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**CEF440: INTERNET PROGRAMMING (J2EE) AND MOBILE
PROGRAMMING**

**DESIGN AND IMPLEMENTATION OF A MOBILE-BASED ARCHIVAL
AND RETRIEVAL OF MISSING OBJECTS APPLICATION USING
IMAGE MATCHING**

TASK FIVE: UI DESIGN AND IMPLEMENTATION

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1. INTRODUCTION

1.1. Project Overview:

In an era characterized by rapid technological advancement and an ever-increasing reliance on mobile applications, the need for innovative solutions to everyday challenges has never been more pressing. One such challenge is the distressing experience of losing personal belongings, be it a cherished item of sentimental value or a practical necessity crucial for daily routines. The emotional toll and inconvenience caused by such losses are undeniable, often compounded by the arduous process of attempting to retrieve or replace the missing objects.

Recognizing the urgency of addressing this issue, the proposed project sets out to develop a groundbreaking mobile application aimed at revolutionizing the archival and retrieval of missing objects through the power of image matching technology. This application will not only streamline the process of reporting lost items but also enhance the likelihood of successful recovery, thereby alleviating the stress and frustration associated with such incidents.

1.2. User Interface Design and Implementation phase

1.2.1. Introduction

The UI design and implementation phase is a critical segment of this project in that it focuses on translating the conceptual designs and system architectures into a tangible, user-friendly interface that meets the needs of end-users. This document aims to provide a comprehensive overview of the design principles, tools, techniques, and methodologies employed in crafting the user interface (UI) for this application.

1.2.2. Report Objective

The purpose of this report is to detail the processes and decisions made during the UI design and implementation phase. It covers the selection of design principles aimed at ensuring usability, consistency, and accessibility, as well as the tools and technologies used to bring these designs to life. Additionally, the report outlines the structure and organization of the codebase, the approach to styling and theming, and the strategies employed for state management and API integration. A thorough explanation of user testing and feedback mechanisms is also included to demonstrate how user insights were incorporated into the final design.

1.2.3. Audience

This report is intended for a diverse audience, including classmates, instructors, and future developers who may work on or extend this project. It serves as both a record of the design and implementation choices made and a guide for understanding the UI aspects of the application. The detailed breakdown of the UI components, user flows, and interaction patterns is designed to provide clarity and ensure that the application is both functional and aesthetically pleasing.

In summary, this document provides an in-depth look at the UI design and implementation phase, showcasing the meticulous planning and execution involved in creating an intuitive and efficient user interface for the lost and found items application. Through this report, we aim to illustrate the importance of UI design in enhancing user experience and ensuring the success of the application.

2. USER INTERFACE (UI) DESIGN

The UI design phase is dedicated to creating a visually appealing and user-friendly interface for the for all users using the application. This phase involves defining design principles, selecting color schemes and typography, and developing wireframes and prototypes to ensure a seamless and intuitive user experience. And these aspects shall be dissected in detail as we walk through the documentation starting with the design principles for a good design taken into consideration when coming up with our application

2.1. Design Principles put in practice

i. User centered design:

In our approach to user-centered design, we focused on creating an interface that thoroughly addresses the needs and requirements of the users. This involved carefully considering all the features and functionalities necessary for users to effectively interact with the "Mobile-based Application for Archival and Retrieval of Lost and Found Items Using Image Matching."

We ensured that every page and interface element is arranged in a logical and intuitive sequence, enabling users to complete or perform use cases in the simplest and fastest way possible. By prioritizing ease of use and efficiency, we aimed to minimize the steps required

to upload or search for lost and found items, thus enhancing the overall user experience. Our design decisions were guided by continuous user feedback and testing, ensuring that the final product is both practical and user-friendly.

We also included a user Feedback page for constant user feedback, review and improvement of the over User interface design and experience

ii. Usability and Acceptability:

To ensure high usability and accessibility, we designed the application by drawing inspiration from popular mobile apps like Facebook. This approach allows users to create posts about missing or found items, making them visible to the entire community, and send chats, thereby facilitating communication and collaboration among users. By incorporating familiar features and interaction patterns from well-known applications, we aimed to create an experience that is both relatable and intuitive. The key aspects of making our application usable and easily accepted by users include

- **Familiar interface:** By leveraging common design patterns and features found in popular mobile apps, we ensured that users would find the interface familiar and easy to navigate. This reduces the learning curve and increases user satisfaction.
- **Community Engagement:** Users can create and share posts about lost or found items, making them visible to the community, similar to how posts are shared on social media platforms. This fosters a sense of community and collaboration.
- **Intuitive Navigation:** The app's navigation is designed to be straightforward, with clear labels and easy access to main features. This helps users quickly find what they need without confusion. We also made use of both an upper navigation such as back button arrows for easy navigation between pages as well as a bottom navigation bar with icons for easy access to the main application pages all with the aim of bettering the user experience
- **Clear and consistent design:** We implemented a clear and consistent pattern in our design components such as component shapes, color schemes, background, fonts and font sizes to reduces cognitive effort and enhance the synergistic feel of the application.

iii. Minimalistic Design

In our UI design, we adopted a minimalistic design approach to ensure simplicity and clarity. This approach focuses on reducing visual clutter and emphasizing essential components, thereby enhancing the user experience.

We kept the design clean and straightforward by using a limited color palette, which not only makes the interface visually appealing but also reduces cognitive load. By carefully selecting a few key colors, we were able to highlight important elements that require user attention, such as buttons, notifications, and critical information. We also made a clean layout structures for all components across different pages enhanced by consistent typography with a focus on user functionality.

