stitches are too loose, gaps can appear at the base of the beads. As shown in the photo, the first three beads on the right are stitched tightly together, while a visible gap appears between the third and fourth beads due to looser stitching.

4. Maintain Safe Distance Between Paths

Ensure the positive path in the centre is at least 5mm away from the beaded wall or any negative stitching. This separation helps prevent accidental contact and ensures the circuit functions correctly.

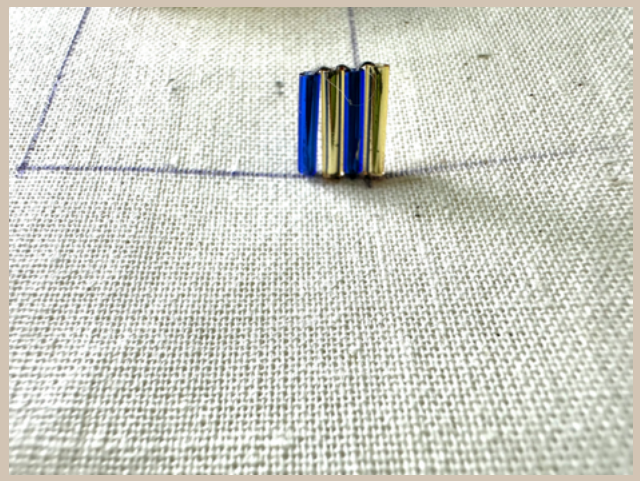


Figure 70 Map of Beads Tips 3

Reflection

Looking back, this project feels quite different from all the ones before it. I did not physically apply any traditional techniques but instead drew inspiration from them and reinterpreted their essence in a new way. This shift in approach opened up fresh possibilities and made me realise that honouring tradition does not always mean repeating it – it can also mean transforming it into something entirely new. This project offers a different approach to embedding storytelling within a textile piece. While the *Stitching Landscape* projects drew directly from visual references, recreating landscapes I observed during my travels through imagery and thread, *Map of Beads* takes a more conceptual and tactile path. Rather than depicting an external scene, it draws on a personal childhood memory, the metal ball maze toy. By reinterpreting this familiar object through embroidery and interactive textile techniques, the project becomes a vessel for evoking shared nostalgia.

Through the use of conductive threads and bead structures, the work transforms into an interactive surface that not only invites physical engagement but also emotional connection. It offers a different kind of storytelling, one that is abstract, sensory, and participatory. It seeks to trigger recognition in viewers who may have encountered similar toys in their own childhoods, creating a quiet yet powerful sense of familiarity and reflection. This piece also holds potential for further development. The modular nature of the design allows for the creation of different patterns and structures, offering opportunities to explore new forms, themes, and interactions in future iterations.

One drawback of this design is that, unlike the traditional toy, the textile piece is not enclosed. This means that manipulating the fabric can cause the conductive object to slip out of the wall. I am wondering if there is a way to add a covering, similar to the transparent layer in the original toy, that would keep the object contained while still allowing visibility and interaction.

Project Ten – Map of Beads: Weave Stitching

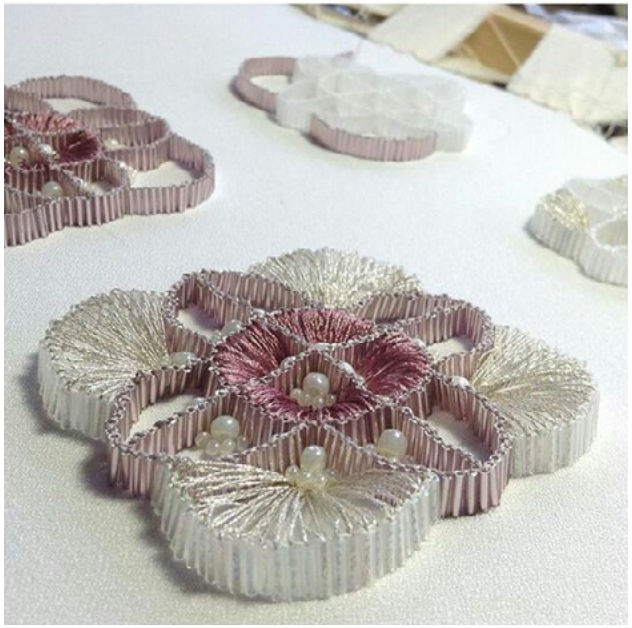


Figure 71 Pinterest. (n.d.). Hand embroidery at its finest [Image]. Retrieved from https://in.pinterest.com/pin/635500197406676205/

About This Project

This piece is a continuation and further exploration of the *Map of Beads* project, pushing the boundaries of how beads, structure, and surface interaction can be reimagined through textile techniques. After completing the last project, I began exploring ways to create a transparent, cover-like layer for the wall structure of the bead maze developed in Project Nine. I was deeply intrigued by the concept of containment paired with visibility. In the toys I remember from childhood, the clear plastic cover kept the ball safely within the maze. It never fell out, no matter how much you tilted or shook the toy. That idea stayed with me and sparked a question; how might I create a similar sense of containment through textile techniques?

While researching, I came across a photo that inspired an experiment, applying weave stitches over the wall of beads. At that stage, it was just an idea. I knew I would not fully understand the outcome until I began sampling. The goal was to test whether I could layer weave stitches on top of a beaded wall and observe how the stitched surface would interact with the beads beneath, visually, structurally, and texturally. Would the woven layer obscure the beads? Would it highlight them or merge seamlessly?

This piece is entirely exploratory, with no fixed expectations. It exists as a material and conceptual test, reflecting my ongoing curiosity about merging traditional craft methods with childhood nostalgia and three-dimensional textile construction.

Visual Demonstration:

Following Figure 72 and the accompanying video provide a visual overview of the sample.

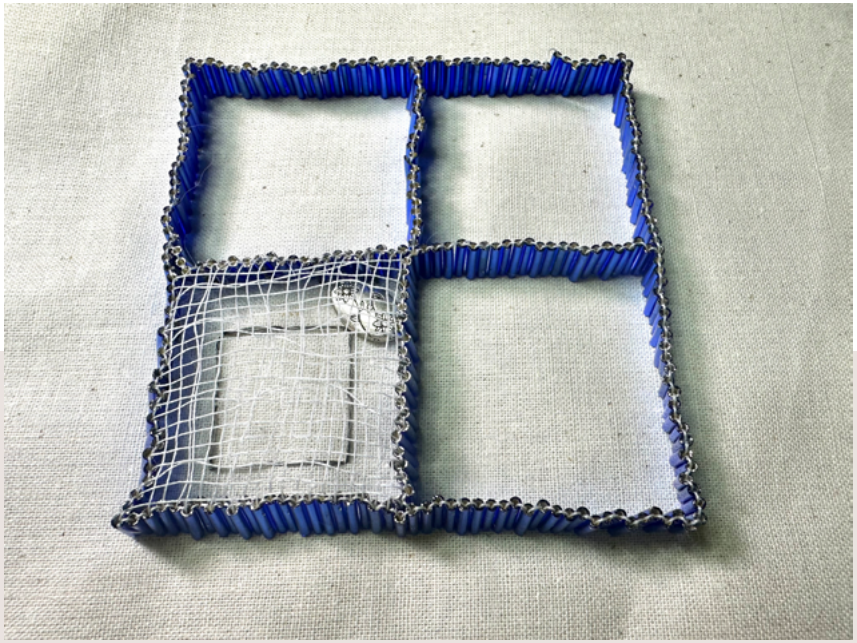
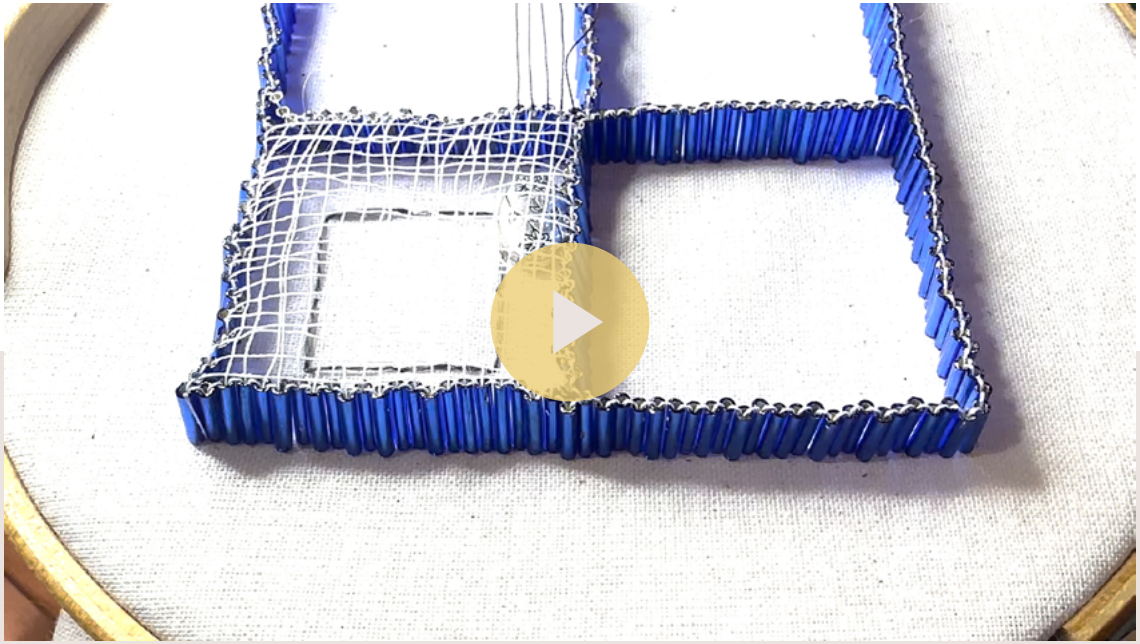


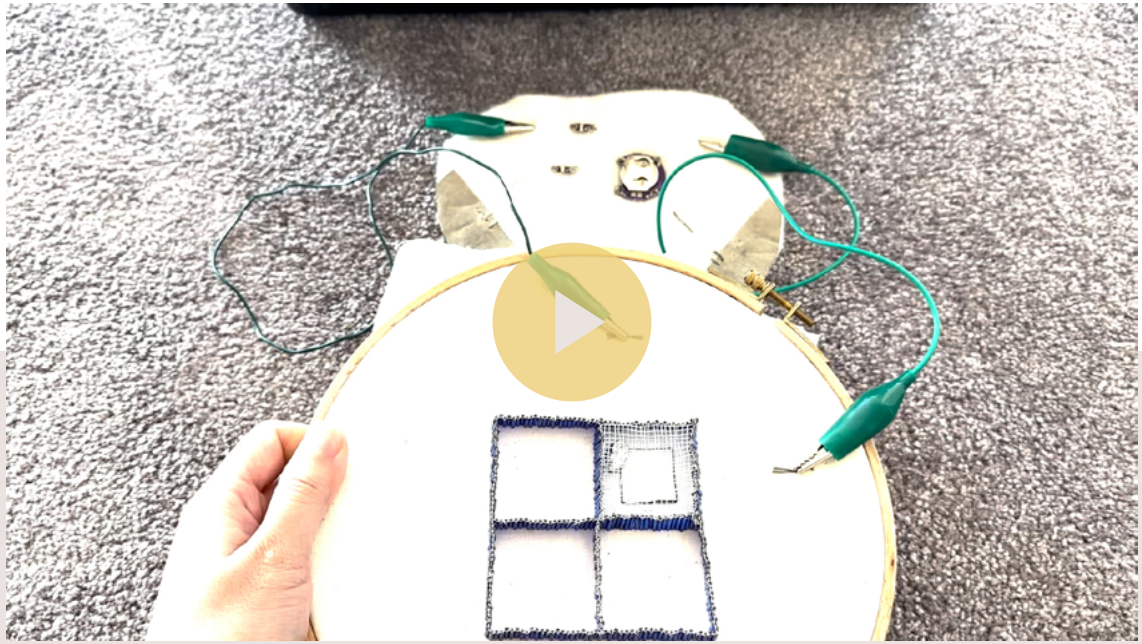
Figure 72 Map of Beads: Weave Stitching Sample Photo



Video 33 Map of Beads: Weave Stitching Demonstration A [Video]

How It Works

As shown in video 34, the beaded wall is now overlaid with weave stitches. I used the traditional weave stitch technique introduced in Project Two, *When Threads Remember Touch*, to create a cover across the top of the wall structure. The threads are anchored by passing through the centre of each bead, securing the woven layer in place. I chose not to weave too densely, allowing visibility of the conductive object inside and preserving the sense of transparency that initially inspired this experiment.



Video 34 Map of Beads: Weave Stitching Demonstration B [Video]

Material List

Textiles & Threads

- Conductive Thread - Grey
- Standard Embroidery Threads
- Medium Bugle Beads
- Conductive Object - It can be anything that is conductive (I used a metal button I sourced from my Vietnam trip)
- Fabric base - Calico (plain woven cotton)

Electronic Parts

- LED
- Battery Holder
- Battery

Tools

- John James hand needle set - assorted 25
- Fabric Marking Pen
- Scissors
- Embroidery hoop
- Optional: Embroidery hoop stand

Techniques Used

- Basic stitching to secure the beads down to the fabric surface
- Traditional weave stitch

Making Steps

Before proceeding, it is helpful to review Project Nine, *Map of Beads*, as this sample builds on its structural design and layout.

For instructions on the traditional weave stitch, refer to the Technique Guide.

1. Construct the Bead Maze Base

The circuitry in this sample follows the same structure as Project Nine, *Map of Beads*. The key difference lies in the addition of the woven cover. To begin, lay out and secure the beads in your desired arrangement to form the bead maze. This will act as the foundation for the woven layer. Make sure the beads are firmly attached to a base fabric to prevent any movement during the stitching process.

Important Notes: When setting up your beaded wall, make sure the beads on each side are evenly spaced and that the number of beads is the same on both sides. If they are uneven, you may end up with extra beads on one side or find that the warp threads are not parallel, both of which can affect the structure and appearance of the final piece.

