FABRICADEMY
textile and technology academy

Booklet
ElectricThreads

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Fabricademy 2024 -2025

Introduction

Since my sister was born, every piece of clothing has needed some kind of alteration. Some adjustments are made to accommodate medical devices or tubing. Others involve modifying sewing lines and elastic bands to ensure they don't press on sensitive areas. Without these changes, the wrong fit could cause discomfort or even sores. Each piece of clothing requires careful attention to make sure it works for her needs.

Having medical needs makes it difficult to wear clothing straight off the rack. When we were younger and went to Comicon with our mom, my sister's costumes had to be significantly altered so she could wear them comfortably for hours. Over time, I started helping with sewing and alterations. Now, she participates in Cosplay competitions, and it's easier to design costumes around her needs rather than altering existing ones. Some characters she wants to cosplay have outfits too complex to modify, and now we have to plan around her wheelchair. Her latest costumes have included wings and lights, requiring multiple carefully crafted layers.

Then I came up with the idea to minimize the layers by creating a specialized bodysuit. This bodysuit would contain all the electronics, carefully integrated to ensure they wouldn't cause sores or discomfort. By incorporating shapewear and compression wear into the design, we could provide support while reducing the risk of rubbing or fabric folds that could lead to pressure sores. This approach would make the overall costume much more wearable for long periods.

With the bodysuit handling all the sensitive components, the actual costume could be a single layer worn on top. This separation allows the bodysuit to hold the electronics and other essential elements securely, preventing them from shifting and causing irritation. It also means the costume itself can have more depth and complexity, without worrying about it interfering with medical needs.

By designing costumes this way, we can create intricate outfits that are both visually stunning and practical. My sister can now participate in cosplay competitions with confidence, knowing her costumes won't cause unnecessary discomfort. As we continue refining this method, it opens up even more possibilities for elaborate designs, including wings, lights, and other detailed features that were once difficult to incorporate while keeping her comfortable.

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1 Abstract

Creating comfortable and accessible clothing for individuals with medical needs requires thoughtful modifications, especially when accommodating medical devices, tubing, and pressure-sensitive areas. These challenges extend to cosplay, where complex costumes must be adjusted for long-term wear. Initially, my sister's costumes had to be significantly altered, but as she progressed into cosplay competitions, we developed a specialized bodysuit integrating electronics, shapewear, and compression wear. This design minimizes friction and pressure while allowing greater costume creativity. By separating functional and decorative layers, we enhance both comfort and complexity. This approach enables full participation in cosplay while maintaining practicality and medical safety.

2 Existing projects research

Traditionally, cosplay costumes are worn over shapewear, with elements attached directly to the costume. This can create discomfort and limit movement, especially with heavier components. Many cosplayers use belts or straps to secure items, but this often results in bulky, restrictive designs.

A better approach is integrating shapewear with electronics and structural components into a single suit. This eliminates the need for external straps, improving comfort, mobility, and practicality.

Cosplayer Svetlana Quindt, for example, integrates shapewear into her costumes, but like most designs, they are primarily suited for standing poses, making sitting and movement challenging.

- Traditional cosplay costumes attach elements directly, causing weight and mobility issues.
- Belts and straps over shapewear often make costumes restrictive and bulky.
- Integrating shapewear with electronics creates a lighter, more comfortable design.
- Attaching items directly to a bodysuit improves mobility and simplifies construction.
- Cosplayer Svetlana Quindt integrates shapewear into her costumes, but her designs, like most, are meant for standing poses, making sitting and movement difficult.

3 Process

Creative process / Sketches & Ideation

The foundation of this project began with a deep dive into the current landscape of cosplay design—its strengths, limitations, and unexplored opportunities. Traditional cosplay costumes are often constructed in layered formats: shapewear is worn underneath, while costume elements—armor, props, electronics, and accessories—are typically attached directly to the outer layer. While this allows for impressive visual detail and customization, it introduces several functional drawbacks, particularly for those with limited mobility or who spend extended periods in costume.

As costumes become more elaborate, the weight and distribution of external components can become problematic. Many cosplayers resort to using belts, harnesses, or adjustable straps to support heavier items such as power banks, wings, or rigid props. Though effective, these solutions often result in cumbersome, restrictive designs that limit fluid movement and can cause discomfort over time. Sitting, bending, or even walking naturally becomes difficult, which greatly reduces the costume's usability—especially for wheelchair users or performers in seated roles.