2.2. Design Tools and technologies

i. Design Software: Figma

We used Figma as design software for the creation of our User Interface prototypes. This was because of Figma's availability as a web application, its strong and robust functionalities permitting for easy and efficient designing and the possibility of creating a team project for seamless collaboration between members for faster and more efficient designing as a team.

ii. Prototyping software: Figma

Figma was again used to run our design prototypes since it provides with this amazing functionality and there was no need of us going out to find another software to run the prototyping with. With this we were able to see the flow of the application logic live, and test all the user scenario maps, orchestrate the sequencing of functionalities with users and make revisions and corrections where necessary.

2.3. UI style guide





The UI Style Guide is a comprehensive set of design standards and guidelines that we followed to ensure a consistent and cohesive user experience across the entire "Mobile-based Application for Archival and Retrieval of Lost and Found Items Using Image Matching." This guide encompasses various aspects of the design, including the color scheme, typography, components and shapes, and navigation patterns. By adhering to these guidelines, we aimed to create an intuitive, visually appealing, and user-friendly interface.

i. Color scheme:

We had a very simple color scheme consisting of very few colors including a primary color, as secondary color, background colors, text color.

- Primary color (#6C63FF 

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- Backgrounds: #FFFFFF (white) for the page and cards, #EEEEEE  (light gray) for the input fields fill
- Borders: #DDDDDD  (light gray) for the input borders
- Text: #444444  (dark gray) For normal text and Headings, #888888  (gray) For caption text

ii. Typography

This includes the type of fonts as well as different font sizes we used for various components and purposes

- Font-family: Poppins -: bold, semi-bold, medium, regular
- Normal text Font sizes: 14px 16px 18px
- Page Headers: 28px
- Headings: 20px 22px

iii. Components

Here we will be outlining the different components and components styles used in the application and where they were implemented

Component Styles:

Round **borders** for buttons, input fields, and other box components

No elevation except for some cards

Buttons:

Used all over the application for performing of different actions

Modals:

Used for displaying various types of messages or alerts from the application including warning messages or success messages. For example, when a user wants to logout, claim an item, delete their account, etc.

Input Fields:

Used for entering user input at various levels in the application and the different variants include text, multiline, password, select, radio, image, just to name a few

Grid And Layout Structures:

A clean grid structure for displaying of cards (posts in the home page) with good spacing (padding) between cards

Navigation:

This includes **side drawers, bottom navigation pane with icons, arrow navigations** to return to previous pages all for the sake of facilitating user experience in the application or easy walkthrough in the application

Cards:

Main Components For Representing An Item In The Application (Either Lost Or Found). Cards Of Different Shapes Will Be Used To Represent Transactions And Messages Etc

2.4. Pages And Description

i. Welcome, Login and signup pages:

This is the first page a new user encounters in the application asking them to login or signup

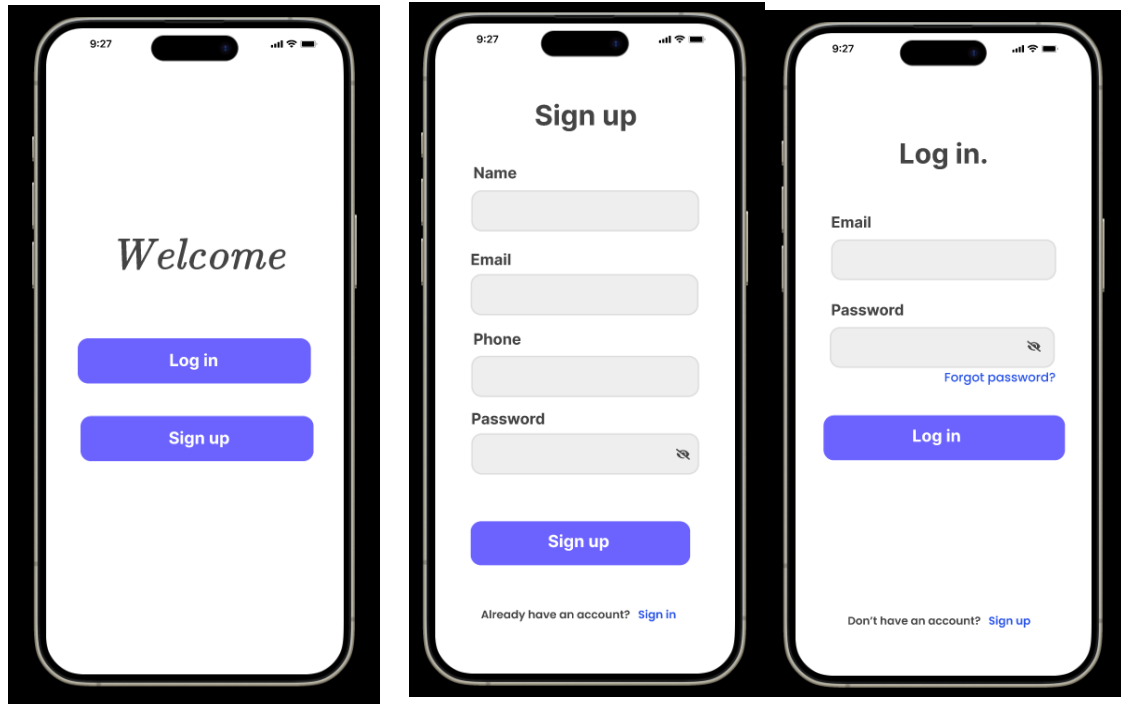


Fig.2.1. Welcome, signup and login pages

The login and signup pages (Authentication pages) permit a user to confirm their identity or create a new account if they don't have one yet. These pages ensure not only user identification in the application but also ensure security in the application.

ii. Home page:

The home page shows all items posted as lost or found by other users in order of the time posted (most recent posts appear first). It also has a bottom navigation page to easily access the other very most used pages in the application such as the reporting page, the profile page, the inbox page, the personal posts page as well as icons at the top to open the side drawer and the notifications page. On click of a post on the home page a user can go to the post details page to see the details for that particular item.