2. Set Up the Warp Threads

As shown in Figure 73, thread a fine, durable needle with a standard sewing thread. From the underside of the fabric, bring the needle up through the centre of the first bead so the thread emerges onto the top surface.

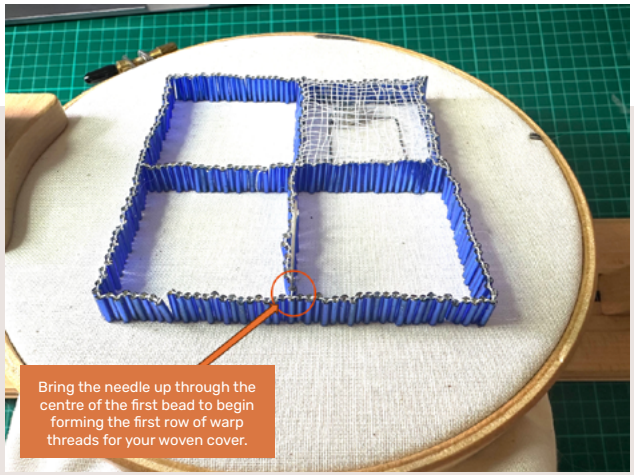


Figure 73 Map of Beads: Weave Stitching Making Step 2

3. Create the First Warp Thread

Pass the needle back down through the first bead from the opposite side, forming a vertical warp thread across the surface. Gently pull the thread taut, ensuring it is secure but not overly tight to avoid distorting the structure.

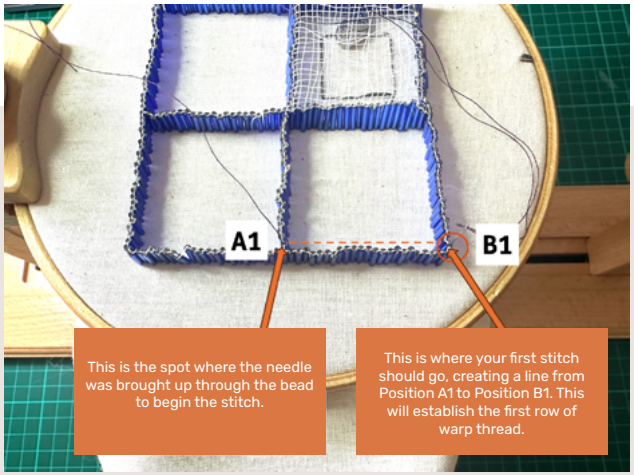


Figure 74 Map of Beads: Weave Stitching Making Step 3

4. Add the Second Warp Thread

As shown in Figure 75, bring the needle up again through the centre of the second bead. Then insert the needle back down through the second bead from the opposite side, just as before. This forms the second warp thread.

5. Continue Across the Row

Repeat the process across the row of beads, creating evenly spaced vertical warp threads over each bead. This structure will serve as the loom for your weaving.

In Figure 76, I have completed six rows of warp stitching as an example. Please continue following the same steps to complete the entire section, ensuring your warp threads are fully set up and ready for weaving.

6. Begin the Weft Threading

To start weaving, bring the needle up from the weft side (horizontal direction) through the centre of the first bead in the row.

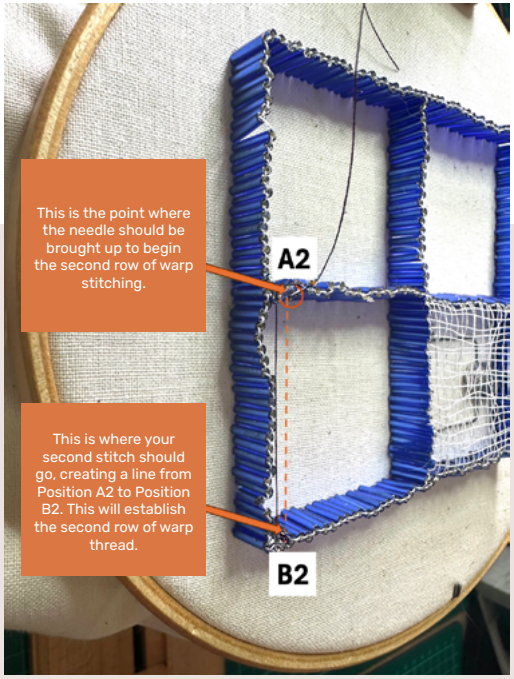


Figure 75 Map of Beads: Weave Stitching Making Step 4

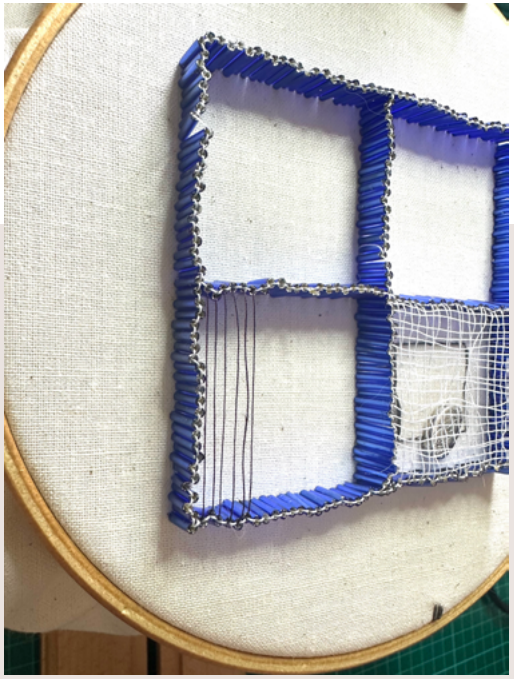


Figure 76 Map of Beads: Weave Stitching Making Step 5

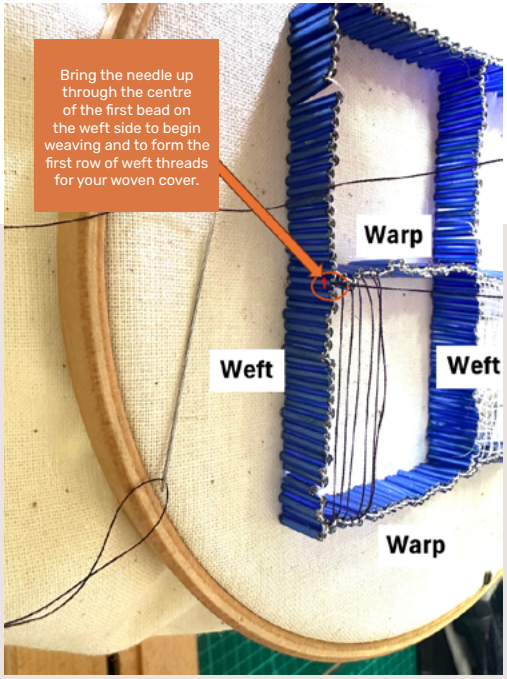


Figure 77 Map of Beads: Weave Stitching Making Step 6

7. Weave the First Weft Row

Weave the thread over and under the vertical warp threads in a basic plain weave pattern: one over, one under. Pull the thread gently through to lay the first row of weft across the top of the bead wall.



Figure 78 Map of Beads: Weave Stitching Making Step 7

8. Secure the First Weft Row

Insert the needle down through the centre of the first bead on the opposite side (right weft edge) to anchor the weft thread in place.



Figure 79 Map of Beads: Weave Stitching Making Step 8

9. Start the Next Weft Row

Bring the needle back up through the centre of the second bead on the left weft edge to begin the next row of weaving.

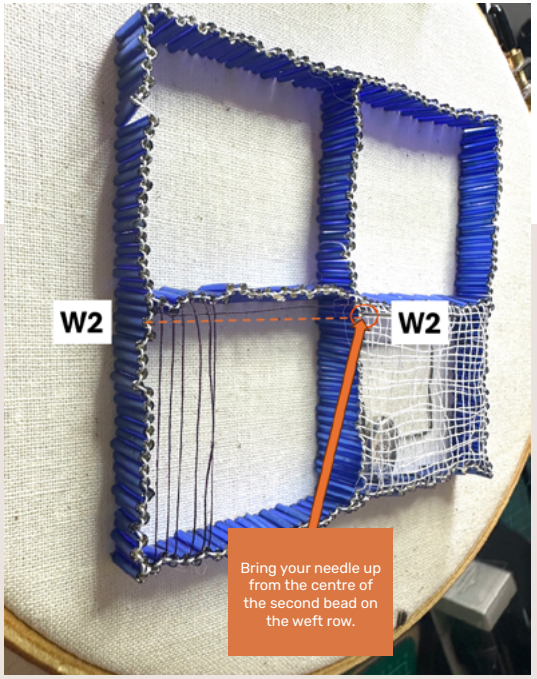


Figure 80 Map of Beads: Weave Stitching Making Step 9

10. Weave the Second Weft Row

Weave the needle back across the warp threads using the opposite pattern of the previous row (if you went over a warp thread last time, go under it this time). This alternating structure builds a stable and visually engaging woven surface.

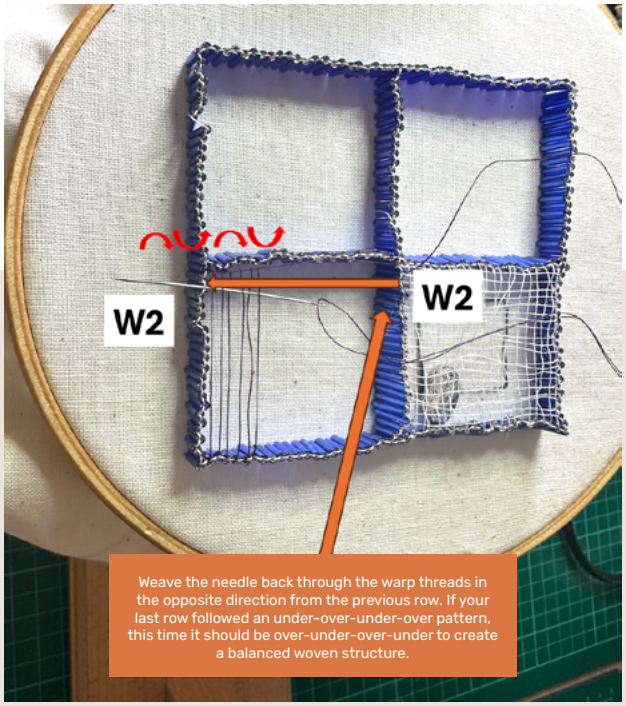


Figure 81 Map of Beads: Weave Stitching Making Step 10

11. Secure the Second Weft Row

Insert the needle down through the centre of the second bead on the left weft edge to hold the stitching in place.



Figure 82 Map of Beads: Weave Stitching Making Step 11

12. Repeat the Weaving Process

Continue working across the beaded wall, alternating the plain weave pattern with each row and securing the thread at the end of every pass through the bead edges. Gradually, a woven textile-like layer will emerge over the bead wall.

In Figure 83, I have completed 6 rows of warp and 5 rows of weft as an example. The goal is to continue setting up both the warp and weft threads across the entire section, so your beaded maze is fully secured with a woven cover.

Important Notes: Do not forget to place your conductive object inside the wall before closing off the cover completely.

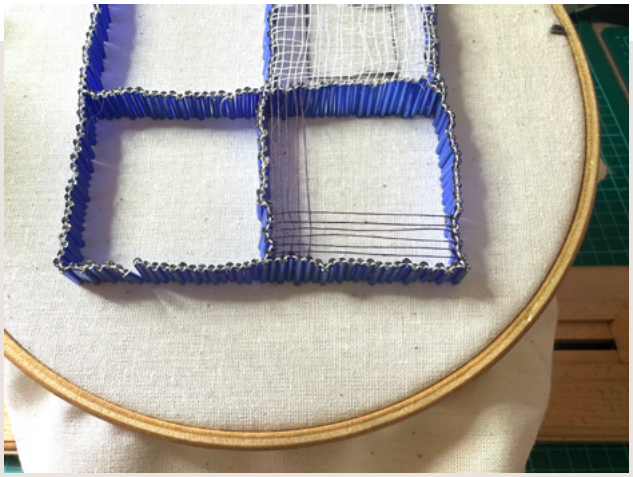


Figure 83 Map of Beads: Weave Stitching Making Step 12

Tips

1. Maintain Consistent Tension

Paying close attention to thread tension is essential for achieving a clean and stable result. If the warp or weft threads are pulled too tightly, the underlying bead structure may become warped or distorted. On the other hand, if the threads are too loose, the woven layer may appear uneven or messy. Aim for a tension that is firm enough to hold shape but gentle enough to preserve the integrity of the beads. The photo below (see Sample Photo 84) shows a good example of what can happen when the weft threads are pulled too tightly. The left hand side of the wall, particularly the bottom left corner, has been pulled inward instead of standing upright, due to the excessive tension.

2. Work Slowly and Be Patient

This process is challenging! It can be very intricate and requires a steady hand and careful attention to detail. Take your time with each stitch and do not rush the weaving. Precision improves with practice, so allow yourself the space to experiment and learn through repetition.

3. Choose the Right Thread Size

The thickness of the thread plays a significant role in both the appearance and practicality of your weaving. I used a very fine sewing thread to accommodate the small bead holes in this project. If your beads have narrow openings, opt for finer thread to avoid unnecessary strain or breakage. Thicker threads may not pass through the beads multiple times and could disrupt the pattern.