This sparked the central idea behind my project: What if the costume itself became part of the infrastructure? Instead of layering shapewear, electronics, and structure separately, what if they could be seamlessly integrated into a single, functional base suit? This would not only reduce external bulk but also enhance mobility, comfort, and ease of assembly—an especially crucial consideration for adaptive cosplay.

One prominent reference in this space is Svetlana Quindt (Kamui Cosplay), a renowned figure in the cosplay community known for her expertise in armor builds, LED integration, and wearable props. Her designs often incorporate shapewear-style underlayers to help support weight and improve fit. However, like many industry-standard approaches, her costumes are primarily built for upright performance and static poses. As a result, they tend to become less functional when seated, limiting flexibility and accessibility for diverse body types or mobility needs.

This realization became the catalyst for a new design direction:

- A bodysuit that not only smooths the silhouette but also serves as a platform for mounting electronics, structural elements, and decorative components.
- A modular costume system where bulkier or heavier items are attached to the body, not the costume exterior, streamlining the visual and mechanical integration.
- A reimagined cosplay workflow where accessibility and adaptability are considered from the outset—not as retrofits, but as integral design features.

Key Insights and Inspirations:

- Traditional cosplay costumes often attach key elements externally, leading to mobility and comfort challenges.
- The use of belts and external rigging is widespread, but introduces bulk and limits natural movement.
- Integrating electronics and structure directly into shapewear can create lighter, more streamlined, and more wearable costumes.
- Bodysuit-based designs allow for modularity, easier assembly, and greater accessibility.

- Influences like Kamui Cosplay showcase the effectiveness of shapewear integration, but reveal the limitations of standing-only designs—highlighting the need for seated and adaptable costume solutions.

These insights guided the early stages of my creative process, leading to initial concept sketches, technical diagrams, and experiments with materials and placement strategies. From the outset, my approach has prioritized not just the visual impact of the costume, but the embodied experience of the wearer—one that supports full expression whether standing, seated, or in motion.

Experimentation process

This project began with a simple but bold idea: to create a bodysuit embedded with interactive lighting. Inspired by wearable tech, stage costumes, and futuristic fashion, I envisioned two primary design variations:

- Version 1: Lighting integrated into the sleeves, creating an expressive visual element for the upper body
- Version 2: Lighting embedded into the legs, offering an unexpected and dramatic illumination from below

The concept is rooted in the fusion of fashion and technology, combining aesthetics with interactivity. These wearable pieces aim not only to capture attention visually but also to explore the potential of smart, responsive clothing for performance, cosplay, or artistic installation.

To bring this idea to life, I revisited an older codebase I had developed for my Fab Academy final project. My goal was to expand and refine this code, making it more modular and adaptable for a wider range of use cases.

This meant enhancing functionality, improving the clarity of logic, and incorporating new components such as touch sensors and LED arrays. This also gave me the chance to deepen my understanding of the code and push my development skills further.

Development process

Cut and Prepare Fabric

Cut all fabric pieces according to the pattern. Double-check and label them for organization.

Sew Individual Sections

Sew smaller sections first to prepare major components.

Assemble Front and Back

- Sew front side panels to front medial.
- Assemble the lower back.
- Attach upper medial back to pocket back, then join to lower back.
- Connect front side panels to upper medial back.
- Sew lower front to front medial.

Fit and Adjust

Fit assembled pieces, pin or trim as needed, then secure adjustments with final stitching.

Reinforce Seams

Zigzag stitch seam allowances to prevent fraying and add flexibility.

Add Elastic Bands

- Attach elastic to pocket back, upper medial back, and mid-lower back.
- Stretch elastic from lower front sides to lower back.

Insert Structure

Insert boning into channels to maintain garment shape.

Assemble Sleeves

- Sew sleeve sections together.
- Attach an elastic band to the sleeve end for a snug fit.

Finish Upper Body

Attach elastic around the upper body or neckline.

Dye and Print

Dye fabric and print any logos or designs.

Prepare and Install Electronics

- Plan and test LED setup.
- Sew conductive thread into sleeves and attach LEDs.

Final Fastenings

Attach stud snaps for closures.

