MigraineEase: Relief Begins with Awareness

PROJECT-II REPORT

Submitted by

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BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE ENGINEERING

Under the supervision of

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ABSTRACT

MigraineEase is an innovative mobile application designed to simplify and enhance the management of migraines. Combining cutting-edge technology with a user-centric design, MigraineEase empowers individuals to track, monitor, and manage migraine episodes effectively. Built using **React Native (Expo)** for seamless **cross-platform** support and powered by a robust **Node.js backend** hosted on a **DigitalOcean Ubuntu droplet**, the app leverages **PostgreSQL** for secure, scalable database management hosted on **AWS**.

Key features include comprehensive **migraine tracking**—capturing details such as pain intensity, duration, and relief methods—alongside **calendar-based visualizations** for easy access to past records. **Notifications** ensure timely reminders for **medications** and **doctor appointments**, with all notification history securely stored for future reference. A **real-time chat system**, powered by **Socket.IO**, fosters direct, instant communication between users. The app also highlights the **duration since the last migraine episode**, offering motivation and insights into progress.

MigraineEase prioritizes **security** and performance with **JWT-based authentication** and encrypted data handling. User-uploaded **images** are efficiently managed through **Cloudinary CDN** integration. Designed for a global audience, the app provides an intuitive, seamless experience for those seeking to take control of their migraine journey. This document outlines the objectives, technical implementation, and design considerations of MigraineEase, showcasing its commitment to improving the quality of life for individuals dealing with migraines.

DECLARATION

I, **Mr. SYED RAZA MEHDI RIZVI** a student of **BTECH(CSE), (Enrolment No: 2021-310-220)** hereby declare that the Project entitled **MigraineEase** which is being submitted by me to the Department of Computer Science, Jamia Hamdard, New Delhi in partial fulfillment of the requirement for the award of the degree of **BTECH(CSE),** is my original work and has not been submitted anywhere else for the award of any Degree, Diploma, Associateship, Fellowship or other similar title or recognition.

(Signature)

Date:

Place:

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to all those who have contributed to the successful completion of this project. Firstly, I would like to express my deepest appreciation to my supervisor, **Ms. Anam Saiyeda**, for her valuable guidance, insightful feedback, and constant support throughout the project. Her expertise and encouragement have been instrumental in shaping this project into its final form.

I am also grateful to the Department faculty and staff for their assistance and support throughout the project. Their expertise and guidance have been invaluable in helping me to understand the technical aspects of the project and overcome any challenges that I encountered.

Furthermore, I would like to extend my thanks to my colleagues and friends who have provided me with support and encouragement throughout the project. Their feedback, discussions, and critiques have been valuable in shaping my ideas and approach to the project. Finally, I would like to express my appreciation to my family for their unwavering support and encouragement throughout the project. Their love and support have been a constant source of motivation for me.

(Signature)

Date:

Place:

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Objective:

MigraineEase aims to empower individuals living with migraines by providing a comprehensive, intuitive platform for effective health management and support. The app is designed to:

- Simplify the tracking of migraine episodes, including pain intensity, triggers, relief methods, and medications.
- Deliver personalized insights into migraine patterns to enhance self-awareness and facilitate better communication with healthcare providers.
- Ensure timely support through medication reminders, doctor appointment notifications, and record-keeping.
- Create detailed PDF reports in seconds and share them effortlessly via Email or WhatsApp.
- Offer secure, real-time chat functionality to foster connection and collaboration with caregivers or healthcare professionals.
- Display the duration since the last migraine attack to motivate users and track progress over time.
- Create a migraine-friendly, accessible experience with features tailored to improve daily life and reduce the burden of managing migraines.

By combining innovative technology with user-centric design, MigraineEase is dedicated to improving the quality of life for migraine sufferers, helping them take control of their condition with confidence and ease.

Introduction:

MigraineEase is a comprehensive migraine management application designed to empower individuals living with migraines through efficient tracking, real-time support, smart notifications, and personalized healthcare solutions. Leveraging modern technologies and a user-centric approach, MigraineEase simplifies health management while providing actionable insights and fostering a supportive environment. This document outlines the key features, technological stack, and design principles, serving as a guide for developers and stakeholders.