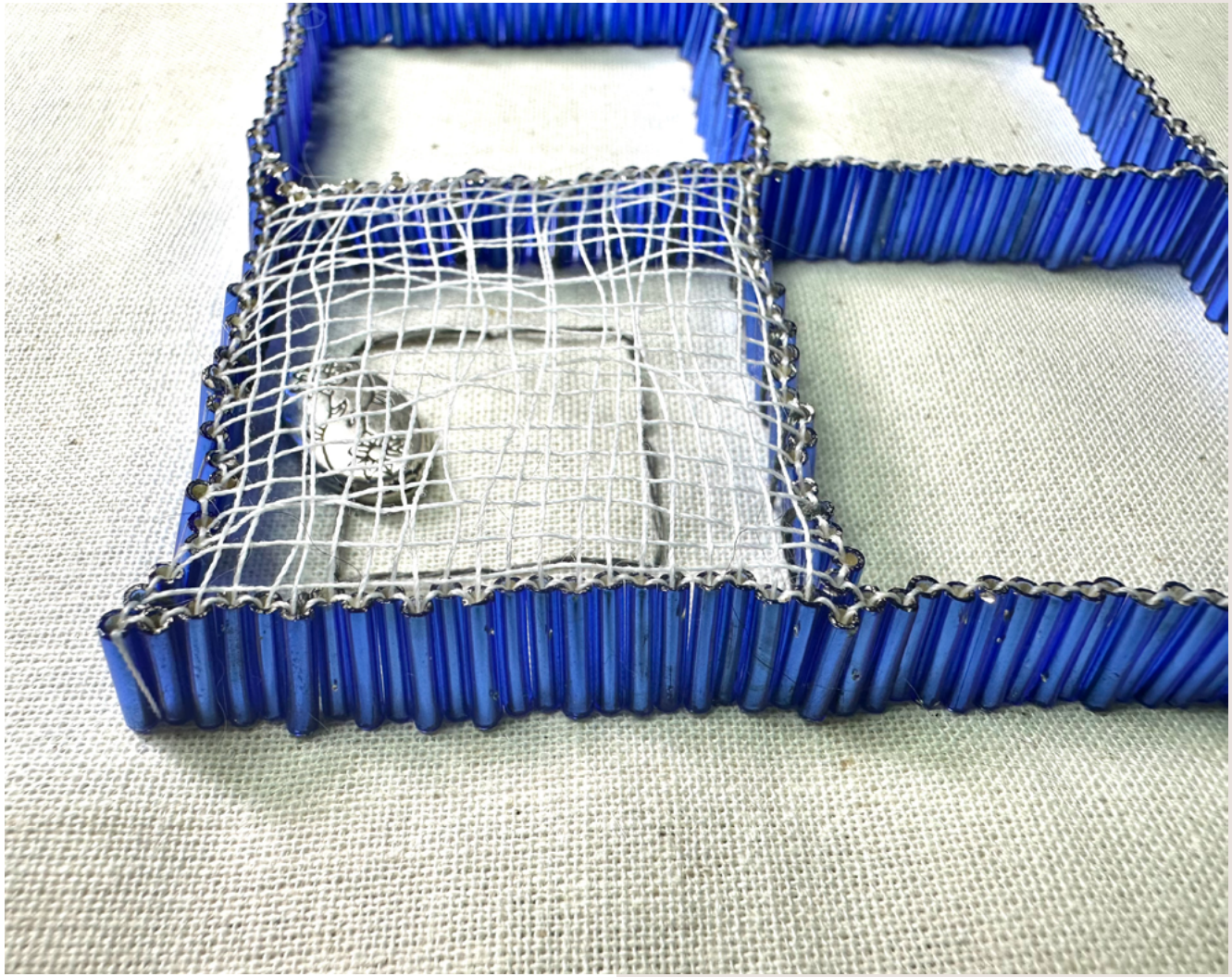


Figure 84 Map of Beads: Weave Stitching Tips 1

Reflection

Weaving on top of a bead structure proved to be far more challenging than I initially expected. While the idea seemed straightforward in theory, in practice it demanded a high level of precision, control, and patience. Because the beads are only secured to the fabric on one side, they tend to shift during the weaving process. When you begin weaving over the top, the beads can move easily and if you pull the threads too tightly, it can quickly distort the beaded wall, causing it to collapse or lean toward the point of tension. Achieving a clean, balanced result was difficult, and it quickly became clear that mastering this technique will require much more practice and refinement. For this project, I chose to do a relatively loose weave over the beads. My intention was to maintain visibility of the conductive component embedded within the piece like the maze toy, allowing the viewer to still engage with its inner workings.

I think the weaving concept works, but the key lies in how it is executed to achieve a visually appealing result. It will definitely take more practice, along with experimenting with different threads, colour combinations, and weaving structures to refine the overall aesthetic. Structurally, I divided the bead structure into four distinct squares. I see strong potential in using this structure to set up multiple circuits where each square could house its own conductive element or interactive component. This modular approach opens up exciting possibilities for future work. Ultimately, this piece stands as a successful experiment in combining two distinct techniques, the beadwork and weaving. It marks an important step in my ongoing exploration of how traditional craft practices can intersect with more experimental and contemporary methods. While there is still much to refine, the process has sparked new ideas and revealed promising directions for future development.

Project Eleven – Map of Beads: Spiral

Image redacted due to copyright restrictions.

About This Project

This piece is a creative variation of Project Nine and Ten, continuing the exploration of structure and interactivity. While the original project was based on a grid of square sections, this version experiments with a spiral structure, introducing a new visual rhythm and movement to the work. The shift from a square layout to a spiral was inspired by a desire to evoke a more playful and immersive experience, one that more closely mirrors the maze toys I remember from childhood, similar to example shown in Figure 85. I wanted this piece to feel fun and playful, like a maze game transformed into textile form. The spiral not only invites the viewer's eye to travel in a continuous path but also introduces a sense of motion and progression, enhancing the interactive quality of the piece.

Figure 85 Indiamart. (n.d.). Handcrafted Wooden Labyrinth Maze Puzzle Game [Image]. Retrieved from https://www.indiamart.com/proddetail/4-handcrafted-wooden-labyrinth-maze-puzzle-game-ball-in-a-maze-toy-for-kids-boys-girls-fun-indoor-brain-teaser-skill-building-p

Visual Demonstration:

Figures 86 and 87, along with the accompanying video 35, provide a visual overview of the sample.



Figure 86 Map of Beads: Spiral Sample Photo A



Figure 87 Map of Beads: Spiral Sample Photo B



Video 35 Map of Beads: Spiral Demonstration Video A [Video]

How It Works

The circuit in this piece functions in the same way as Project Nine, *Map of Beads.* Conductive threads are stitched along the centre of the maze tunnel to form the positive path, while the negative path is created with conductive threads stitched along the inner side of the wall. When a conductive object moves through the tunnel and makes contact with both the positive and negative threads, the circuit is completed and the LED lights up. If the object touches only one path, the circuit remains incomplete and the light stays off.

I have included two demonstration videos. In the first (see Video 36), I use a metal button sourced from my trip to Vietnam. To activate the circuit, I manually move the button through the maze. While it is possible to tilt the fabric to move the metal button through manipulating the fabric, the lack of a cover means it can easily fall out if tilted too far.

In the second video (see Video 37), I experiment with a different approach. Instead of one, I use two magnets, one placed visibly on top and another hidden beneath the fabric. By moving the bottom (invisible) magnet, the top one follows, allowing for controlled interaction without the risk of the object falling out. This setup offers a more contained and responsive way to navigate the maze while maintaining a playful, game-like experience.



Video 36 Map of Beads: Spiral Demonstration Video B [Video]



Video 37 Map of Beads: Spiral Demonstration Video C [Video]

Material List

Textiles & Threads

- Conductive Thread - Grey
- Standard Embroidery Threads
- Medium Bugle Beads
- Conductive Object - It can be anything that is conductive (I used a metal button I sourced from my Vietnam trip)
- Magnets
- Fabric base - Calico (plain woven cotton)

Electronic Parts

- LED
- Battery Holder
- Battery

Tools

- John James hand needle set - assorted 25
- Fabric Marking Pen
- Scissors
- Embroidery hoop
- Optional: Embroidery hoop stand

Techniques Used

- Basic stitching to secure the beads down to the fabric surface

Making Steps

This section offers a step-by-step guide to creating this sample.

Before proceeding, it is helpful to review Project Nine, *Map of Beads*, as this sample builds on its structural design and layout.

1. Draw the Spiral Bead Map Base

Start by sketching a spiral shape directly onto your fabric base. This spiral will serve as the main path or “maze” of the piece. Use a fabric-safe pen or tailor’s chalk to ensure the markings are visible but removable if needed. Keep the spacing consistent to allow enough room for both beads and conductive thread placement along the path.

2. Construct the Spiral Bead Wall

Following your spiral guide, begin stitching beads into place along the drawn line to form a raised wall. This bead wall outlines the pathway and will help guide any metal or interactive components used later. Secure each bead tightly so they remain fixed and evenly spaced, forming a continuous, well-defined spiral structure.

3. Install the First Group of Conductive Threads (Wall Side)

Negative Path: the conductive threads should be carefully stitched along the inner edge of the spiral wall, as shown in Figure 88. These threads follow the curve of the spiral, mirroring the maze structure and forming one side of the electrical circuit.



Figure 88 Map of Beads: Spiral Making Step 3

4. Install the Second Group of Conductive Threads (Centre Path)

Positive Path: as per Figure 89, the second set of conductive threads should be placed down the centre of the spiral path, running through the space where the metal object or game element will travel.



Figure 89 Map of Beads: Spiral Making Step 4

5. Ensure Electrical Isolation

It is crucial that the two groups of conductive threads remain completely separate and do not touch each other at any point, as shown in Figure 90. The effectiveness of the interactive element relies on this separation. When a conductive object moves through the spiral and simultaneously touches both a wall-side conductive thread and a central-path thread, it completes the circuit. This interaction can be used to trigger a response, such as lighting an LED or sending a signal.



Figure 90 Map of Beads: Spiral Making Step 5

6. Test the Circuit Pathway

Once both groups of conductive threads are in place, test the setup with a conductive object. Move it through the spiral path and observe whether it successfully bridges the threads to complete the circuit. Adjust spacing or thread tension as needed to ensure reliable contact and function.

Tips

1. Plan Around Your Conductive Element

Before designing your spiral, decide which conductive element you intend to use, whether it is a metal ball, magnet, or another object. Measure its dimensions carefully (length, width, and height if needed) and ensure your spiral path is wide enough to allow it to move freely without obstruction. This early planning step is essential for maintaining both the functionality and interactivity of the piece.

2. Consider the Length of Your Beads

The size of the beads you choose, particularly their length, will directly affect the height of your wall structure. Taller beads will create a more pronounced, elevated boundary along the spiral path, while shorter beads will result in a lower, more subtle wall. Choose accordingly based on the visual effect and functional needs of your design.

3. Test Frequently Throughout the Process

Do not wait until the end to check if your circuit works. Test the conductive pathways at various stages as you stitch and assemble. This allows you to catch potential issues early, such as thread contact, spacing problems, or tension irregularities, and adjust them before the piece is fully constructed.

Reflection

This project marks a meaningful evolution in the Map of Beads series by shifting from a square grid to a spiral-based structure. The change in form is not purely aesthetic, it brings the design closer to the memory of childhood maze toys, which often featured winding, circular paths that encouraged both curiosity and play. The spiral shape naturally guides the viewer's eye and hand along a continuous journey, enhancing the piece's interactive qualities and making the experience more immersive.

This experiment also opens up exciting new creative directions. The open spiral used in this version serves as a foundation, but it is by no means the only possibility. Future versions could experiment with more complex layouts, such as spiral mazes with dead ends, blocked paths, or even branching routes, introducing elements of decision-making, trial and error, and surprise. In addition to the spiral shape, other forms can also be explored. It could be interesting to experiment with different proportions and sizes to see how they affect both the visual impact and the interactivity of the piece. These additions could heighten the sense of engagement, challenge, and fun, transforming the piece into a more dynamic and playful interactive textile piece. Overall, this project demonstrates the potential of combining form, memory, and interactivity in textile-based designs. It not only reflects on the technical possibilities of integrating conductive materials and stitching but also invites the viewer, or participant, into a playful, evolving experience.

Conclusion

This prototype book is not a conclusion, but a continuation, an unfolding narrative that traces a path through traditional craft, material inquiry, and emerging technologies. It does not aim to offer definitive answers or a fixed methodology. Instead, it documents a living, evolving practice shaped through experimentation, reflection, and hands-on making. It is part journal, part archive, part invitation.

At its core, this book captures a making journey that weaves together ancestral techniques with contemporary possibilities. Alongside threads, beads, and fabric are also battery, sensors, and conductive materials, elements that may seem foreign to traditional craft but, when handled with care, open up new ways of storytelling and connection. Rather than focusing solely on outcomes, this book foregrounds process, the learning, unlearning, testing, failing, and rediscovering that occur when traditions meet new tools. It offers visual and written documentation not only to preserve what was explored, but to open it up for further interpretation. Every photograph, diagram, and annotation are a window into the decisions, questions, and ideas that shaped the work.

This is not a traditional prototype book, nor is it a technical manual for e-textiles. It sits somewhere in between a hybrid space, much like the practice it represents. You may find inspiration here if you are a maker curious about traditional techniques, or a designer drawn to the tactile potential of textiles. You may be a researcher navigating practice-led inquiry or someone simply exploring new creative pathways. Regardless of background, this book is designed to spark curiosity and support new connections between disciplines, between generations, and between ideas.

In presenting this book, I hope to offer a platform that supports further experimentation. It is a personal archive, but not a closed one. Instead, it is a field of possibility, open-ended, layered, and adaptable. By sharing my own explorations, I hope to encourage others to begin their own, contributing to a broader, more inclusive conversation about the future of craft and its place in our technological age.

Resources & References

Material Guide

This section provides an overview of the tools and materials featured throughout the book. It serves as a helpful guide to understanding each item's purpose and how they are used within various projects. By becoming familiar with these tools and materials, readers can build confidence and better prepare themselves before starting their own creative work.

Conductive Thread

Conductive thread is frequently made of stainless-steel fibre and is primarily used for sewing connections between components on embroidery designs or to create a circuit. There is a wide variety of conductive threads available on the market, each designed for different purposes. Some are durable enough for machine sewing, while others are more delicate and suitable only for hand stitching.