4 Pattern

Body Measurements	Measurements	Conversions
1. Bust *Round*		
2. Waist *Round*		
3. Stomach *Round*		
4. Hip *Round*		
5. Back Length *Neck to Waist*		
6. Width of Back		
7. Neck *Round*		
8. Shoulder Length *Neck to Shoulder*		
9. Sleeve Length		
10. Upper Arm *Round*		
11. Wrist *Round*		
12. Neck to Bust		
13. Bust to Waist		
14. Waist to Surface		
Extra Body Measurements	**Measurements**	**Conversions**
Upper Thigh *Round*		
Crotch Length		
Front Panties		
Back Panties		
Armhole		

Body Measurements (1)

1. Bust *Round*

   The person is measured while standing, with measurements taken over the chest, under the arms, and horizontally across the back.

2. Waist *Round*

   Around the waist. The measurement should correspond to the measurement of the skirt or trouser waistband.

3. Stomach *Round*

   Approximately 10 cm below the waist, a horizontal measurement taken between the waist and the hips.

4. Hip *Round*

   Approximately 20 cm below the waist, measured horizontally around the widest part. Make sure the measuring tape is below any protruding stomach.

5. Back Length *Neck to Waist*

   From the base of the neck to the waist; protruding shoulder blades increase the length.

6. Width of Back

   Horizontally across the shoulder blades, between the indentations that form when the upper arms rest against the body.

7. Neck *Round*

   Align the measuring tape around the neck. The measurement should be as low and even as the neckline.

8. Shoulder Length *Neck to Shoulder*

   From the neckline to the outer shoulder joint.

9. Sleeve Length

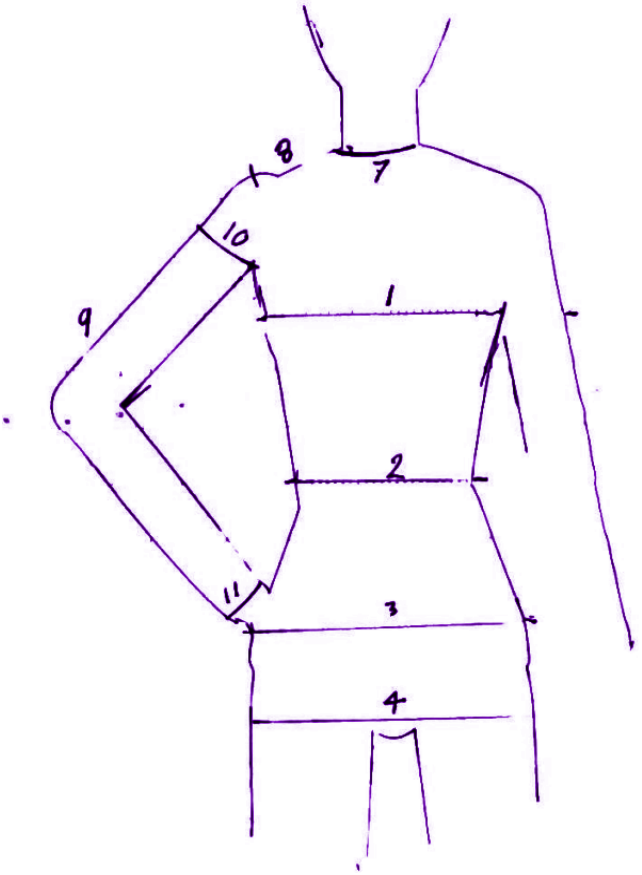
   From the outer shoulder joint, over a slightly bent elbow, to the wrist. Note the measurement at the elbow for the placement of the elbow seam.

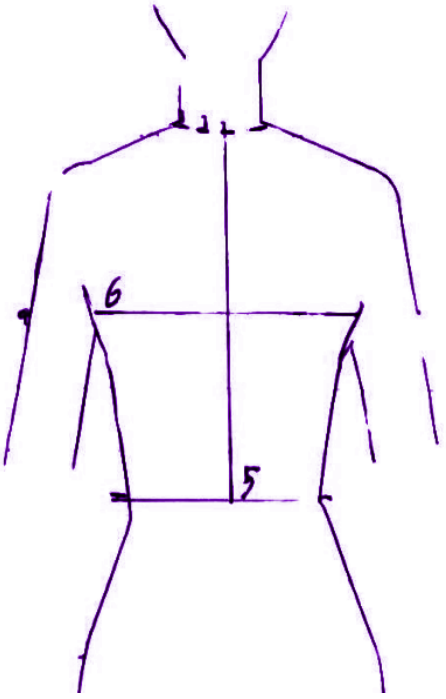
10. Upper Arm *Round*

    Around the widest part of the upper arm.

