



An-Najah National University

Faculty of Engineering & Information Technology

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Graduation Project I

Sewing Scope



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Abstract

The fast-paced fashion industry demands efficiency in managing client interactions, measurements, orders, and designer collaboration. To address these challenges, we present an integrated application tailored for fashion designers to streamline their workflow.

This application facilitates communication with clients and other designers, enables the posting of designs and sharing of fashion tips, supports client chats and order management, records body measurements and design-related data, and schedules virtual meetings. Additionally, it allows for quick sketching of client orders, order planning with reminder notifications, and effective material resource management through a fabric inventory tracker. By implementing these features across both mobile and web platforms, we aim to enhance the productivity and organization of fashion designers, fostering a more efficient and collaborative design process.

Furthermore, a complementary desktop application will provide tools for dynamic design visualization and pattern creation, allowing users to upload or create new patterns with precise adjustments, ensuring alignment with the designer's vision. The output can be saved for future use or converted into a 3D version, offering a comprehensive solution for modern fashion design needs.

Chapter 1: Introduction

Recently, there is a big integration of technology into various fields of business, including fashion. However, there still lack of availability of helping tools for designers, many designers still face challenges in managing their processes due to the fragmented nature of existing solutions.

Sewing Scope is an integrated solution, done by combining important functions for designers into a single platform, providing user-friendly experience. This project is expected to enhance productivity, helps to have better communication, and leads to more better fashion designs.

Sewing Scope offers many features accessible after a registration process. This process ensures user validity through several steps: a unique username to prevent duplication, a correct email address for communication and verification, a phone number starting with specific digits to ensure proper format, and a strong password to meet security standards. In the final step, an OTP code is sent to the user's email, which must be entered on the registration page to verify the email address and complete the registration process. This verification enhances security and ensures that the provided email address is valid and accessible. To ensure that the app have real designers the designer can't enter the system without admin's approval admin can contact designer via phone number or email.

Sewing Scope provides a user-friendly social media app for designers and customers, allowing users to add posts and chat with various useful functions. Users can edit or delete sent messages, send photos, and see if their messages have been read by the other side. The app also provides notifications for new messages, to enhance communication and interaction within the fashion community.

To simplify the design ordering process, Sewing Scope offers a straightforward sequence of steps to capture all necessary details for an order. Users start by selecting the type of design they want, going through few steps, the most important step being the entry of user body measurements. Finally, users set a completion date for when they need the design to be finished, to ensure efficient project management.

Designers within Sewing Scope have the capability to manage orders, either by accepting or rejecting them and other features, designers can view and edit submission dates to better align with their availability, with these updates is notified to the order owner by notifications. In addition, designers have the option to arrange virtual meetings with customers.

Designers can have a drawing canvas to create simple sketches, which can be saved on a sketches page for reference., the application provides an inventory tracker for fabrics, to maintain a clear overview of their stock.

To enhance the customer's visualization of designs, the desktop application for designers offers the ability to create design patterns, which is the first step in fashion design. Designers can add all necessary details to the design. Then, these design patterns can be converted into 3D object.

In the next chapters, we will go through the constraints encountered during the development of Sewing Scope, the courses that we learnt to create this project. We will detail the methodology, technologies, and procedures employed in completing this project, Finally, we will present the conclusions, discuss any limitations, and potential future development within the Sewing Scope framework.

Chapter 2: Constraints, Standards and Earlier Work

2.1 Constraints

- **Computational Power:** Real-time dynamics and visualization of detailed garments necessitate a formidable amount of computational power. Ensuring that the application runs smoothly on average desktop computers without excessive lag was a primary concern.
- **Software Compatibility:**
Compatibility and inter-operability limitations formed some challenges due to the necessity of this solution to complement some of the dominant Maya and other standard packages.
- **User Constraints: Learning Curve:** We tried to make it user friendly but had to balance that with the number of features. Making it accessible to both new and experienced designers was tough.
- **Customization Limits:** Giving users too many options would be overwhelming. We had to design and test iteratively.
- **Financial Constraints: Budget:** We were limited by budget so the scope of features and amount of user testing we could do.
- **incompatibility between various libraries and versions in Flutter.** For example, the 'just_meet' library, which we used for virtual meetings, had compatibility issues with other dependencies in our project. This necessitated extensive troubleshooting and adjustments to ensure that all components worked seamlessly together.

2.2 Standards

Industry Standards:

- **File Formats:** Considering that working on 3D models requires utilizing different designing tools and manufacturing systems, it was crucial to stick to standard file formats such as . obj or . fbx.
- **Design Protocols:** The fan base maintained integrity and adhered to different design protocols and guidelines in fashion design so as to achieve the goal of creating a tool that will suit the needs of professional designers.

2.2 Earlier Work

Existing Design Tools:

CAD Software: As for the tools that are more traditional for sketching, like AutoCAD and Adobe Illustrator, they have been implemented in pattern design before, however, they do not offer the option to simultaneously see the model wearing the garment like our tool does.

3D Fashion Design Software: Software such as CLO 3D and Marvelous Designer are available have features that enable simulating of garments. Nevertheless, our application has a focus on what seems to be the least explored field of using Quoth for pattern design and real-time garment visualization

Chapter 3: Methodology

In this chapter we will talk about the tools, technologies, programming languages that were used in this project, we will give sufficient detail about our materials and methods, and explain the implementation and development process.

3.1 Tools, Programming Languages, and Technologies

3.1.1 Mobile application and Website

For mobile application development there are many frameworks and languages that are used to build the platform of the mobile application.

3.1.1.1 Client Side

- Framework

Flutter is an open-source UI software development toolkit created by Google. It is used for building applications for mobile and web from a single codebase. Flutter provides rich set of pre-designed widgets and tools, enables developers to create highly responsive user interfaces, it has hot reload feature allows for real-time updates without restarting the application.

- Language

Flutter's use of the Dart programming language ensures smooth performance across different platforms.

3.1.1.2 Server Side

- Runtime environment, Framework.

We used Node.js Express which is an open-source server-side framework for Node.js, we used Express.js framework because of its flexibility, performance and easy to connect with database.

- Language

We used JavaScript as Node.js language and easy to connect with Flutter client side.

3.1.2 Desktop App

- Language
python
- Tools
Maya and mayapy exe with Qualoth Plugin
A stitching trained model that we retrained using
dataset of 3D garments with sewing patterns.

3.1.3 Database

- MongoDB
- Most of the data stored in MongoDB which is a widely used, NoSQL database that belongs to the family of document-oriented databases, storing data in flexible, JSON documents, making it easy to work with.
- Firebase

For chatting and notifications Firebase is used which is a platform from Google that simplifies app development with features like real-time database, authentication, hosting, and analytics. It's popular for its ease of integration and scalability, making it ideal for developers aiming to build modern mobile and web applications quickly and efficiently.

3.1.4 IDE's and Code Editors

- We used Visual Studio Code as code editor, it supports JavaScript language, has Flutter tools and inline terminal to start the project, and the server.
- We used Android studio to use the emulator of Android platform.
- We used MongoDB Compass which is a powerful graphical user interface designed to interact with MongoDB databases. It provides a user-friendly to visualize and manipulate data.
- We used Firebase online to build and run database for chatting and notifications.
- We used PyCharm which is a robust integrated development environment (IDE) designed specifically for Python development. Developed by JetBrains.

- We used Maya that is a powerful 3D computer graphics software developed by Autodesk.
- We used Postman for API development. It simplifies the process of designing, testing APIs.

3.2 Architecture

3.2.1 Mobile application and Website

User make different request when using the mobile application or website, these requests vary according to the complexity and desired goal.

3.2.1.1 Server-side Processing

Requests that involve more complex operations or require access to sensitive data typically go under server-side processing. This includes handling POST requests for submitting data, DELETE requests for removing data from the database. Server-side processing ensures data integrity.

For example, getting fabric items for designer, edit and delete them.

3.2.1.2 Client-side Processing

In contrast, certain requests can be processed on the client-side to enhance user experience and reduce server load. This includes operations such as form validation before data submission, client-side sorting of fetched data, and implementing dynamic UI updates without reloading the entire page.

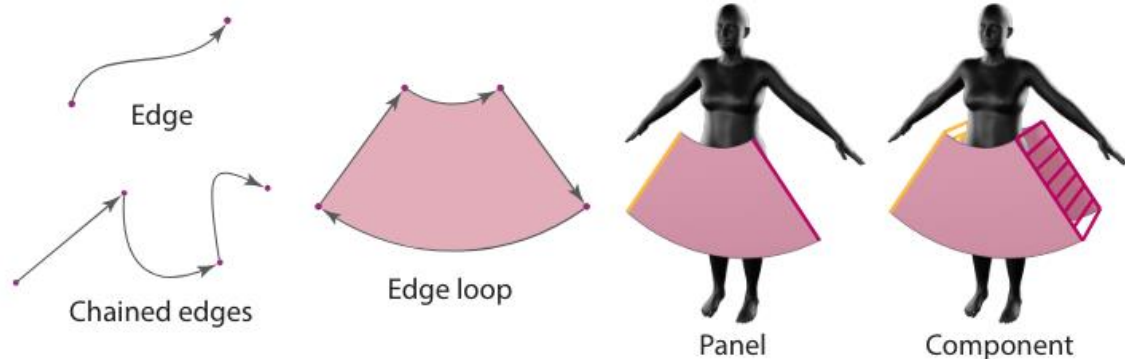
For example, we sort orders according to date.

3.2.1.3 Architecture Integration

Both mobile applications and websites interact with a common backend infrastructure, typically through APIs. The backend serves as a bridge between the frontend (mobile app or website) and the database, ensuring smooth communication and data synchronization.

3.2.2 Desktop (pattern configurator)

3.2.2.1 Constructing the patterns



3.2.2.1.1 Component

A component is an abstract class providing a framework to describe a compound garment or a garment element and holds some component processing methods (serialization, rotation, translation, mirroring, etc.).

Any component should contain the following attributes:

- set of subcomponents:
- Stitches – a list of stitching rules describing how the subcomponents should be connected
- set of interface objects that describe how other components can connect to this one

3.2.2.1.2 Panel

A panel is a “leaf” component with special structure, so that it can act as a subcomponent, but also specify the panel geometry a panel is a closed piecewise smooth curve represented as a sequence of directed edges organized in a loop, as well

3.2.2.1.3 Edge

An edge is an elementary building block of panels in a sewing pattern

3.2.2.2 Stitching rule

In our implementation, an abstract stitch is specified simply as a pair of interfaces, wrapped in a stitching rule object. The wrapper encapsulates the processing of the stitch performed at stitch declaration time. Stitching details are added from the stitch model that we imported

3.2.2.3 Flattening stitch representation

While abstract stitches are convenient for modelling, downstream processing tasks like simulation usually require a flat representation of stitches as edge-to-edge connection instructions. Unpacking the hierarchy of interfaces is straightforward, however, oftentimes one or both interfaces participating in a stitch contains multiple edges. Breaking such a stitch down to edge-to-edge instructions requires additional processing. To perform this conversion, our app automatically generates additional vertices on the underlying panels to match the number of edges in the two connecting interfaces. Once the subdivision is completed, the set of resulting one-to-one stitches can then be used as a flattened representation. At the current stage of development, we use a simplifying assumption that each edge participates in no more than one stitch.

3.2.2.4 Serialization

Serialization denotes a conversion of our hierarchical component into a flat sewing pattern representation that can then be passed on to downstream tasks such as cloth simulation. The process is fairly straightforward: the app recursively converts all panels involved in component construction into a text representation and then gathers them into one file, together with flattened stitching instructions. In this work, we serialize component instances into the open-source JSON file format introduced in Korosteleva, and Lee (2021), compatible with their draping pipeline.

Plus, we used computational pattern making from 3D garment models. This is described by Pietroni et al. (2022) and allows us to make patterns more accurately and faster with algorithms.

3.3 Implementation

3.3.1 Mobile App

- Splash Screen

This screen has an animation as the logo of sewing scope goes from the center to the top of the screen and then fades.

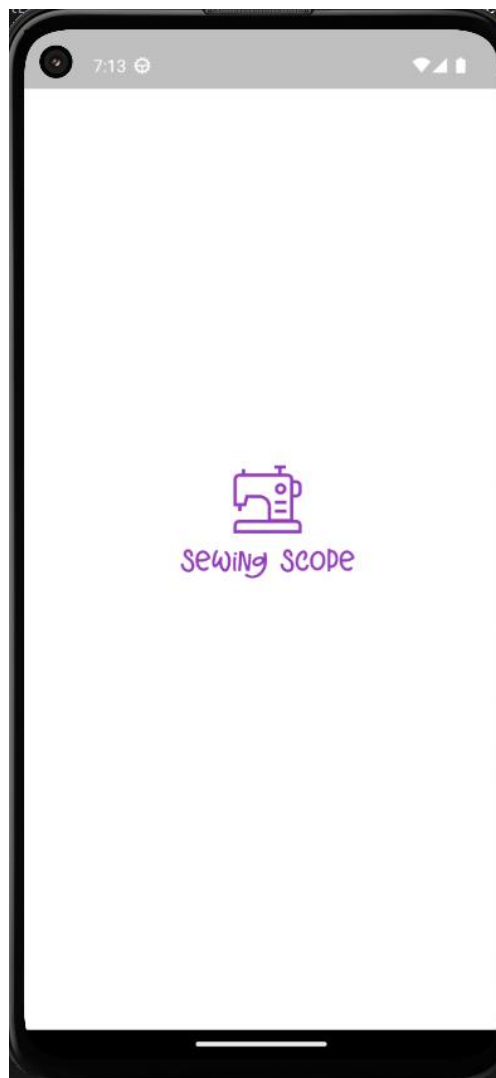


Figure 1: Splash Screen

- Login Screen

This screen has video background from sewing a fabric, at this screen user enters his/her username and password, there is many cases to handle login button.

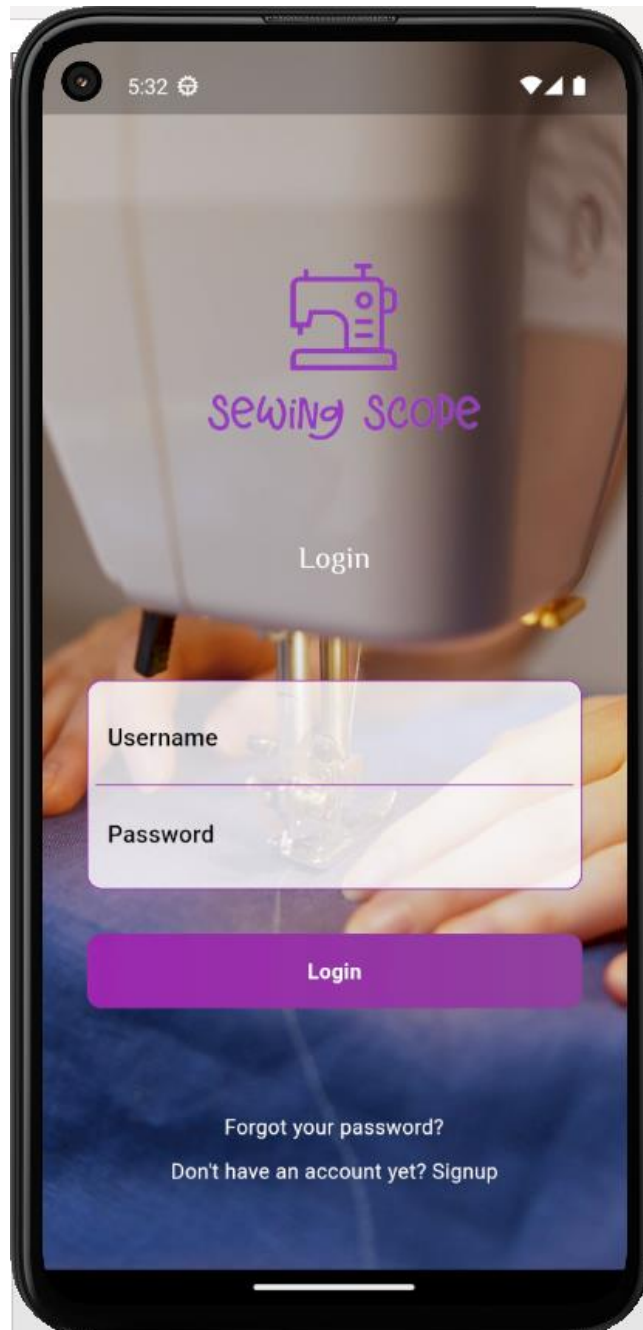


Figure 2: Login Screen

Case one: If user doesn't have an account:

This popup message shown:

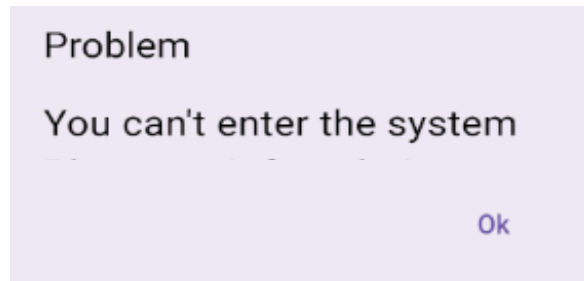


Figure 3: Case One of Login

User must sign up first by clicking on the text:

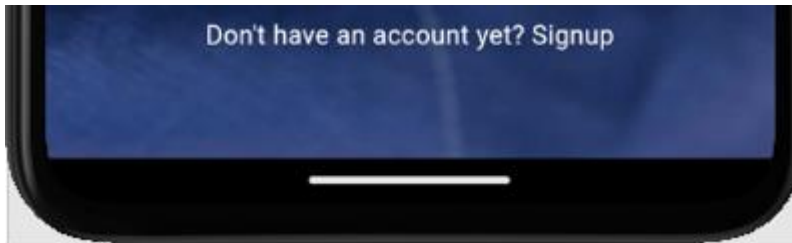


Figure 4: Signup Text Button

User then must choose what type he/she wants to be as shown in Figure 5 bellow

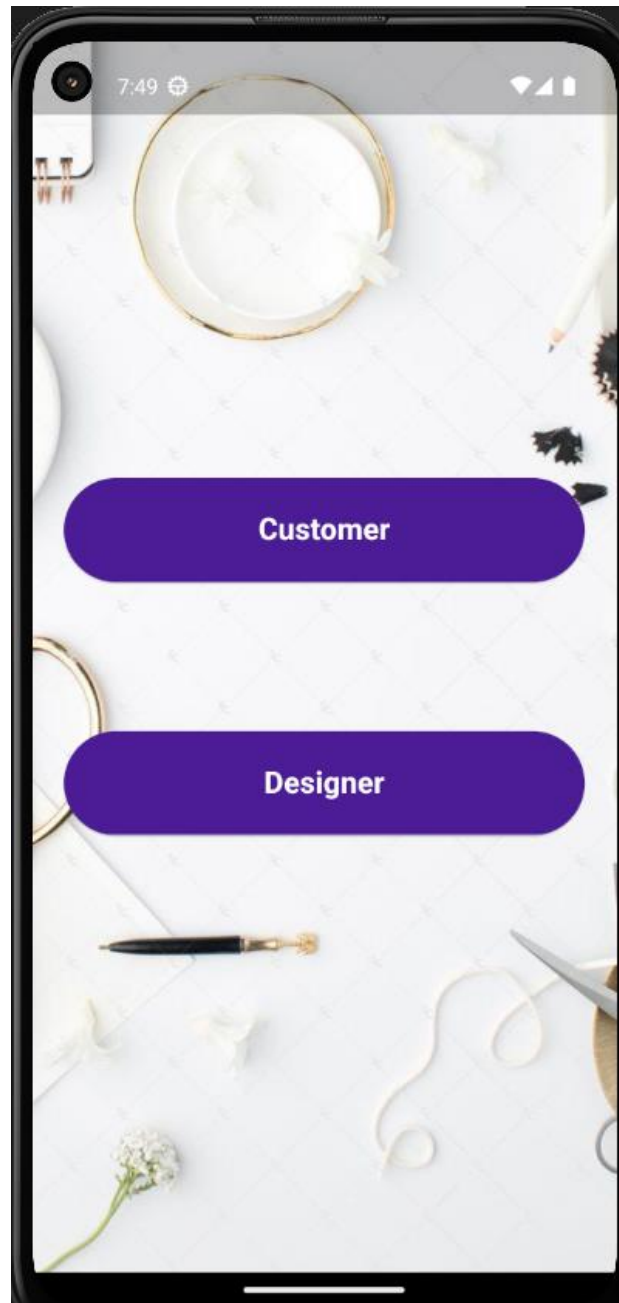


Figure 5: User Type Screen

Both types require same data to be entered:

- A Unique username.
- Email.
- Phone number.
- Bio (optional).
- Strong password.
- Profile photo (optional).

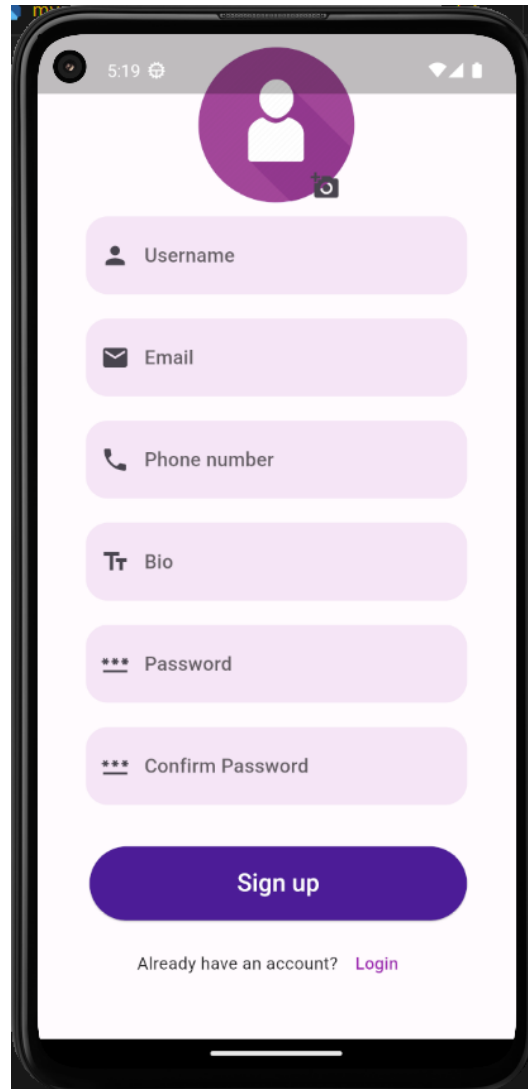
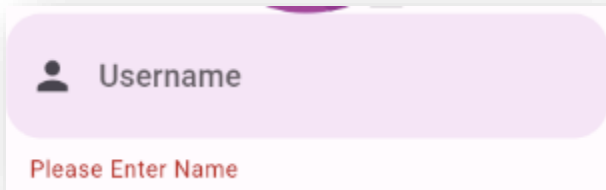


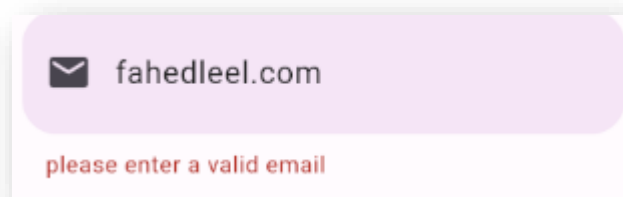
Figure 6: Signup Screen

Input Validation:



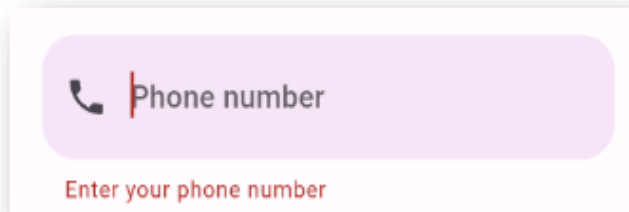
A light purple rounded rectangular input field with a person icon on the left and the text "Username". Below the field, a red error message reads "Please Enter Name".

Figure 8: Username Validation 1



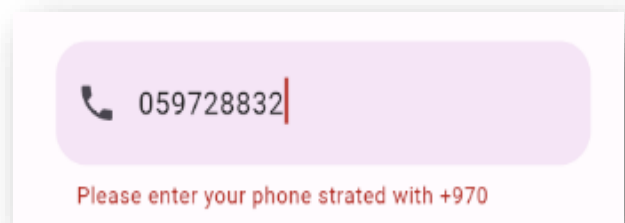
A light purple rounded rectangular input field with an envelope icon on the left and the text "fahedleel.com". Below the field, a red error message reads "please enter a valid email".

Figure 7: Email Validation



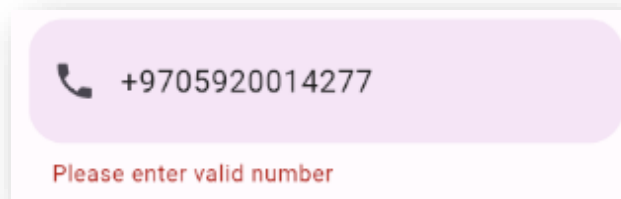
A light purple rounded rectangular input field with a phone handset icon on the left and the text "Phone number". Below the field, a red error message reads "Enter your phone number".

Figure 10: Phone Number Validation 1



A light purple rounded rectangular input field with a phone handset icon on the left and the text "059728832". Below the field, a red error message reads "Please enter your phone strated with +970".

Figure 9: Phone Number Validation 2



A light purple rounded rectangular input field with a phone handset icon on the left and the text "+9705920014277". Below the field, a red error message reads "Please enter valid number".

Figure 11: Phone Number Validation 3

Password must be strong, contains at least 8 chars, contains capital and small letters, symbols and numbers



Two light purple rounded rectangular input fields for password confirmation. The top field contains "***" followed by seven dots. The bottom field contains "***" followed by four dots. Below both fields, a red error message reads "Password does not match".

Figure 12: Password Validation

More validation:

To ensure that the user is informed if they try to sign up with an existing username or email, we implemented a validation and display a pop-up notification.

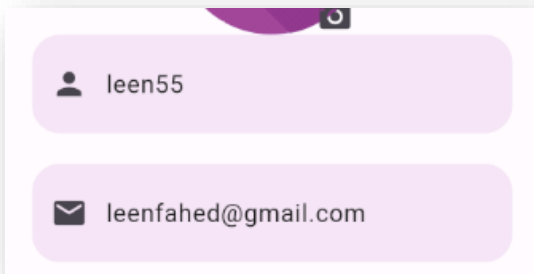
A form with two input fields. The first field has a person icon and the text 'leen55'. The second field has an envelope icon and the text 'leenfahed@gmail.com'.

Figure 14: Exist Username



Figure 13: Exist Username or Email Popup

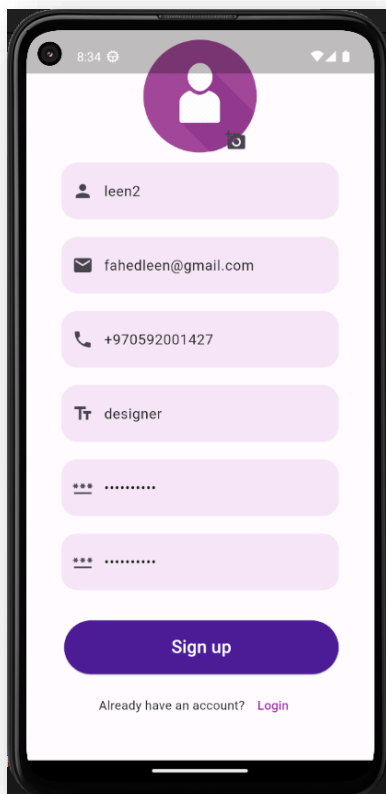
A mobile app interface for signing up. It features a purple profile icon at the top. Below it are several input fields: 'leen2', 'fahedleen@gmail.com', '+970592001427', 'designer', and two password fields with asterisks. A purple 'Sign up' button is at the bottom, followed by a link 'Already have an account? Login'.

Figure 15: Correct Input Data

When the entered data is correct, an OTP code will be sent to the user's email, and a bar will appear at the bottom of the screen to inform user that OTP has been sent and when user enters it the bottom bar will show if the OTP has been verified or not. When OTP is verified, user trying to login will not success until admin approve the registration request.

All mentioned steps are in next figures.