Key Features

- **Health Management:** Track migraine episodes, including pain intensity, triggers, relief methods, and medications. Effortlessly log and monitor health data while scheduling doctor appointments.
- **Smart Notifications:**
  - Medication reminders with start and end dates to ensure adherence to prescribed treatment plans.
  - Doctor appointment notifications to keep users informed and prepared.
  - Persistent notification records for reference and accountability.
- **Personalized Insights:** Analyze patterns in migraine attacks to enhance self-awareness and improve consultations with healthcare providers.
- **Real-Time Support:** Stay connected through secure, real-time person-to-person chat powered by Socket.IO for communication with caregivers or healthcare professionals.
- **Progress Monitoring:** Displays the duration since the last migraine episode, helping users track their progress and stay motivated.
- **Accessible Design:** Intuitive and migraine-friendly interface tailored to ensure accessibility and ease of use across all devices.

- **Instant PDF Generation and Easy Sharing Made Simple:** Create detailed PDF reports in seconds and share them effortlessly via Email or WhatsApp.

  By combining advanced technology, smart notifications, and thoughtful design, MigraineEase strives to improve the quality of life for migraine sufferers, empowering them with tools to take control of their condition effectively and confidently.

Problem Statement:

Migraines affect millions worldwide, bringing not only physical discomfort but also emotional and social challenges. Managing migraines involves more than just tracking pain—it requires timely medication reminders, personalized insights, and emotional support. Despite advancements in healthcare, individuals living with migraines face several critical barriers:

- **Fragmented Management:** Existing tools are often disconnected, making it difficult to track migraine episodes, triggers, medications, and doctor appointments in one unified platform.
- **Missed Support Opportunities:** Without consistent medication reminders and doctor appointment notifications, managing migraines can become inconsistent, leading to worsened outcomes.
- **Emotional Isolation:** Migraine sufferers often face a lack of understanding and support, leaving them feeling isolated and misunderstood.
- **Trigger Risks:** Many digital tools fail to address migraine-specific triggers, such as bright visuals or poorly optimized interfaces, potentially worsening symptoms for users.
- **Communication Gaps:** Patients struggle to effectively track and share migraine patterns, medications, and progress with healthcare providers, resulting in delayed or incomplete care.

MigraineEase is designed to bridge these gaps by offering a comprehensive, user-centric solution to empower individuals with migraines, simplify their health management, and foster a supportive environment.

Software Requirements Specification for MigraineEase

1. Introduction

1.1 Purpose

The purpose of this document is to outline the software requirements for the **MigraineEase** project. **MigraineEase** is a mobile-first application designed to empower individuals living with migraines by providing efficient migraine tracking, personalized health insights, timely medication reminders, and a supportive community. The application leverages modern technology to simplify health management, promote better communication with healthcare providers, and improve the quality of life for migraine sufferers. Through real-time features and comprehensive migraine data tracking, **MigraineEase** aims to be a comprehensive solution for managing migraines in a holistic and user-friendly manner.

1.2 Scope

MigraineEase is a cross-platform mobile application intended for both iOS and Android devices. The app will enable users to track migraine episodes, medications, triggers, relief methods, and other related health data. Key features include:

- **Migraine Tracking:** Track details of each migraine episode, including pain intensity, duration, triggers, and medications taken.
- **Medication Reminders:** Timely reminders for medication intake and doctor appointments.
- **Real-Time Chat:** Secure communication with caregivers, healthcare providers, or other users for support.

- **Health Insights:** Personalized insights based on tracked data to improve self-awareness and communication with healthcare providers.
- **Progress Monitoring:** Track duration since the last migraine attack and other metrics to observe patterns over time.
- **Instant PDF Generation and Easy Sharing Made Simple:** Create detailed PDF reports in seconds and share them effortlessly via Email or WhatsApp.