11. Wrist *Round*

    Around the wrist.





12. Neck to Bust

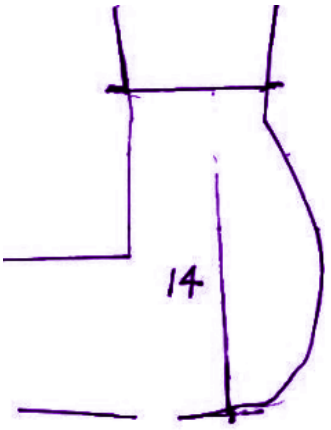
From the base of the neck, along the neck, to the bust point.

13. Bust to Waist

Like the bust height, but continue down to the waist.

14. Waist to Surface

The person being measured is sitting, with the measurement taken from the waist to the lower edge at the side, straight down to the surface.



Extra Body Measurements (1)

Upper Thigh *Round*

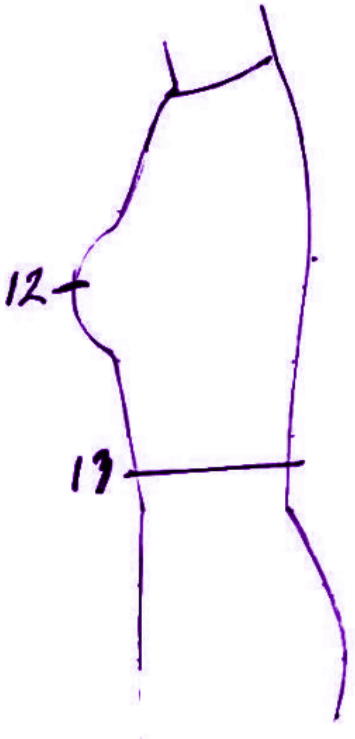
Around the thigh, approximately 5 cm below the crotch.

Crotch Length

Tie a string around the waist and measure from front waist through crotch to back waist. Compare your measurement to measurement below for your size. if length needs adjusting, add or deduct

Front and Back Panties

Half the amount on front panty and back panty pattern pieces



Assemble the pattern T-shirt

This basic pattern is made for jersey fabric with a lot of stretch or Lycra material. If the fabric has little stretch, additional ease must be added for movement.

Body Measurements	Measurements	Conversions
1. Bust *Round*		
5. Back Length *Neck to Waist*		
Armhole		
6. Width of Back		
7. Neck *Round*		
9. Sleeve Length		
11. Wrist *Round*		