Figure 91 Conductive Thread

Mill Hill Glass Beads

Mill Hill Glass Beads are small, high-quality decorative beads made of glass, commonly used in embroidery, cross-stitch, and other craft projects. They are produced by Mill Hill, a well-known American brand specialising in needlework supplies.



Figure 92 Mill Hill Glass Beads

Mill Hill Bugle Beads

Mill Hill Bugle Beads are slender, tubular-shaped beads commonly used in embroidery, embellishment, and various needlework projects. Available in a range of sizes and colours, they add texture, dimension, and sparkle to designs. These beads are made from glass and are non-conductive.



Figure 93 Mill Hill Bugle Beads

Basic Elements Crimp Beads

These are small, gold-plated crimp beads commonly used in jewelry making to secure the ends of beading wire or thread. Because they are gold-plated, they are conductive, which makes them potentially useful in certain e-textile applications as well. They are available in various sizes to suit different types of projects.



Figure 94 Basic Elements Crimp Beads

LilyPad Battery Holder

The LilyPad Coin Cell Battery Holder is a specific component designed for to securely hold and connect a coin cell battery. This type of battery is commonly used in e-textiles and wearable electronics projects due to its compact size and sufficient power for driving small electronic components like LEDs or sensors.

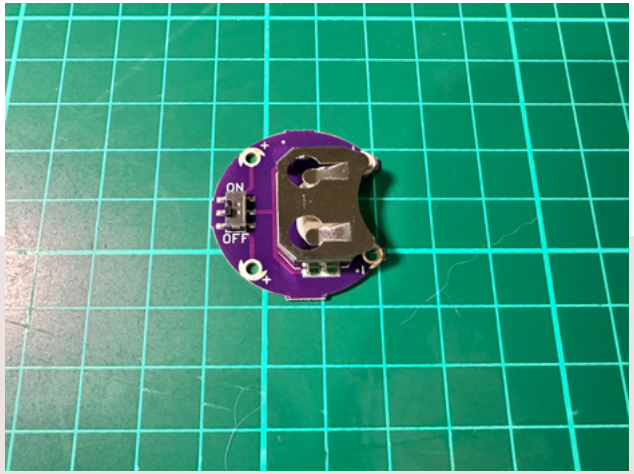


Figure 95 LilyPad Battery Holder

LilyPad LED

The LilyPad LED is a specialised type of LED intended for e-textiles and wearable electronics projects. It is available in various colours and is ideal for sewing into clothing or textiles.

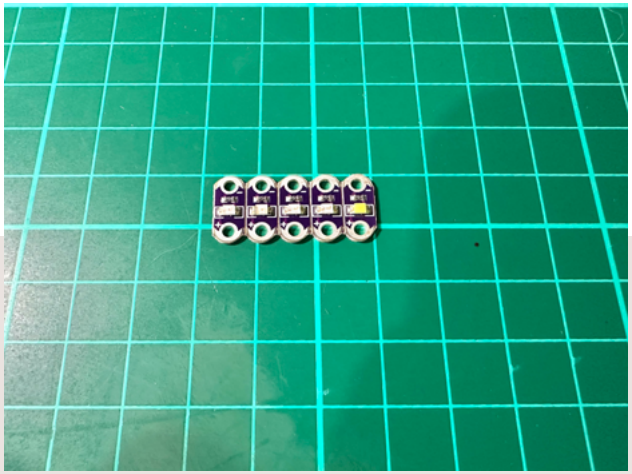


Figure 96 LilyPad LED

Embroidery Hoop

Embroidery hoops, made from wood, plastic, or metal, play a crucial role in maintaining fabric tension and achieving precise stitching in embroidery and needlework. They are offered in circular or rectangular frames and a range of sizes to suit various project needs.



Figure 97 Embroidery Hoop

DMC Pearl 12 Thread

DMC Pearl Cotton 12 is a fine, high-quality, twisted embroidery thread made of 100% mercerised cotton. It has a smooth, lustrous finish and is non-divisible. These threads are often used in the projects as regular, non-conductive threads.



Figure 98 DMC Pearl 12 Thread

Muslin/Calico

Aida cloth, commonly used for cross-stitching, is an excellent choice for beginners. Its mesh-like structure makes it easy to count and stitch accurately. If you prefer a smoother, non-mesh fabric, muslin or calico are great alternatives. They offer a flat, even surface that still works well for stitching practice and experimentation.



Figure 99 Muslin/Calico

Fabric Marking Pen

A fabric marking pen (sometimes called a fabric pen or textile marker) is a tool designed specifically for drawing temporary marks on fabric for sewing, embroidery, quilting, or craft projects.



Figure 100 Fabric Marking Pen

Temperature-Sensitive Colour Changing Thread

Temperature-sensitive colour changing thread is an innovative type of thread that alters its colour in response to temperature variations. This thread contains special pigments or dyes that undergo a reversible colour change at specific temperature thresholds. As the temperature fluctuates, the thread transitions between different hues, creating a captivating visual effect.

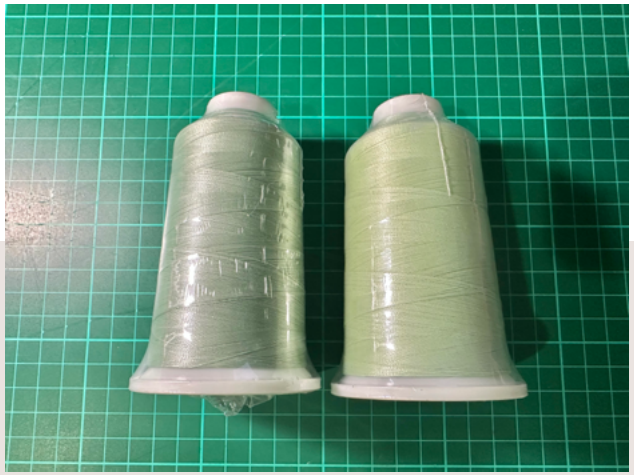


Figure 101 Temperature-Sensitive Colour Changing Thread

Tutorials, Blogs, and Communities

This section provides a curated list of websites, blogs, and online communities dedicated to e-textile projects and tutorials. These platforms are valuable for exploring new techniques, staying informed about current developments in the field, and finding inspiration for your own work. Whether you are looking to deepen your understanding, discover innovative projects, or start building connections within the e-textile community, these resources are a great place to begin.

The Kobakant DIY Wearable Technology Documentation

(https://www.kobakant.at/DIY/)

Kobakant is a comprehensive website that documents a wide range of e-textile projects, offering valuable resources such as material guides, tool recommendations, techniques, and sensor applications. It is an excellent platform for anyone interested in learning more about e-textiles, whether you are a beginner or an experienced maker. Many of the featured projects include detailed, step-by-step instructions, making it easy to follow along and replicate the work. Kobakant serves as both an educational tool and an inspiring reference for exploring the creative possibilities of electronic textiles.



Figure 102 The Kobakant DIY Wearable Technology Documentation



Figure 103 Sew Electric A



Figure 104 Sew Electric B

Sew Electric

(http://sewelectric.org)

Sew Electric is an online resource focused on introducing e-textiles through tutorials featuring the LilyPad Arduino. The website includes step-by-step instructions for five beginner-friendly projects, complete with written guidance and illustrations. For those looking to dive deeper, a companion book is available for purchase, offering additional projects and insights. The site also provides helpful materials lists, troubleshooting tips, and a glossary of key terms commonly used in e-textile projects. It is an accessible and well-structured starting point for anyone interested in combining electronics with fabric and sewing. While this compendium is not directly based on Sew Electric, the resource provided useful background context on foundational e-textile techniques.

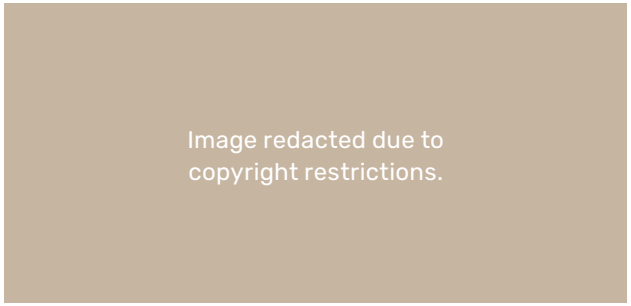


Figure 105 Instructables

Instructables

(https://www.instructables.com)

Instructables is an online DIY community where makers from around the world share their projects, skills, and knowledge. Tutorials on the site typically include step-by-step instructions, often accompanied by photos or videos to guide you through the process. Unlike platforms dedicated solely to e-textiles, Instructables covers a wide range of topics, from electronics and crafts to cooking and woodworking, so you will need to search specifically for e-textile projects. Despite this broader focus, it remains a valuable resource for discovering creative ideas and learning from a diverse community of makers.

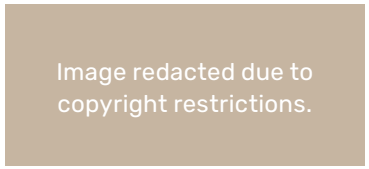


Figure 106 Sparkfun

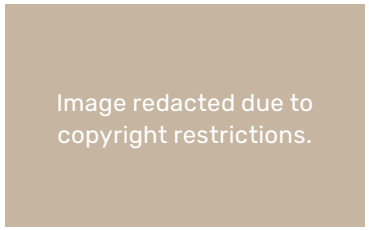


Figure 107 Sparkfun
Start Something



Figure 108 Adafruit

Sparkfun

(https://www.sparkfun.com)

(https://learn.sparkfun.com)

SparkFun is an online retailer that offers a wide selection of electronic components and conductive materials commonly used in e-textile and DIY tech projects. Alongside its extensive product range, the site features detailed descriptions, specifications, and video tutorials to help users better understand and apply the materials. It is a dependable resource for both sourcing supplies and expanding your technical knowledge.

The SparkFun website also includes a documentation section where you can search for tutorials. As there is a wide variety of projects available, it is helpful to narrow your search using keywords such as “e-textiles,” “wearables,” or “e-craft.” In my own research process, I found myself using SparkFun primarily for sourcing electronic components, while relying more on the first three websites for in-depth tutorials and project guidance.

Adafruit

(https://www.adafruit.com/?srsltid=AfmBOopnQKNfmn1PE_FBwgDtgMgy5oSt5tPdiuV1WzHdjKevOs4Jr35a

FLORA. adafruit.com blog.adafruit.com)

Adafruit is a comprehensive online platform that offers a wide range of electronic products, tutorials, blogs, and community forums. The site features dedicated sections for beginners, fun hands-on projects, and skill-building resources to help users advance their electronics knowledge. Like SparkFun, Adafruit covers a broad spectrum of electronic fields, so to find relevant content, you will need to narrow your search using keywords. It is a valuable resource for both learning and exploring creative tech-based projects.

Adafruit has also developed its own wearable electronics platform called Adafruit FLORA, which focuses exclusively on wearable tech projects. Each project typically includes a clear introduction, wiring diagrams, software instructions, assembly steps, and troubleshooting tips. The platform also encourages community interaction, allowing users to leave feedback and reviews to engage with project creators. One particularly helpful feature is that each project is labeled with a difficulty level, making it easy to identify which projects are suitable for your current skill level.

Books

This section features a list of books I highly recommend for anyone interested in gaining a deeper understanding of traditional crafts and ethnic cultures. These texts offer valuable context, inspiration, and insight into the cultural significance and historical roots of various craft practices.



Figure 109 One Needle, One Thread: Miao (Hmong) Embroidery and Fabric Piecework from Guizhou, China

One Needle, One Thread: Miao (Hmong) Embroidery and Fabric Piecework from Guizhou, China

Author: Tomoko Torimaru

An English-translated version is available. The book features numerous photos and step-by-step visual guides of traditional techniques practiced by the Miao (Hmong) people. It is a resource I frequently return to, as it offers a wealth of clear, detailed images, something rarely found in other publications, which often rely solely on written descriptions. It also covers a wide range of techniques, including many I have not seen documented elsewhere, making it an especially valuable reference.



Figure 110 A Collection of Traditional Embroidery Techniques

A Collection of Traditional Embroidery Techniques

Author: 粘碧華

This book is only available in Chinese, but it features clear, high-quality photos of the stitching techniques used in the projects presented here. If you are an experienced embroiderer, you should be able to follow and replicate the techniques based on the visuals alone. The embroidery showcased in this book is truly remarkable, though it does require a certain level of skill to learn and execute effectively. In addition to the techniques themselves, the book also provides background information that offers valuable context and insight into the tradition behind the craft.

Artists/Researchers

This section highlights a selection of artists and researchers actively working in the e-textile field. If you are seeking inspiration or want to explore current developments and innovations in this area, these individuals and their work offer valuable insight. Whether you are just starting out or looking to deepen your understanding, their projects are a great source of ideas and creative direction.

Anja Hertenberger: anjahertenberger.net

Anouk Wipprecht: anoukwipprecht.nl

Cute Circuit: cutecircuit.com

Ebru Kurbak: ebrukurbak.net

EJTech: ejtech.cc

Lara Grant: lara-grant.com

Leah Buechley: leahbuechley.com

Maggie Orth: http://maggieorth.com/

Malin Bobeck: https://tadaa.se/

Meg Grant: http://meggrant.com/

Melissa Coleman: http://www.melissacoleman.nl

Mika Satomi: nerding.at

Piem Wirtz: piemwirtz.com

Ying Gao: yinggao.ca

Where to Buy?

This section offers suggestions on where to find the materials needed for your projects, including both craft and electronic supplies. It features a mix of local (New Zealand) and international sources to help you access a wide range of tools and components, no matter where you are based.

Craft Equipment and Material

New Zealand:

The Ribbon Rose: https://www.ribbonrose.co.nz

Spotlight: https://www.spotlightstores.com/nz

Overseas:

Etsy: https://www.etsy.com/nz/?ref=lgo

Velve: https://velve.cn

Shieldex: https://www.shieldex.de

Electronic Component and Material

New Zealand:

Mindkits: mindkits.co.nz

Mouser Electronics Ltd: https://nz.mouser.com/

Overseas:

Sparkfun: sparkfun.com

Adafruit: adafruit.com

LessEMF: lessemf.com

Technique Guide

This section offers guidance on some of the traditional techniques used throughout the projects. Each technique is introduced with a brief background to provide cultural and historical context, followed by step-by-step photo instructions and accompanying video demonstrations to support your learning and practice.