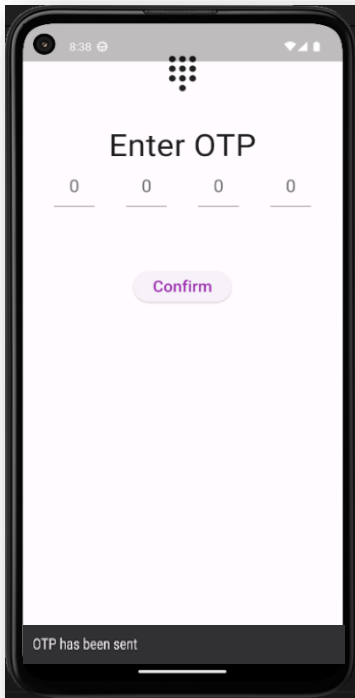


Figure 16: OTP Screen 1

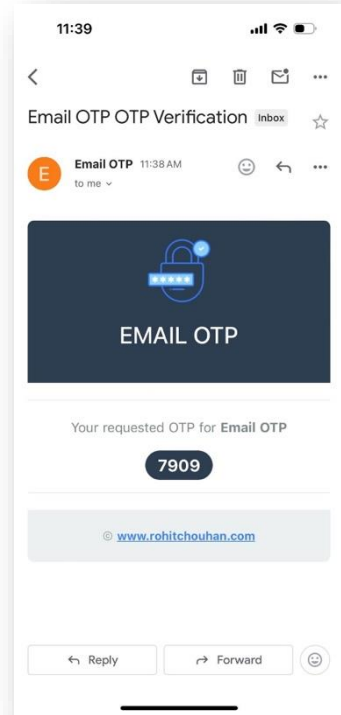


Figure 17: OTP Screen 2

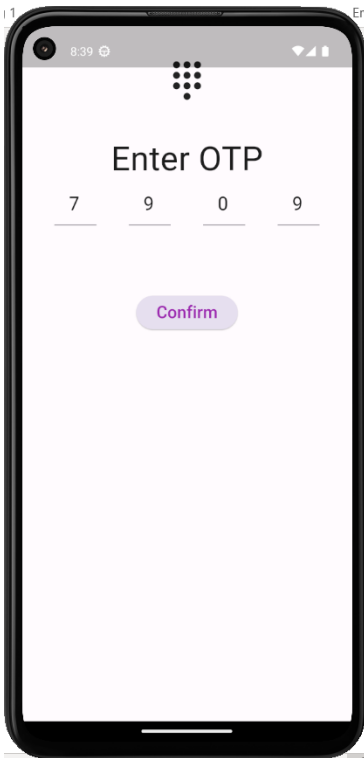


Figure 19: OTP Screen 3

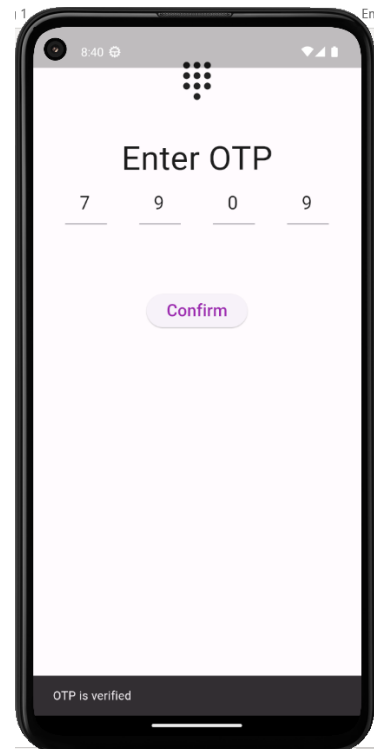


Figure 18: OTP Screen 4

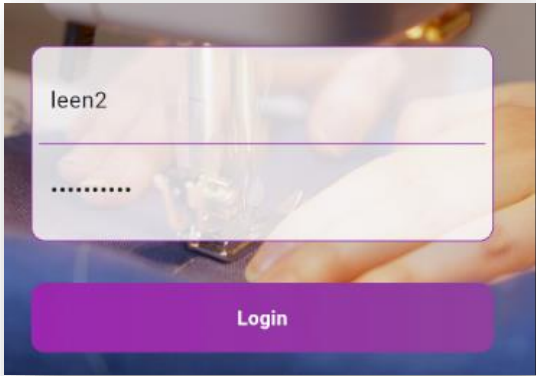


Figure 20: Login Screen

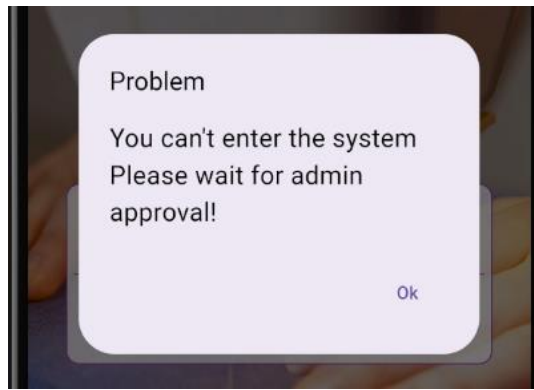


Figure 21: Admin Approval Popup

Admin has registration requests to sewing scope system, he/she can approve them or not by contact them via email or using phone number to make sure that the designers are real and have some experience in fashion design field, Figure 22 shows side menu.

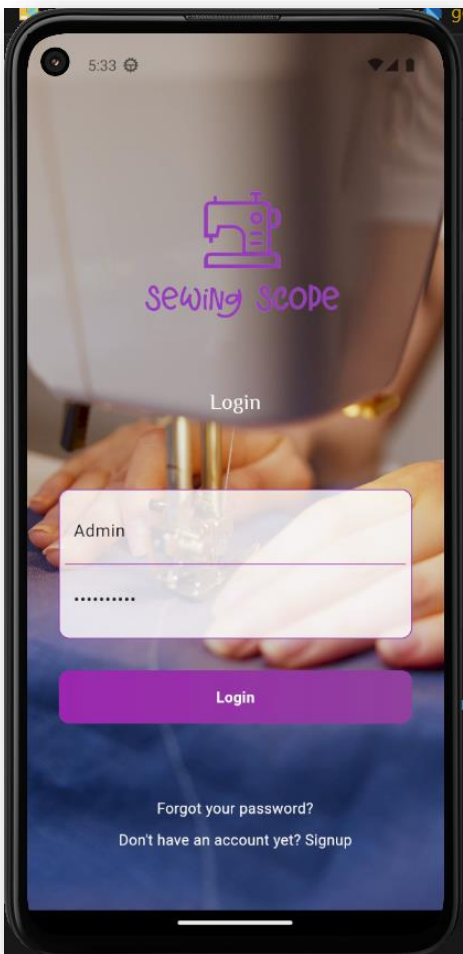


Figure 23: Admin Login

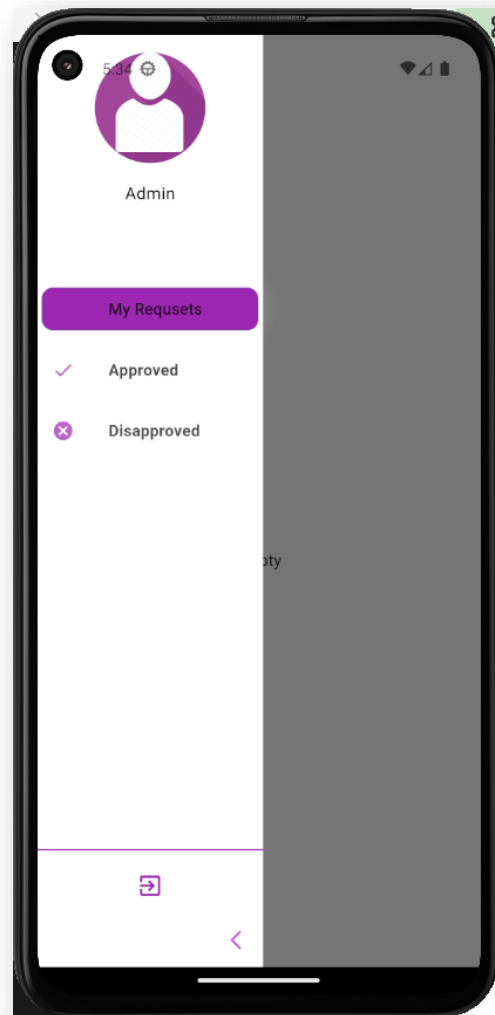


Figure 22: Admin Sidemenu

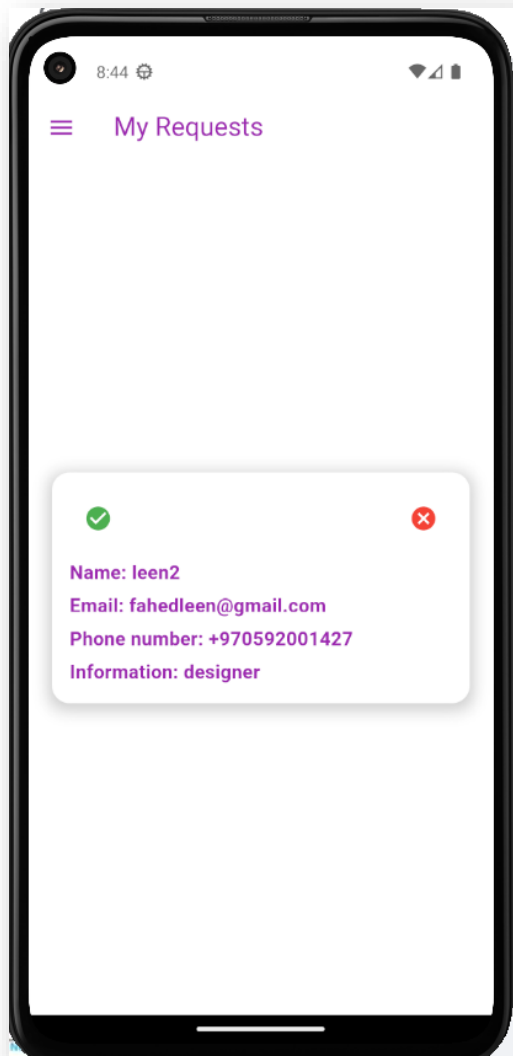


Figure 25: Admin Requests Page

When green check button is pressed user will be approved and shown in approved page as the right figure 24 shows.

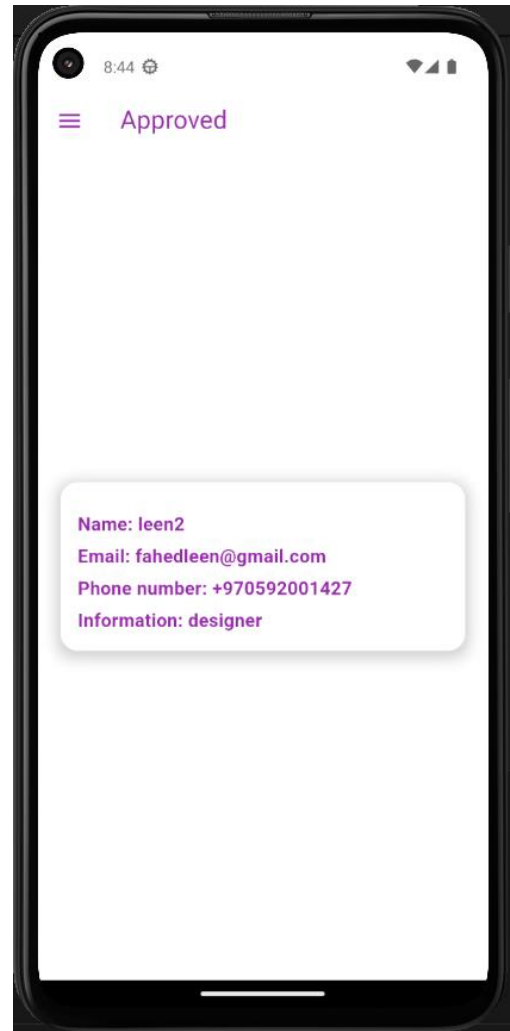
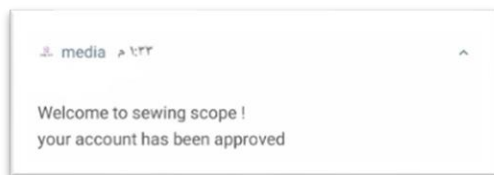


Figure 24: Admin Approved User Page



A previously disapproved user is shown in the figure 26.

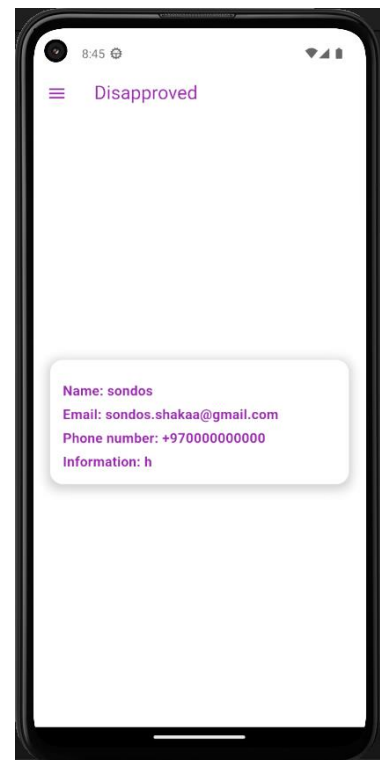
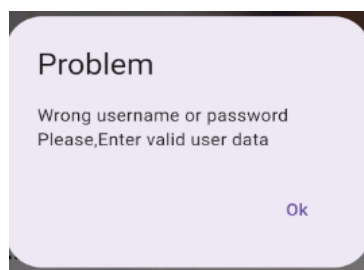


Figure 26: Admin Disapproved User Page

- Forget Password feature

This feature requires user email to be entered and then OTP code will be sent, after checking that is correct, user can enter new password and confirm it then password will be updated.

Figure 27: Forgot Password Text Button

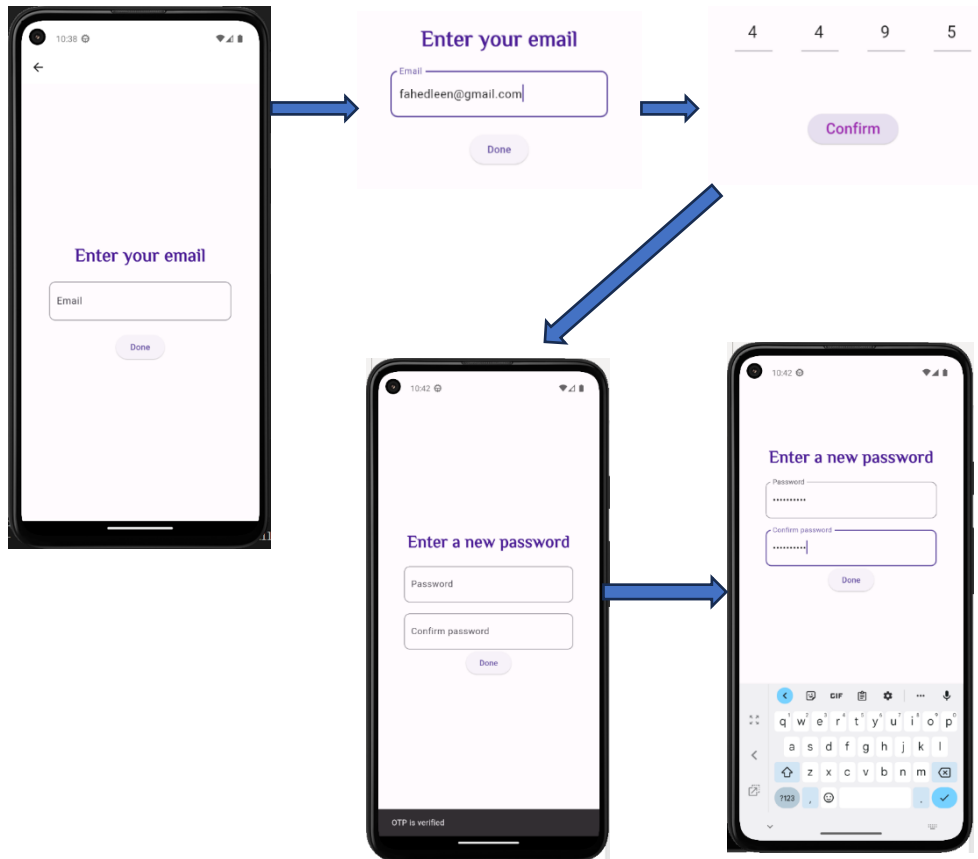
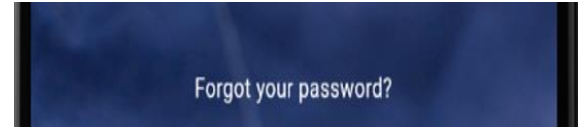


Figure 28: Forget Password Steps

- Designer Features

After designer has logged in successfully, designer account provides many helpful features, side menu contains all pages, it can be expanded or not as shown in figure 29 and figure 30.

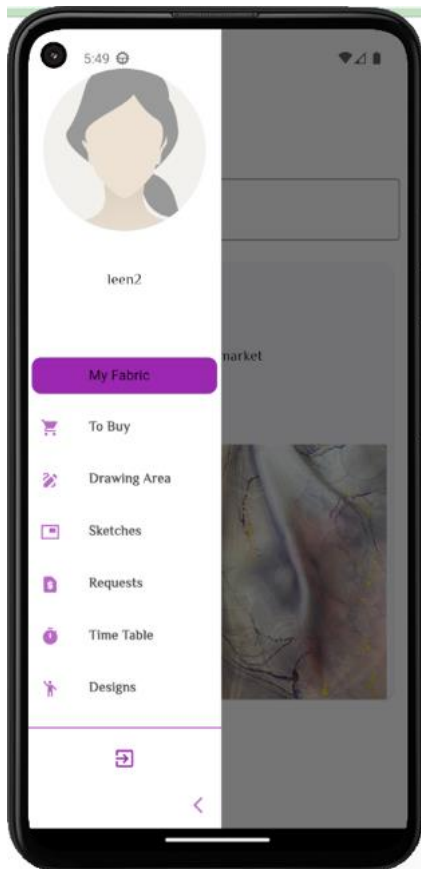


Figure 29: Sidemenu Expanded

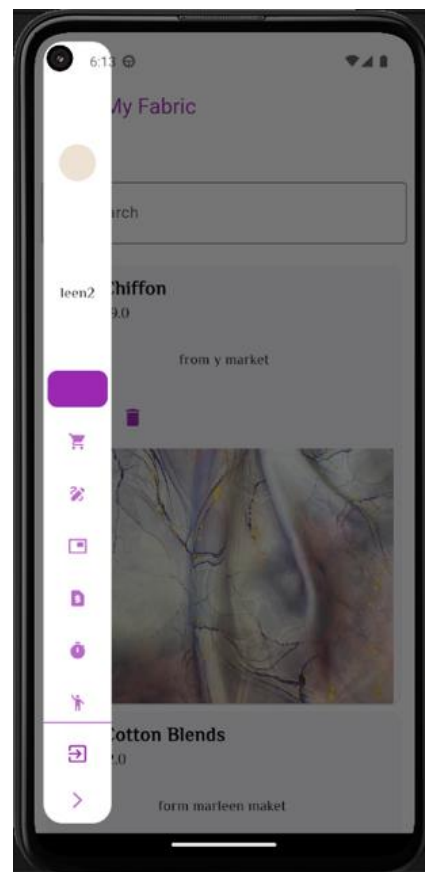
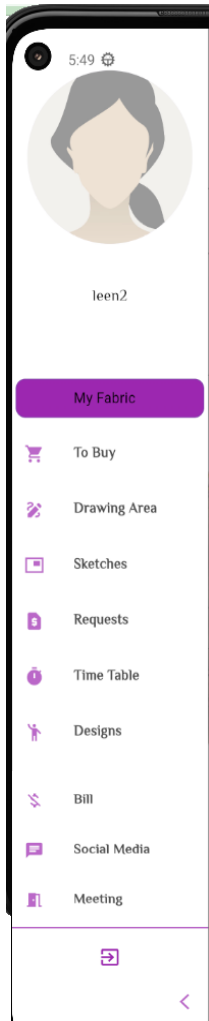


Figure 30: Minimized Sidemenu

Side menu contains the following features:



- **My Fabric:** This page allows designers to save details of the fabric they own in real stock. This feature helps them manage their inventory by enabling search, edit, and delete functions.
- **To Buy:** This page stores all fabric that is out of stock, where the quantity has reached zero meters. It helps designers see what needs to be purchased.
- **Drawing Area:** This page allows designers to create sketches for designs before finalizing what the customer needs. It will be particularly useful during virtual meetings with customers, thanks to its screen-sharing feature.
- **Sketches:** Saved drawings are stored on this page after the user clicks "Download PNG" or "Download JPEG."
- **Requests:** This page contains design requests from customers.
- **Time table:** This page has a timetable that lists approved design requests. Designers can change the dates and other features.
- **Designs:** This page contains all designed items in the desktop app.
- **Bill:** This page is for creating a bill for a customer.
- **Social media:** This page allows designers to upload posts, chat with other people, and access many other features.
- **Meeting:** This page is for creating a virtual meeting between the designer and the customer.

- **My Fabric Screen**

At this page, designers can view all added fabric items and search for them by color name, number of meters, and other data.

- *Add Item*

When a designer wants to add a new fabric, a photo of the fabric is required. If the user doesn't upload one, a photo with a question mark will be added instead. The color of the fabric should also be chosen, along with the name of the fabric, the number of meters (which must be a valid number), and any notes.

- *Edit Item*

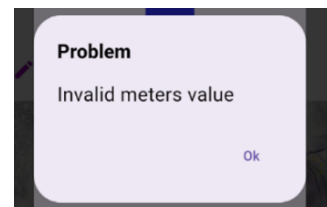
Designers can edit any property of the fabric. Notably, when the meters are updated to zero, the fabric item will be moved to the next page called "To Buy".

- *Search for Fabric*

Designers can search for a fabric by entering its name, number of meters, color name, or note.

- *Delete Fabric*

Any fabric can be deleted.



31:Invalid meters popup

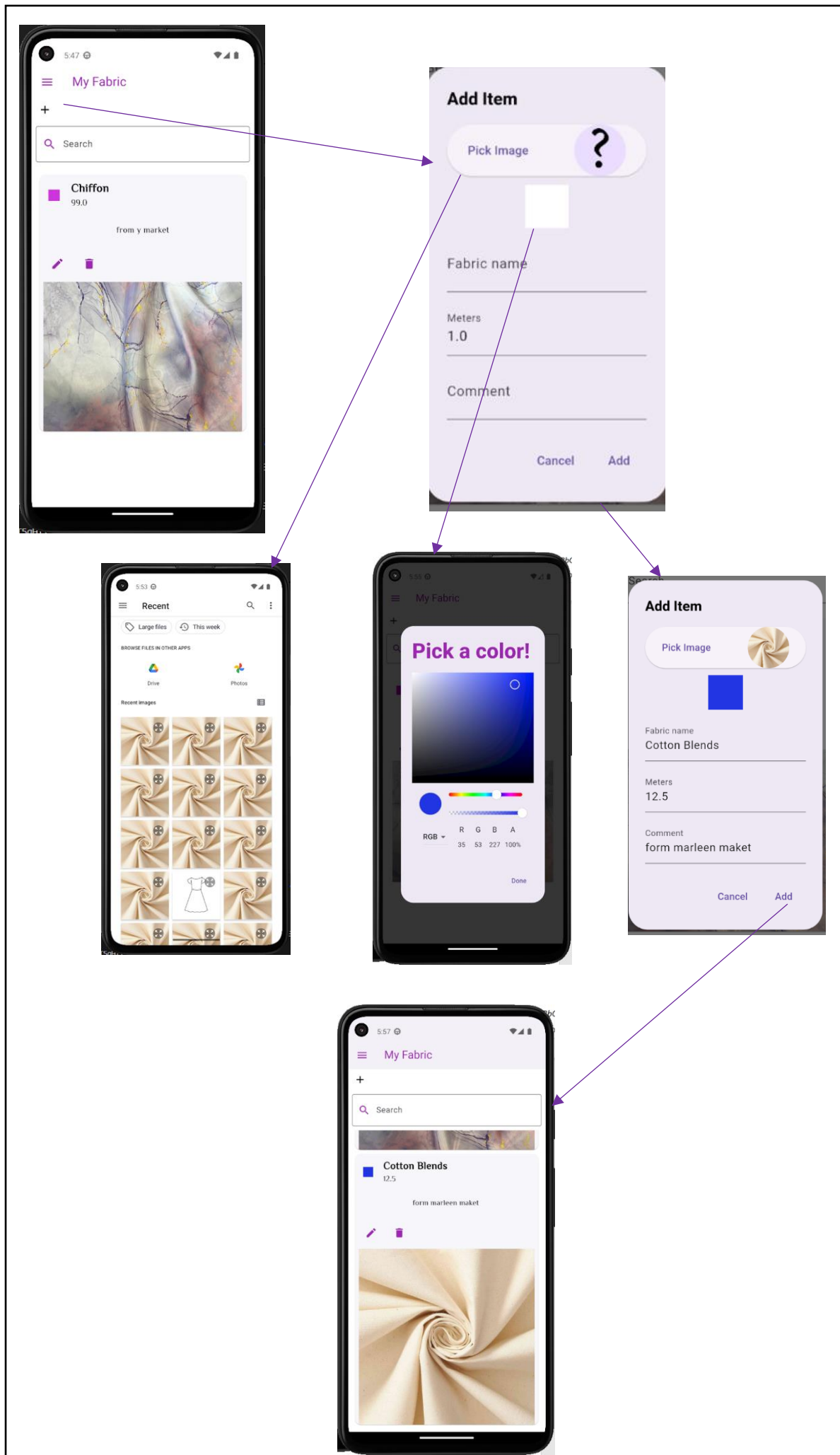


Figure 32: Add Fabric Steps

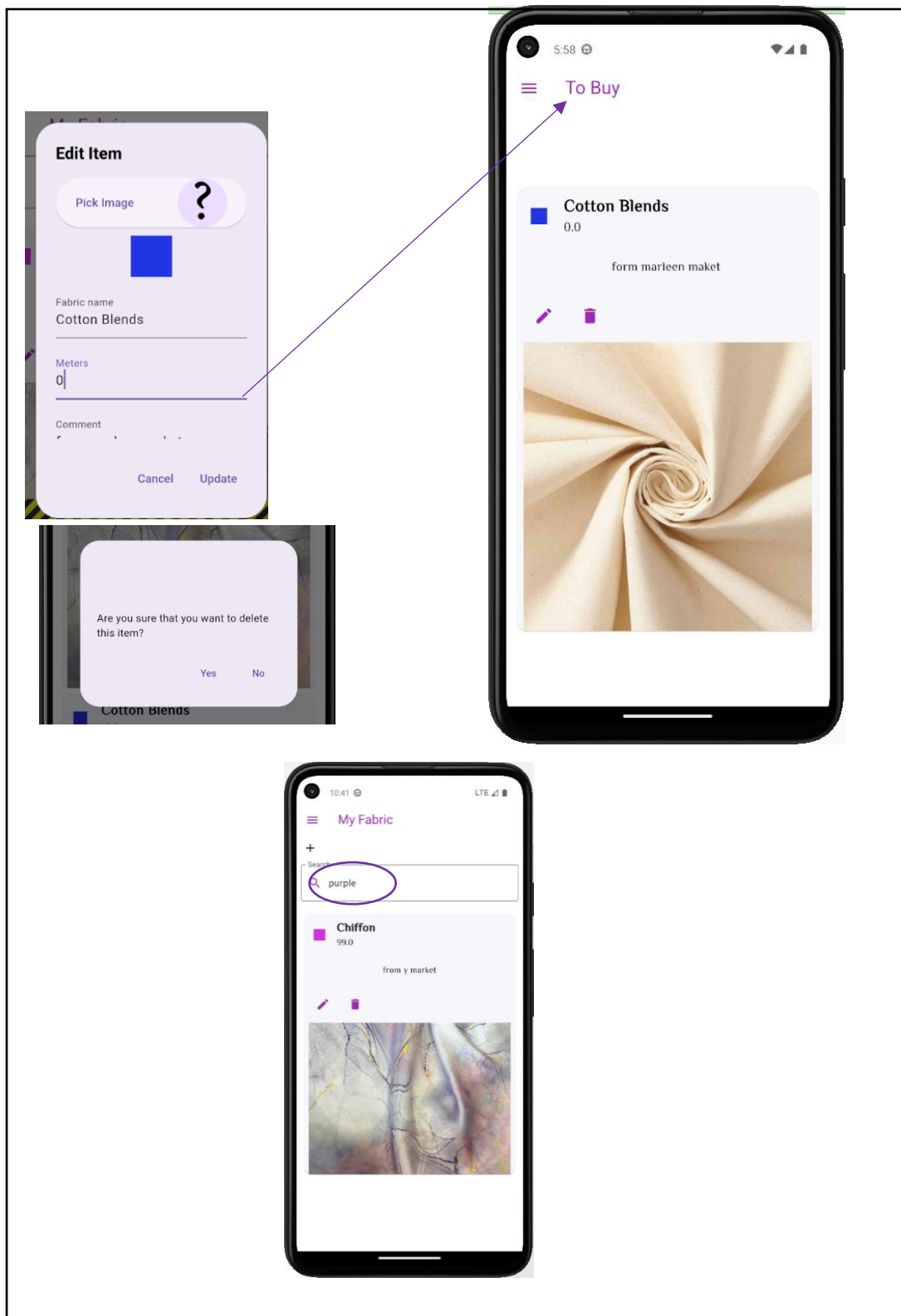


Figure 33:Edit Meters Result , delete and search

- Drawing Area Screen and Sketches Screen

For drawing fast sketches and save them in sketches page by press download button.