Top

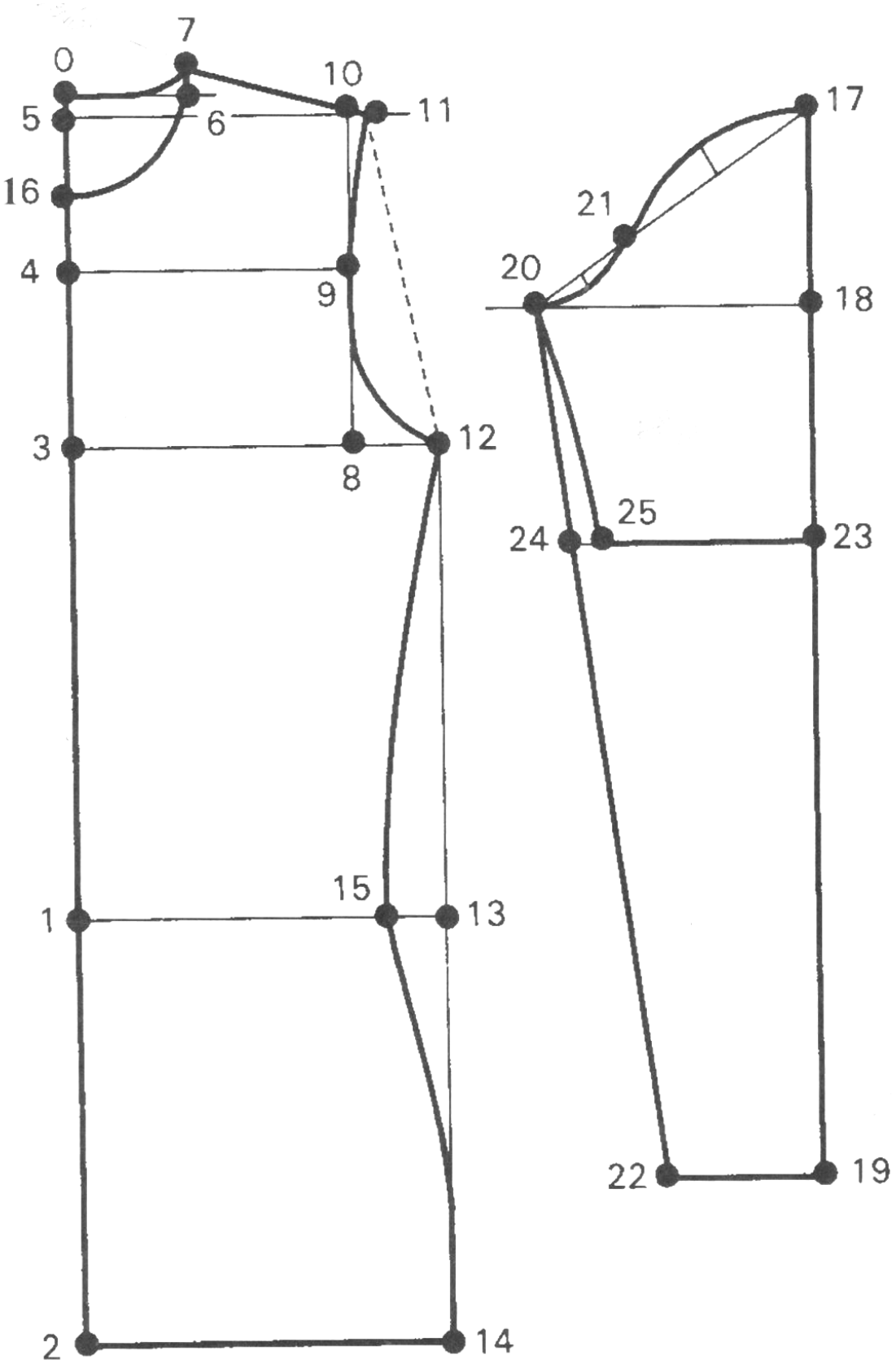
0-1. Draw a line perpendicular from point 0, back length plus 1 cm; draw a perpendicular line across.
0-2. Body length; draw a perpendicular line across.
0-3. Armhole depth minus 3 cm; draw a perpendicular line across.
0-4. 1/2 the length from 0 to 3; draw a perpendicular line across.
0-5. 1/8 of the length from 0 to 4; draw a perpendicular line across.
0-6. 1/6 of the neck width; draw a perpendicular line upward.
6-7. 1.3 cm; draw a curved neckline.
3-8. 1/2 back width minus 2.5 cm; draw a perpendicular line up to points 9 and 10.
10-11. 1 cm; connect points 7 to 11.
3-12. 1/4 chest circumference minus 3 cm; draw a perpendicular line down to point 13 on the waistline and point 14 on the hemline.
Draw the armhole curve from point 11 through point 9 to point 12.
13-15. 3 cm; draw the side seam from point 12 to 15 to 14.
0-16. 1/6 of the neck width minus 1 cm; draw a curved front neckline.

Back and front pieces are the same, except the front neckline is curved and extends lower.

Sleeves

Draw a perpendicular line from point 17.
17-18. 1/2 the length from point 0 to 3 plus 1 cm.
17-19. Sleeve length for jersey plus 3 cm; draw a perpendicular line across.
17-20. Measure the armhole according to the guideline between points 11–12 on the bodice, plus 0.5 cm.Draw the sleeve cap. Divide the line from point 20 to 17 in half.Mark point 21, which is 1/3 from point 20.

20-21. Curve the line inward by 0.6 cm.
21-17. Raise the line by 2 cm.
19-22. 1/2 wrist width plus 0.5 cm; connect points 20 to 22.



Assemble the pattern with a raglan sleeve

Trace the basic pattern for jersey T-shirt.