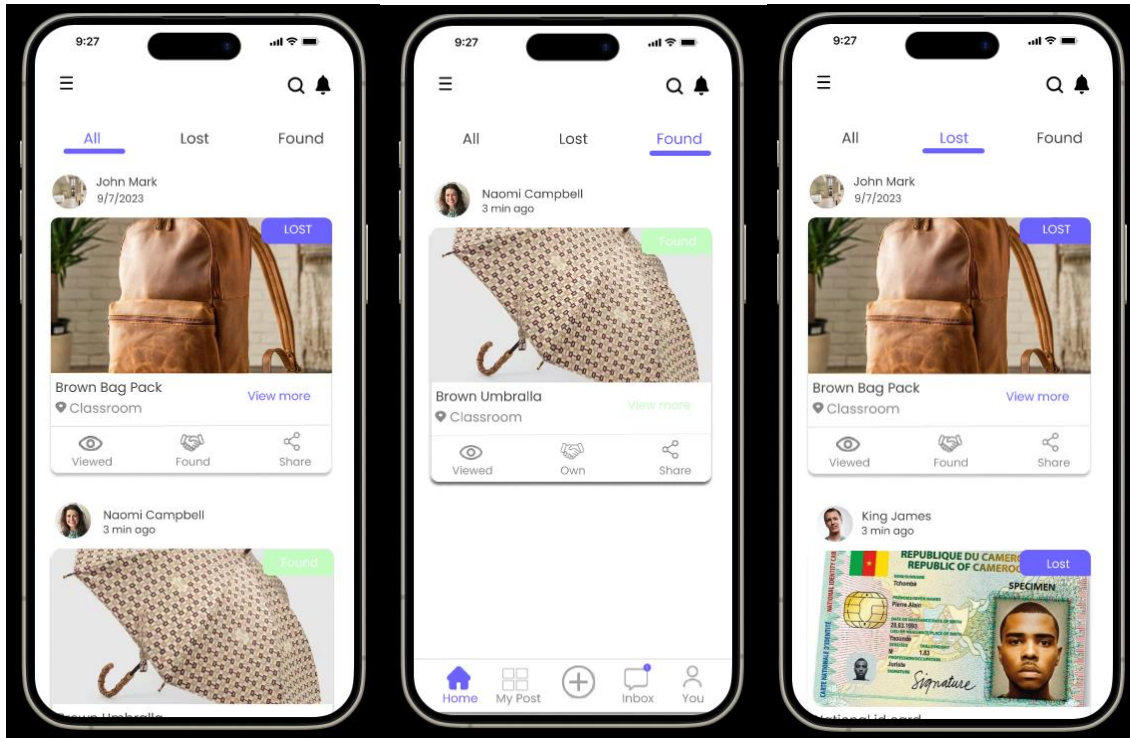


Fig2.2. Home pages showing all, lost and found items screens

iii. Item details page:

This page give more details about a particular post, the item lost , the description, the additional information and a lot more, as well as button to either message the poster, claim the item if the item was a found item, or report the item as found if it was a lost item.