The application will also focus on user-centric design, ensuring accessibility and ease of use for individuals affected by migraines.

1.3 Definitions, Acronyms, and Abbreviations

- **MigraineEase**: The mobile application developed to track and manage migraines.
- **Notification System**: A system designed to send alerts for medication reminders, doctor appointments, and other user-defined events.
- **REST API:** Representational State Transfer Application Programming Interface.
- **Socket.IO:** Library for real-time, bidirectional communication.
- **AWS:** Amazon Web Services, used for hosting and deployment.
- **PostgreSQL:** Relational database management system used for storing application data.
- **Pain Intensity**: A scale or measure used by users to quantify the severity of pain experienced during a migraine episode.
- **Cloud Storage (Cloudinary CDN)**: A platform used for storing and serving images uploaded by the users.

- **JWT (JSON Web Tokens)**: A method for secure authentication and authorization within the app.

1.4 References

- **IEEE Standard 830-1998 for Software Requirements Specifications**: This document provides the standard guidelines and best practices for writing Software Requirements Specifications (SRS), ensuring that the MigraineEase application meets industry standards for software design and development.
- **Documentation for React Native, Expo, and Tailwind CSS**: React Native (https://reactnative.dev/), Expo (https://docs.expo.dev/), and Tailwind CSS (https://tailwindcss.com/docs) are key technologies used for the front-end development of the MigraineEase app. The respective documentation provides valuable information on usage, configuration, and best practices for these technologies.
- **PostgreSQL and AWS Hosting Documentation**: PostgreSQL (https://www.postgresql.org/docs/) is the relational database system used for MigraineEase. AWS hosting (https://aws.amazon.com/documentation/) provides the infrastructure for deploying and maintaining the app's backend services.

2. Overall Description

2.1 Product Perspective

MigraineEase is a comprehensive mobile-first application designed to help individuals living with migraines by providing efficient tracking, real-time support, and personalized health management. The app leverages modern

technology stacks to offer migraine episode tracking, medication reminders, real-time communication with healthcare providers, and detailed health insights. The aim of MigraineEase is to simplify migraine management, reduce the burden on users, and create a supportive, stigma-free environment. Key features include tracking pain intensity, relief methods, medications, doctor appointment reminders, and real-time chat, all while ensuring user experience, security, and scalability.

System Interfaces

- **Backend-API:**

  Node.js with Express.js will handle **backend API** calls to manage user data, including migraine logs, medication history, and doctor appointments. The API will interact with the database and provide necessary data to the mobile app frontend.

- **Database:**

  PostgreSQL will be used as the relational database to store user profiles, migraine tracking data, medication logs, and doctor appointment records. The database will be hosted securely on AWS to ensure high availability and scalability.

- **Frontend:**

  The mobile application will be developed using **React Native with Expo** to ensure cross-platform compatibility for both iOS and Android devices, providing users with a responsive and user-friendly interface.

- **Real-time-Communication:**

  Socket.IO will be used to enable real-time communication, allowing users to chat with healthcare professionals, caregivers, or other users in real time. This feature fosters a supportive environment for users.

- **Notification-System:**

  Expo Notifications will be used to send medication reminders, doctor appointment notifications, and updates on migraine episodes to ensure users stay on track with their treatment.

- **Pdf Generation and Sharing:**

  Expo-sharing and Expo-print will be used to generate the dynamic pdfs of the migraine reports and can be shared via email , whatsapp or other platforms.

Dependencies

Backend:

- **Express.js:**

  A Node.js web framework used to create RESTful API endpoints that handle requests from the mobile app, such as tracking migraine episodes and medication details.

- **jsonwebtoken(JWT):**

  For secure user authentication and authorization, JWT ensures that user data is protected and that only authorized users can access their profiles and health information.

- **nodemailer:**

  Used for sending email notifications and Migraine reports to users and their healthcare providers about upcoming doctor appointments, medication reminders, and other important health updates.

- **Socket.IO:**

  Powers real-time communication on the backend, enabling instant chat between users and their healthcare providers or caregivers.