Technique: Seed Stitch (打籽绣)

打籽绣 is one of the core techniques used in traditional Chinese embroidery. The Seed Stitch is known for its dense, fine, dot-like stitching that creates texture and depth, and is often used to fill areas or form outlines. Each stitch resembles a tiny seed or grain, which is where the name comes from — "打籽" means "to strike or plant seeds."



Figure 111 Biftmuseum. (n.d.). Seed Stitching 1 (Left) [Image]. Retrieved from http://www.biftmuseum.com/technics/detail?sid=39&pid=0



Figure 112 Biftmuseum. (n.d.). Seed Stitching 2 (Right) [Image]. Retrieved from http://www.biftmuseum.com/technics/detail?sid=39&pid=0

Visual Demonstration (Video 38)

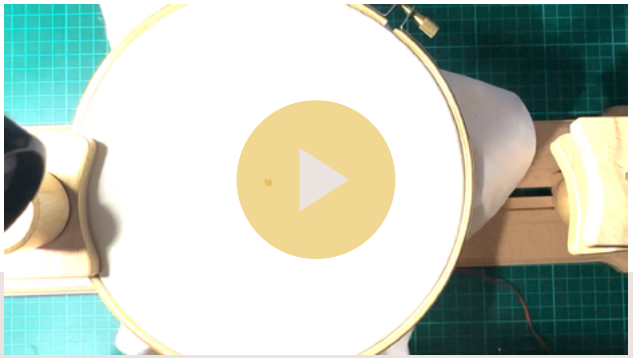
The following video demonstrates how to practice this technique from start to finish. In this example, the seed stitching is wrapped twice, as part of the standard process.



Video 38 Seed Stitch Technique Demonstration A [Video]

Visual Demonstration (Video 39)

The following video demonstrates how to wrap seed stitching three and four times. It shows how the number of wraps directly affects the size and appearance of the stitch.



Video 39 Seed Stitch Technique Demonstration B [Video]

Making Steps:

The following section provides step-by-step instructions for practicing this technique, complete with photos and written descriptions to guide you through each stage.

1. Begin at Point A (Figure 113)

Start by inserting the needle from the underside of the fabric and bringing it up through at Point A. Make sure to pull the thread all the way through so it sits flat against the fabric before moving on to the next step.

2. Wrap the Thread Around the Needle (Figure 114)

Hold the needle in your right hand, keeping it parallel to your body rather than pointing it straight down. With your left hand, take the thread and wrap it around the needle twice, moving from front to back. This positioning helps create a clean and controlled loop as you prepare to pull the needle through.

3. Form the Knot (Figure 115)

Gently hold the longer end of the thread with your fingers, and insert the needle back into the fabric very close to Point A. As you pull the thread through, keep the needle pointing straight down toward the fabric. This helps guide the wrapped thread into a tight, neat knot on the surface.

4. Complete the First Stitch (Figure 116)

You have now completed one seed knot stitch. At this stage, the knot should sit securely on the surface of the fabric. Check that the thread tension is balanced and the knot is well-formed before moving on to the next stitch.

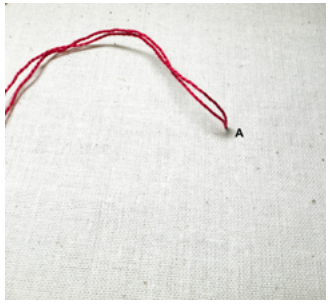


Figure 113 Seed Stitch Making Step 1



Figure 114 Seed Stitch Making Step 2

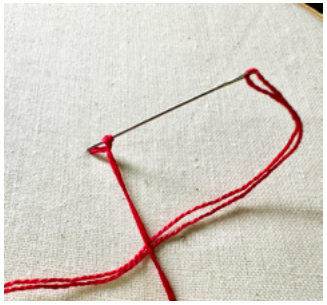


Figure 115 Seed Stitch Making Step 3



Figure 116 Seed Stitch Making Step 4

Tips:

1. Loosen Your Grip for Smoother Knot Formation

If the needle feels stuck while you are pulling it through to form a knot, it may be because you are holding the thread too tightly. Try relaxing your grip slightly with your left hand to allow the needle to pass through more smoothly.

2. Adjusting Seed Knot Size

There are four main ways to change the size of a seed knot:

- Use a thicker thread: this increases the overall volume of the knot.
- Use a thicker needle: it creates a larger loop.
- Wrap the thread more times: wrapping 2, 3, or 4 times (as shown in the Figure 117) results in different knot sizes.
- Control the tension: a tighter grip with your left hand makes smaller, more compact knots, while a looser grip creates softer, puffier ones.

3. Avoid Stitching into the Same Hole

Always insert the needle back into the fabric near, but not exactly at, the point where you came out. This prevents the knot from slipping through the hole and disappearing to the other side of the fabric.



Figure 117 Seed Stitch Tips 2

Reflection:

Working with seed stitching revealed how small, repetitive gestures can hold a powerful visual and tactile presence. Seed stitching remains a widely practiced method today, which made it easy to learn through books and online resources. Its accessibility is part of its charm, simple enough for beginners, yet versatile enough to support a wide range of creative applications. Whether used to fill large areas with texture or as individual knots to add delicate highlights, seed stitching is a flexible skill that can enhance your work in many different ways.

Throughout the projects in this prototype book, seed stitching emerged as a recurring method, not only for its decorative qualities but also for its potential to be functional. The technique's ability to build form and density in specific areas made it useful for emphasising detail or adding a sense of depth. In the *To Be Touched* series it was combined with beads to explore new interactive possibilities, while in the Beaded Circuitry projects it served as a key method for isolating or establishing electrical connections, and in the *Landscape* pieces it was used purely for embellishment.

Technique: Turkey Stitch (绒毛绣)

The Turkey Stitch as shown in Figure 118, also known as Ghiordes Knot or Loop Stitch, is a decorative embroidery technique used to create a plush, fluffy, and highly textured surface. Traditionally found in rug-making and textile embellishment, this stitch involves forming loops on the surface of the fabric, which can be left as-is for a loopy effect or cut to create a soft, velvety pile.

Because of its ability to build volume and dimension, Turkey Stitch is perfect for adding tactile interest to embroidered landscapes, animal fur or decorative borders. It brings a playful, touchable quality to textile art, making it especially useful in projects where interaction, movement, or visual contrast is desired. When combined with specialty threads like thermochromic or metallic threads, The use of the Turkey Stitch can enhance both texture and interactivity in modern e-textile applications.

It Is worth noting that this stitching technique is not a traditional method practiced by any specific ethnic group. I have included it here because it played a significant role in my *Landscape* projects where I used it extensively to create volume and to mimic the texture and feel of tea fields and bushes. Its ability to build soft, raised surfaces made it an effective tool for evoking natural forms.

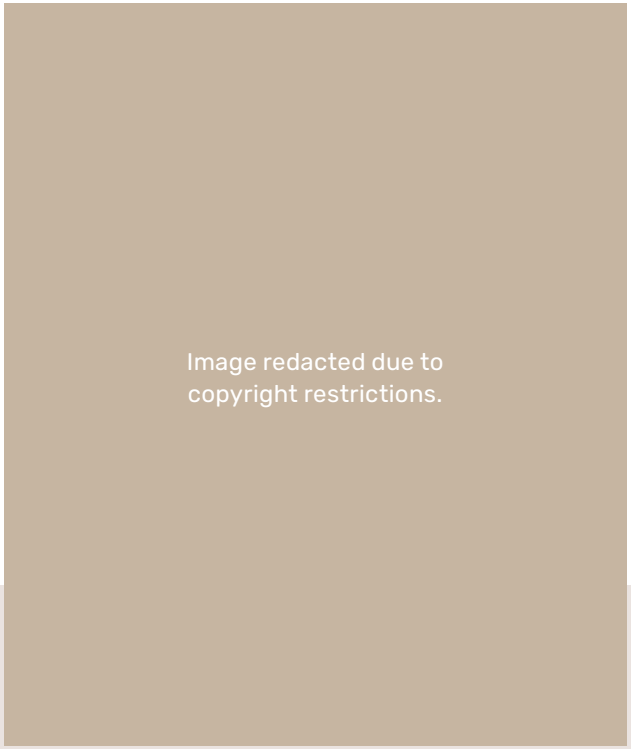
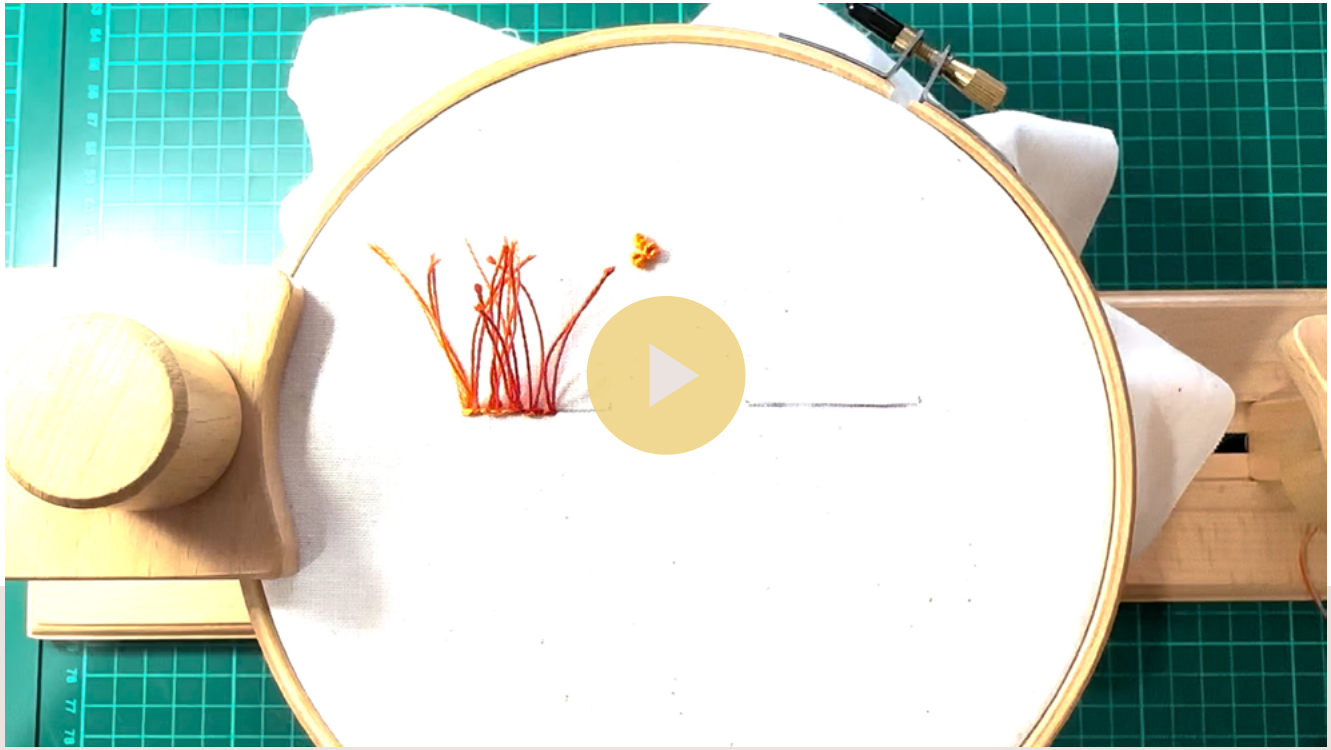


Figure 118 Elaraembroidery. (2023, November 12). How to stitch: Turkey rug stitch [Image]. Retrieved from https://www.elaraembroidery.com/how-to-stitch-turkey-rug-stitch/

Visual Demonstration

The following video 40 demonstrates how to practice this technique from start to finish.



Video 40 Turkey Stitch Demonstration [Video]

Making Steps:

The following section provides step-by-step instructions for practicing this technique, complete with photos and written descriptions to guide you through each stage.

1. Thread the Needle and Position the Tail for Turkey Stitch (Figure 119)

Thread the needle without knotting the end. Insert the needle down through the fabric along the outline of the design and pull the thread through, leaving the tail resting on the surface. Adjust the tail to your desired length. Then gently lift the tail so it stands upright, slightly above the marked line, this forms the first set of thread for your Turkey Stitch.

2. Secure the Tail by Stitching Beside It (Figure 120)

Bring the needle up just to the right of the tail, leaving a small gap. Pull the thread through gently, making sure the original tail remains in place and doesn't get pulled through the fabric.

3. Lock the Tail in Place with a Securing Stitch (Figures 121 & 122)

Insert the needle down just to the left of the tail to create a locking stitch. This will anchor the tail securely in place, forming the foundation for your Turkey Stitch.



Figure 119 Turkey Stitch Making Step 1

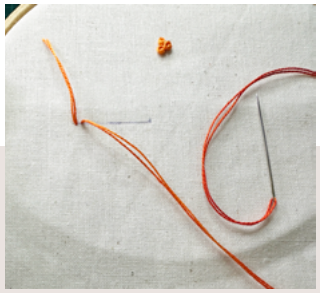


Figure 120 Turkey Stitch Making Step 2

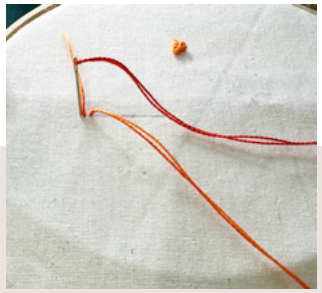


Figure 121 Turkey Stitch Making Step 3A

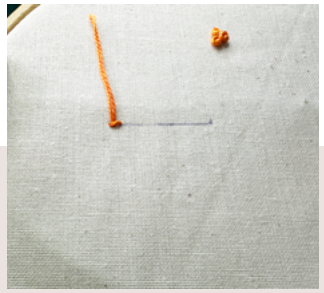


Figure 122 Turkey Stitch Making Step 3B

4. Begin Forming the First Loop (Figure 123)

Bring the needle up just to the right of the tail, slightly above the locking stitch. Pull the thread through gently, this sets up the thread to form your first loop.