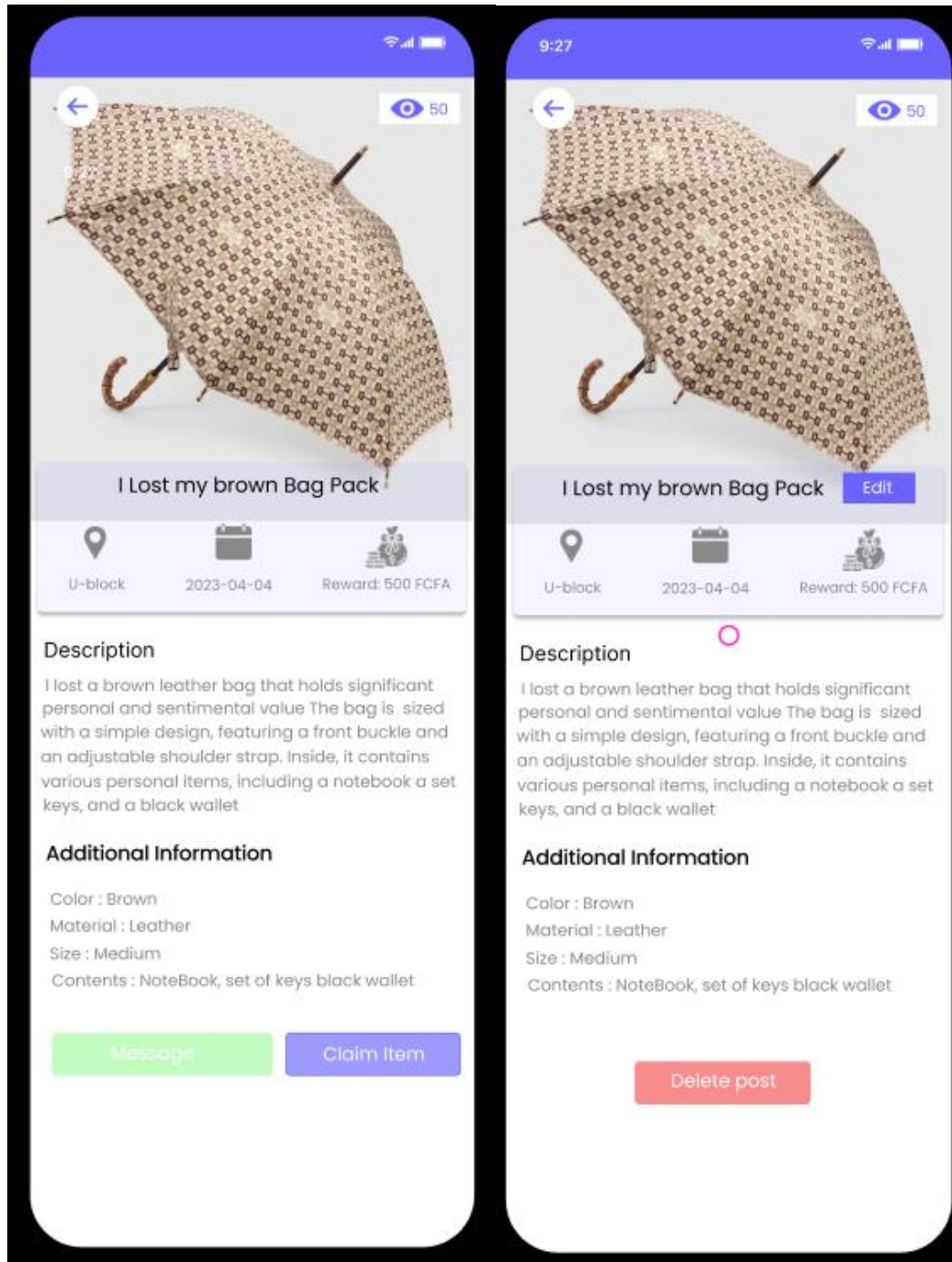


Fig2.3. Item details pages for other users post and users personal post

iv. Posts pages:

Here as user can see all the posts they have ever made in the application both about items they have lost and items they have found and they can click on the post to see details, edit the details of current post, delete posts and filter posts

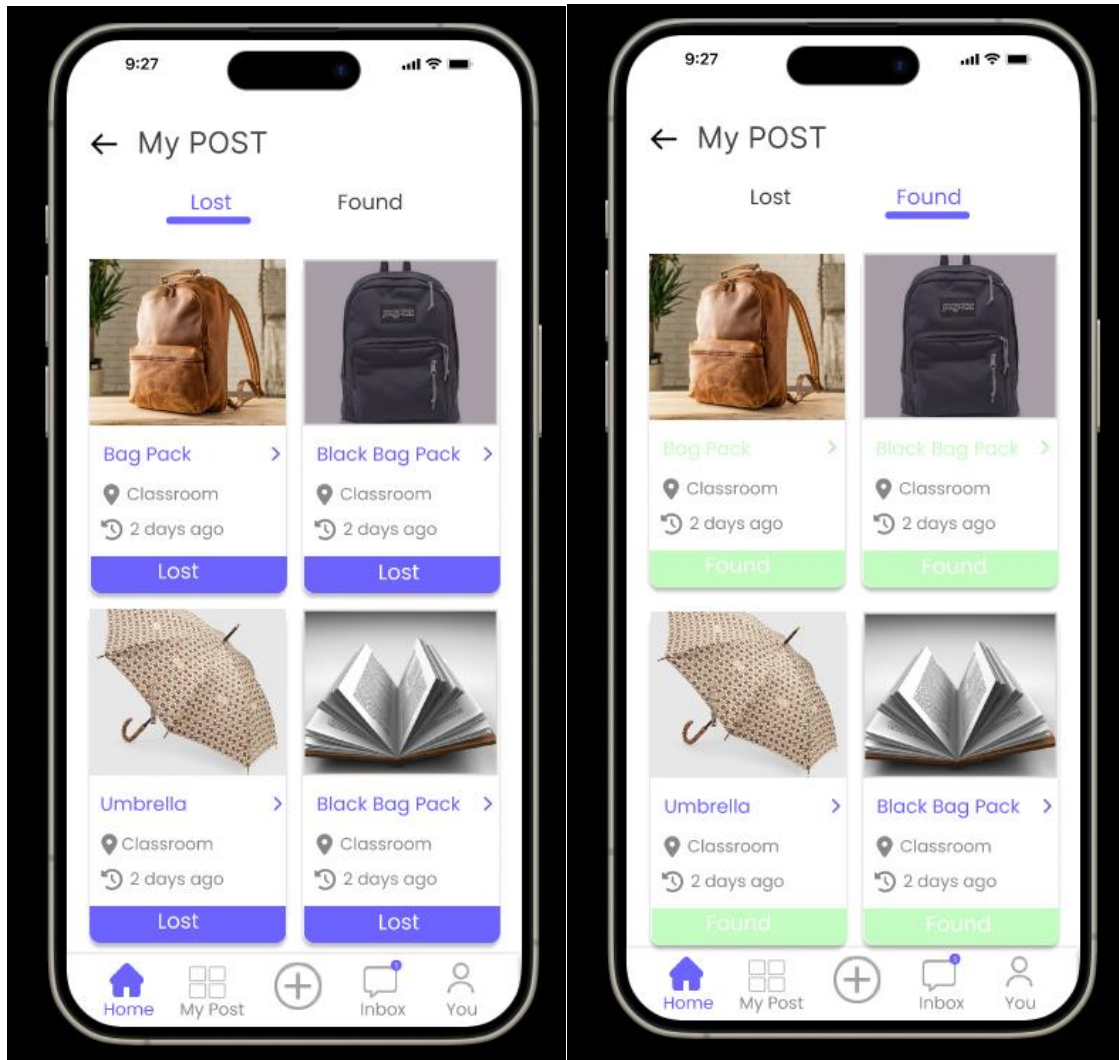


Fig2.4. Post pages showing users lost and found items screens

v. Profile page and editing profile page

The profile page can be accessed either by the profile icon on the bottom navigation bar or on the side drawer and display the user information. It also has an edit button which when clicked leads to a new page for a user to edit their profile information. The profile page also has a button for deleting the user account which upon clicking pops up a modal to confirm the account removal.