Body Measurements	Measurements	Conversions
1. Bust *Round*		
8. Shoulder Length *Neck to Shoulder*		
9. Sleeve Length		
11. Wrist *Round*		

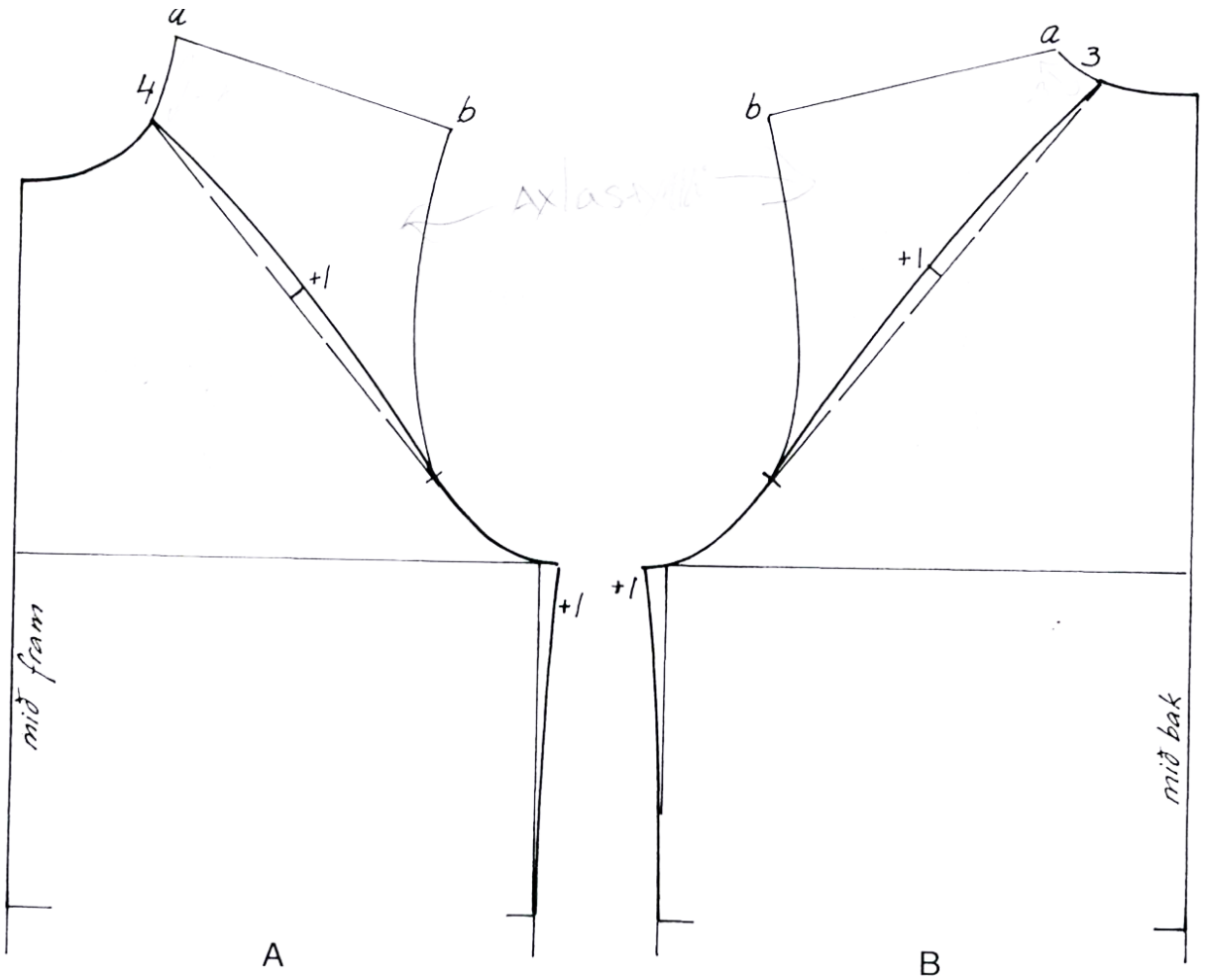
The sleeve cap is approximately 6 cm, which corresponds to half of the original height

Front and Back Pieces

1. **Mark raglan cutting lines** at the neckline (here: 4 cm on the front, 3 cm on the back).
2. **Draw guide lines** to the armhole and decide on reference points. Divide the lines in half. Shape the raglan lines according to the illustration.
3. **Add 1 cm to the side seams** and shape the side seams smoothly.
4. **Trace the shoulder pieces.**