5. Form and Secure the First Loop (Figures 124 & 125)

Position the working thread next to the first tail, just above the stitched line, and press it gently against the fabric with a thumb to hold it in place. Insert the needle back into the fabric just to the right of the previous locking stitch. Pull the thread slowly through to the underside, maintaining light pressure with a thumb to guide the thread into a loop. Avoid pulling too tightly, as this may cause the loop to shrink or vanish.

6. Bring the Needle Up to Start the Next Loop (Figure 126)

Return to the right side of the initial locking stitch and bring the needle up through the fabric. This prepares the starting point for forming the next loop in your Turkey Stitch.

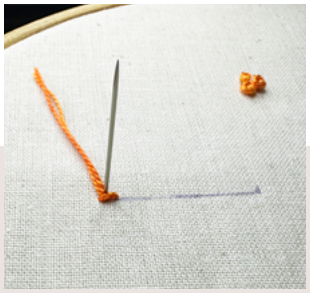


Figure 123 Turkey Stitch Making Step 4

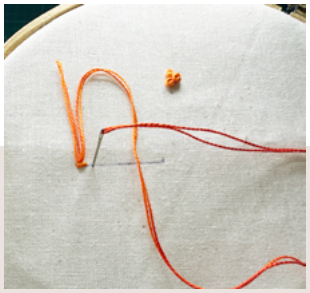


Figure 124 Turkey Stitch Making Step 5A

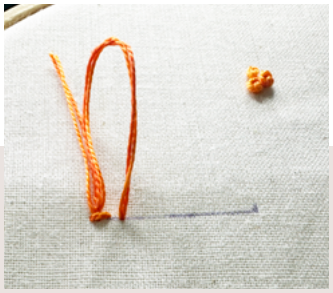


Figure 125 Turkey Stitch Making Step 5B

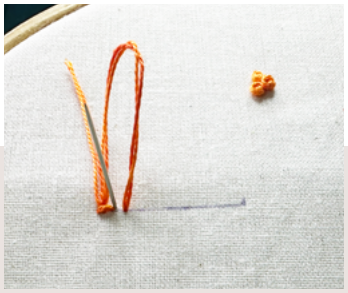


Figure 126 Turkey Stitch Making Step 6

7. Secure the First Loop with a Locking Stitch (Figures 127 & 128)

Cross over the first loop and insert the needle down through the fabric to the left of the loop. This creates the second locking stitch, securing and completing the first loop.

8. Form the Second Loop (Figure 129)

Bring the needle up through the centre of the previous loop. Then insert it down just to the right of the second locking stitch. This creates the second loop, continuing the Turkey Stitch pattern.

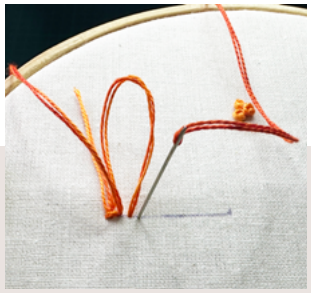


Figure 127 Turkey Stitch Making Step 7A

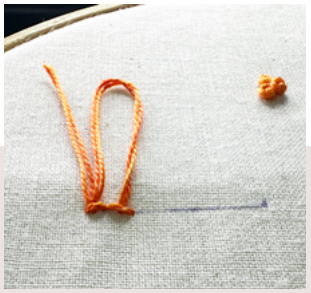


Figure 128 Turkey Stitch Making Step 7B

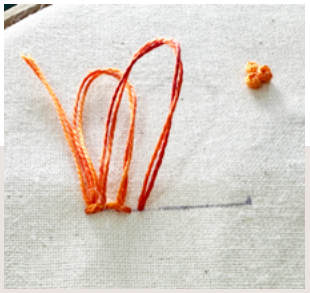


Figure 129 Turkey Stitch Making Step 8

9. Continue Creating Loops Along the Line (Figure 130)

Repeat the same method to form loop after loop along the outline. Although this technique requires careful attention at first, it will become second nature with a bit of practice.

10. Trim the Loops to Create Texture (Figure 131)

Once the area is fully stitched, carefully cut the loops to achieve a textured, shaggy effect. Trimming adds depth and dimension to the design, giving it a soft, fluffy appearance. Cut the loops evenly for a consistent look, or leave some longer for a more varied, natural texture. This step enhances the embroidery's visual appeal by adding a playful, tactile element to the piece.

11. Complete Your First Row of Turkey Stitching (Figure 132)

You have now finished one row of Turkey Stitch! Great job, your embroidery is taking shape with beautiful texture and dimension.

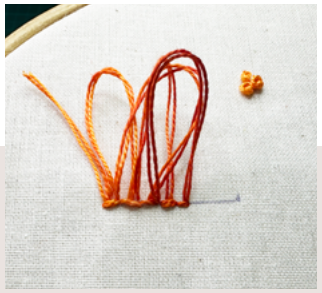


Figure 130 Turkey Stitch Making Step 9

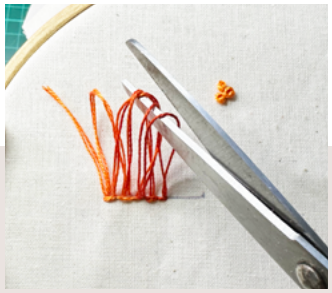


Figure 131 Turkey Stitch Making Step 10

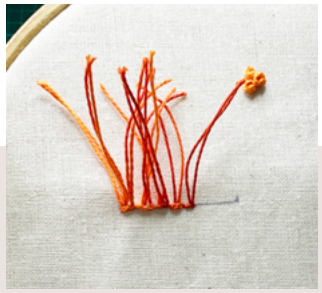


Figure 132 Turkey Stitch Making Step 11

Tips:

1. Work in Small Sections

Turkey stitch requires patience and precision. To maintain better control over the loops and ensure consistency, work on small, manageable areas of your design at a time, such as a few centimeters or one motif section before moving on. This approach makes it easier to focus on detail and correct mistakes as you go, especially when covering larger areas.

2. Keep Loop Length Consistent (When Not Cutting)

If you plan to leave the loops uncut, aim to keep them uniform in length or vary them intentionally according to your design. Consistency is key to achieving a clean, intentional look.

3. Start with Longer Loops

Begin by making your loops slightly longer than needed. This gives you room to trim and refine them later, allowing more control over the final shape and texture.

4. Cut Carefully and Gradually

When it is time to snip the loops, take your time, especially with the first cut. It is always easier to trim a bit more than to undo a cut that is too short. Go slowly to avoid removing too much at once.

5. Tail Length Shapes the Texture

The length of the trimmed loops significantly affects the final appearance. Short, densely trimmed loops create a rug-like texture, while longer loops produce a looser, grassy look. Leaving the loops uncut results in a raised, looped texture that adds volume and softness, similar to a plush pile. Try varying loop lengths and cutting styles to see what works best for your design.

6. Adjust Turkey Stitch Density for Desired Texture

Turkey stitch can be worked densely, placing loops close together for a rich, textured surface, or more loosely with spaced loops for a lighter, airier effect. Choose the density based on the texture and visual impact you want in your design.

7. Fluff for Volume

After trimming, use a brush or the blunt end of a needle to gently fluff and separate the threads. This adds volume and enhances the plush, textured feel of the work.

8. Use Tape to Tidy Up

To clean up leftover thread bits, press a piece of sticky tape over the surface and lift away the loose fibers. It is a quick, fabric safe way to keep your workspace neat and your piece looking polished.

Reflection:

Turkey stitching is not traditionally used by minority groups in China. The reasons I chose to learn and incorporate it into my work is because its unique, rich, dense, and raised texture offered an opportunity to experiment with surface design in a way that aligned with the concept of *Stitching Landscapes*. The texture created by Turkey stitching closely resembles the dense, layered forms of foliage and bushes, making it a fitting technique for conveying the natural, organic elements of a landscape. As I worked with this stitch, I discovered how its bold, voluminous texture added a sense of depth and tactility to the embroidered surface, perfectly complementing the more delicate, repetitive nature of seed stitching. Together, these two techniques began to form a dynamic interplay of contrast: Turkey stitching added volume and structure, while seed stitching provided a fine, almost intricate texture that spoke to the subtler elements of the landscape.

There are several variations in how Turkey stitching can be performed, each producing a slightly different texture and density. In this book, the version demonstrated is a denser approach, where the loops are placed closely together to create a fuller, more textured surface. However, it is worth noting that Turkey stitching can also be done in a much looser, less dense manner. In that variation, the loops are spaced further apart, resulting in a lighter, airier texture that can be useful when a softer, less prominent effect is desired. Depending on the material, scale, and desired outcome, makers may choose to adapt the stitch accordingly.

Technique: Weave Stitch (织绣)

Weave stitching is a traditional embroidery technique widely practiced by the Miao ethnic minority in China. This method is deeply rooted in their textile heritage and is known for its intricate craftsmanship and decorative versatility. The technique is inspired by the fundamental structure of weaving. It begins by laying down a series of parallel stitches that act as the warp threads. Then, using a needle as a shuttle, the artisan weaves the weft thread over and under the warp, creating a grid-like structure similar to loom weaving. By varying the order and frequency of the weft insertion, makers can generate a range of geometric or symbolic patterns.

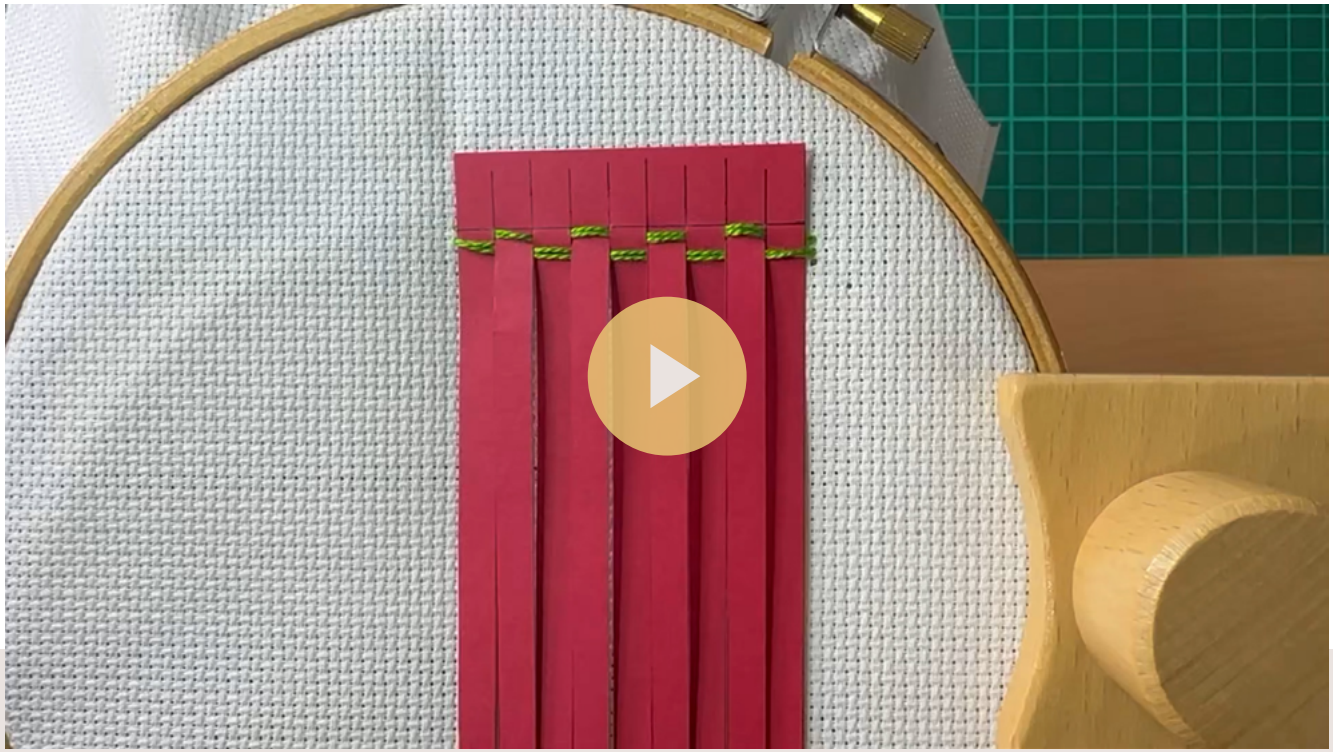
One of the distinctive characteristics of the Miao application of this technique is the use of tin strips as the warp material, rather than conventional thread. This substitution adds a reflective, metallic texture to the embroidered surface, giving it both visual brilliance and cultural significance. In Miao culture, such metallic elements often symbolise protection, prestige, or ancestral connection. Weave stitching is traditionally used to embellish the edges of garments, sashes, and other accessories, serving both ornamental and symbolic functions. For example, in Figure 133, the blue and silver weave stitch areas demonstrate this technique's intricate detail. The technique not only showcases the technical ingenuity of the Miao people but also embodies their storytelling traditions. Each stitch, pattern, and metallic accent often represents cultural narratives, myths, or ancestral histories passed down through generations in their textile art.



Figure 133 Weave Stitch

Visual Demonstration:

The following video 41 demonstrates how to practice this technique from start to finish.



Video 41 Weave Stitch Demonstration [Video]

Making Steps:

The following section provides step-by-step instructions for practicing this technique, complete with photos and written descriptions to guide you through each stage.

To demonstrate the technique of weave stitching more clearly, I created a simplified model using paper and regular thread. In this demonstration, red paper represents tin strips (the warp), and green thread stands in for the weft thread. While the materials have been adapted for clarity, the process closely mirrors the traditional method used by the Miao people.