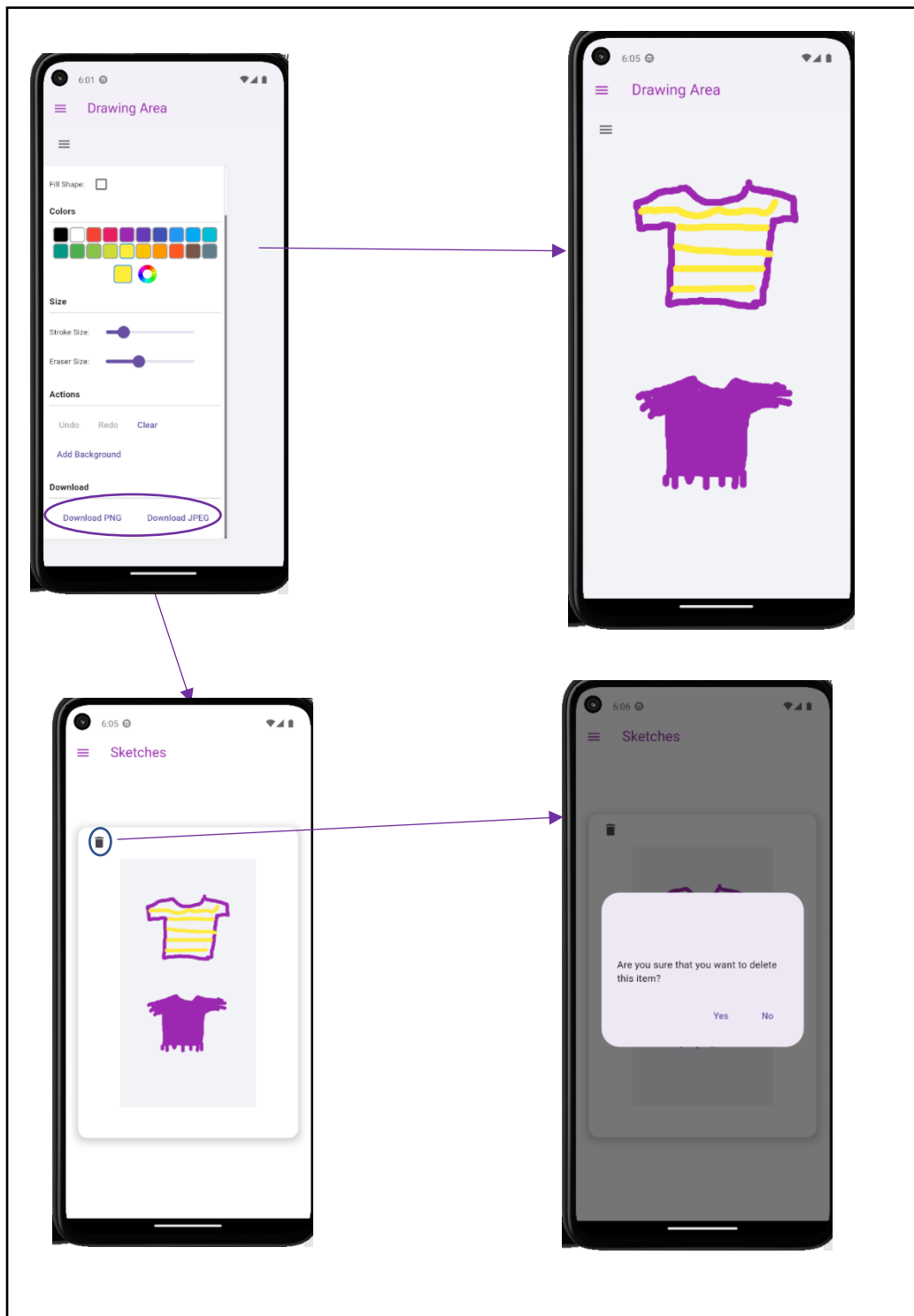
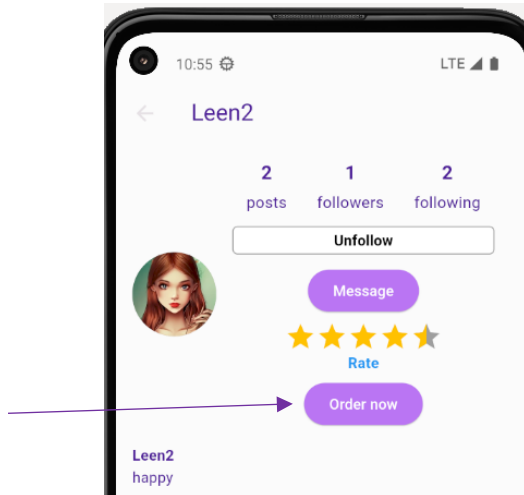


Figure 34: Drawing and Sketches Screens

- Requests Screen

This page has all customer design requests. For instance, placing an order is a feature in customer pages, but to make the next step make sense, we will view it in this section. Let's first place an order for a design from customer Marah to designer Leen2.

Customer starts order by visiting designer profile and clicks on Order now button.



Step one: Choosing what customer needs to design.

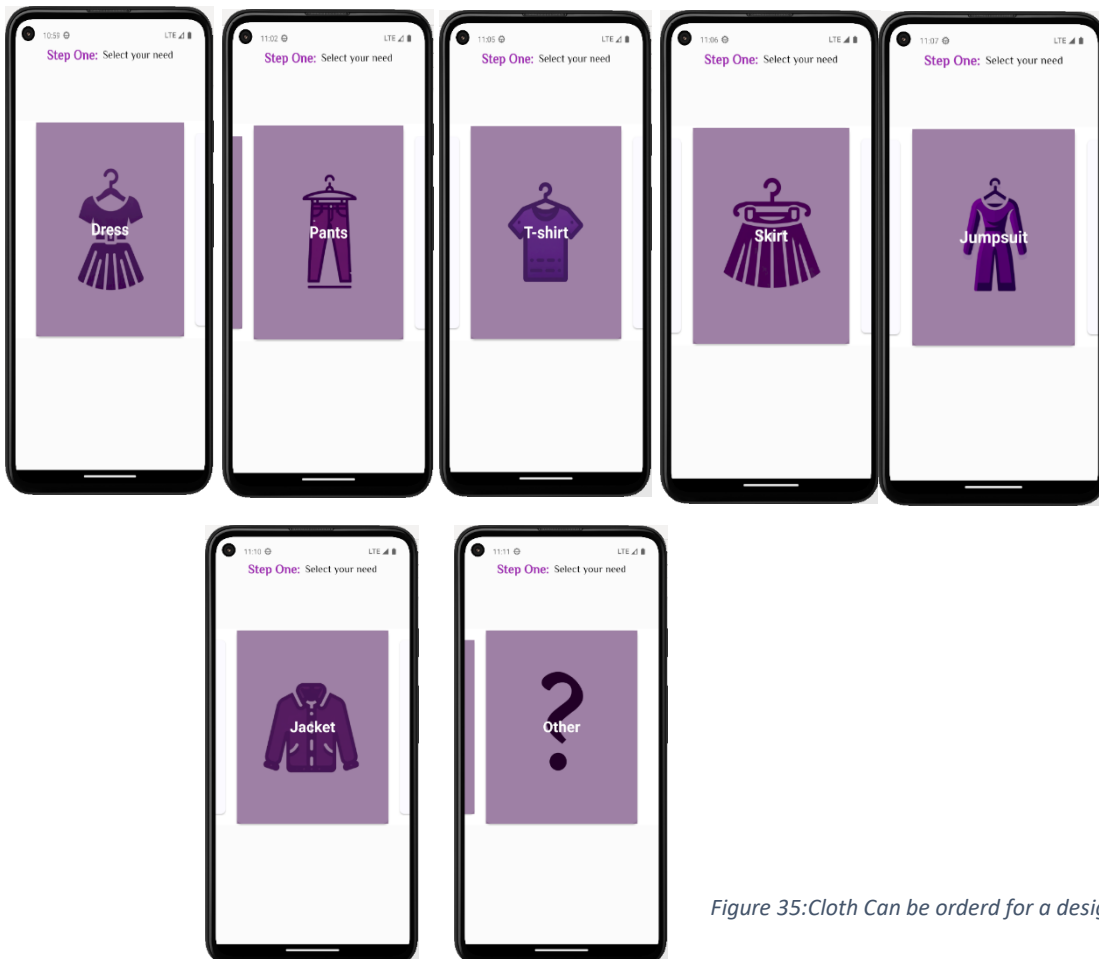


Figure 35: Cloth Can be orderd for a design

Step Two: Choosing Fabric Materials for the Design

In this step, the customer can select multiple fabric materials, as shown in the next figures. For example, the customer has chosen Tweed and denim fabric for their design.

If no fabric is selected, a pop up indicating a problem appears. When clicking at check button.

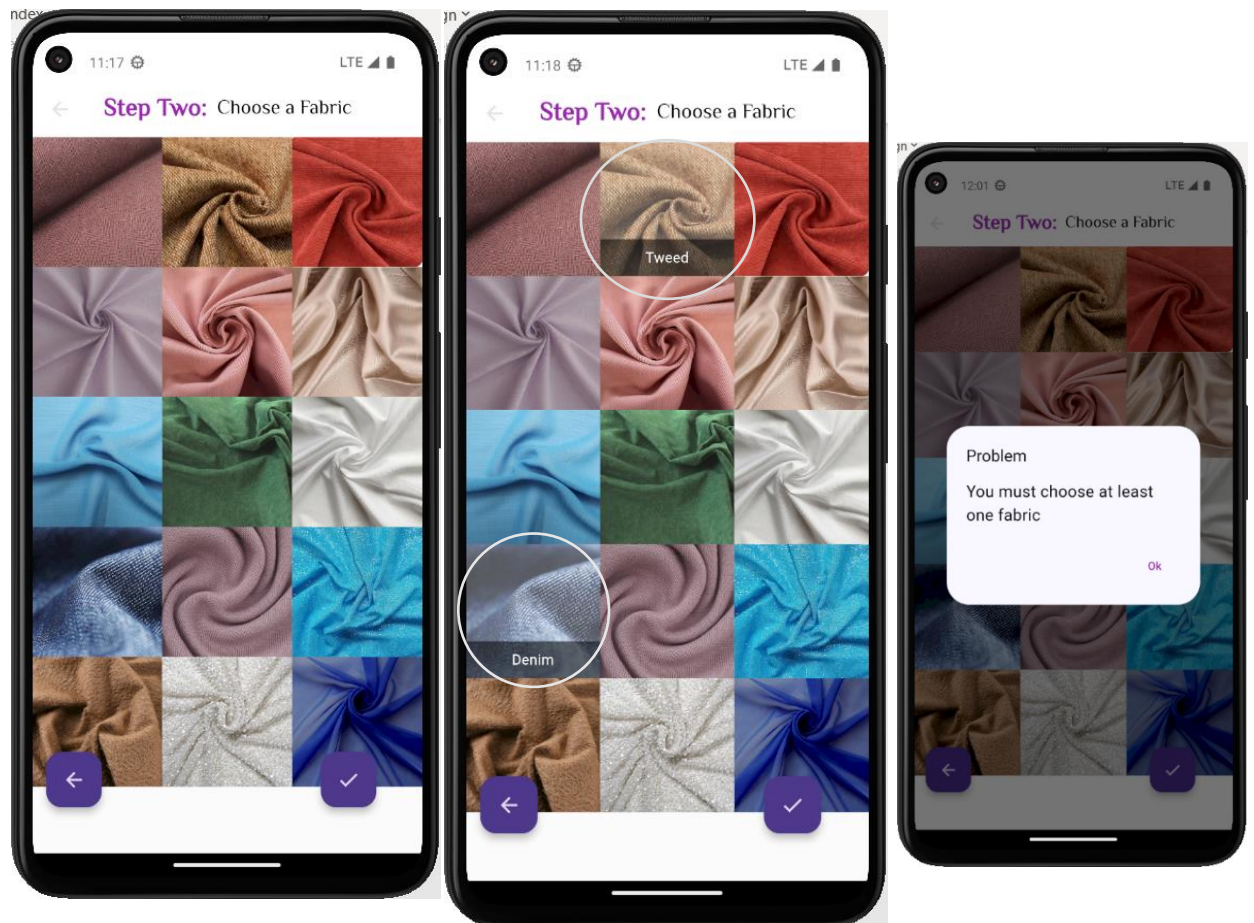


Figure 36: Choose fabric materials

Step Three: Choosing Colours for Each Fabric

Initially, the default color for each chosen fabric is grey. To change it, the customer must click on the grey square. The hex code of the selected color can be copied. There are also two palettes available: one for primary colors and another for accent colors.

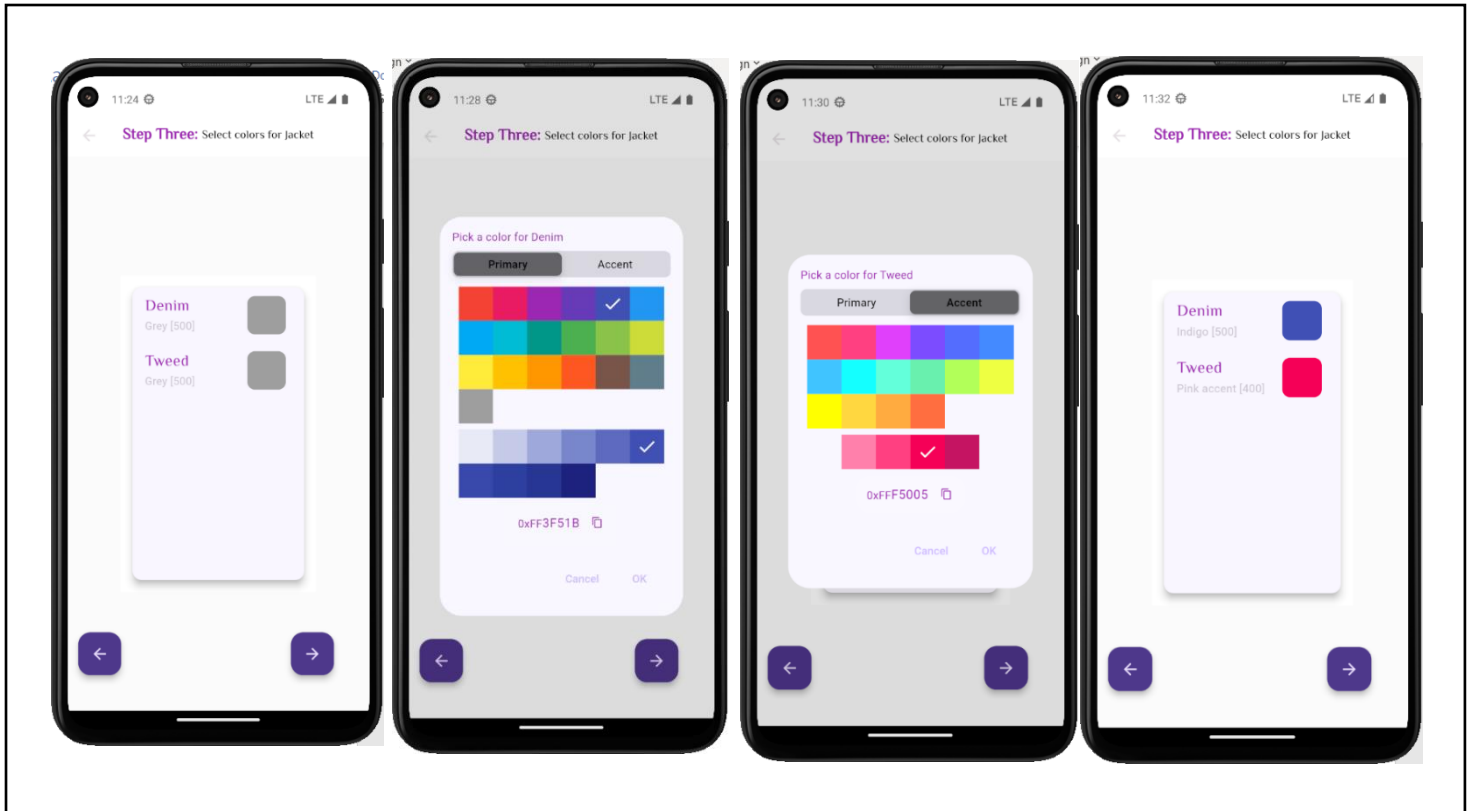


Figure 37: Choose colors steps

Step Four: Uploading Design-Related Photos and Adding Notes

In this step, customers can upload a photo related to the design they want, making it easier for the designer to understand their order. If the customer wants to add additional notes, there is a text field at the bottom specifically for this purpose.

If no image is selected a pop up will appear.

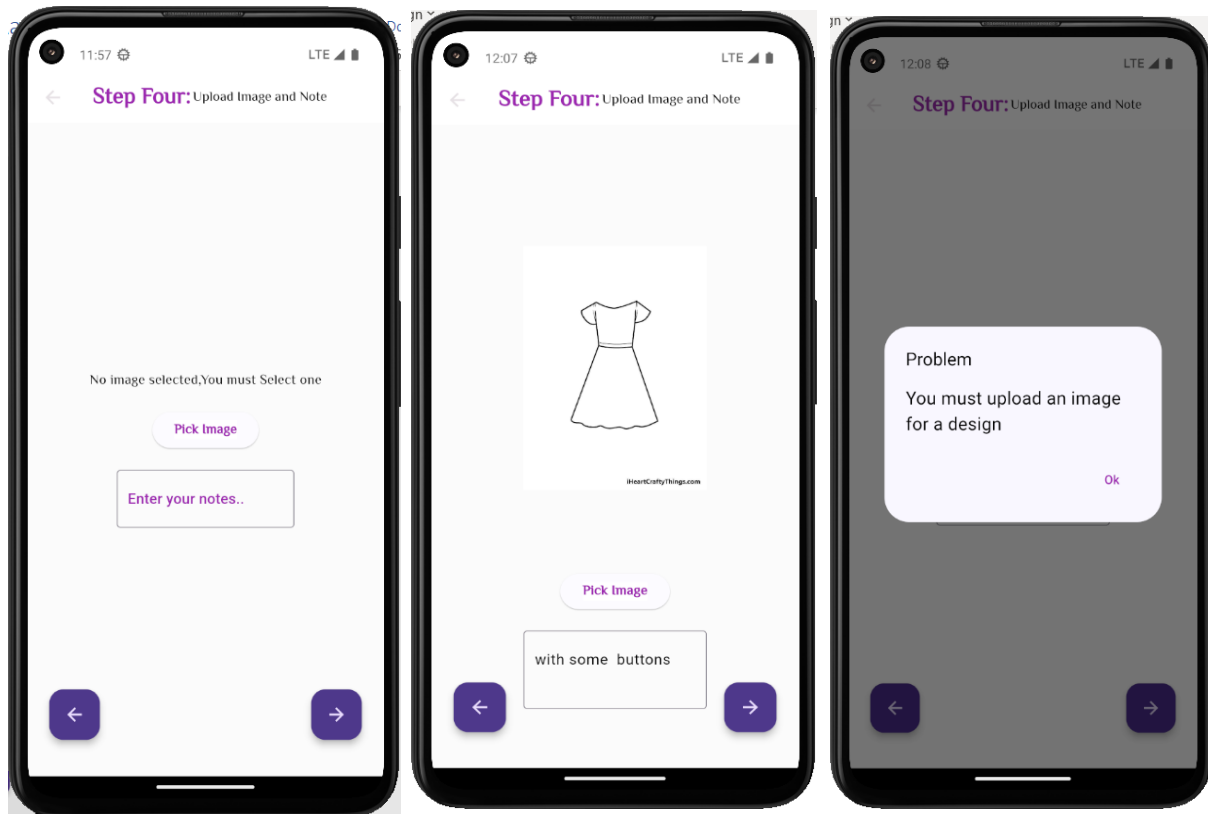


Figure 38: Pick image and add note step

Step Five: Selecting a Date from the Time Table

In this step, customers select a date from the timetable to specify when they want the order to be ready. The customer's timetable starts three days after the current date of placing the order. Each day offers multiple hours to choose for picking up the order after it's ready. If a time slot is reserved, a purple square with the text "Reserved" will indicate its availability.

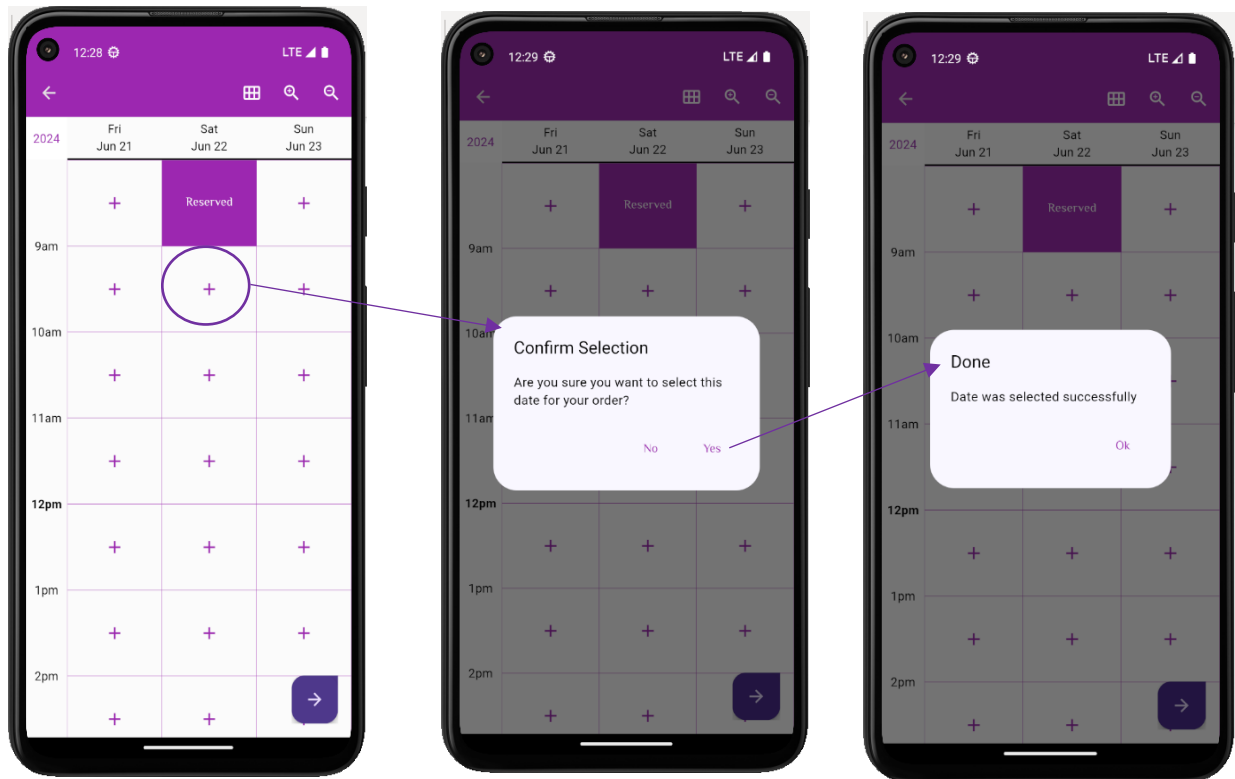


Figure 39:Date selection

Final Step: Filling Body Measurements

In the final step, customers fill in their body measurements. Each required field is accompanied by a helper image appears when clicking on question mark icon the image indicates where to measure. Customers can follow the red lines on the image.

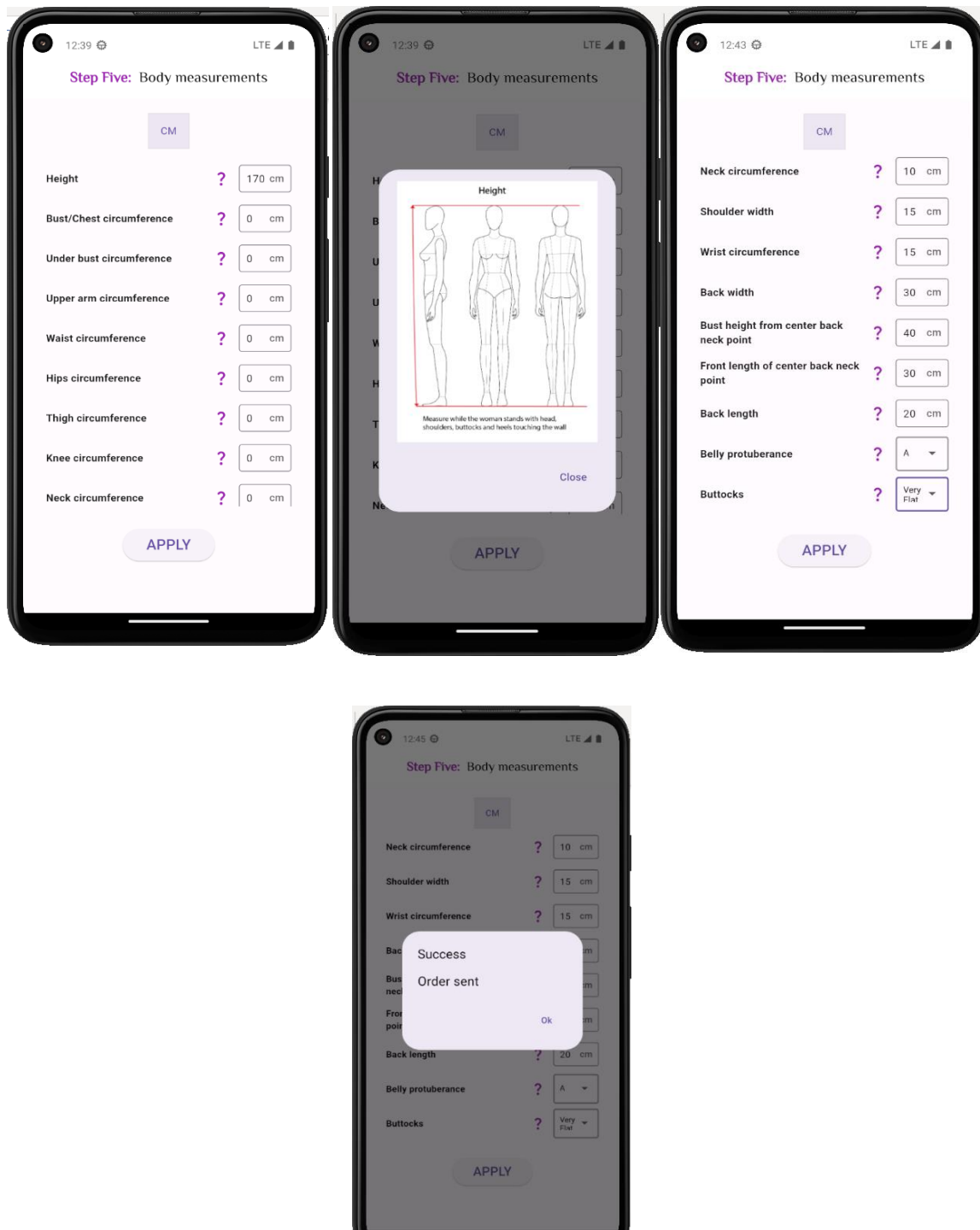


Figure 40: Body measurements step

After Marah sends the order to designer Leen2, the request appears on the Requests page. Order details can be viewed by clicking on the eye icon. Inside the details, the designer can add additional notes for themselves regarding the viewed order by click "submit text". They can also click on the colour squares to copy their hex codes, change the date by clicking on the date field, view image by clicking on it, and view measurements and copy them as needed. Once reviewed, the request can be approved. Upon approval, it will be moved to the designer's timetable. Alternatively, the request can be disapproved and not added to the timetable, all mentioned changes is provided to client by notifications.