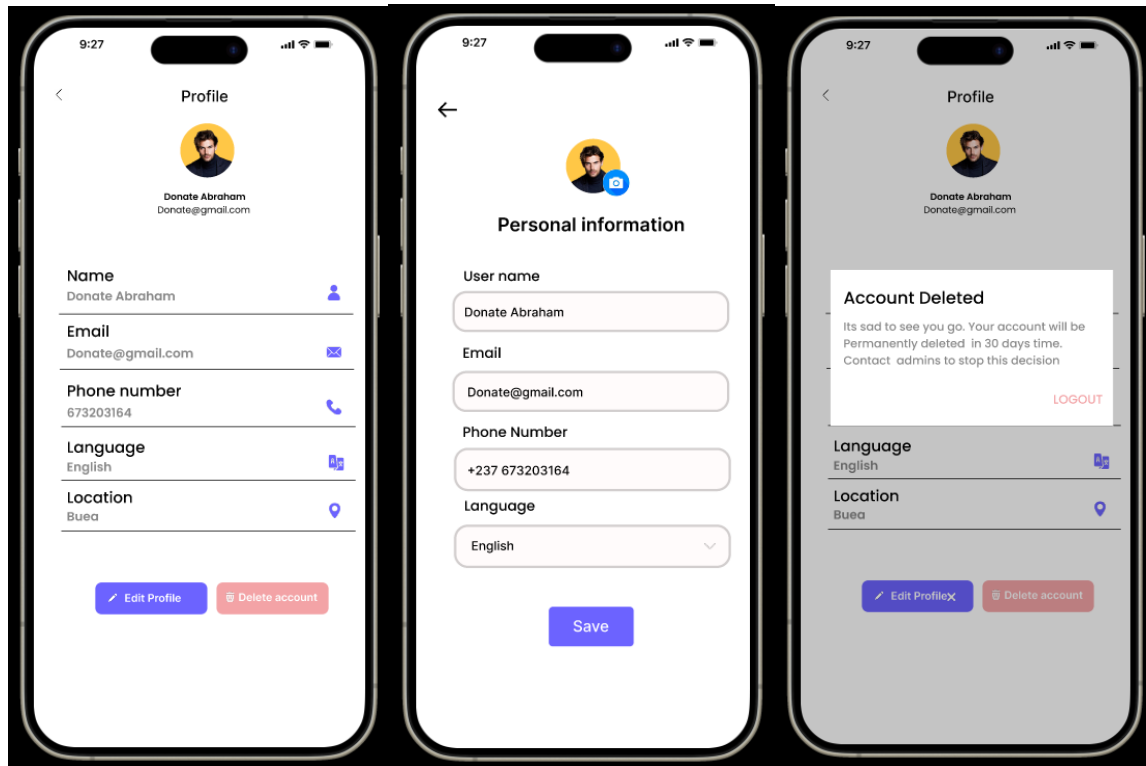


Fig2.5 Profile, edit profile and delete account modal and pages

vi. Reporting page:

This page has input fields for creating a new post for a lost or found item. It is accessed when the plus button on the home page in the bottom navigation bar is pressed. Or from the details page when a user views an item and clicks on the found button to report the item as found.