- **PostgreSQL:**

  A relational database system for storing structured data, such as user

profiles, migraine logs, and medication records, while ensuring data security and scalability.

- **Cloudinary Cdn**: A cloud-based media management solution used to store and serve images, user-uploaded files, and other media content. Cloudinary CDN ensures fast, optimized delivery of media files across devices and regions, improving user experience.

Frontend:

- **React-Native**:
  The framework used to build the mobile app, ensuring that **MigraineEase** provides a smooth user experience across both iOS and Android devices.
- **TailwindCSS**:
  A utility-first CSS framework that helps in building a clean and responsive user interface, ensuring that the app is visually appealing and accessible, with migraine-friendly design principles.
- **Expo**:
  A set of tools built on top of React Native that helps in fast development, testing, and deployment of the mobile app with cross-platform support.
- **Socket.IO-client**:
  A client-side library that facilitates real-time communication between users and their healthcare providers or caregivers through instant chat.
- **Lottie-React-Native**:
  This library will be used to integrate smooth animations in the app, improving the user experience by making the interface more engaging and visually appealing.

2.2 Product Functions

- **User Authentication:**
  - Secure Registration and Login
  - Password Security
  - JWT-Based Session Management

- **Migraine Tracking:**

  Users can log detailed migraine episodes, including pain intensity, pain location, and triggers. They can also track relief methods and medications used for each attack.

- **Medication Reminders:**

  The app sends notifications to users to remind them of their scheduled medications based on their input, ensuring timely treatment during each episode.

- **Doctor Appointment Notifications:**

  Users receive alerts for upcoming doctor appointments, helping them stay on track with their healthcare.

- **Instant PDF Generation and Easy Sharing Made Simple:** Create detailed PDF reports in seconds and share them effortlessly via Email or WhatsApp.

2.3 User Characteristics

- **Primary Users:** Migraine sufferers, caregivers, and healthcare providers. The app is tailored to help manage migraines and provide support.
- **End-Users:** The app is user-friendly and accessible to people of all ages and technical abilities, ensuring ease of use for everyone.
- **Healthcare Providers:** Doctors can track patient data, offer advice, and conduct video consultations for efficient migraine management**.**
- **Caregivers:** Family members or friends of migraine sufferers who receive real-time alerts and notifications to assist during attacks and ensure medication adherence.

2.4 Constraints

- **Cross-Platform-Compatibility:**
  MigraineEase will support both iOS and Android devices, with a responsive design that adapts to various screen sizes, ensuring a smooth user experience across all platforms.
- **Backend-Scalability:**
  The app's backend will be built for scalability and reliability, hosted on AWS to ensure secure, high-performance data storage and efficient handling of user traffic, even during peak usage periods.
- **Data Management with PostgreSQL:**
  PostgreSQL will be used for secure and efficient data management, handling user profiles, migraine logs, medication history, and appointment details in a robust and organized manner.

2.5 Assumptions and Dependencies

- Users have stable internet connections for real-time communication
- All dependencies are correctly installed and configured.
- Users are familiar with basic smartphone applications but may not require advanced technical knowledge.
- Medical data handling will comply with relevant privacy regulations and data security standards.

3. Specific Requirements

3.1 Functional Requirement

User Registration and Login:

- Users can securely create an account and log in.

- Authentication is handled securely, ensuring only authorized access to personal health data.

Health Tracking & Migraine Log for MigraineEase:

- **Migraine Event Logging**:
  Users can log migraine episodes, including details such as date, time, duration, pain intensity, and specific triggers (e.g., food, stress, weather).

Real-time Communication:

- Secure, real-time messaging between users (patients, caregivers, healthcare providers).
- Real-time alerts and notifications for upcoming medications, doctor appointments, or emergency alerts.

Frontend Functionality:

- A mobile-first, responsive interface using React Native for seamless access across various devices.
- Intuitive navigation with clearly defined sections for tracking health, and messaging.
- Real-time notifications and reminders using libraries like react-hot-toast for alerting users.