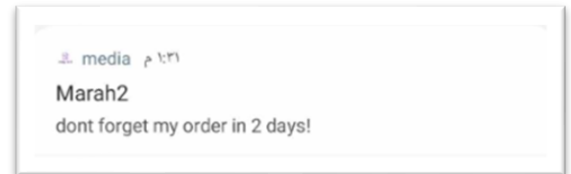
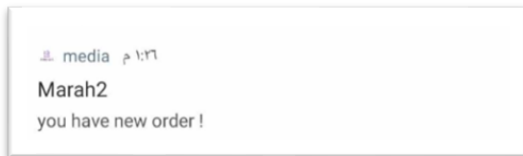
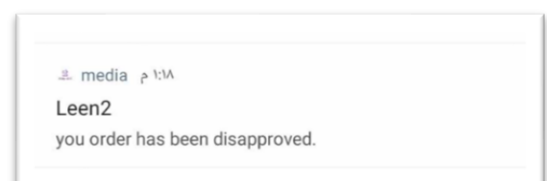
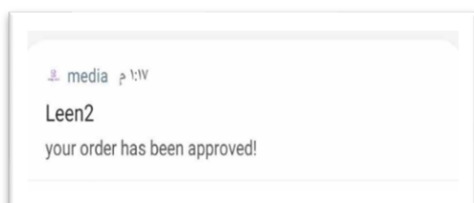


Figure 41:Requests screen



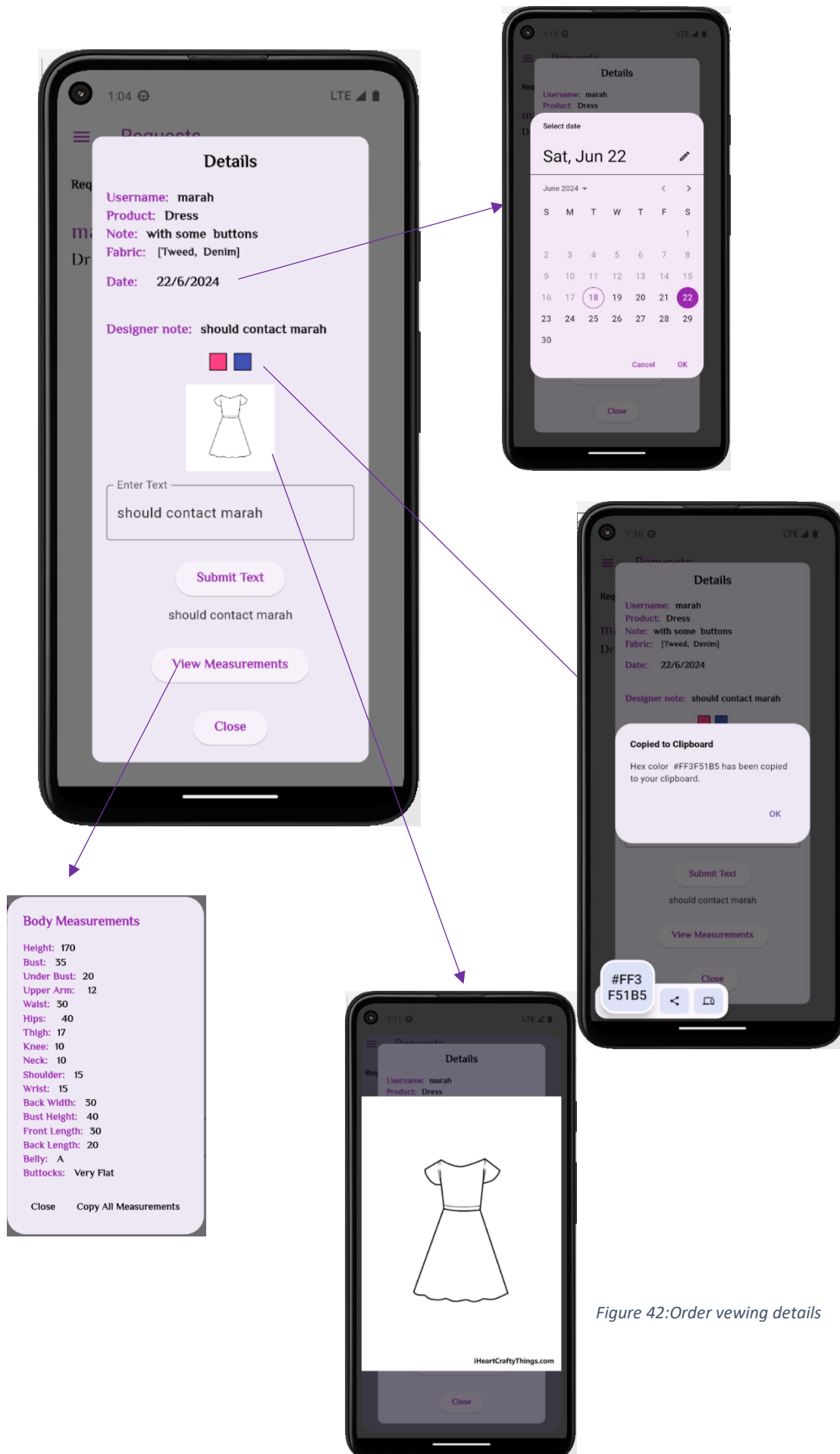


Figure 42:Order vewing details

- Time Table Screen

Designers can view their monthly schedule, zooming in and out as needed. Purple blocks represent orders that must be completed. Each order block includes a viewing button mentioned earlier in Figure 42. Orders can be deleted and removed immediately from the table, and meetings scheduled for customers by clicking on the clock icon. Designers can also adjust dates, as mentioned previously, causing the order block to move to a new slot with updated dates. Customers are notified regarding the approval status or any date changes of their order.

Here leen2 changed the date from 22 to be 23 for customer Marah.

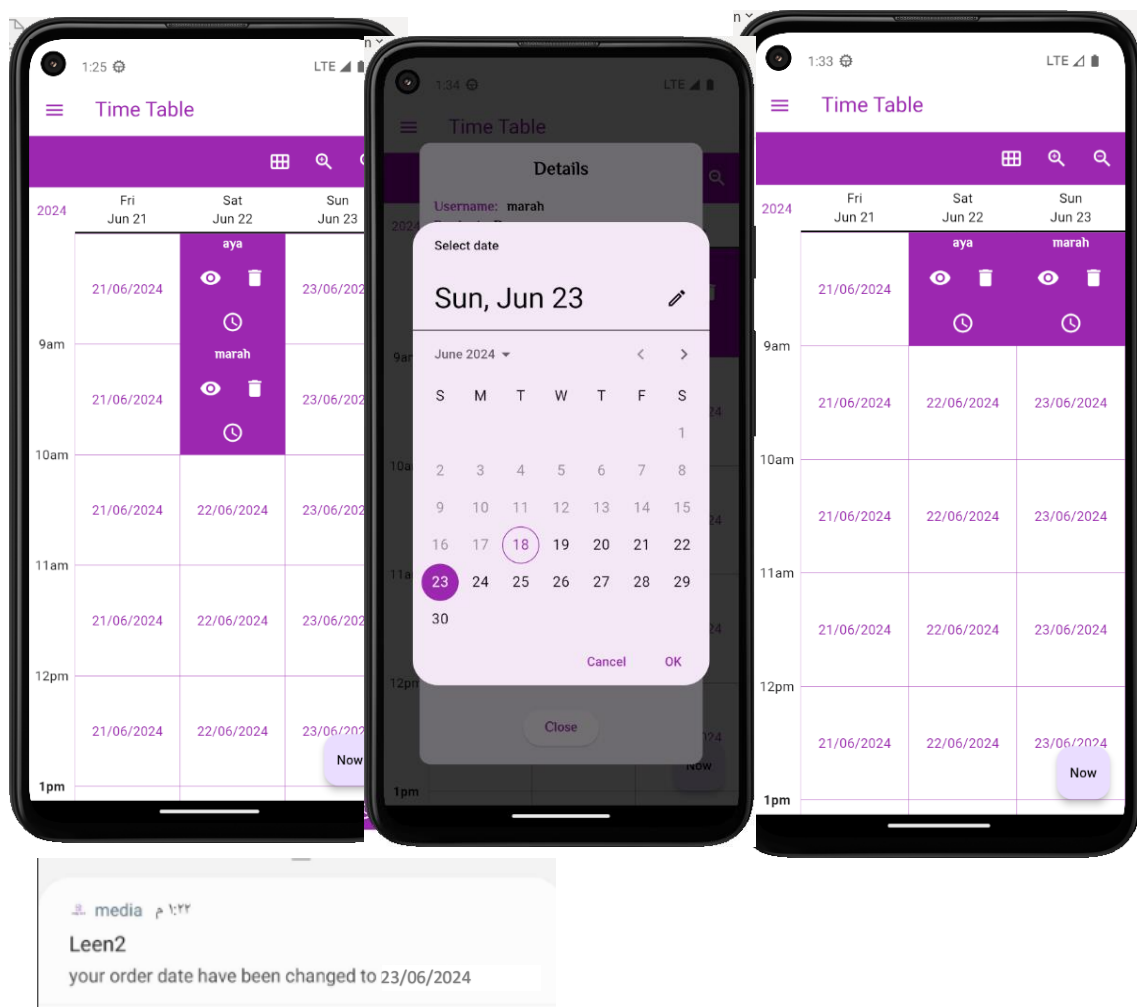


Figure 43:Change date at time table result

Designer can schedule meetings by selecting a date and time, adding a meeting ID, and saving the details. Upon saving, notifications are automatically sent to the customer to inform him/her of the scheduled meeting.

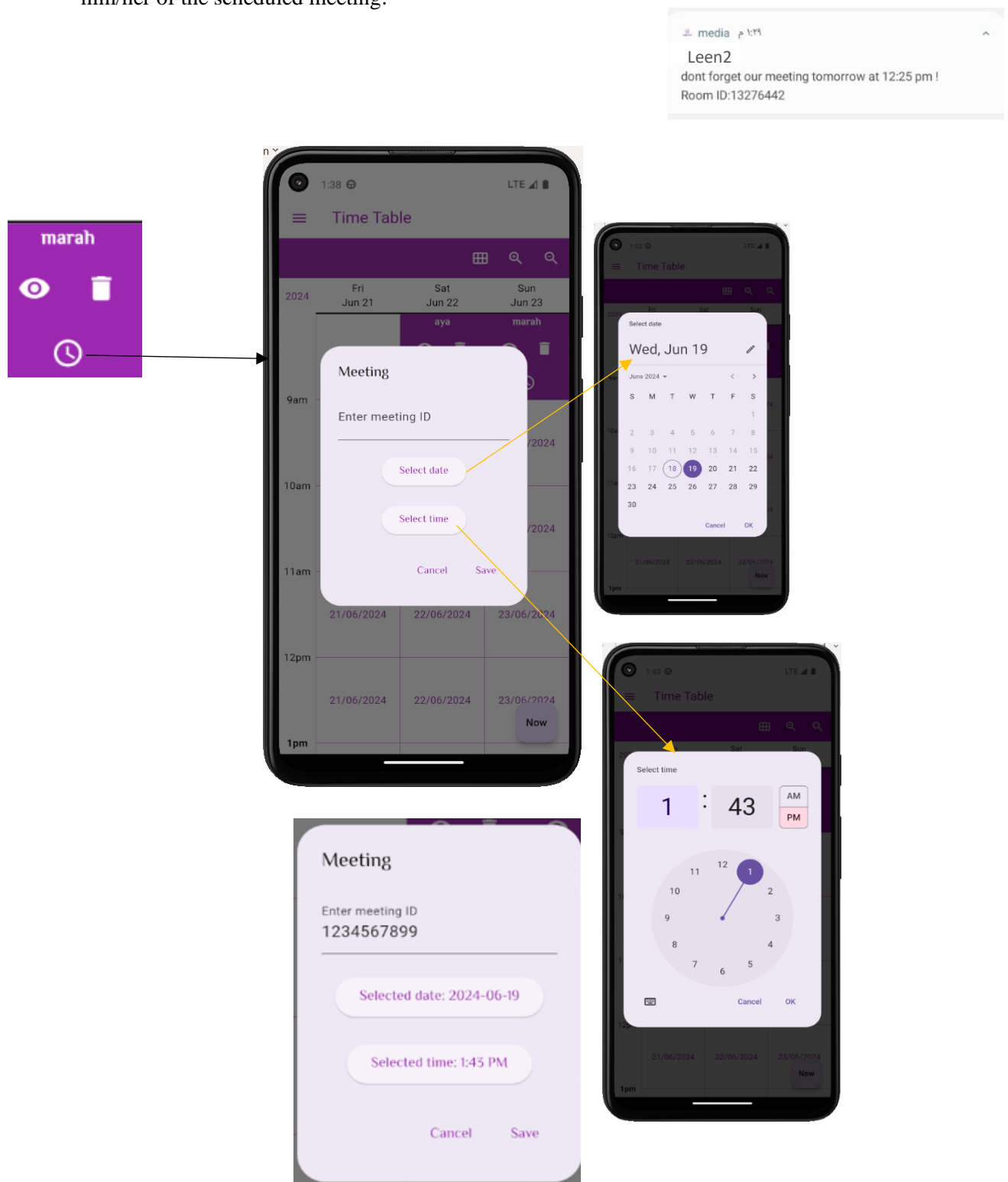


Figure 44:Schedule meeting steps

- Meeting Screen

On this page, the designer can start a virtual meeting, and customers can join by entering a meeting ID. The meeting participants can open or close their cameras and flip it, share their screens, chat in the meeting chat, and mute or unmute their microphones, view participant list. This feature is designed to facilitate communication between the customer and the designer, allowing them to clarify details and ensure the order is designed perfectly.

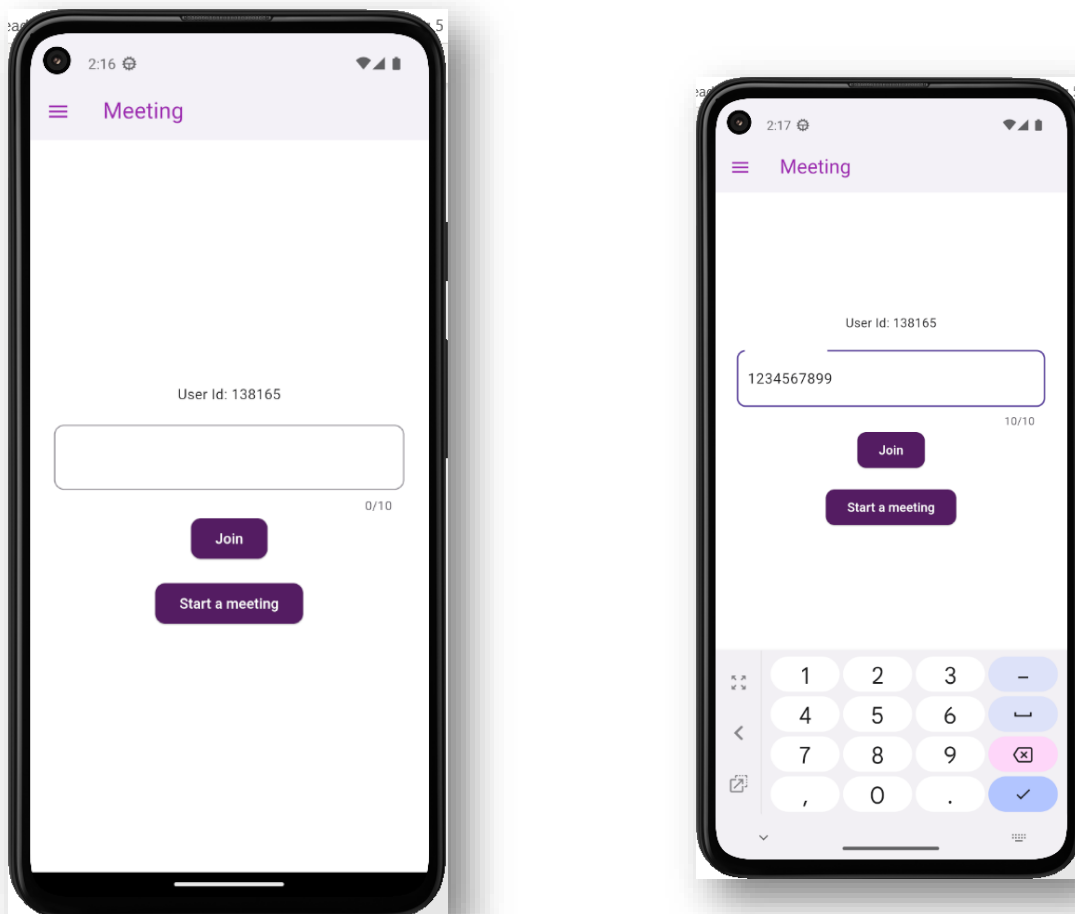


Figure 45: Meeting screen

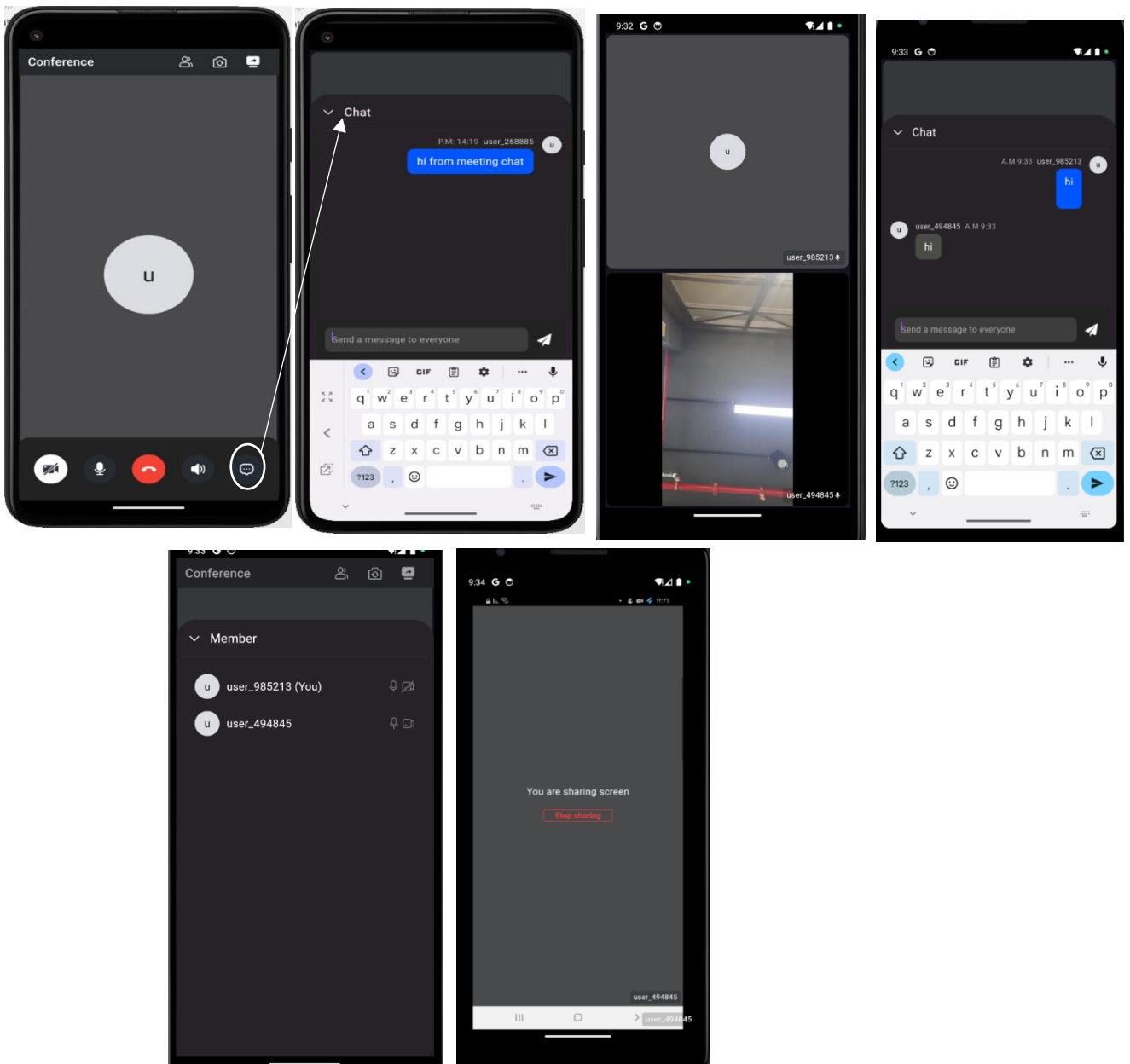


Figure 46:Virtual meeting screens

- Bill Screen

This page is for creating a bill for a customer's order. The required fields are shown in the next figure. Designers can apply discounts or add taxes. The total is calculated automatically based on the added items, their quantities, and prices. When "Send Bill" is clicked, the bill will appear on the customer's Bills screen.

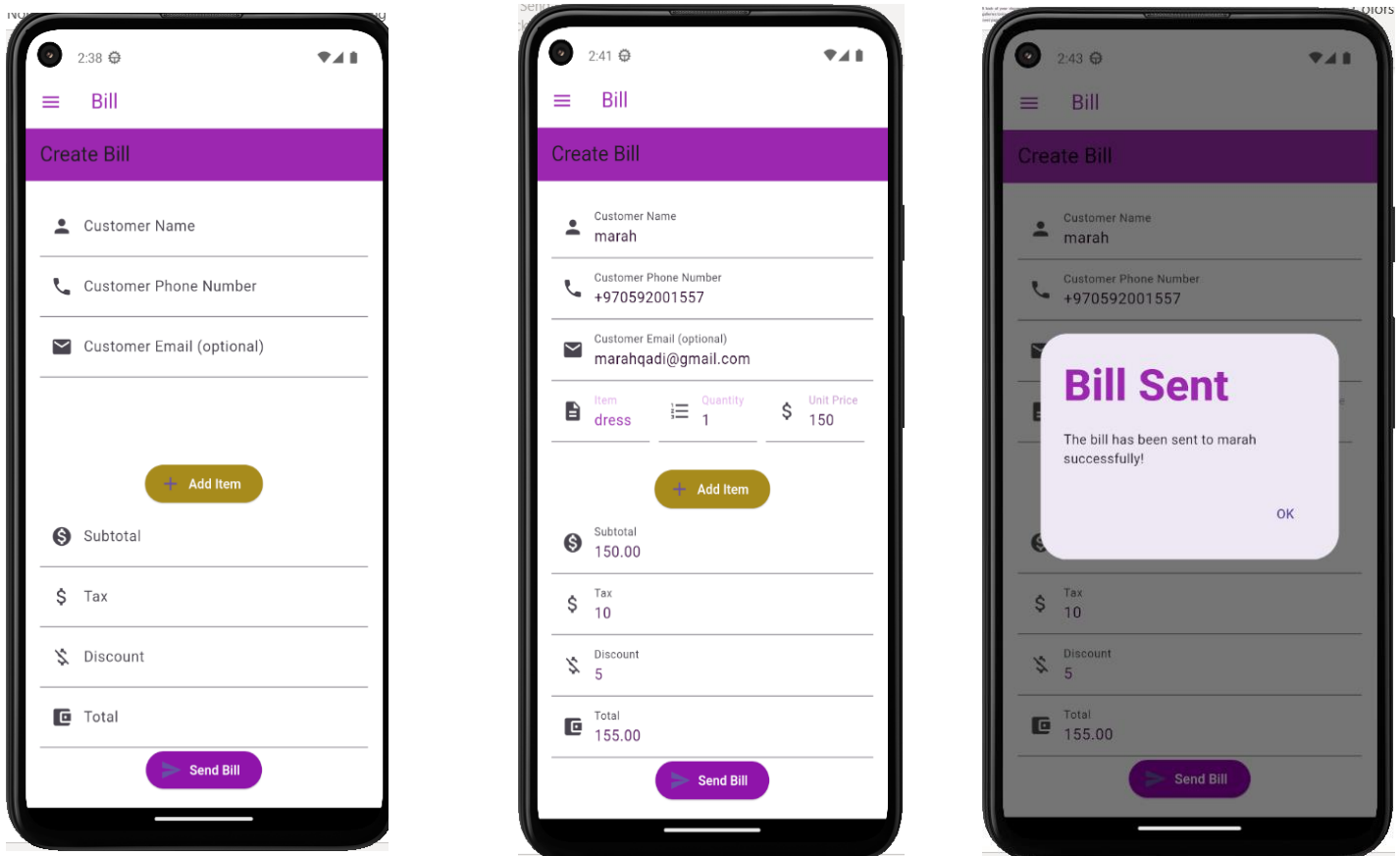
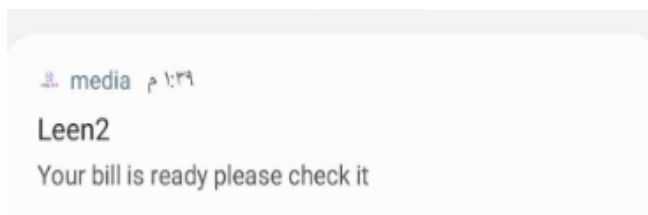


Figure 47:Bill creating for customer



This figure shows bill reached to customer screen

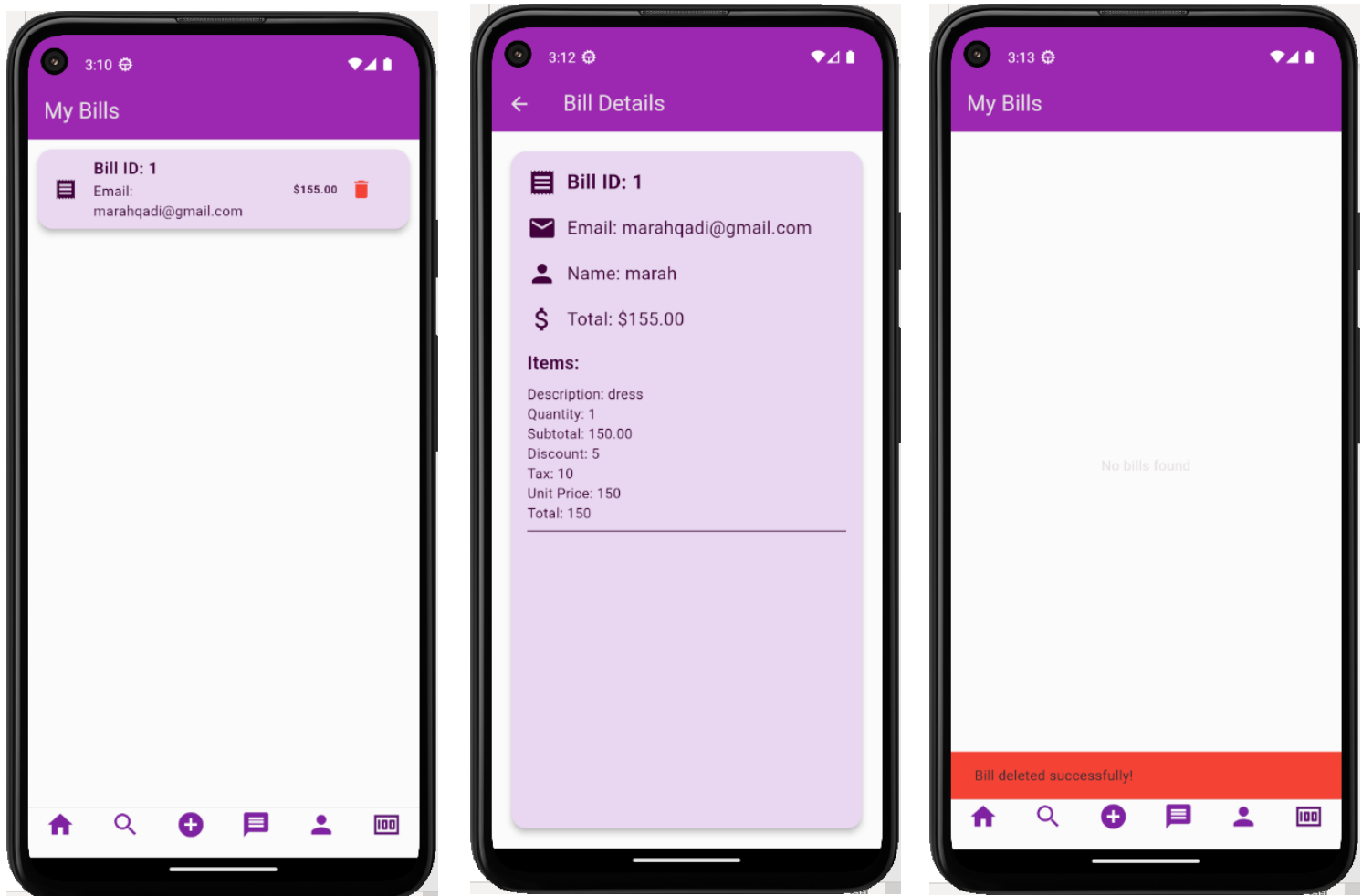


Figure 48: Bill pages in customer account

- Designs Screen

This page contains designs uploaded by the designer from the desktop app. The designer can add posts to social media featuring these designs by clicking at world button, or simply delete them.