Sleeve

5. **Draw a straight line from point a to b** and determine the shoulder width (here: 14.5 cm). Measure approximately 6 cm further (corresponding to ½ the sleeve cap height) and draw a perpendicular line = upper arm line. Decide the **sleeve length from point b** (the shoulder point). Draw a right angle at the bottom and **mark ½ wrist width** on both sides.
6. **Take the front shoulder piece** and align it with line a–b up to the shoulder width line. Repeat the same process with the **back shoulder piece**.
7. **Shape the raglan seams**, making sure they are the same length as the seams on the garment.
8. **Shape the sides of the sleeve.**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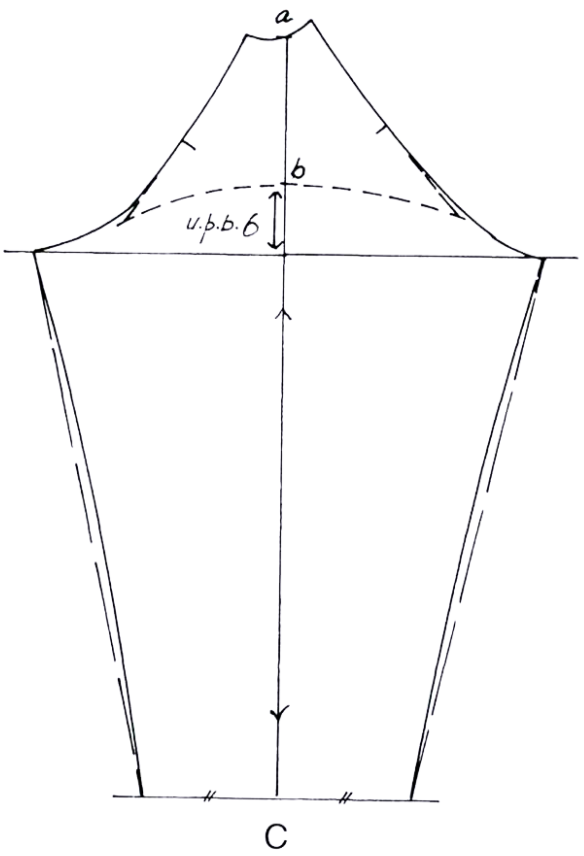
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5 Conclusion

Hi everyone, I want to talk about something that's been a big part of my life—cosplay. If you've ever worn a cosplay costume, or even just watched someone take theirs off after a long convention day, you probably know one thing: cosplay is uncomfortable.
The more complicated a costume is, the more layers it requires. You've got shapewear, harnesses, buckles, straps—layers on top of layers just to make everything stay in place. And while it might look amazing, it's often a nightmare to wear.

I wanted to fix that. Instead of piling on multiple layers, why not design one base layer that holds everything in place? A single bodysuit that combines shapewear, attachment points for costume pieces, and even built-in electronics. That way, the actual costume sits on top, and you don't have to deal with all the extra bulk and discomfort underneath.
Now, you might be thinking, "Okay, but is it really that bad?" Well, imagine wearing something so tight, with so many folds and seams, that it causes bruises or even sores after wearing it for a few hours. For most cosplayers, that's just part of the experience. They power through it. But for some people, it's more than just uncomfortable—it's dangerous. My sister is a cosplayer, and she's also handicapped. Ever since she was little, we've had to adjust all her clothes—including her Halloween costumes—to make sure they don't cause sores, hide seams, and allow for easy access to her medical devices, like her G-tube and oximeter.

When she started competing in cosplay competitions, we noticed a major problem. The things that make regular cosplayers a little sore? For her, they could take weeks to recover from. And that's when I started thinking—there has to be a better way.
That's how I came up with this bodysuit. It's designed to hold everything—wings, armor, halos, lights, even sound systems—all in one piece. No more awkward straps or electronics sewn into random places.
And because it's custom-fitted, there's less friction, less restriction, and most importantly, less pain.

We've all seen those videos of cosplayers struggling to take off their costumes, wincing in pain as they reveal the bruises and marks left behind. Think about Kim Kardashian at the Met Gala in 2024—she wore three corsets for a few hours, and when she took them off, her body was bruised. Now imagine being a cosplayer and having to put that same setup back on less than 12 hours later—and wear it for up to 12 hours at a time.
It doesn't have to be that way. Cosplay is about passion, creativity, and self-expression—not suffering.

This bodysuit isn't just for cosplayers. It could be a game-changer for stage performers, movie costumes, and even other performance artists. It's custom-made to fit each person's needs while giving them freedom of movement and comfort.
At the end of the day, my goal is simple: to make cosplay more accessible, more comfortable, and just as stunning as ever. Because if we're going to put our hearts into these costumes, we shouldn't have to put our bodies through pain to do it.

20.4.2025

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