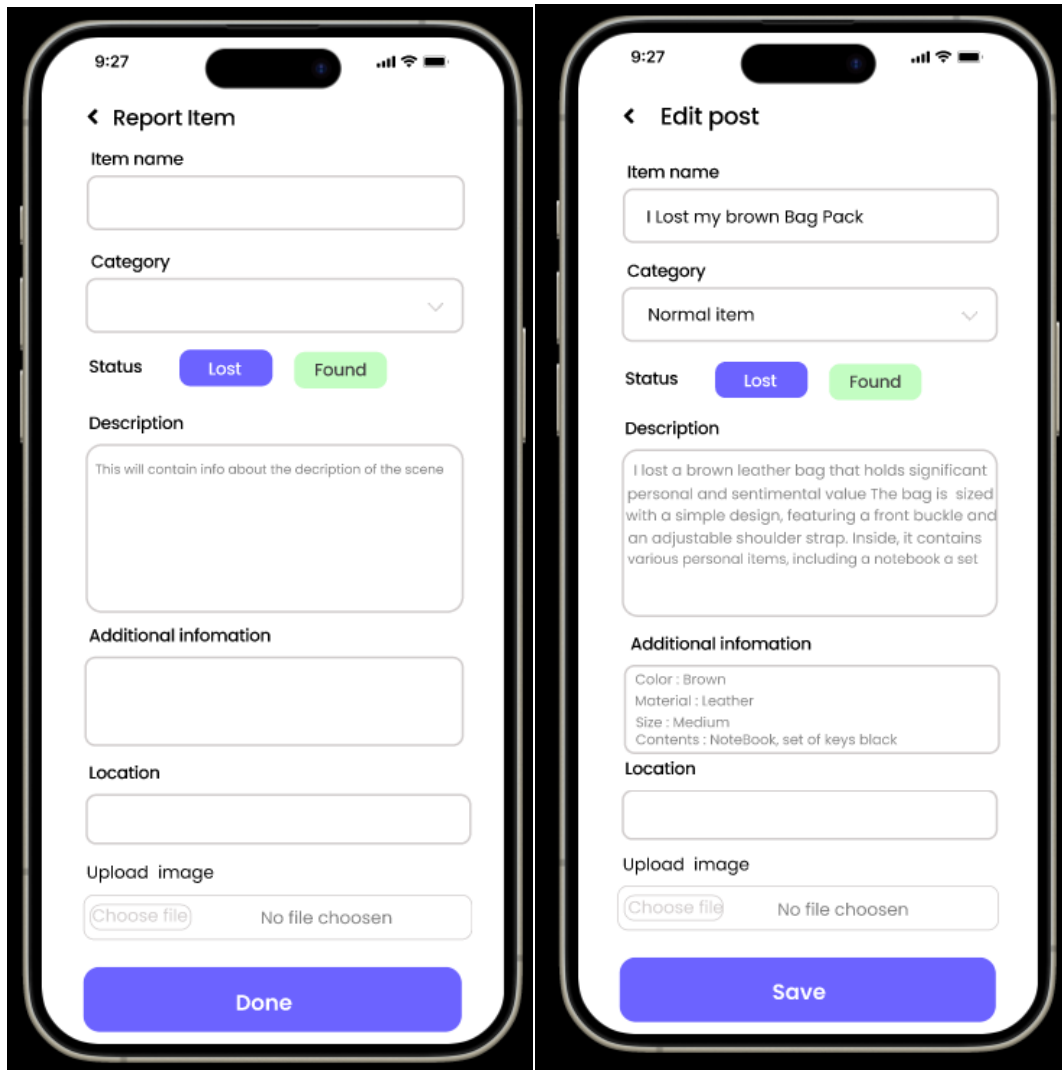


Fig2.6. Reporting items pages for a new item and for editing user post

vii. The Notifications, messages and chat screens:

The notifications page where a user actually chats with another user about an item which was lost or found and set details for claiming the item

In the messages a user can see all their chats with other users concerning both items they lost and items they found. The page is accessed using the notification icon on the bottom navigation bar.

The chat screen page opened when the user clicks on a push notification of when a user clicks on the notification icon in the home page and shows all the user notifications which

can be of two types. Those sent by the application to notify about transactions and matches and message notifications from other users

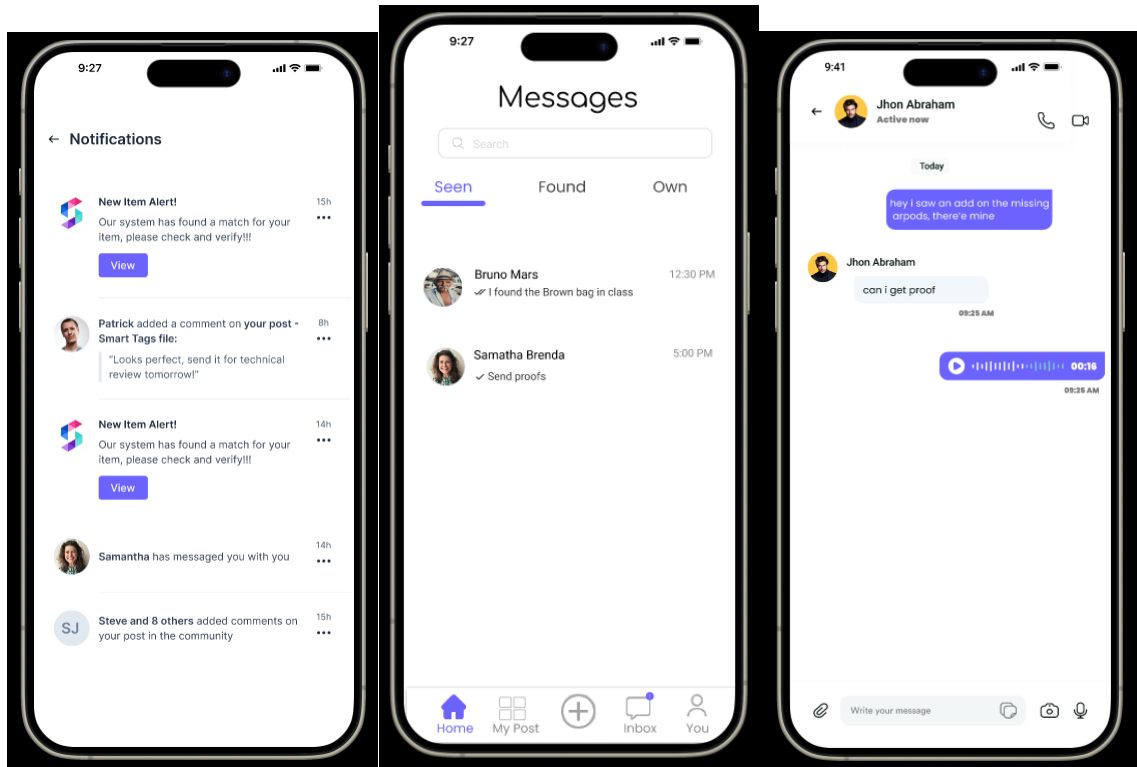


Fig.2.7 notifications, message inbox and chat pages

viii. Transaction and Payment pages:

The transaction page shows a list of all user transactions done in the application, both for money paid to the system or received from the for lost or found items respectively giving the details of these transactions. It is accessed by clicking on the transactions option in the side drawer navigation

The payment page shows the screen where a user executes a payment to another user. And depending on if the payment is successful modals are popped to the screen to show the user his or her transition status

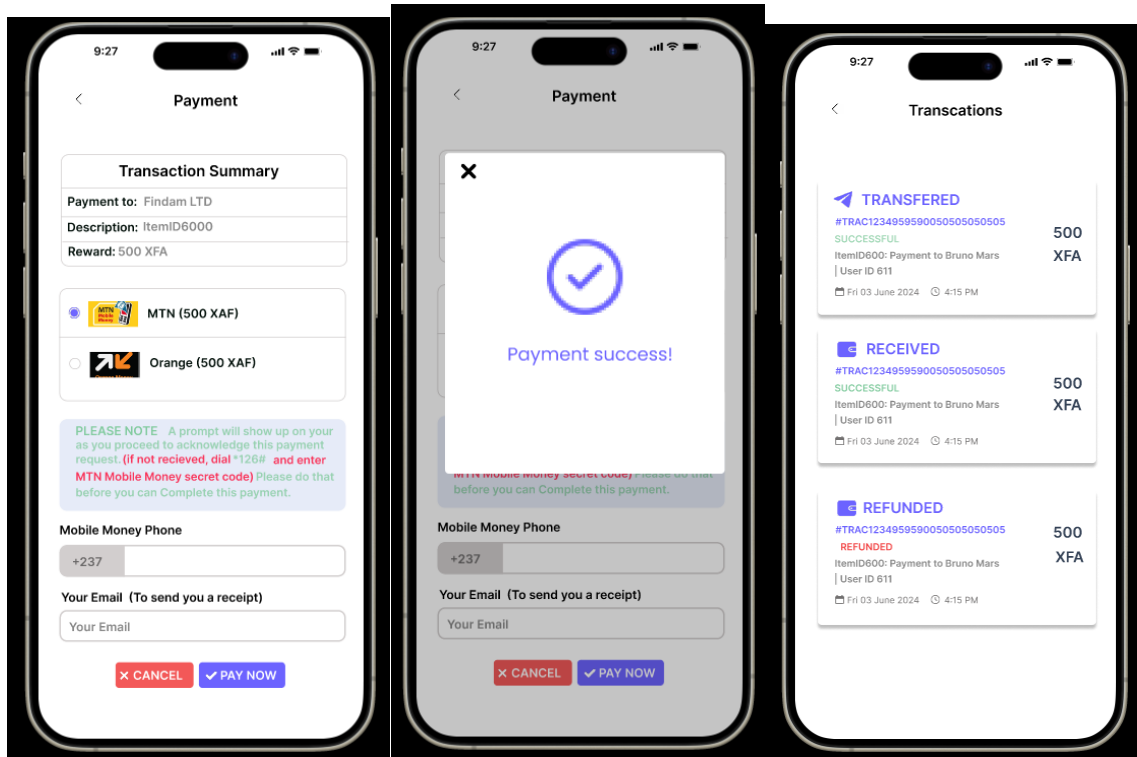


Fig 2.8 Transaction history and payments pages

ix. Settings page and Side drawer:

The settings page is accessed from the setting option in the side drawer and permits a user to change some setting such as notifications

This Side drawer on the other hand is not actually a page but a component for navigation that appear when the user clicks on the menu icon at the top left conner of the home page from where they can navigate to other pages in the application