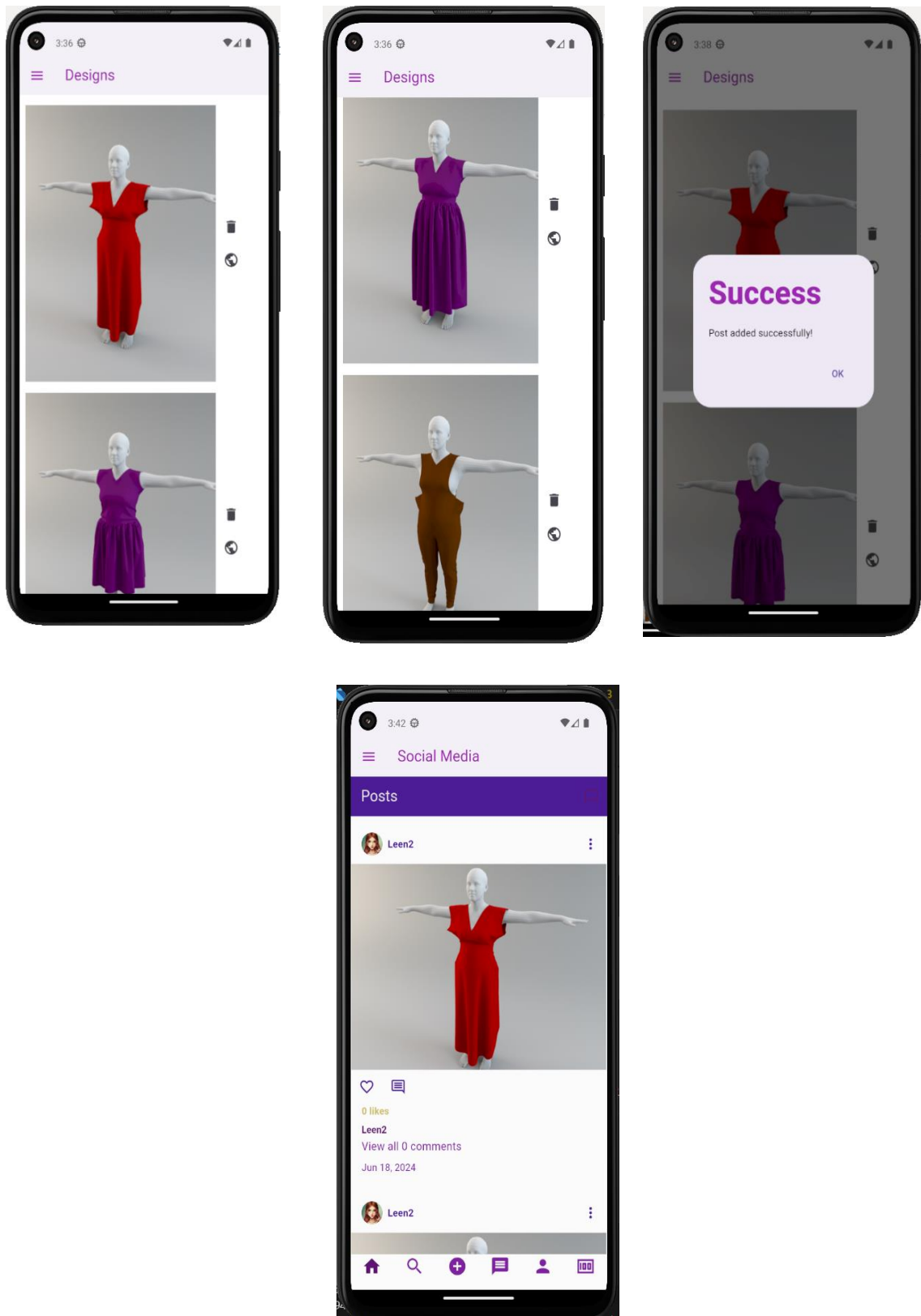


Figure 49: Designs screen

- Social Media Screen:

Designers can use social media to upload, edit, and delete posts of their designs. They can also view posts from other users, like and comment on them, and follow or unfollow users. Additionally, designers can search for users and chat with them, especially customers. The chat feature includes options to edit sent messages, delete them for everyone, and send messages and photos. Users can see whether the other person is online, or when was the last seen, and if their message has been delivered or seen.

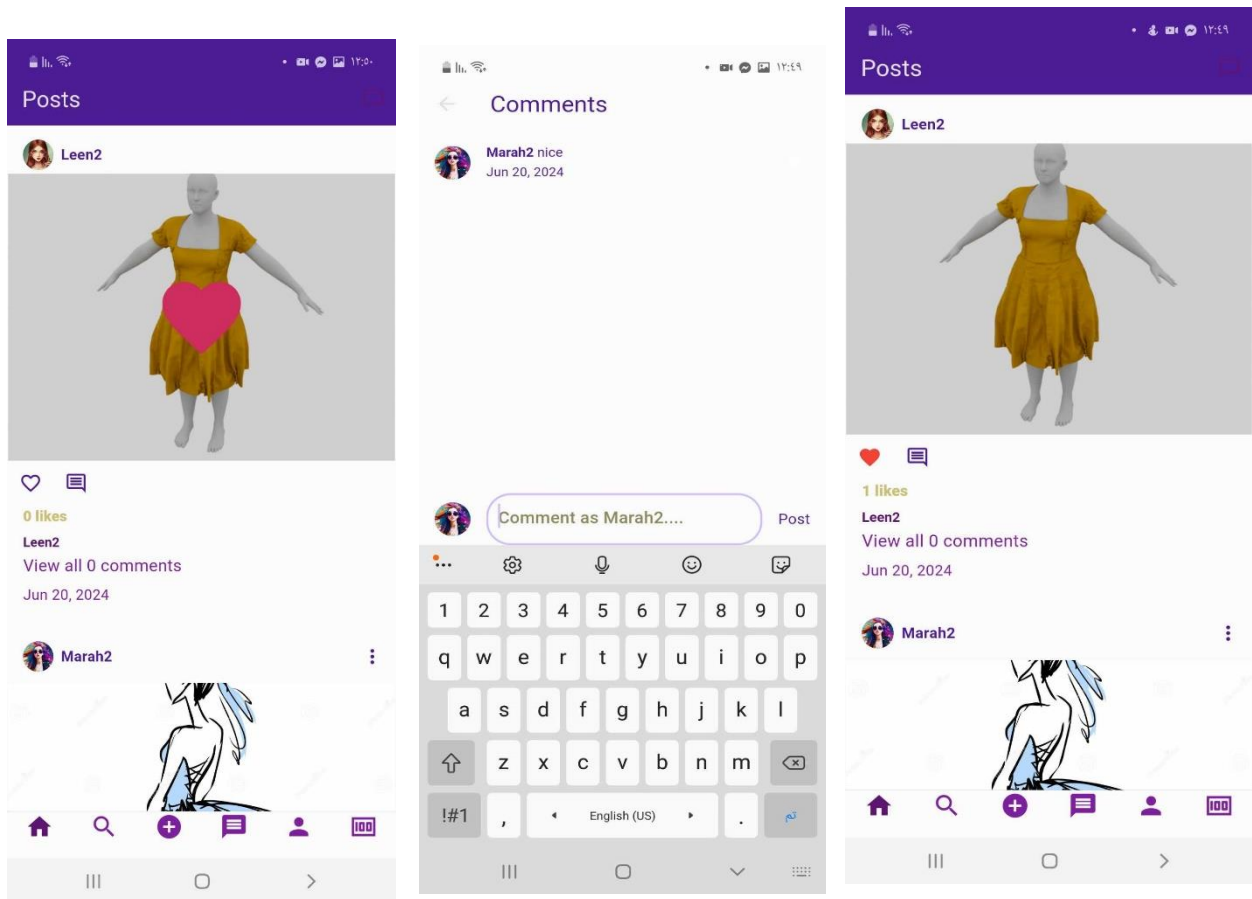


Figure 50: Like and comment on post

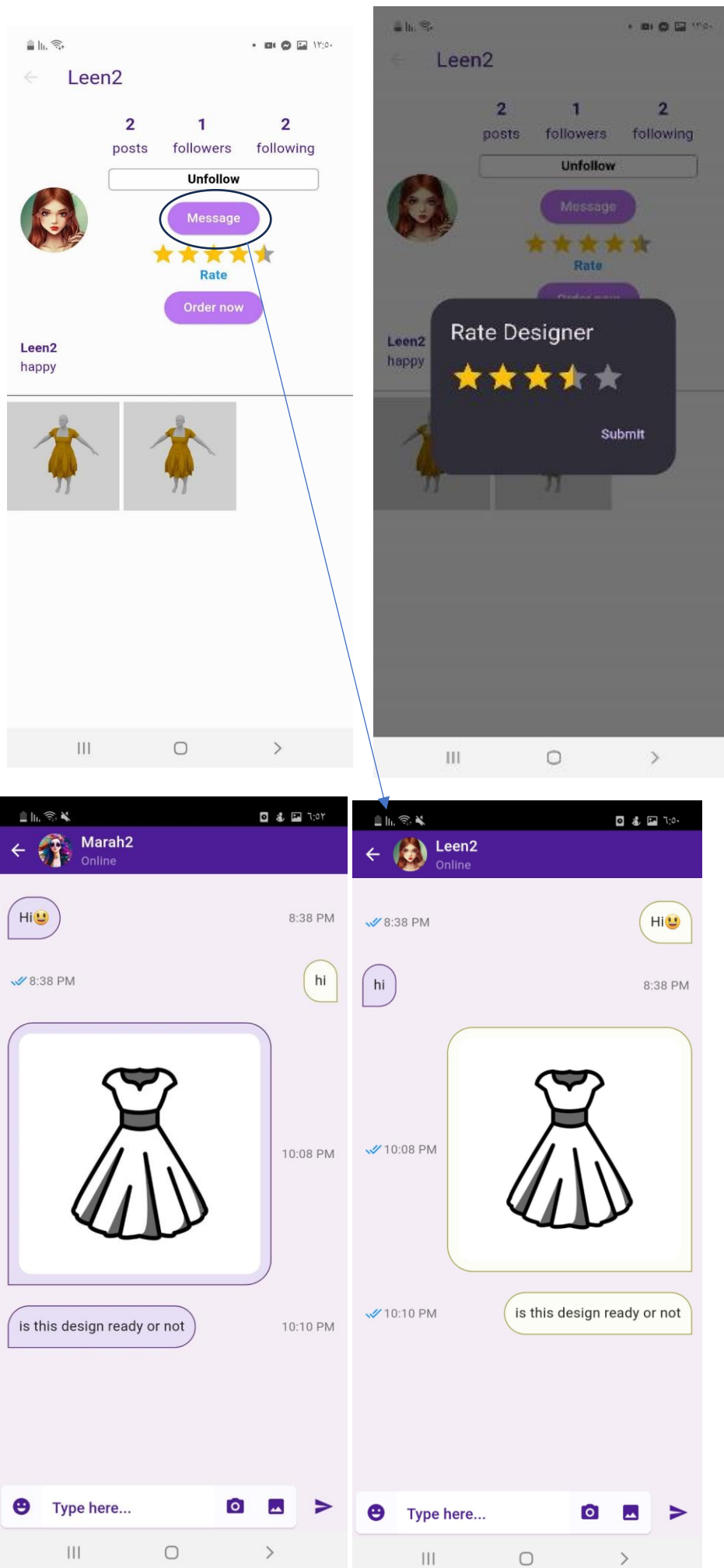


Figure 51: Designer rated by customer and chatting

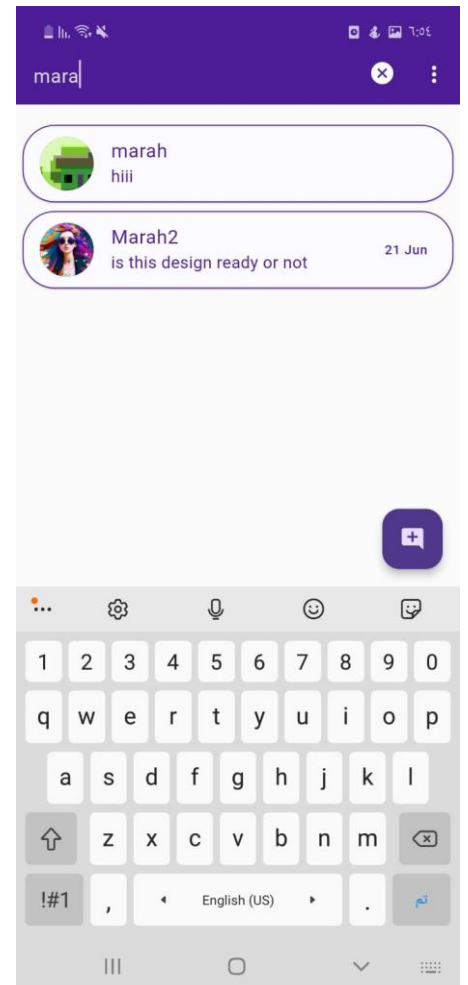
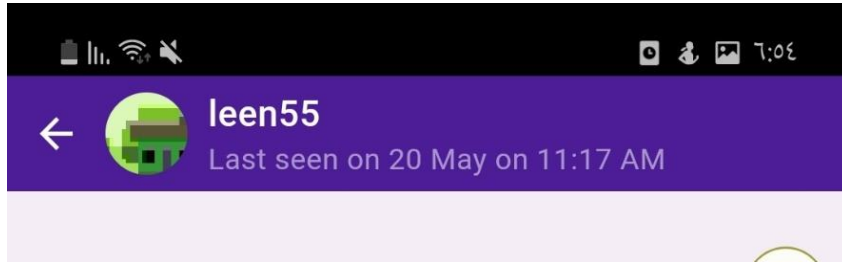


Figure 52:Online status in chat and search

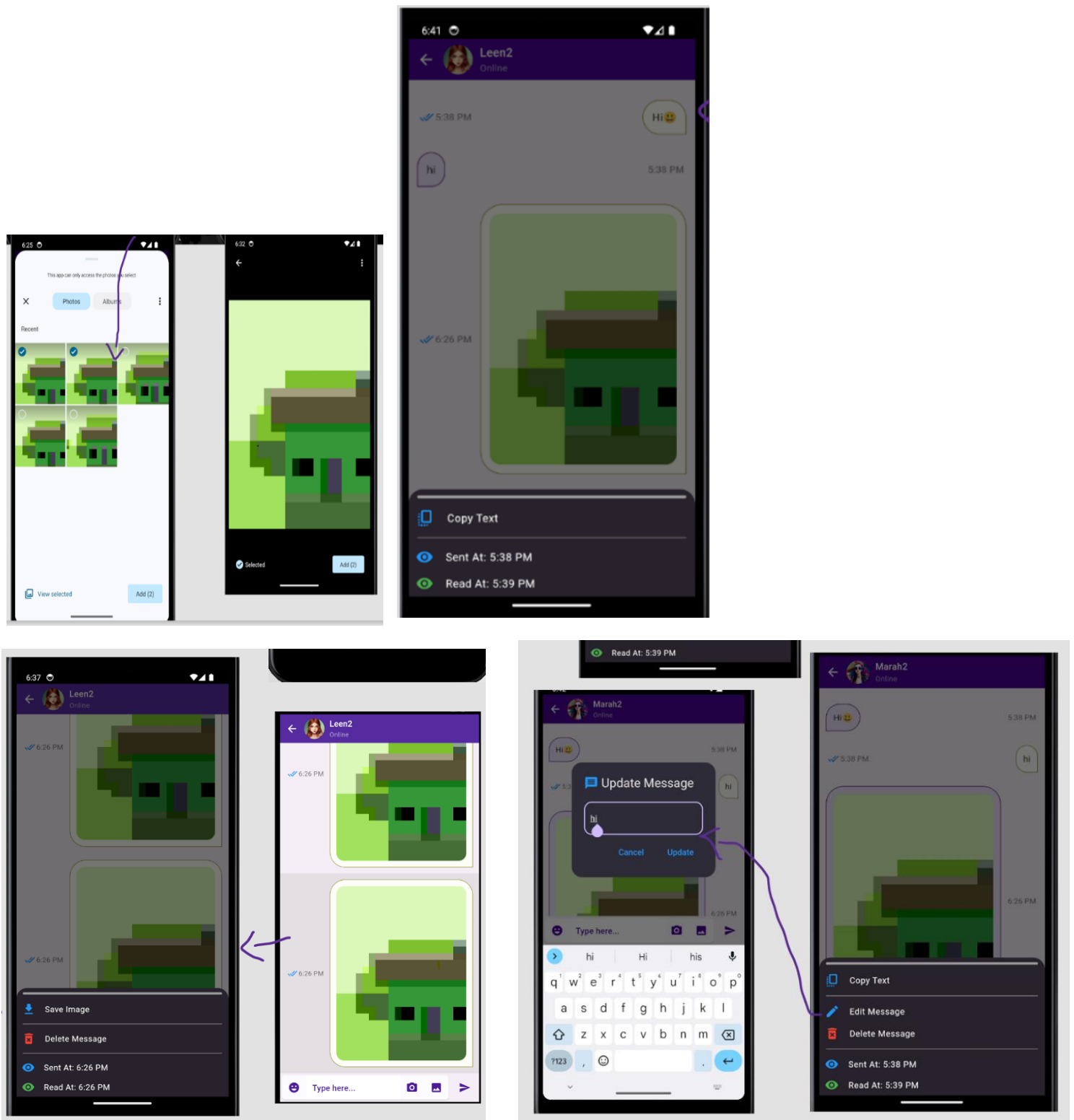


Figure 53:Editing Images and Messages in chat

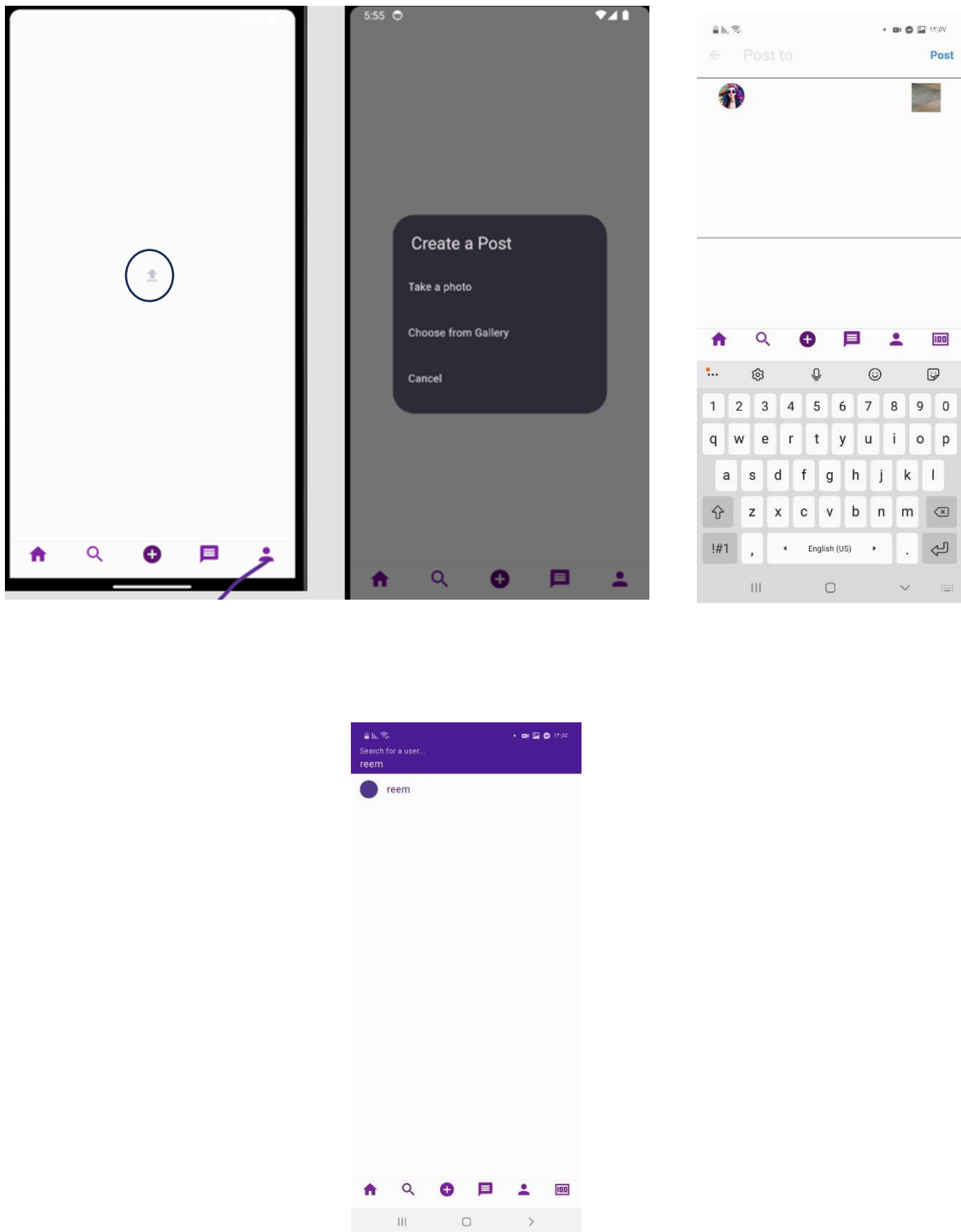


Figure 54: Add post and search for user

3.3.2: Website

All features mentioned for the mobile app are also available on the website without any excepti

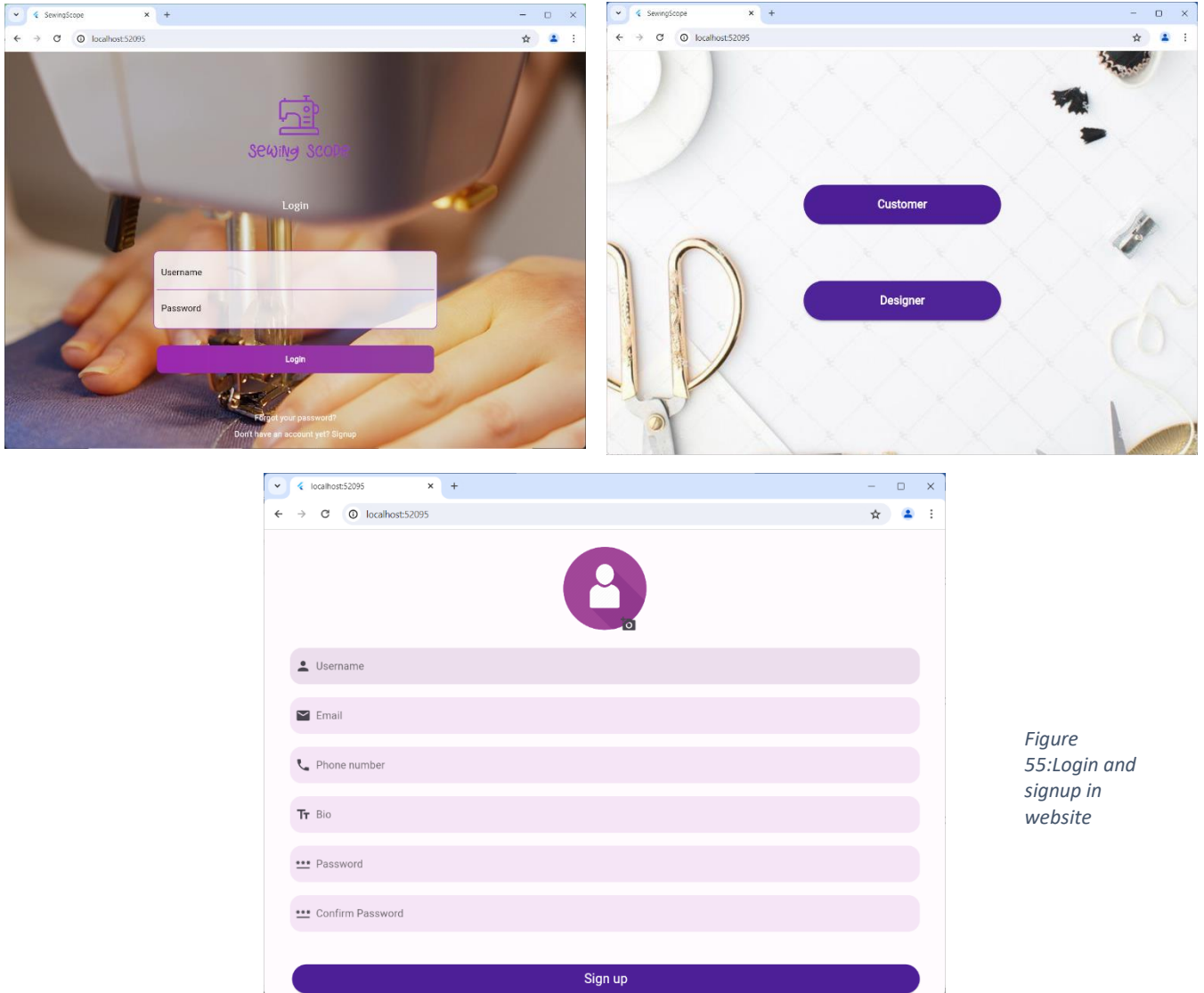


Figure 55: Login and signup in website

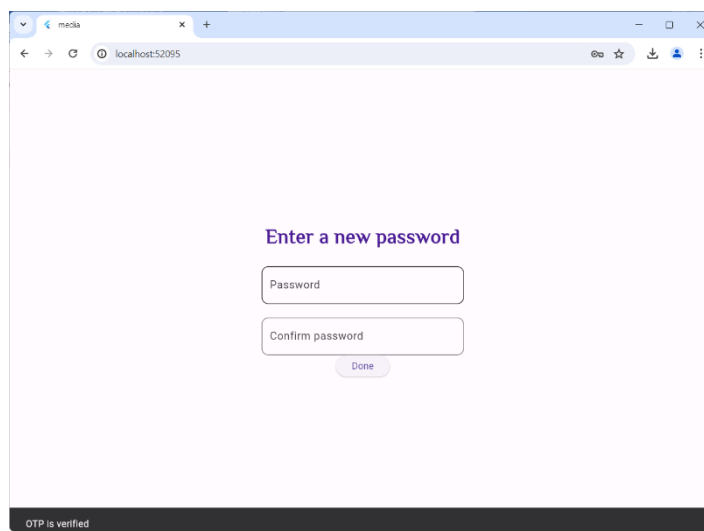
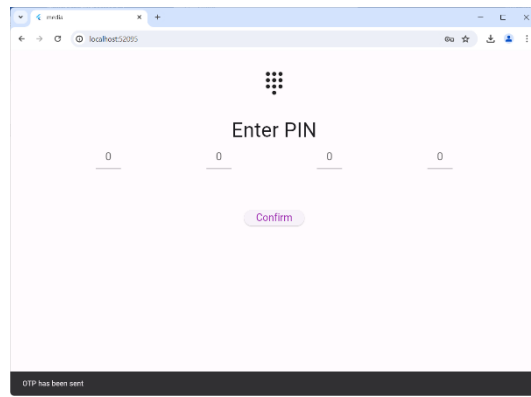
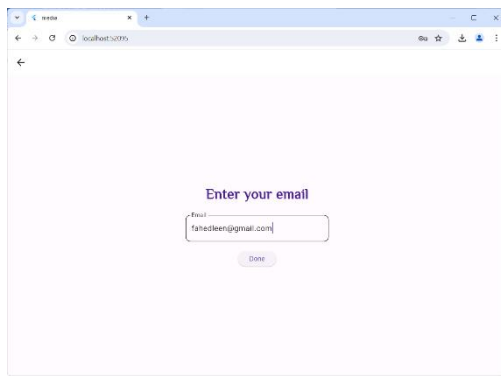