1. Prepare the Tin Sheet (Figure 134)

Begin by selecting a piece of thin tin sheet. This will serve as your warp base.

2. Create the Warp Strips (Figures 135 & 136)

Cut the tin sheet into parallel vertical strips, stopping short of cutting all the way to the end. This way, the strips remain attached at one edge, forming a hinged warp structure. If you want the metallic element to stand out more in the final design, make the warp strips wider.

3. Mount the Tin on a Backing (Figure 137)

Place the prepared tin sheet on top of your base material. Traditionally, cardboard was used as backing. In this demonstration, I used cross-stitching fabric, which helps visually guide thread placement due to its grid structure.



Figure 134 Weave Stitch Making Step 1

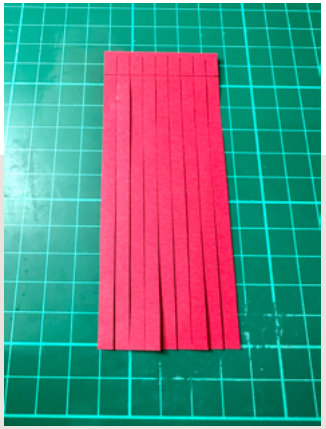


Figure 135 Weave Stitch Making Step 2A

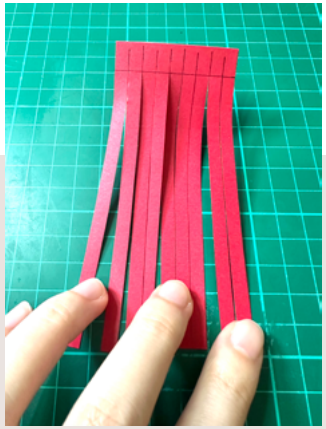


Figure 136 Weave Stitch Making Step 2B

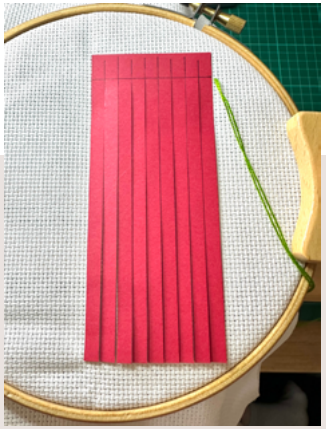


Figure 137 Weave Stitch Making Step 3

4. Begin the Weave Stitch (Figure 138)

Decide on your desired pattern. Starting from the right side, use a needle to pass the thread over and under alternating tin strips (warp), moving horizontally from right to left.

5. Continue Weaving in the Opposite Direction (Figure 139)

Pull the thread back up one row lower (or one grid down), and weave back from left to right, alternating the over-under pattern in reverse from the previous row. This creates the classic woven texture by interlacing weft and warp.

6. Repeat Until Complete

Continue alternating directions with each row, repeating the process until the full pattern is achieved.

Figures 140 and 141 show two examples I created using tin and copper sheets.

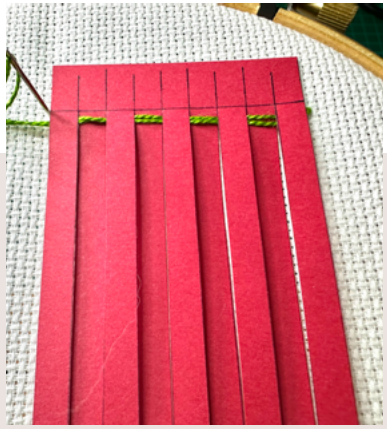


Figure 138 Weave Stitch Making Step 4

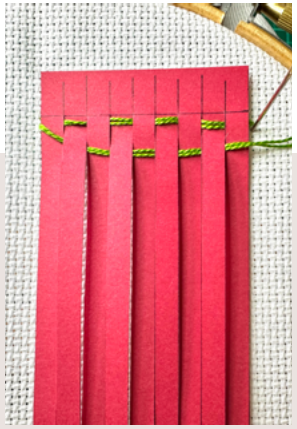


Figure 139 Weave Stitch Making Step 5

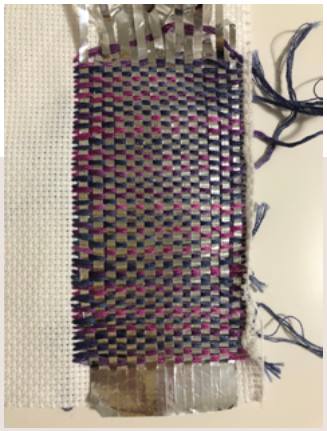


Figure 140 Weave Stitch Sample with Tin

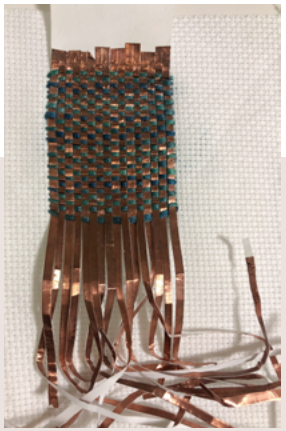


Figure 141 Weave Stitch Sample with Copper

Tips:

1. Plan Your Warp Carefully

Before you begin weaving, ensure your warp (vertical threads or strips) is evenly spaced and securely attached to the backing fabric or base. Consistent spacing helps maintain a clean and stable weave.

2. Secure the Ends of the Warp

If you are using materials like tin or paper for the warp, do not cut all the way to the end. Leave a margin intact to keep the strips connected and prevent them from shifting.

3. Use the Right Needle

A blunt or ballpoint embroidery needle is ideal for this technique, especially when working with open-weave fabrics like Aida cloth. It prevents piercing the threads and allows smoother weaving.

4. Use Your Needle as a Beater

Since there is no loom or beater tool, use the side of your needle to gently press each woven row into place. This keeps the structure neat and tight.

5. Alternate Your Rows

Like traditional weaving, alternate the path of your weft (horizontal thread) each row, go over-and-under, then under-and-over in the next row, to create a stable structure.

6. Mind the Thread Tension

Avoid pulling the weft thread too tightly; this can distort the warp and cause the fabric to pucker. Keep tension even throughout.

7. Test Different Materials

Different thread types (e.g. wool, metallic, thermochromic) behave differently in weaving. Try a few samples before committing to a full piece to see how each material interacts.

8. Maintain Contrast in Design

If you want your woven pattern to stand out, use threads of contrasting colours or textures for the warp and weft.

9. Secure Each Row

After weaving a row, secure the end of the thread with a small stitch into the backing fabric before moving up to the next line. This keeps the pattern intact and prevents unravelling.

10. Use a Backing Fabric with Grids

Cross-stitch or even-weave fabrics are especially helpful for beginners, as the grid helps keep alignment and spacing consistent.

11. Experiment with Weft Density

You can vary the density of the woven area by using thicker threads, combining multiple strands, or spacing rows more closely or widely for different visual effects.

Reflection:

This was one of the first traditional textile techniques I explored during my PhD study, and it marked a meaningful entry point into learning through cultural craft. Unlike more widely documented methods, weave stitching (织绣) is not easily accessible through conventional online resources. There are very few step-by-step instructions and no video tutorials available. As a result, I had to take a more investigative approach to learning. For example, sourcing physical samples, closely examining existing pieces, and engaging in repeated trial and error to understand the construction and flow of the stitch.

While I cannot claim that my version of the technique is an exact replica of the traditional practice, I have done my best to interpret and reconstruct it with respect to its cultural roots. My adaptation may differ in certain ways, but it reflects the closest approximation I could achieve based on the materials available and the insights gained through making. This process has been both rewarding and humbling. It highlighted the depth of knowledge embedded in traditional handwork, knowledge that is often passed down orally or through apprenticeship rather than formal instruction. By experimenting directly with materials and structure, I was able to uncover not only the technical aspects of the stitch but also gain a deeper appreciation for the patience, precision, and creativity inherent in traditional craftsmanship. This method of learning through making, reflecting, and adjusting has become a vital part of my research process.

Technique: Tin Embroidery (锡绣)

Tin embroidery is a distinctive and culturally significant embroidery technique traditionally practiced by the Miao minority groups in China, particularly in the Jianhe region. What sets this technique apart is its unique incorporation of the metal tin, which is used not merely as an embellishment but as a key structural element of the embroidery itself. The process begins with conventional embroidery threads, typically cotton, which are used to create a foundational pattern on the fabric. This base layer acts as both a visual guide and a structural anchor for the tin components. Once the base embroidery is complete, artisans carefully apply slender strips of tin, cut and shaped by hand, which are threaded through and wrapped around the underlying threadwork. Figure 142 shows a close-up view of this technique, highlighting how the hand-cut tin strips interlace with the embroidered base to create intricate, reflective patterns.

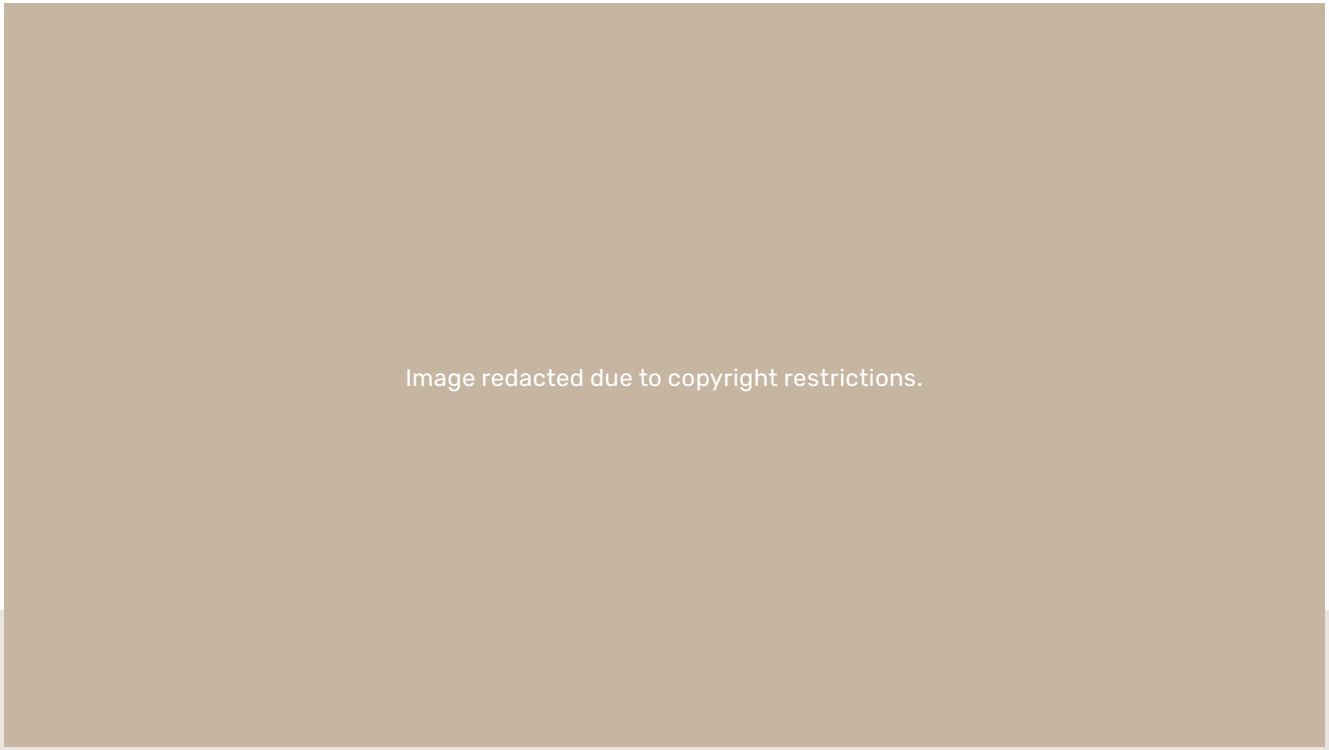
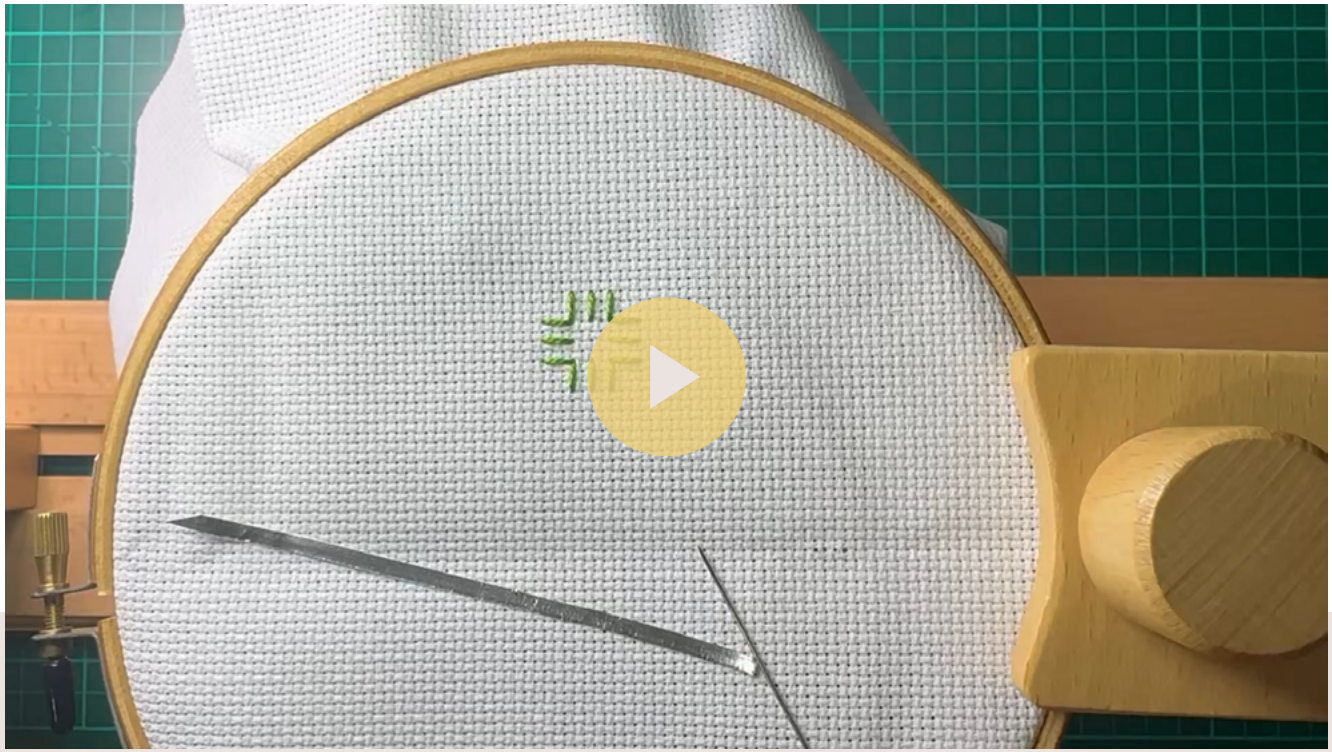


Figure 142 biftmuseum (n.d.). Seed Stitching [Image]. Retrieved from http://www.biftmuseum.com/technics/detail?sid=60&pid=

This layered approach results in a highly textured and shimmering surface that reflects light and adds dimension to the embroidered motif. The use of tin not only enhances the aesthetic appeal but also carries cultural significance, often representing protection, status, or community identity within the traditions of the people who practice and wear it. Tin embroidery is a labour-intensive and delicate art form, requiring precision, patience, and deep knowledge of both textile and metalworking techniques. It exemplifies the ingenuity of traditional craft practices, blending soft and hard materials to create designs that are both visually striking and deeply rooted in cultural heritage.