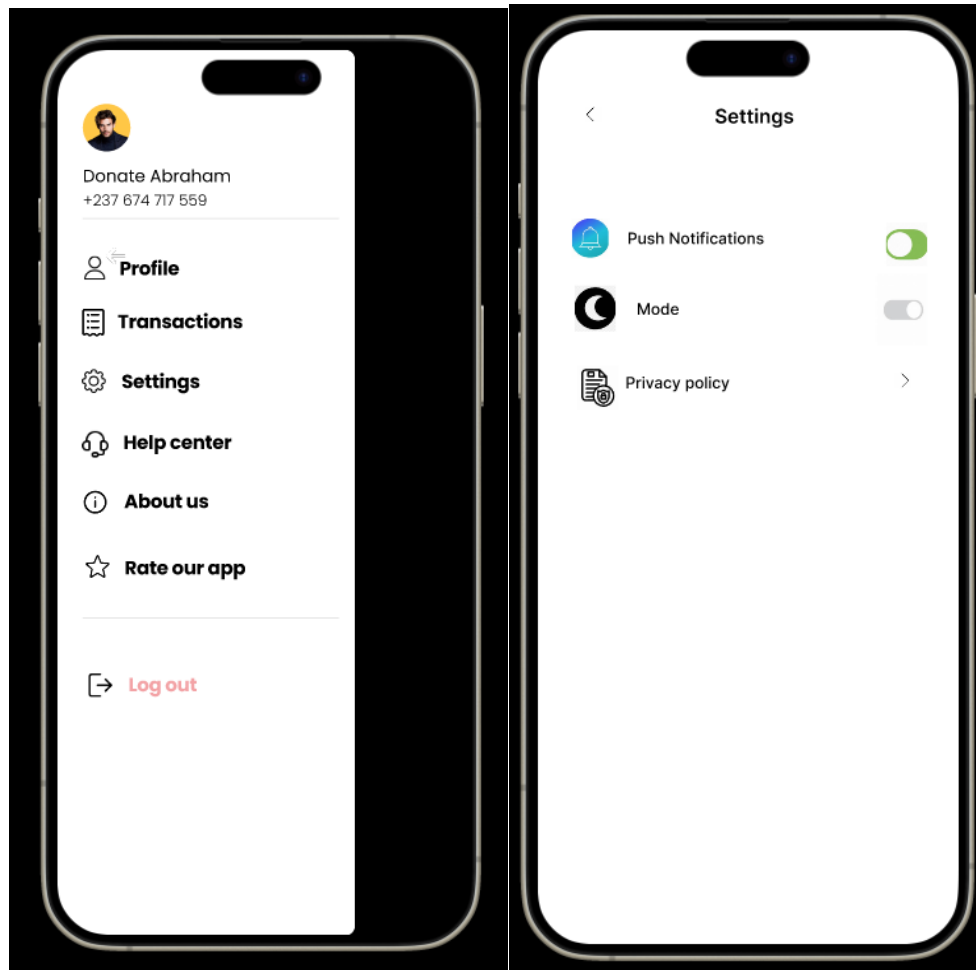


Fig2.9 side drawer and setting screens

3. UI IMPLEMENTATION

This section delves into the technical aspects of bringing the UI to life, including the tools, frameworks, and methodologies used. It outlines the process of coding the UI components, integrating them with the backend, and ensuring responsive and efficient performance across various devices. Through careful implementation, we aimed to deliver a seamless user experience that aligns with the initial design vision and meets the users' needs effectively. We shall walkthrough this topic by discussing the following subtopics . While Time didn't allow for the actual physical implementation of the UI, the steps and tools and methodologies to be used would be presented in the subtopics below.

3.1. Frontend Frameworks and libraries

i. Frameworks: React native

ReactNative was chosen as the frontend framework for this application. The setup was that of an **expo** application rather than using the normal react Native CLI. The decisive factor in choosing the application setup was the power of the tools used by the development team. A react Native application using the react native CLI will have to be simulated on an android studio emulator which is very memory costly and can't run on the majority of computers properly (8GB of RAM or less) whereas when using expo, the application can easily be simulated on the Expo Go application on the developers mobile device. This crucial factor prompted the usage of react native with the expo CLI.

Also, reactnative was chosen due to it's vast collection of libraries and plugins as well as ability to build cross platform applications. Not forgetting that its is based on react, hence was easier to learn and adapt to.

ii. Libraries used:

Many libraries will be used to ease certain processes in the application. Such libraries include:

- React-navigation, React-stack-navigation: for implementing sliders and navigation bars as well as navigating between screens
- Expo-app-loading, expo-splash-screen: To control the app loading process and actions done during this process
- Formik, Yup: For creating form components and implementing Form validation respectively
- Expo-font, Expo-vector-Icons: For changing the fonts and icons respectively

3.2. Code Structure and modularization

i. Code structure

The whole frontend code shall be contained in a single parent frontend directory which will be the react native expo application. In this directory, different other files and directories will be created with the directories containing a group of similar or related files.

The main frontend directory will have the basic starter files such as the package.json, the app.js, app.json, babel.config.js and folders like the node_modules for storing packages and dependencies but also folders such as:

- The route folder: for storing navigation based files
- The shared folder: for grouping shared components in the application such as shared cards or buttons used across multiple components
- The screens folder: for grouping all the different pages in the application
- The styles folder: for grouping the styling objects for different components or pages together
- The assets folder: for grouping icons, fonts and other utilities together

3.3. Styling Libraries

i. React native paper

The chosen styling library is react paper library due to how easy its abundant number of custom components and how easy it is to customize these custom components.

It is a very easy styling library to use with well explained documentary making code shorter, cleaner and more manageable.

3.4. State Control and Management

i. Contexts with hooks

React native is built on the standard react framework making it possible to use its strong functionalities such as contexts with hooks for state management which is going to be this case in this project. Contexts make it possible for sharing of data globally across all components and pages in the application

ii. Props

This is another way very efficient and convenient way of managing state and data throughout the application between parent and children components.

iii. Fetching and displaying:

Fetching of Data will be done with libraries like axios for easy fetching methods and display methods such as mapping and rendering in list or dynamic rendering with use Effect hooks and useState hooks shall be used to make the application function in real time and in a dynamic manner

3.5. Testing and user Feedback

Testing will perform on our mobile devices using the Expo Go application permitting fast catching of errors in the design and revision of these errors. Also implemented prototypes shall be given to users and walkthroughs of the application shall be performed with these users so as to get their insights on what can be changed, removed or improved on in the application design as a whole.

4. CONCLUSION

The UI design and implementation phase of the "Mobile-based Application for Archival and Retrieval of Lost and Found Items Using Image Matching" project has been a pivotal step in creating an intuitive, efficient, and visually appealing user experience. By adhering to user-centered design principles, employing a minimalistic approach, and leveraging familiar design patterns from popular applications, we have ensured that our interface is not only user-friendly but also accessible and engaging.

Through the meticulous selection of color schemes, typography, and UI components, we have crafted a cohesive and consistent visual identity for the application. The implementation phase translated these design concepts into a functional interface using modern frameworks and tools, ensuring responsive performance and seamless integration with backend services.

This phase's success is a testament to the careful planning, design, and execution that went into creating an application that meets the users' needs and expectations. As we move forward, the foundation laid during this phase will be crucial in maintaining and enhancing the application's usability and overall user satisfaction. The result is an application that is both practical and enjoyable to use, making the process of reporting and retrieving lost items as simple and effective as possible.

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