Figure 56:Forgot passowrd in web

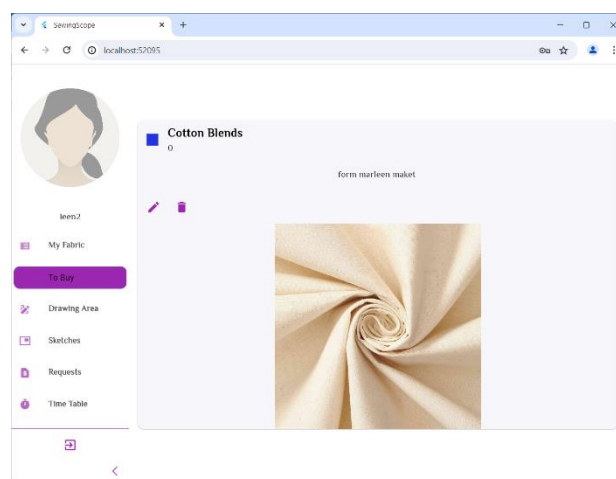
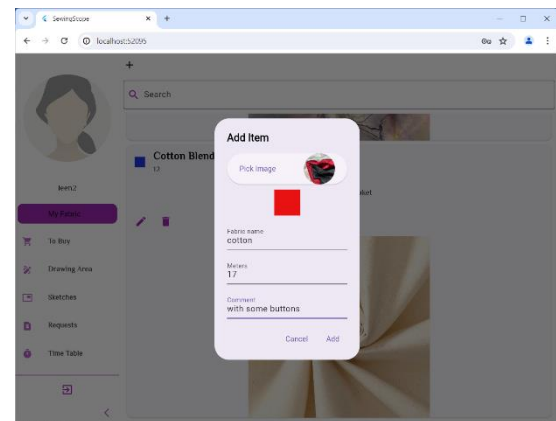
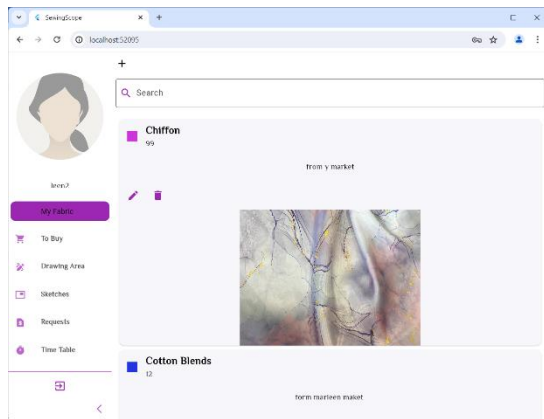


Figure 57: My Fabric and To Buy Screens on web

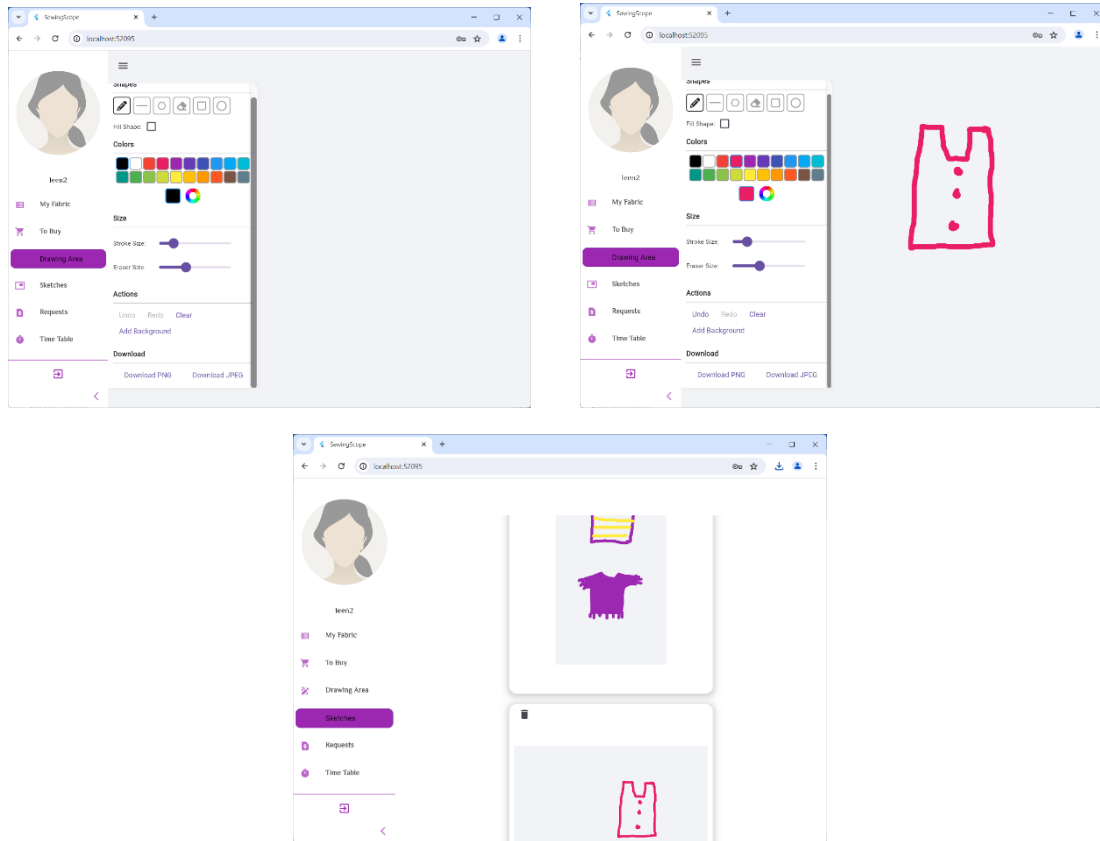


Figure 58: Drawing area and Sketches Screens on web

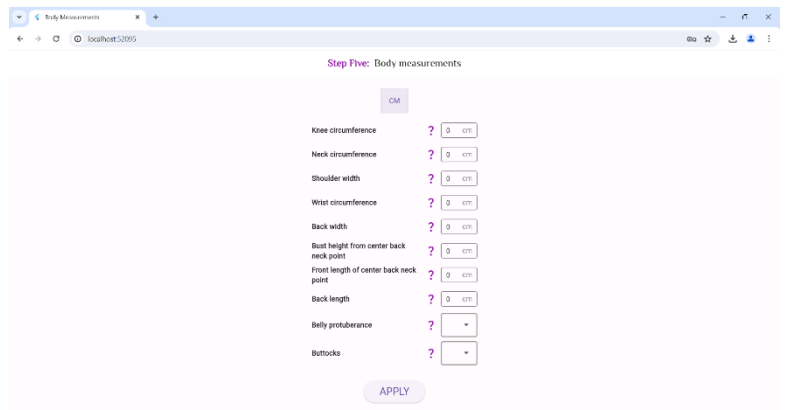
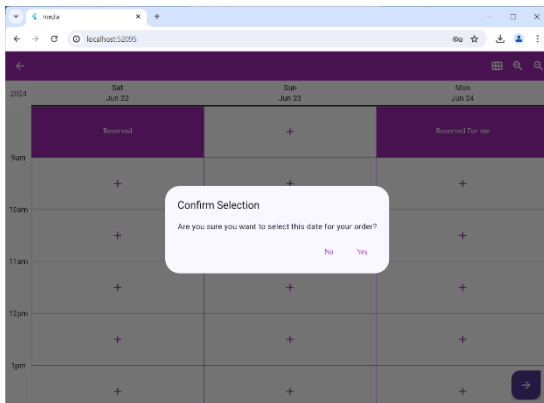
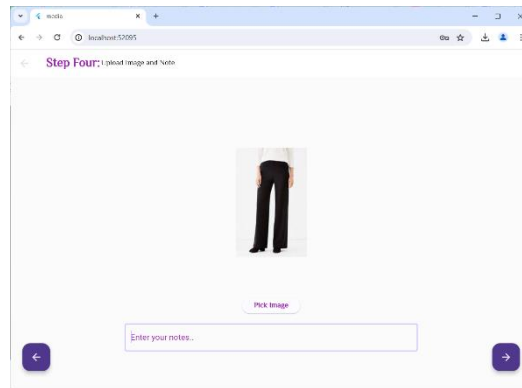
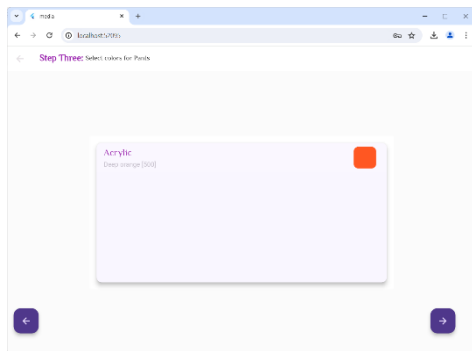
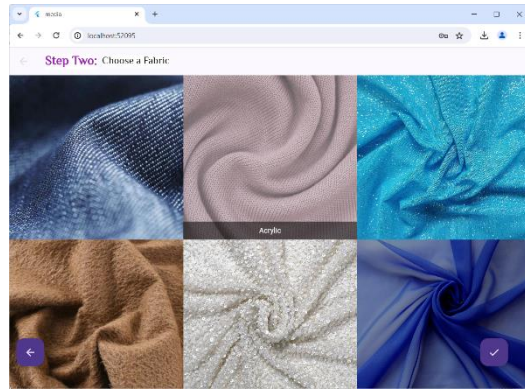
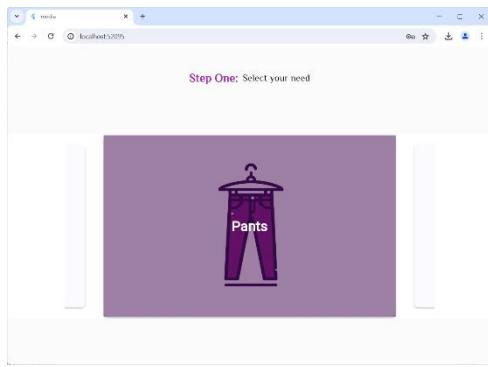


Figure 59: Pice order steps in web

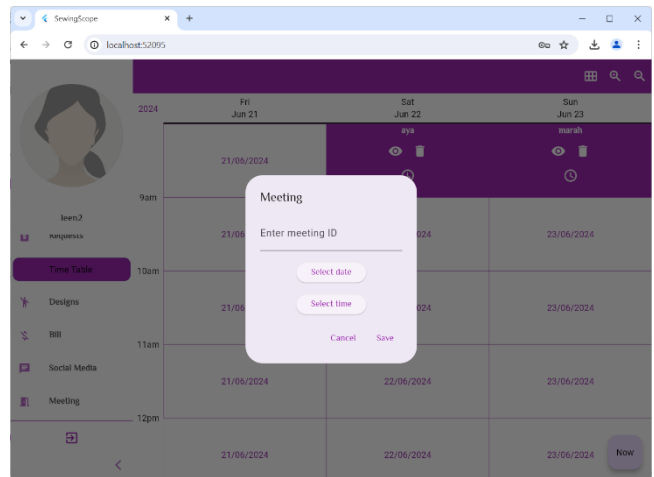
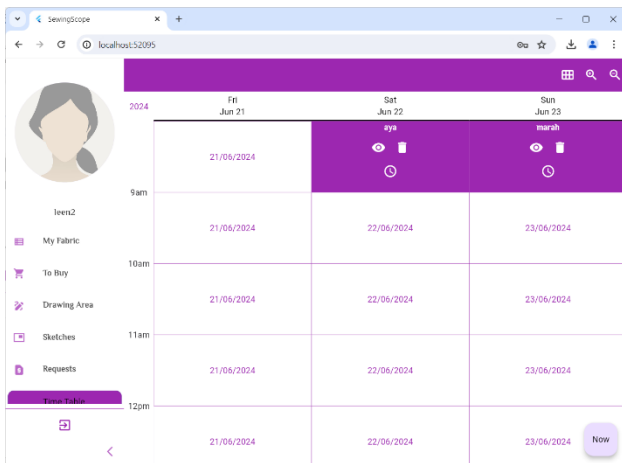
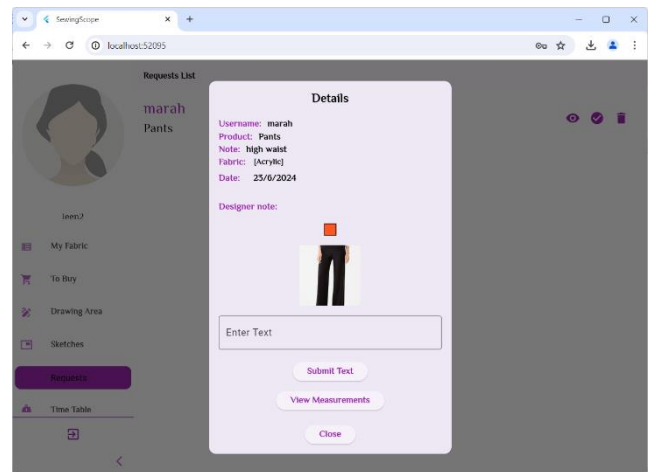
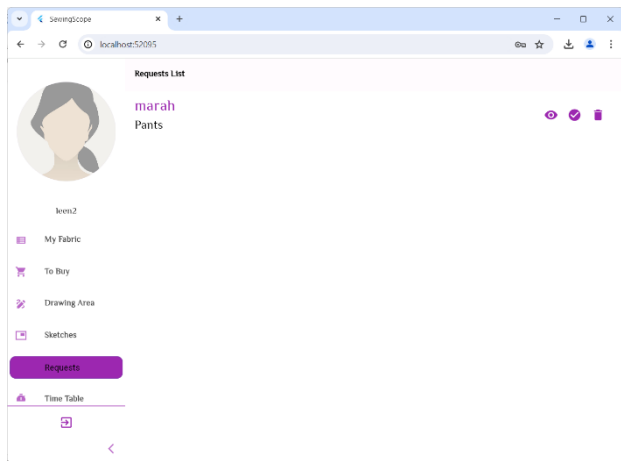


Figure 60:Requests and Tim Table in web

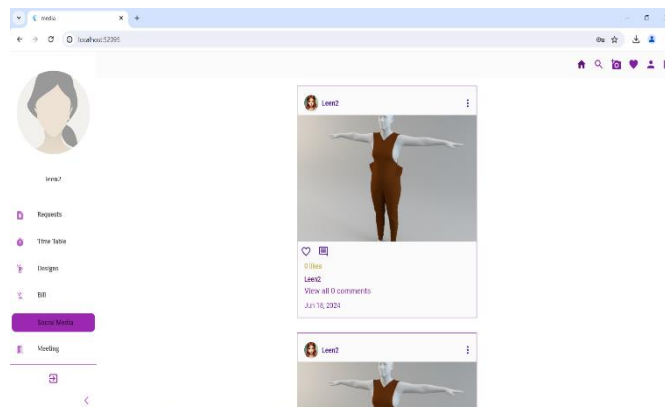
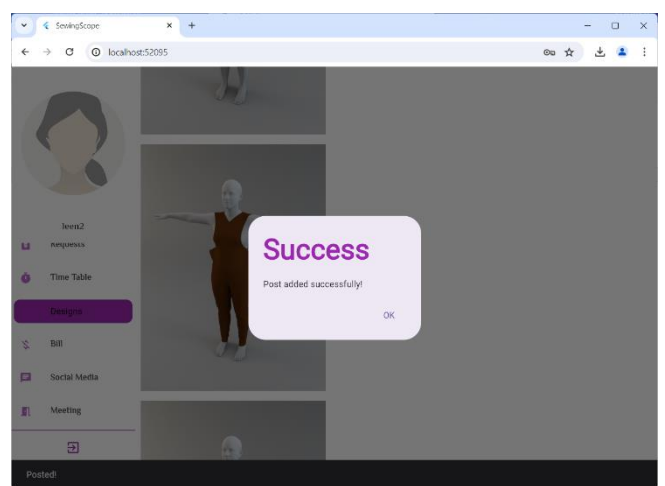
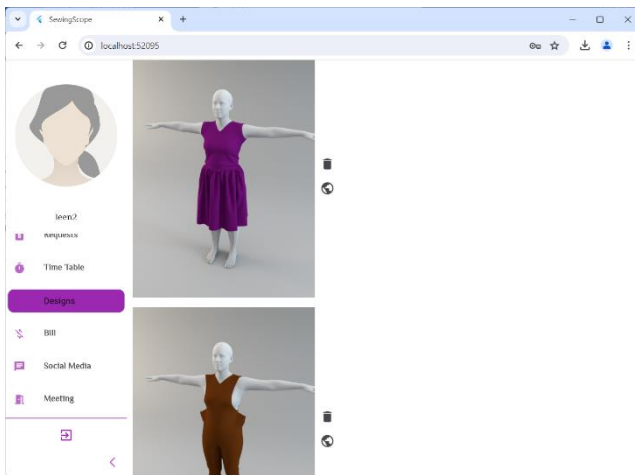


Figure 61: Designs and post added in web

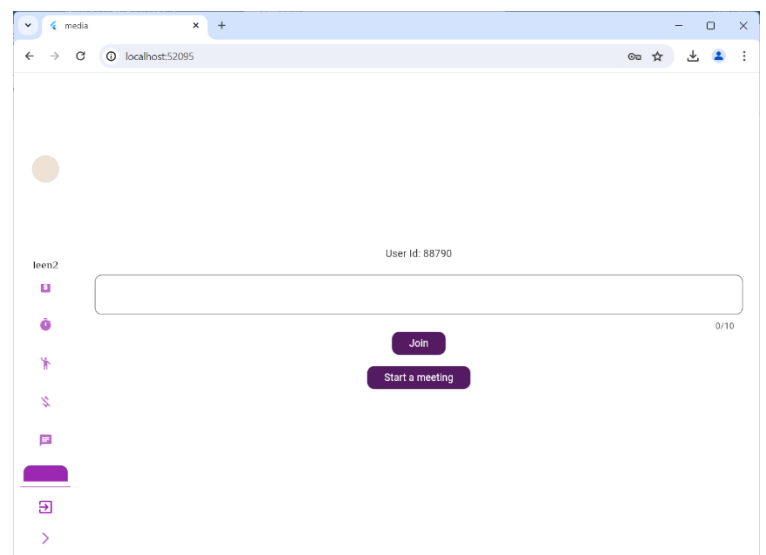
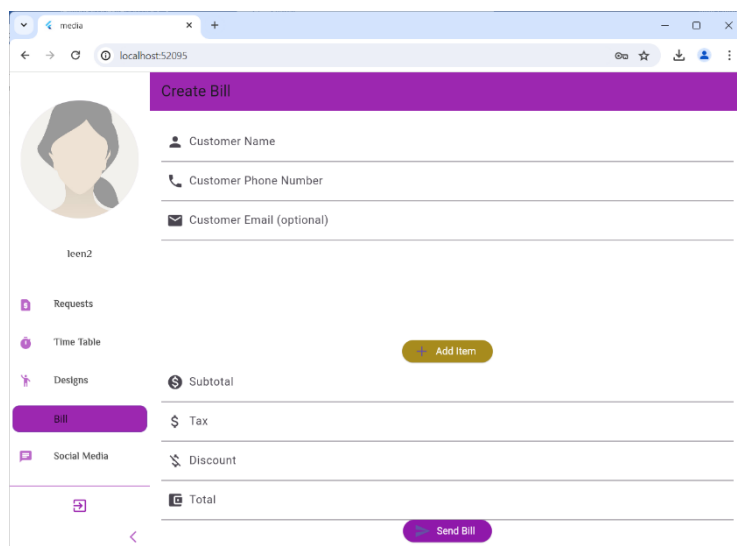


Figure 62: Bill and meeting Screens in web

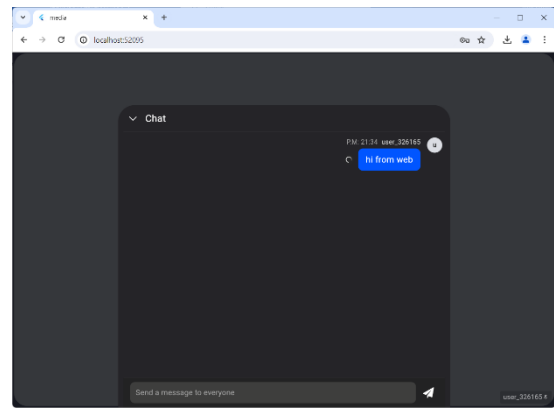
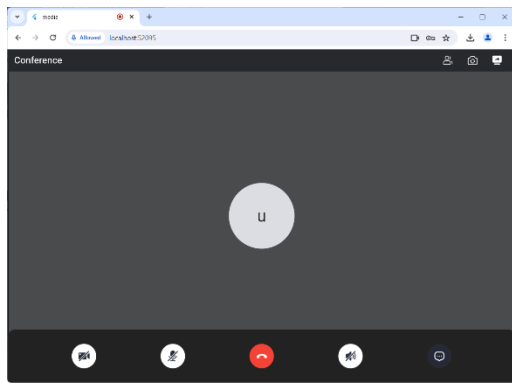


Figure 63: Inside meeting in web

3.3.3: Desktop App

This tool is a sewing pattern configurator than enable designers to make sewing patterns and get the cross-ponding 3D garment.



Figure 64:Desktop main page

here the designer chooses the top and the bottom part of the design using the meta tap with the ability to add a waist band

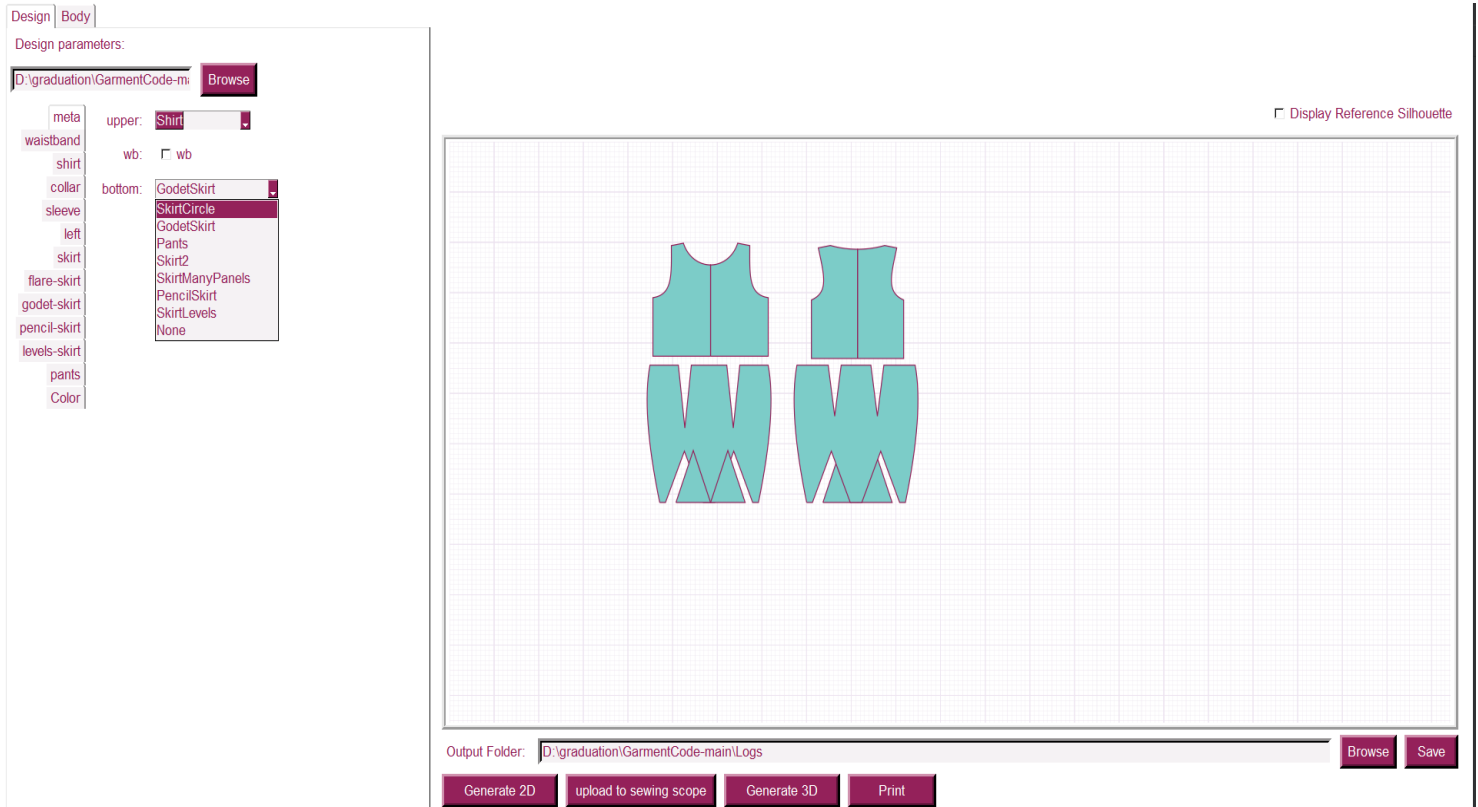


Figure 65:meta screen

the width and hight of the top can be adjusted



Figure 66:adjust width and length

the first kind of skirts is the godet skirt the designer can change the base skirt and adjust the inserts details

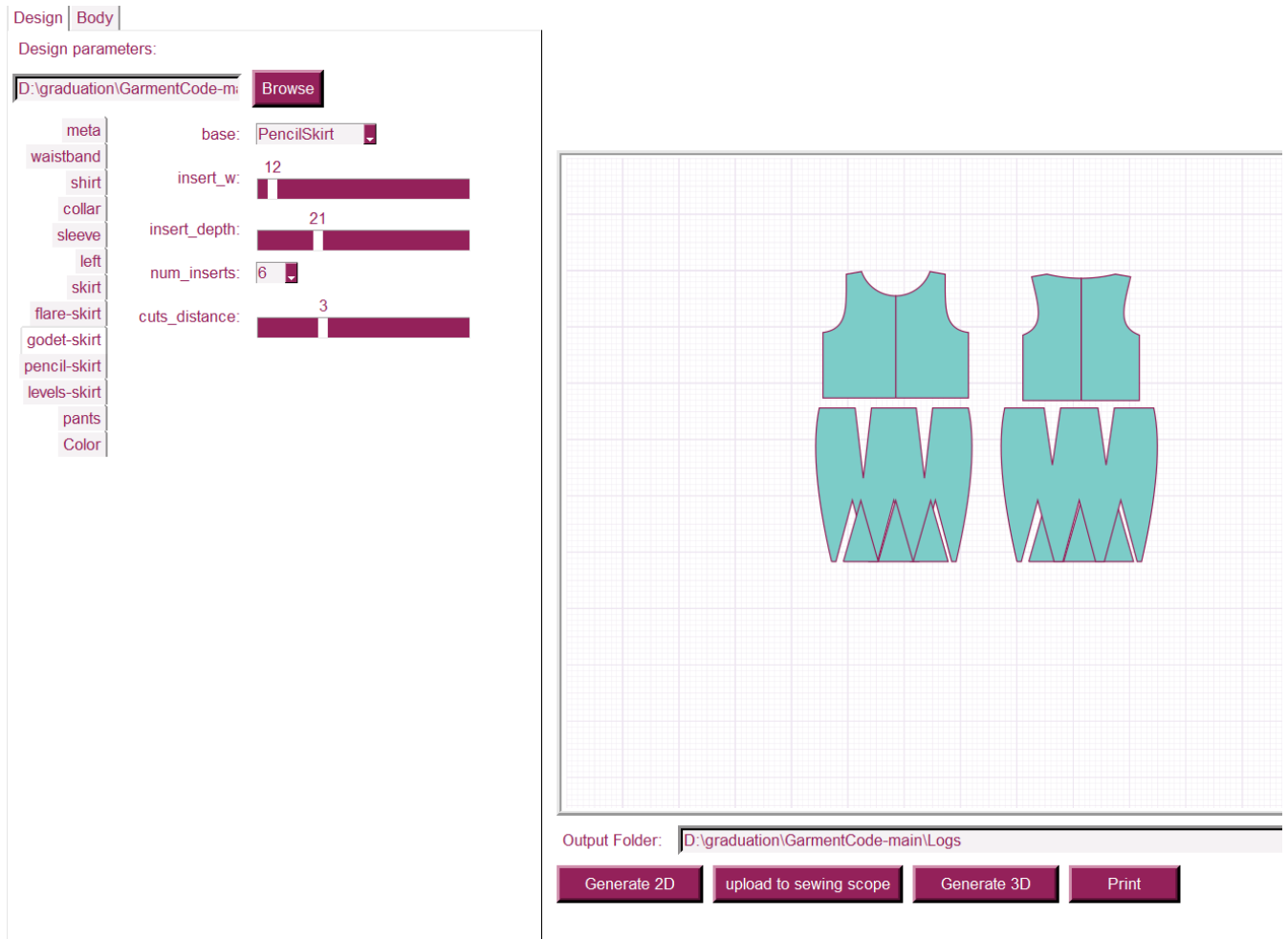


Figure 67:godet skirt

the next type is the flare skirt, the designer has the ability to adjust length, panel number, flareness ,and the ability to add a cut in any position he wants