Visual Demonstration

The following video 42 demonstrates how to practice this technique from start to finish.



Video 42 Tin Embroidery Demonstration [Video]

Making Steps:

The following section provides step-by-step instructions for practicing this technique, complete with photos and written descriptions to guide you through each stage.

Historically, tin embroidery involves the use of handmade tin sheets, which are melted and crafted by artisans themselves. Each sheet, being hand-formed, carries unique natural surface patterns that add to the individuality and charm of the final embroidery. This traditional process is deeply rooted in the craftsmanship of ethnic minority communities, where both the metalwork and the stitching are done entirely by hand. In this demonstration, I used commercially available tin sheets due to the difficulty of sourcing traditional hand-crafted ones. There are no historical records specifying the exact thickness of the tin traditionally used, so I experimented with different thickness. I found that 0.1 mm and 0.2 mm sheets strike a good balance, they are thin enough to manipulate easily, yet sturdy enough to hold their shape. Thinner sheets tend to be too soft and may lose form, while thicker sheets are difficult to bend and control during stitching. Figure 143 shows a close-up of the tin strip being hand-applied to the embroidered base, illustrating how the metal is threaded and wrapped around the underpinning threadwork.

Due to the scarcity of detailed documentation, there is limited information available on the traditional practice of this technique. What I present here is a reconstructed version, pieced together through careful observation of online documentaries, articles, and visual references. While it may not capture every aspect of the original method as practiced by artisans in its cultural context, it represents the closest possible interpretation based on the fragmented records currently accessible. This version reflects my understanding of the technique, developed through trial, research, and informed speculation in the absence of comprehensive historical or instructional sources.

Image redacted due to copyright restrictions.

Figure 143 Lyster, S. T. (n.d.). Secures with shaped hook at the strip end [Image]. Retrieved from https://www.thetextileatlas.com/craft-stories/miao-tin-gimp-embroidery-in-zhanliu-china

1. Prepare the Tin Strips (Figures 144 to 146)

Determine the width of your tin strips according to the visual effect you wish to achieve. There are no strict rules, narrow strips can create fine details, while wider strips can emphasise bold, metallic accents.

Measure and mark the tin sheet accordingly and then use scissors or metal snips to cut it into strips.

2. Prepare the Base Pattern (Figures 147 & 148)

Tin embroidery designs are composed of repeating units. Figures 147 and 148 below shows a green motif that represents a single unit; several such units are pieced together to form a complete pattern.

For this demonstration, I used white cross-stitch fabric and bright green embroidery thread to make the process more visible. However, in traditional practice, cotton threads that match the base fabric colour, usually indigo, are used.

When stitching the base pattern, adjust the width of the stitches to match the thickness of your tin strips. It is important that the tin strip can pass through and be secured by the stitching.

3. Shape the Tin Strip (Figure 149)

Select a prepared tin strip and sharpen one end to create a point. This makes it easier to thread through the base embroidery.



Figure 144 Tin Embroidery Making Step 1A

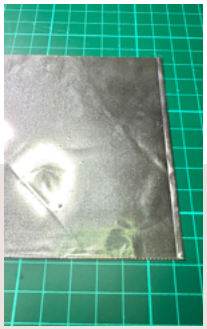


Figure 145 Tin Embroidery Making Step 1B



Figure 146 Tin Embroidery Making Step 1C



Figure 147 Tin Embroidery Making Step 2A

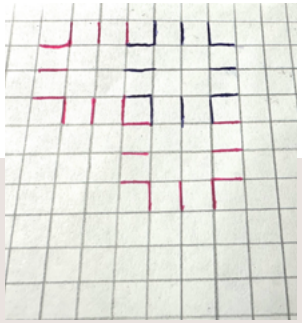


Figure 148 Tin Embroidery Making Step 2B

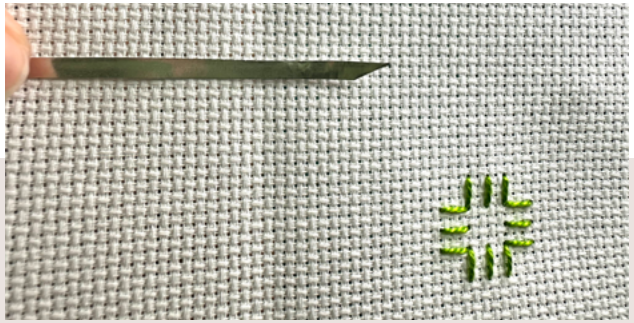


Figure 149 Tin Embroidery Making Step 3

4. Prepare the Needle (Figure 150)

Take a sturdy embroidery or upholstery needle. Wrap the opposite end of the tin strip (not the sharpened end) around the needle to create a small hook.

5. Thread the Tin Strip (Figure 151)

Carefully insert the pointed end of the tin strip through the base embroidery stitches, guiding it underneath the thread without damaging the fabric.

6. Secure the Thread with the Hook (Figure 152)

Once the strip has been threaded through to the desired position, use the hooked end, which you previously formed by wrapping the tin around a needle (see Step 4), to catch and grip the embroidery thread securely. This hook functions like a clasp, anchoring the tin to the stitched structure.

7. Secure the Tin Piece (Figure 153)

With the hook in place, take your needle and gently press the hook downward, closing the gap and locking the tin strip into position. This step is crucial, as it ensures that the tin does not shift or loosen over time. The pressure from the needle flattens and secures the hook, creating a firm bond between the tin and the base thread.

8. Form the Cover Loop (Figure 154)

While holding the needle in place, fold the tin strip over to the opposite side of the base pattern. This creates a small loop or cover section over the stitching.

9. Finish the Stitch (Figure 155)

Cut off the excess tin to complete the unit. Continue this process to complete the full pattern.

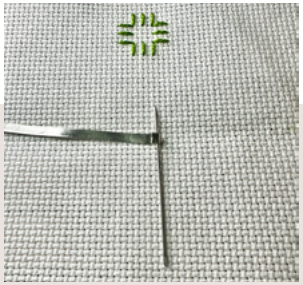


Figure 150 Tin Embroidery Making Step 4

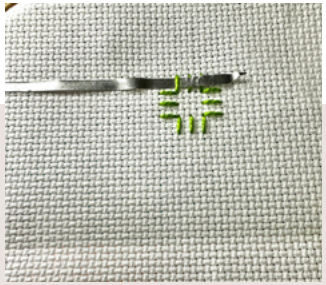


Figure 151 Tin Embroidery Making Step 5

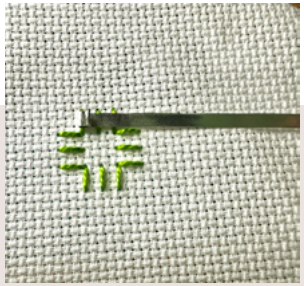


Figure 152 Tin Embroidery Making Step 6

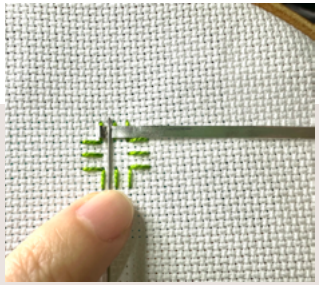


Figure 153 Tin Embroidery Making Step 7

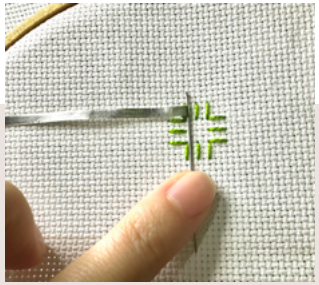


Figure 154 Tin Embroidery Making Step 8

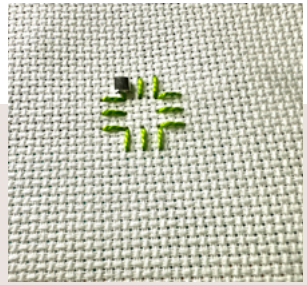


Figure 155 Tin Embroidery Making Step 9

Tips:

1. Start with a structured fabric for practice

Tin embroidery is a delicate and highly intricate technique that requires a great deal of patience, precision, and repetition. For beginners, it is advisable to begin practicing on cross-stitch fabric. The evenly spaced grid allows you to count stitches easily, helping you develop a consistent rhythm and gain better control over stitch placement and spacing.

2. Maintain consistency in tin strip width

It is essential that the tin strips are cut with precision and uniformity. If one end of a strip is wider than the other, this variation will be clearly visible in the final embroidered piece. Each segment of tin will appear uneven, disrupting the overall symmetry and visual flow of the design.

3. Use equal lengths for each stitch unit

When wrapping the tin strip over and under the embroidery stitches, be mindful to use approximately the same length of tin for each unit. This step is particularly important in creating uniform, clean-looking segments. Inconsistent use of tin will result in pieces that vary in size, which can affect the pattern's balance. Achieving this level of consistency takes time and repeated practice.

4. Control the pressure when securing the tin

When using a needle to press down and secure the hooked end of the tin strip, apply gentle but firm pressure. Pressing too hard can deform the surface of the tin, leaving dents or scratches that compromise the appearance of the finished work. For example, in the lower section of my sample piece shown in Figure 156, excessive pressure caused visible surface damage to the tin, resulting in an uneven and less refined finish.

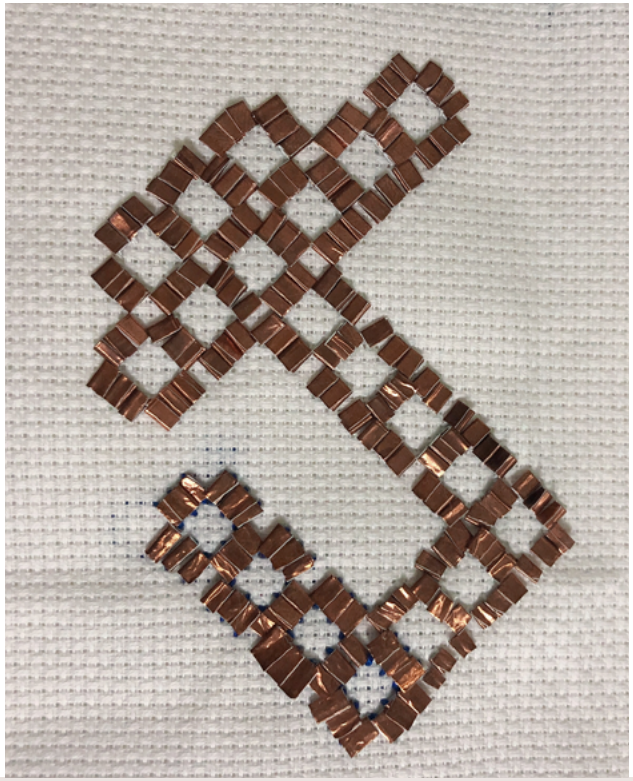


Figure 156 Tin Embroidery Tips 4

Reflection:

Tin embroidery is one of the most distinctive and visually striking traditional techniques I have encountered, which is why I was drawn to learn and explore it further. Its combination of metalwork and textile art embodies a rare blend of materiality and cultural significance, making it stand out among other forms of embroidery. In the early stages of my learning journey, I relied heavily on online documentaries, photographs, and written accounts to piece together an understanding of the process. With limited access to in-depth documentation or formal tutorials, the only way for me to learn the skill was through examining samples and trial-and-error experimentation.

Initially, I had planned a research trip to China, with the goal of visiting Miao villages where tin embroidery is traditionally practiced. Unfortunately, due to the COVID-19 pandemic, those plans were disrupted. As an alternative, I traveled to Vietnam and visited several rural villages in hopes of encountering artisans who might still practice similar techniques. However, despite my efforts, I was unable to locate anyone actively working in this method. This experience highlighted for me the urgency of documentation. I realised how easily traditional knowledge can become inaccessible or even lost over time, especially in the face of globalisation and generational shifts. It also underscored the need for clear, step-by-step guides and video resources that can preserve and share these techniques in an accessible, practical way. That realisation became a driving force behind this book. My aim is not only to record the process as I have learned and reconstructed it, but also to contribute to the preservation and broader appreciation of this endangered craft. Through this work, I hope to support others, artists, researchers, and makers who are interested in reviving, adapting, or simply understanding the beauty and complexity of tin embroidery.