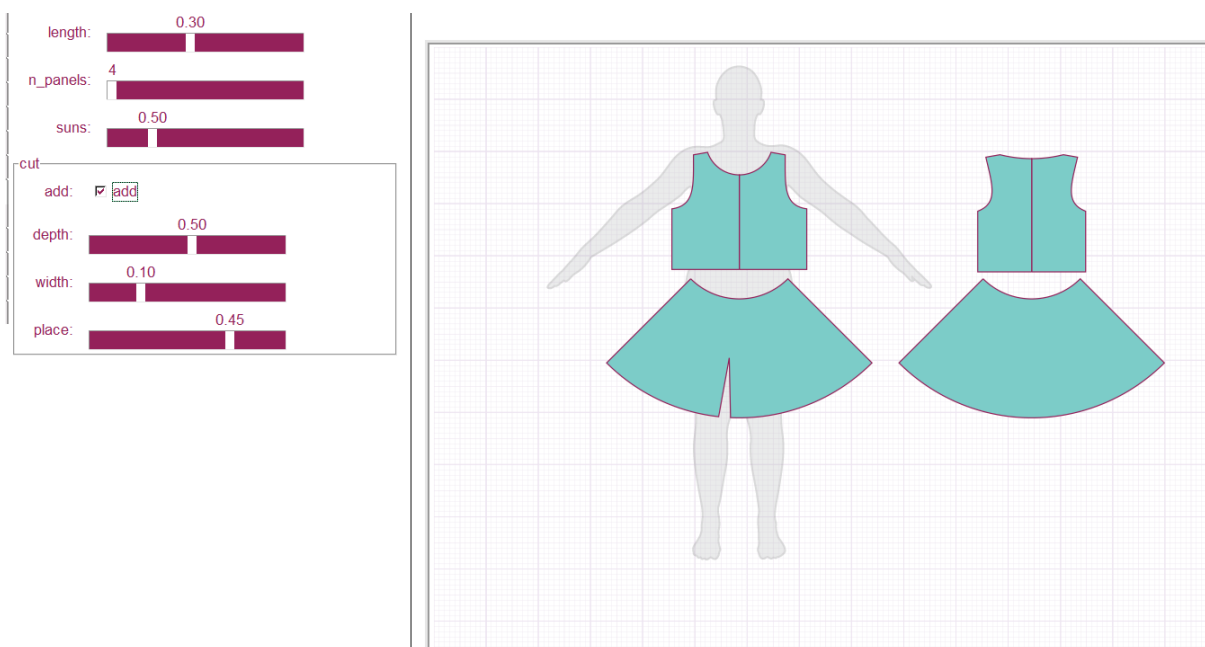


Figure 68:flare skirt

next is pencil skirt

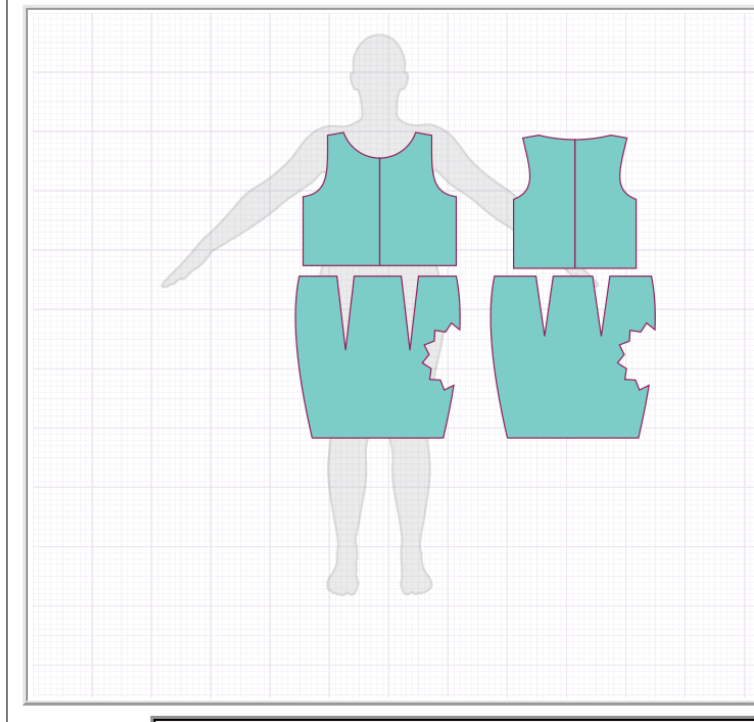
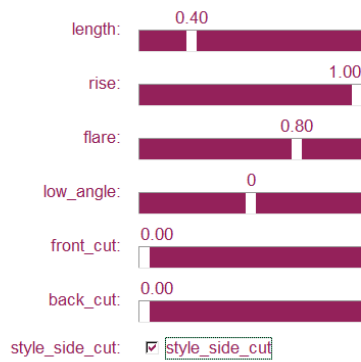


Figure 69:pencil skirt

for the multi-level skirt the designer can combine any 2 types of the previous skirts add any number of levels he wants

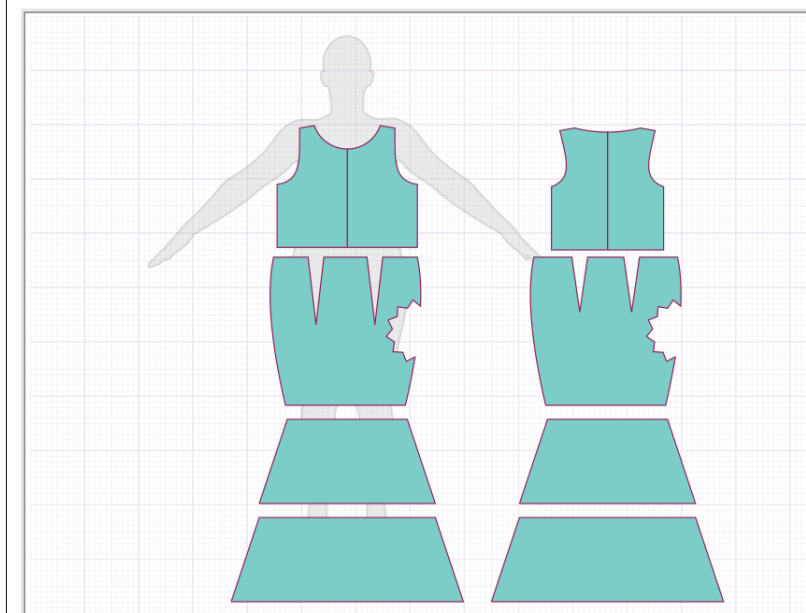
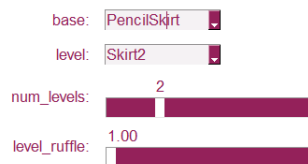


Figure 70:multi-level skirt

and for the pants the user can adjust length, width, flare, rise, and also have the ability to add a Cuff band or Cuff skirt or both and also adjust the details

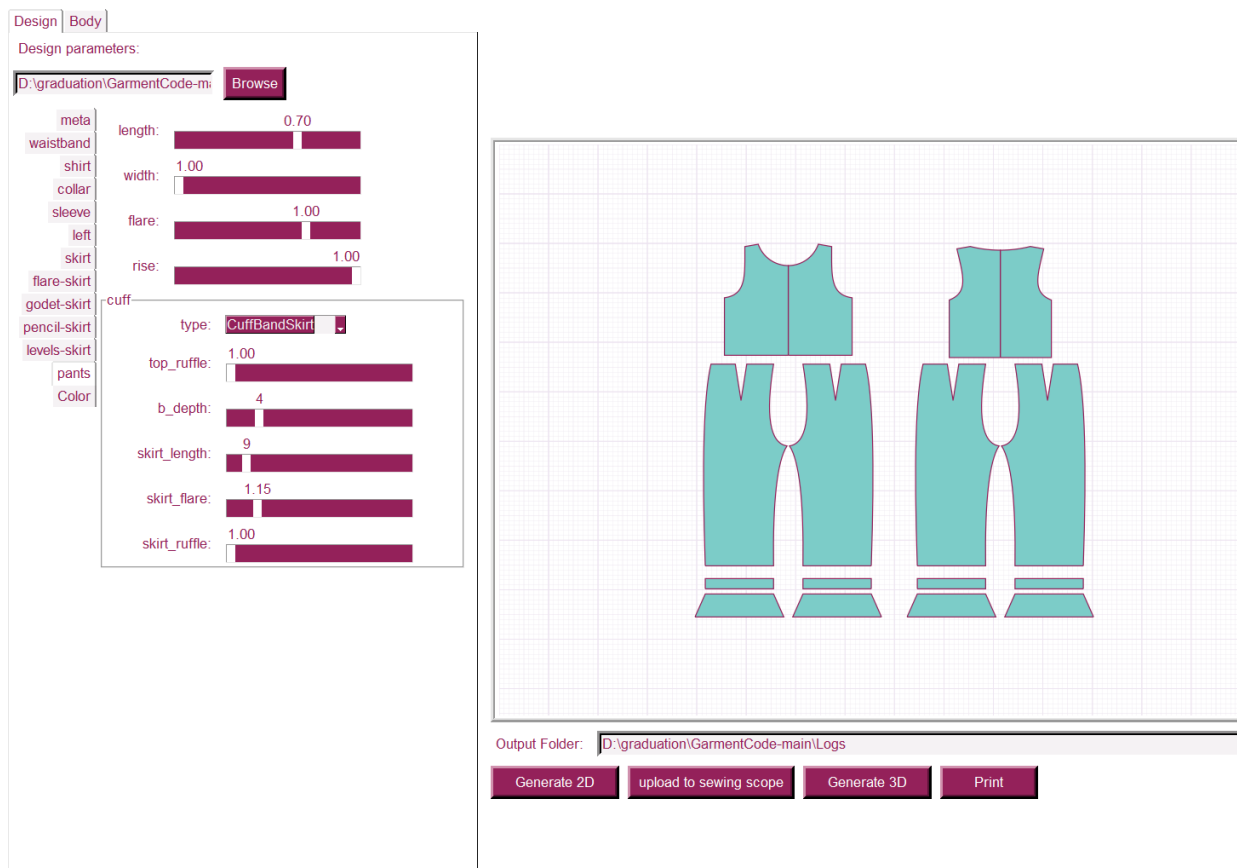


Figure 71:pants

for the sleeves the user can adjust the armhole shape, length, width, shoulders, and can connect a cuff band or cuff skirt or both, or choose the design to be completely sleeveless or strapless

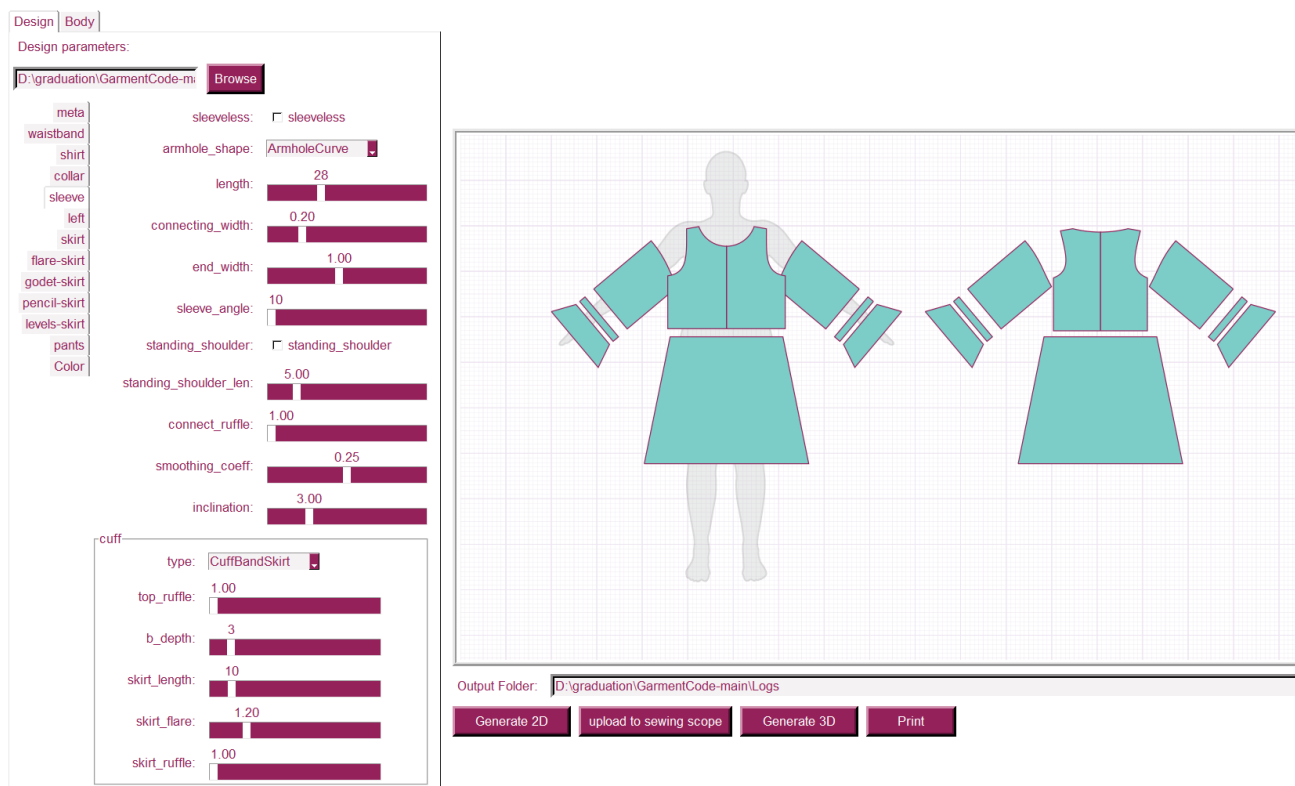


Figure 72:sleeves

and finally, the designer can choose one of these Collar options and adjust its details

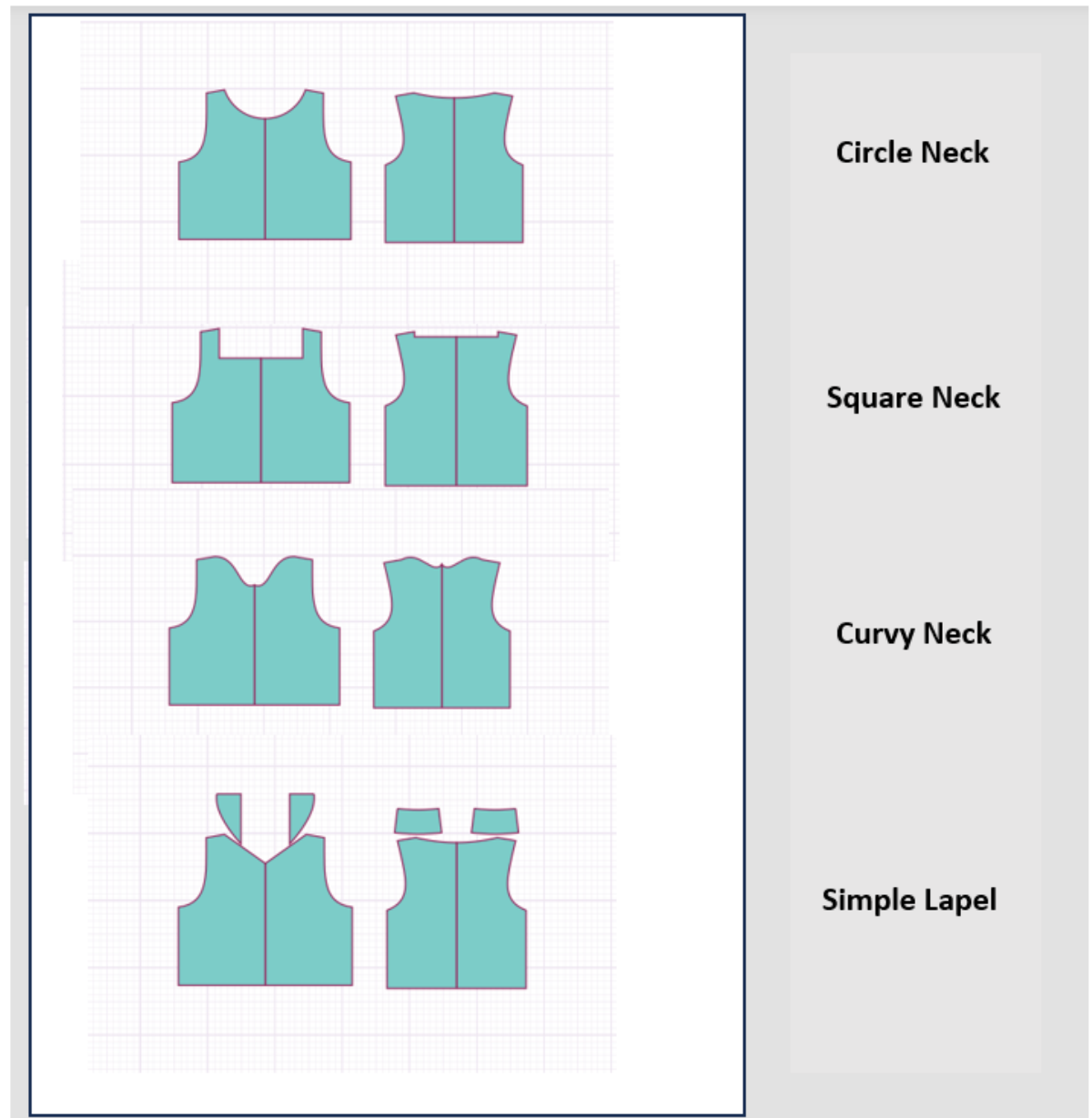


Figure 73:color shapes

To make the tool more dynamic we added an asynchronous design option that gives the designer the ability to change one of the design sides to not match the other.

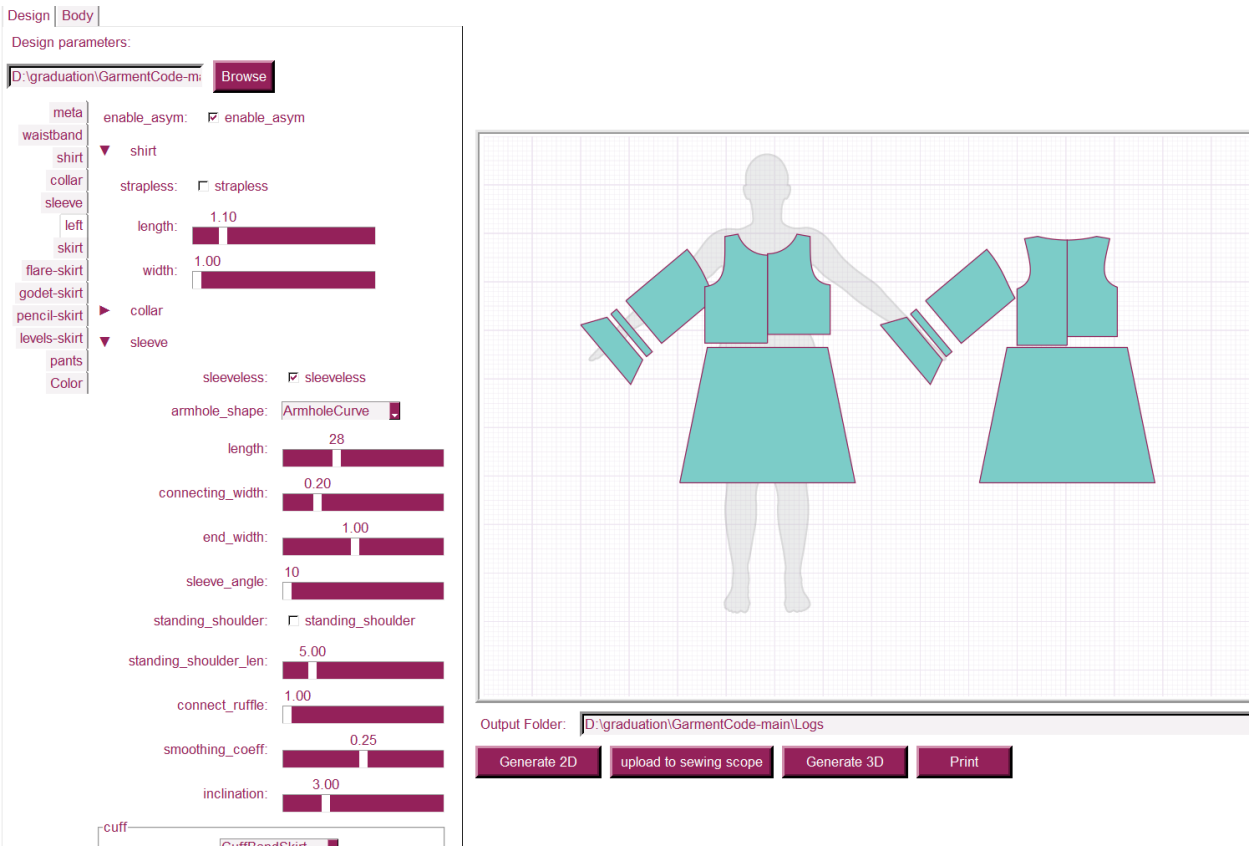


Figure 74:asynchronous design

User can upload previous design and adjust and save them

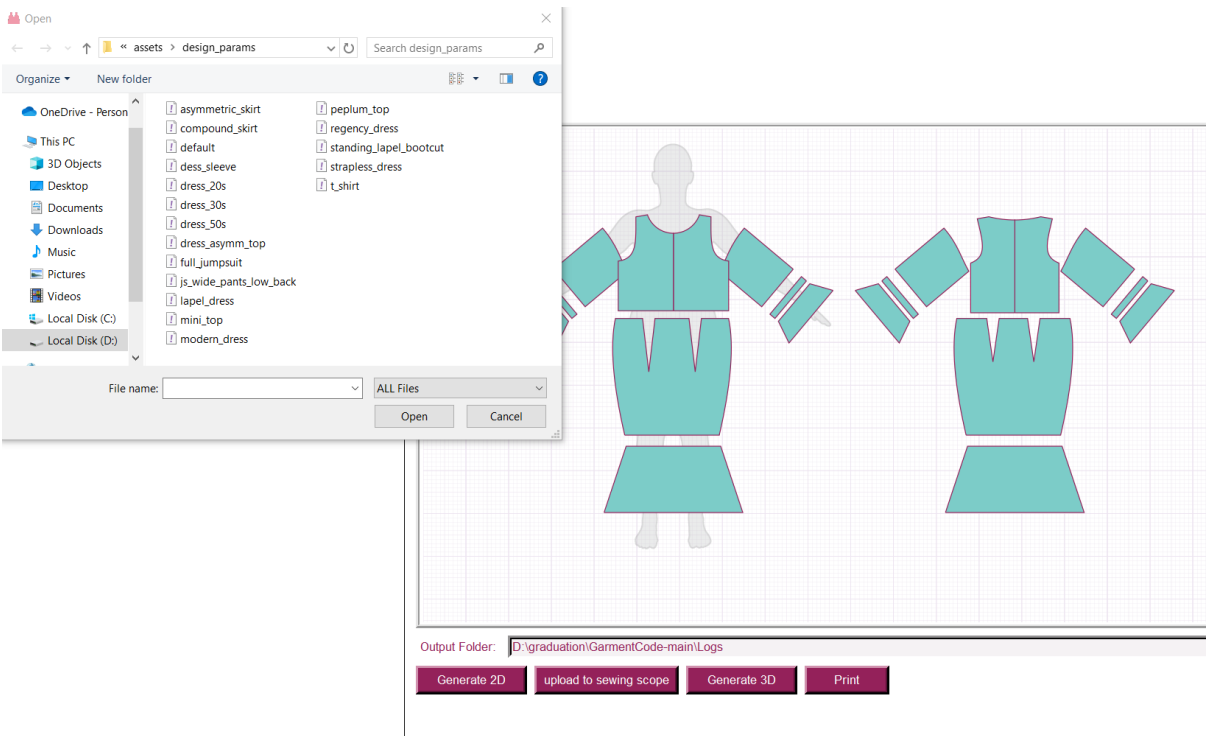


Figure 75:upload a design

When the user presses the generate button an image of the sewed design appears



Figure 76:2D view

And when pressing Generate, a 3D object appears for the sewed design that was rendered using the Maya cameras, leveraging techniques from garment modelling with a depth camera (Chen et al., 2015).

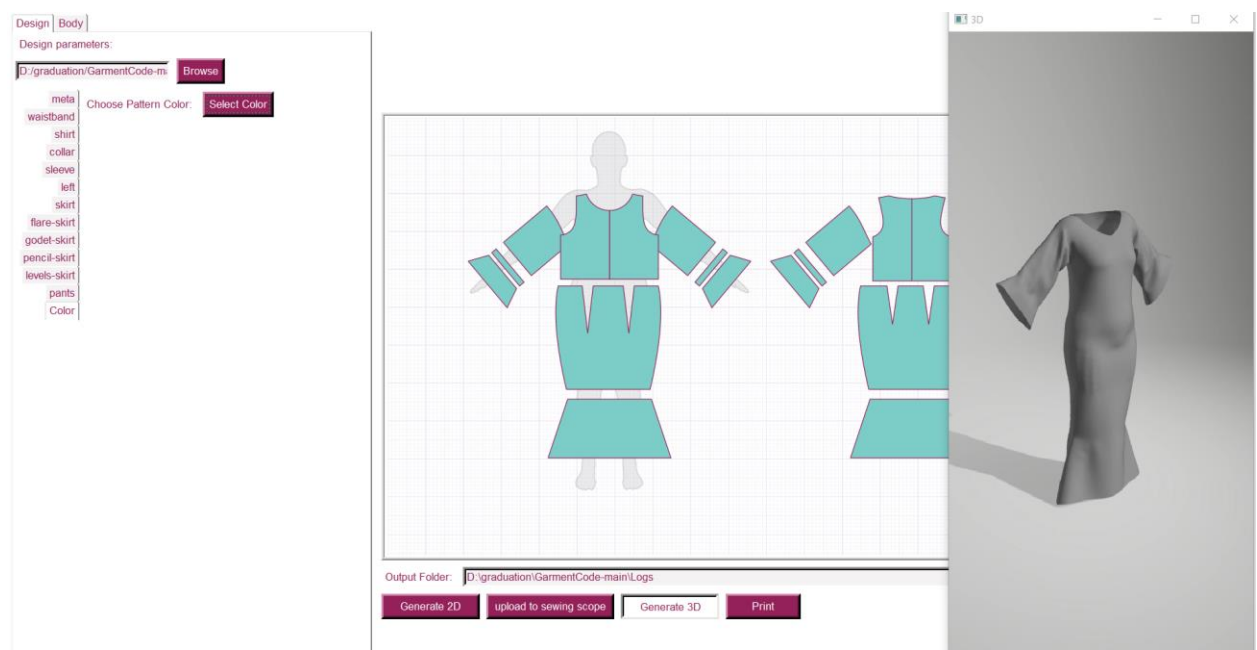


Figure 77:3D view

In our implementation, to achieve the more lifelike image of the garment patterns on 3D objects in maya, we used the Qualoth bulging feature. This was achieved by including the Qualoth bulging in our desktop application that enables the computer to mimic the way different patterns of cloth would naturally bulge and deform. We first built the mesh for the garment and then assigned Qualoth cloth properties in this mesh. Utilizing bulging feature, parameters like the stiffness, damping, and the pressure required for achieving the required maximum bulging were adjusted correspondingly. This process makes it possible to visually and physically manipulate the fabric against the 3D-objects, and have a preview of the garment's look and behaviour in real life. This was made possible since the outcome produced higher levels of accuracy and better presentation of the designed patterns in the application improving the functionality of the program for fashion designers.

We are using the SMPL female average body model as the base for our 3D designs (SMPL, n.d.).

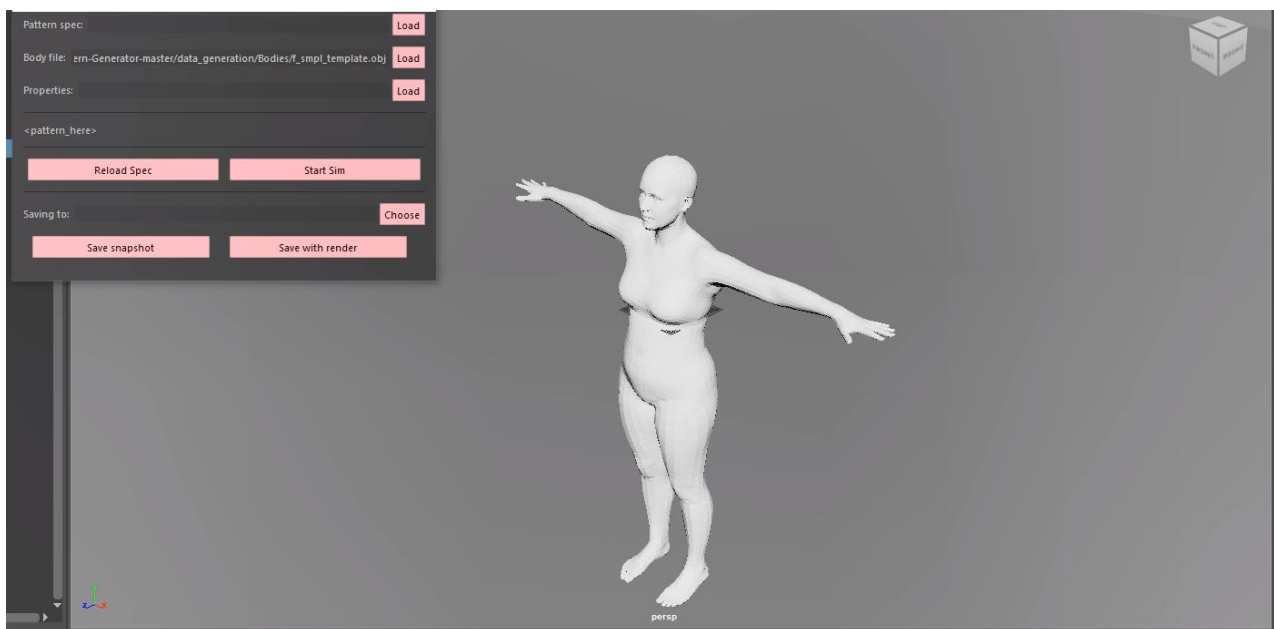


Figure 78:SMPL in maya

We also used point-based deformation of garment meshes. As described by Wang et al. (2022) this allows for more realistic and accurate simulation of the garment.



Figure 79: Add pattern in maya

We used the Mayapy executable, which allowed us to run Python scripts within Maya, automating the application of Qualoth settings and ensuring seamless interaction between the pattern design configurator and Maya's powerful simulation tools (FXGear, n.d.). The result was a more accurate

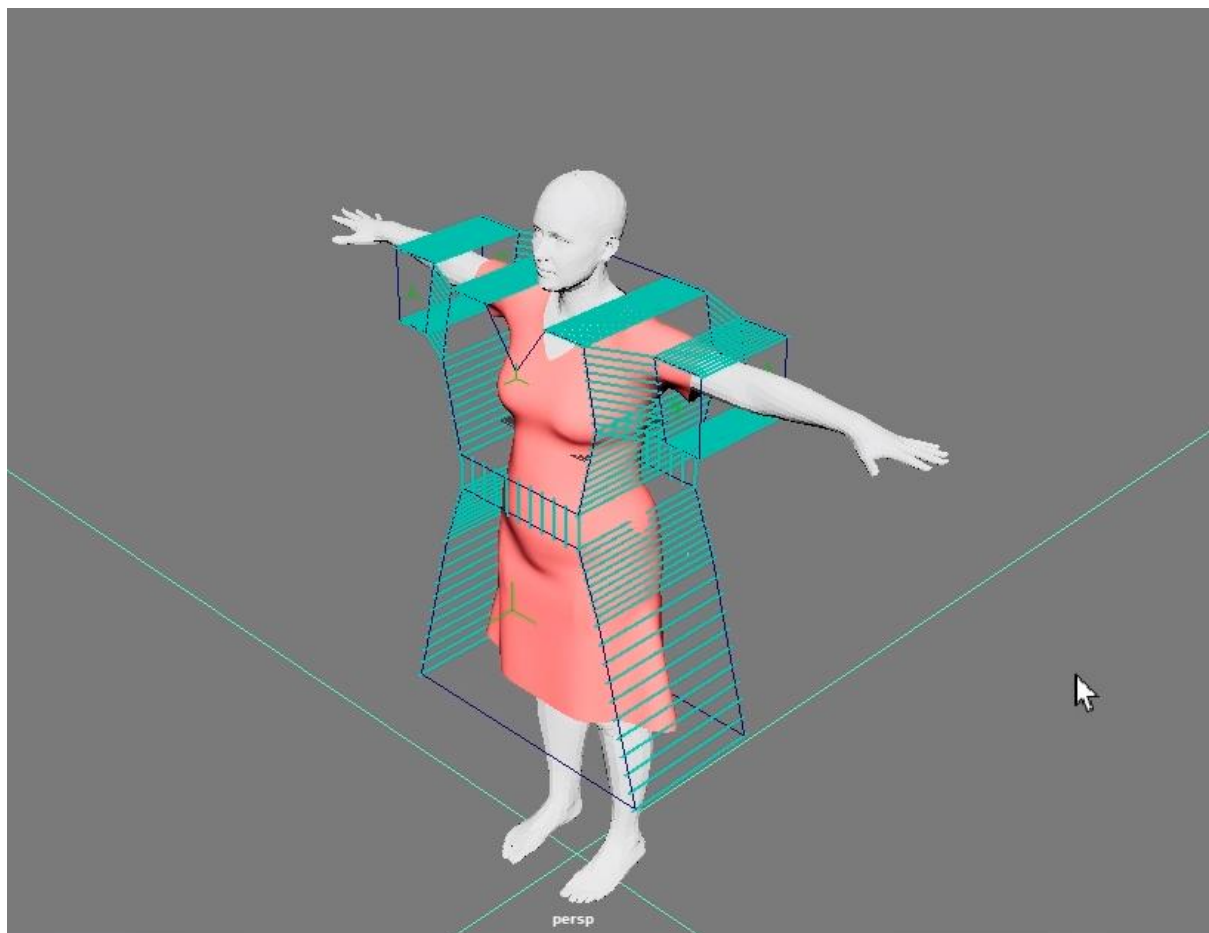
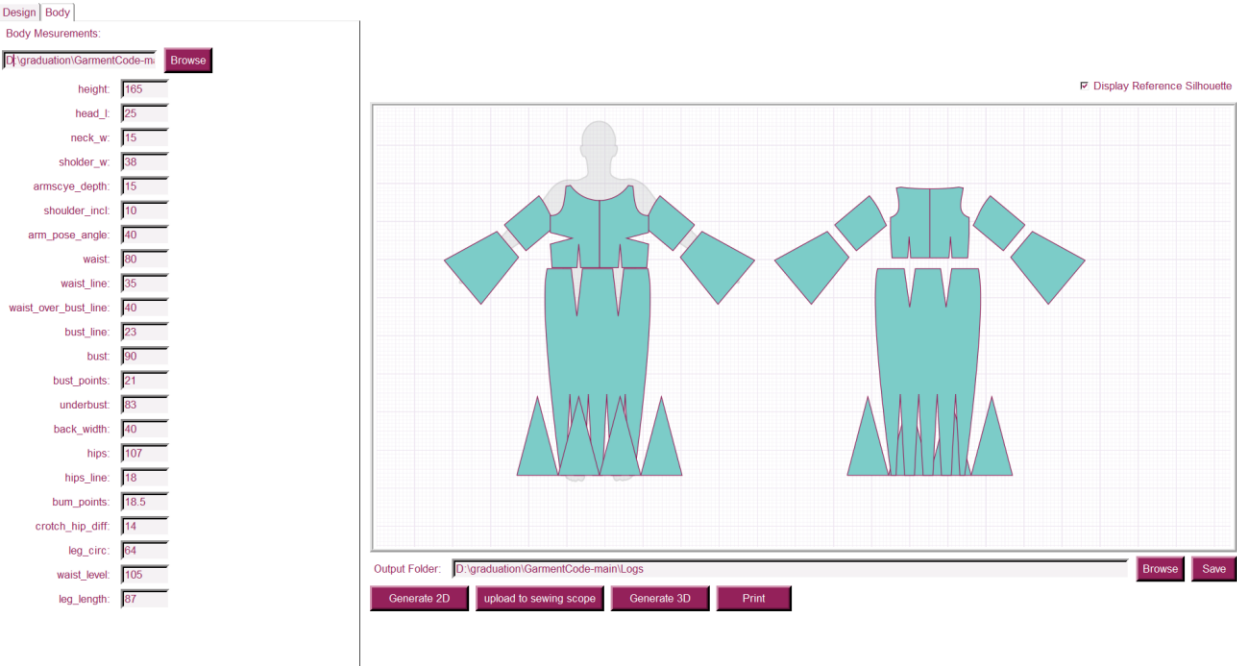


Figure 80: simulation

and visually appealing representation of the designed patterns, enhancing the overall utility of our application for fashion designers.



in the body tap the designer can add the customer body measurements and the pattern adapts with it immediately

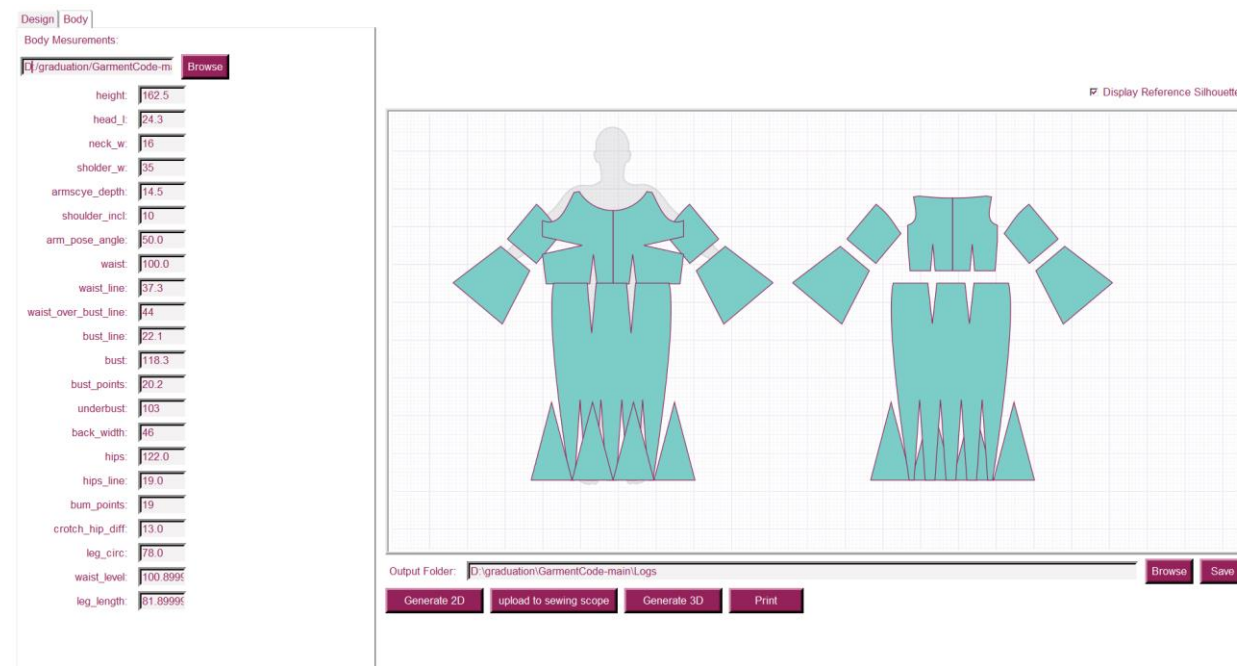


Figure 81:body measurements tap

the pattern can be later printed in real sizes using the print button

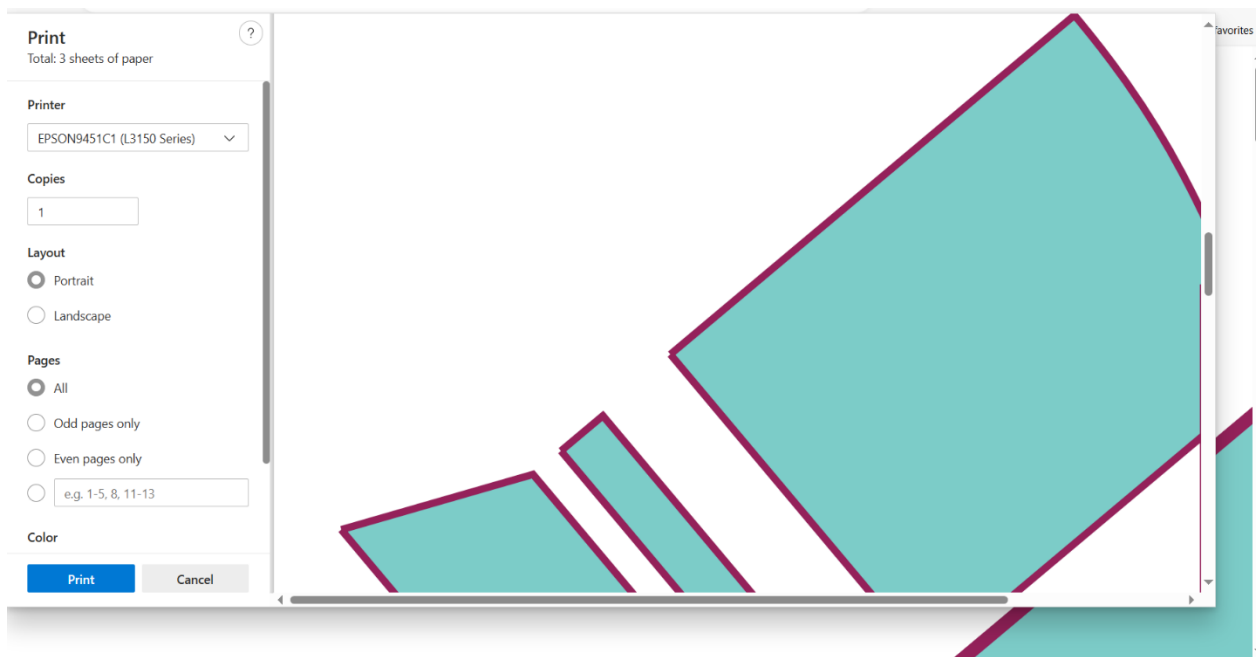


Figure 82:print pattern

the colour of the design can be changed

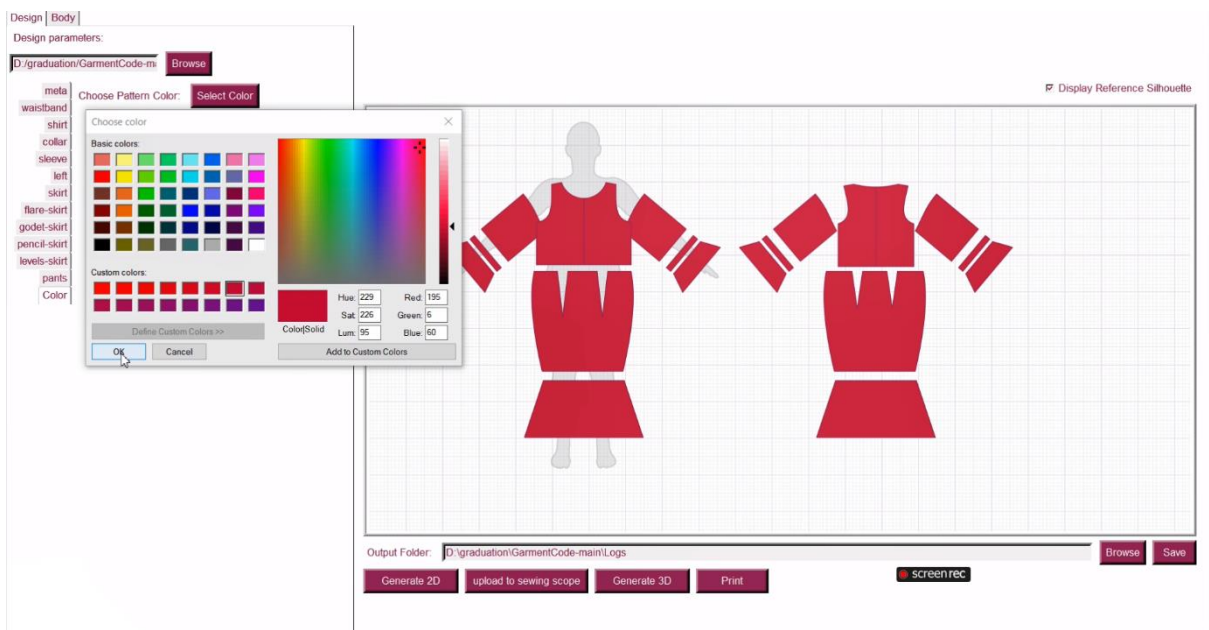


Figure 83:design color

and finally, it can be uploaded to our mobile app or website

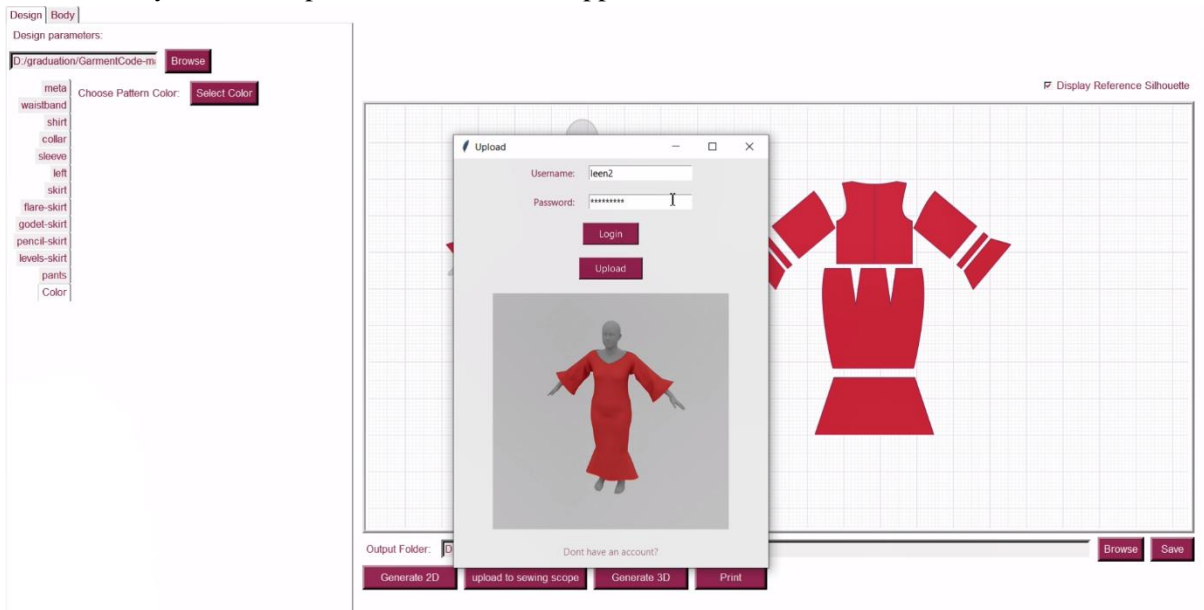


Figure 84:upload to sewing scope

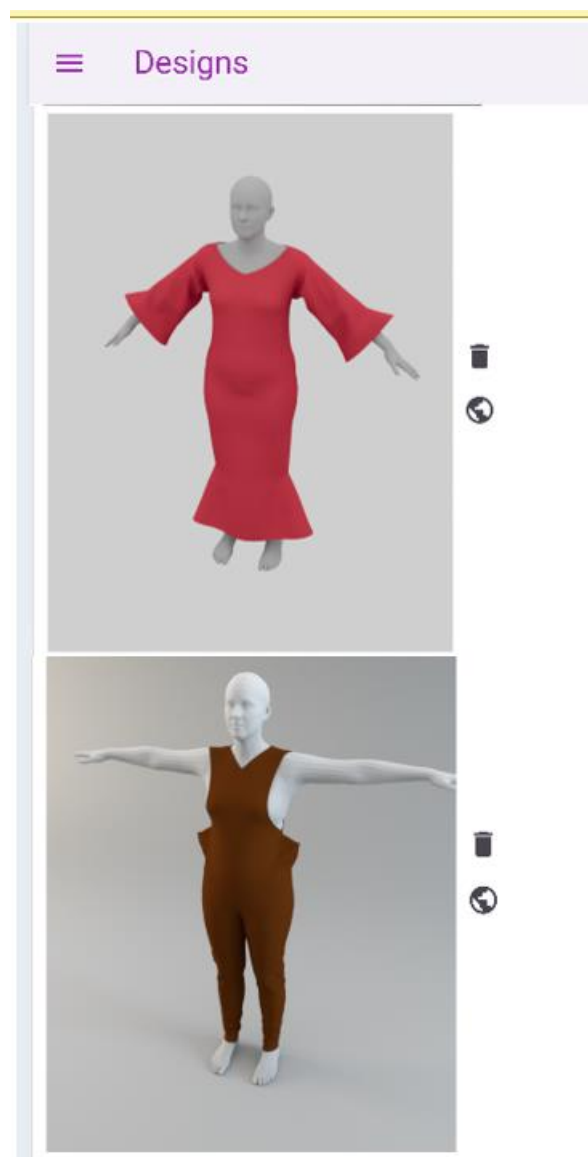


Figure 85:uploaded designs

Chapter 4: Results and Discussion

4.1 Results

In this section, we present the results of our graduation project Sewing Scope

4.1.1 Mobile Application and Website

The mobile application and website share similar functionalities, ensuring users have a consistent experience across both platforms. Key features include:

- **Authentication:** Users can sign up, log in, and reset their passwords using OTP verification.
- **Fabric Management:** Designers can add, edit, search, and delete fabric items in their inventory. The application handles fabric details such as color, name, meters available, and associated notes.
- **Design Requests:** Customers can place orders for designs by selecting fabric materials, colors, uploading reference images, and specifying body measurements. Designers receive these requests, review the details, and approve or disapprove them.
- **Scheduling and Meetings:** Designers can manage their schedules using the timetable feature, which allows date adjustments and meeting scheduling. Virtual meetings can be conducted directly through the platform.
- **Billing:** The platform includes a billing feature where designers can create and send bills to customers., with automatic calculations for totals, discounts, and taxes.

4.1.2 Desktop Application

As our work, the first and primary goal was to design an app that would make the process of designing garments and choosing patterns less time-consuming and more accessible for designers. Our results indicate that we have successfully addressed this problem in several key ways:

- **User-Friendly Interface:** Designers also liked it because it was user friendly and therefore made the process of designing easier.
- **Pattern Customization:** The configurator is immensely flexible to meet the need of the designer, with many possibilities of customization.
- **Real-Time Visualization:** Once designers got the pattern designed, they were able to get an immediate sight of the garment and so make a change if it was needed, making the design to improve.
- **Integration with Manufacturing Processes:** The application smoothly translated digital patterns into the formats that could be easily fed into the garment cutting systems.

However, it is important to analyze the application in question to determine whether it effectively facilitates students' work on various stages of the pattern design process; to do this, it is necessary to identify the specific elements that can still be improved.

Features and Limitations

While our application offers significant benefits, it also has limitations that must be addressed in future iterations:

- **Computational Limitations:** Geometry that is rich in details brings problems that ravage the appearance of complexity and makes the representation of real-time visualization a little bit slow.
- **Learning Curve:** Despite a user-friendly interface, some designers, especially those less familiar with digital tools, may require training to fully utilize the application's capabilities.
- **Integration with Different Manufacturing Systems:** One of the challenges in the application of the presented model is compatibility with different manufacturing technologies and systems.

4.2 Discussion

In the end, we were able to reach the intended goal: a cross-platform application that helps designers and customers interact more efficiently. Achieving this goal was not without challenges; confronting difficulties and learning new things was integral to the project's

success. This chapter will detail the achievements, challenges, and future directions for the Sewing Scope project.

4.2.1 Achievements

Learning anything new requires effort, patience, and a lot of research and perception, and this is what we have followed since the beginning of the work. We learned a lot from this project, and we used many new technologies that we were not familiar with before and need to learn from scratch, we choice to learn and use Flutter, Node.js for our client and server sides, python for our desktop app.

The Internet is full of useful educational content in any topics in addition to the great and huge documentation of any technology, all these helped in planning, developing the idea and implementing it more easily

- We learnt how to integrate our desktop app with mobile and web.
- Some features are harder to work on web so we made sure to have consistency in all features.

Chapter 5: Conclusion and Recommendation

5.1: Conclusion

In conclusion, the "Sewing Scope" project has laid a strong, user-friendly platform that addresses the needs of the sewing and fashion industry.

5.2: Recommendation

5.2.1 Future Work

To further enhance the "Sewing Scope" platform, several areas for future development have been identified:

- **AI Integration:** Incorporating artificial intelligence for fabric suggestions, design recommendations, and virtual fitting could significantly enhance user experience and efficiency.
- **Enhanced Analytics:** Providing designers with detailed analytics and insights into their inventory usage.
- **Expanded Social Features:** Enhancing the social media integration with more interactive features, such as live streaming of design sessions and direct customer feedback mechanisms, could increase user engagement.

- **Admin Features:** Introducing additional features for administrators, such as tracking social media performance and rating of designers, would provide valuable insights and improve overall platform management.
- **Designs for Men and Babies in both applications:** Expanding the platform to include designs specifically for men and babies.
- Add different body shapes and types in the 3D view in the desktop app
- Add fabric choices and different textures to the desktop app

References

hen, X., Zhou, B., Lu, F., Wang, L., Bi, L., & Tan, P. (2015). Garment modeling with a depth camera. *ACM Transactions on Graphics*, 34(6), 1–12. [Garment modeling with a depth camera | ACM Transactions on Graphics](#)

FXGear. (n.d.). VFX software. Retrieved from <https://www.fxgear.net/vfx-software?locale=en>

Seungbae Bang, Maria Korosteleva, and Sung-Hee Lee. 2021. Estimating Garment Patterns from Static Scan Data. *Computer Graphics Forum* 40, 6 (2021), 273–287. <https://onlinelibrary.wiley.com/doi/10.1111/cgf.14272>

Guenot-Falque, R., Liu, M., Vidal-Calleja, T., & Sorkine-Hornung, O. (2022). Computational pattern making from 3D garment models. *ACM Transactions on Graphics*, 41(4). Retrieved from <https://www.youtube.com/watch?v=7b27T8rh7SU>

SMPL: A skinned multi-person linear model. (n.d.). Retrieved from <https://smpl.is.tue.mpg.de/>

Wang, C., Yu, L., Li, H., Zhao, H., Guo, S., & Zhang, W. (2022). Learning deformable garment mesh with point-based formulation. *arXiv preprint*. Retrieved from <https://arxiv.org/abs/2201.13063>