Backend Security:

- Data encryption and compliance with health data privacy regulations (e.g., HIPAA, GDPR).
- Secure configuration management using dotenv for environment variables.

3.2 Performance Requirements

- **Real-time Messaging:** Real-time messaging functionality should have a latency of under 300ms for message delivery to ensure a smooth communication experience.
- **Database Management:** The backend should efficiently handle up to 200 concurrent users initially, with the ability to scale as the user base grows.

3.3 Design Constraints

- **Architecture:** The system should follow the MVC (Model-View-Controller) architecture for clear separation of concerns and maintainability.
- **Responsive Design:** The frontend should adhere to responsive design principles, optimized for mobile devices, and designed with accessibility in mind.
- **Styling Consistency:** The frontend should use TailwindCSS to maintain consistency in styling, with a focus on user-friendly design.
- **Platform Compatibility:** The mobile application should be fully compatible with both iOS and Android devices through React Native.

3.4Non-Functional Requirements

Usability:

- The application should be easy to use, intuitive, and require minimal training for new users.
- It should have a clean interface that focuses on key features such as health tracking, alerts, and real-time communication.

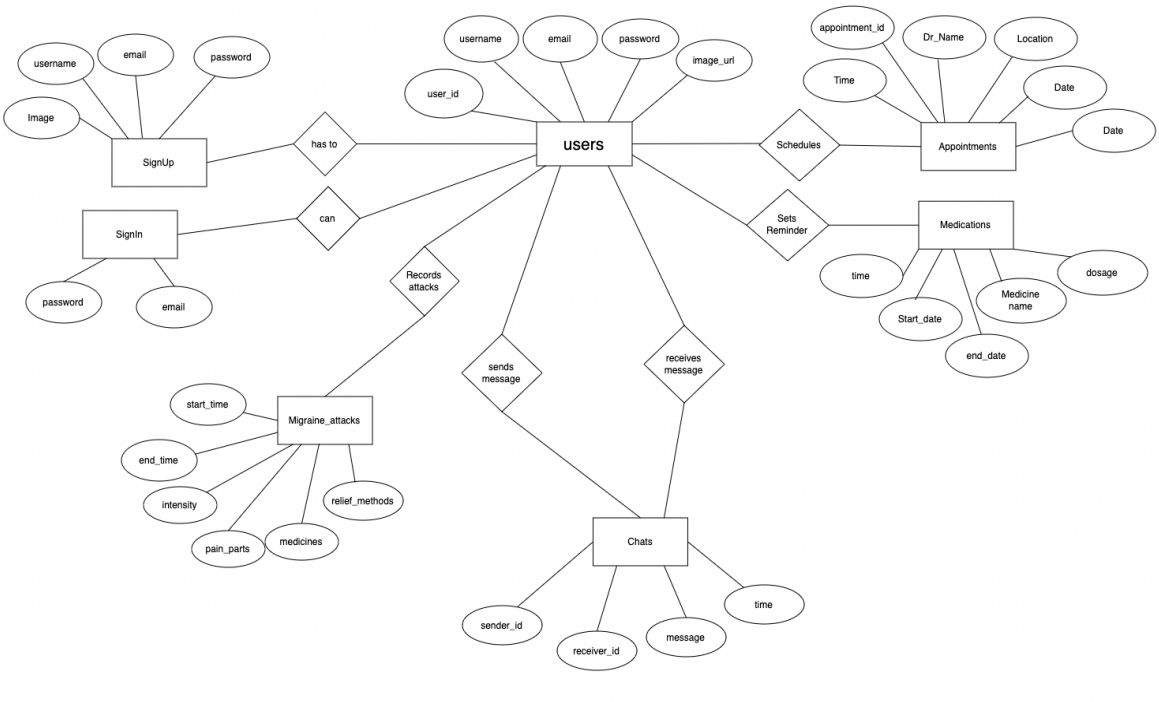
Reliability:

- The application should maintain 99.9% uptime, ensuring availability during critical situations like health emergencies or scheduled doctor consultations.
- Data backup and recovery processes should be in place to safeguard user data.

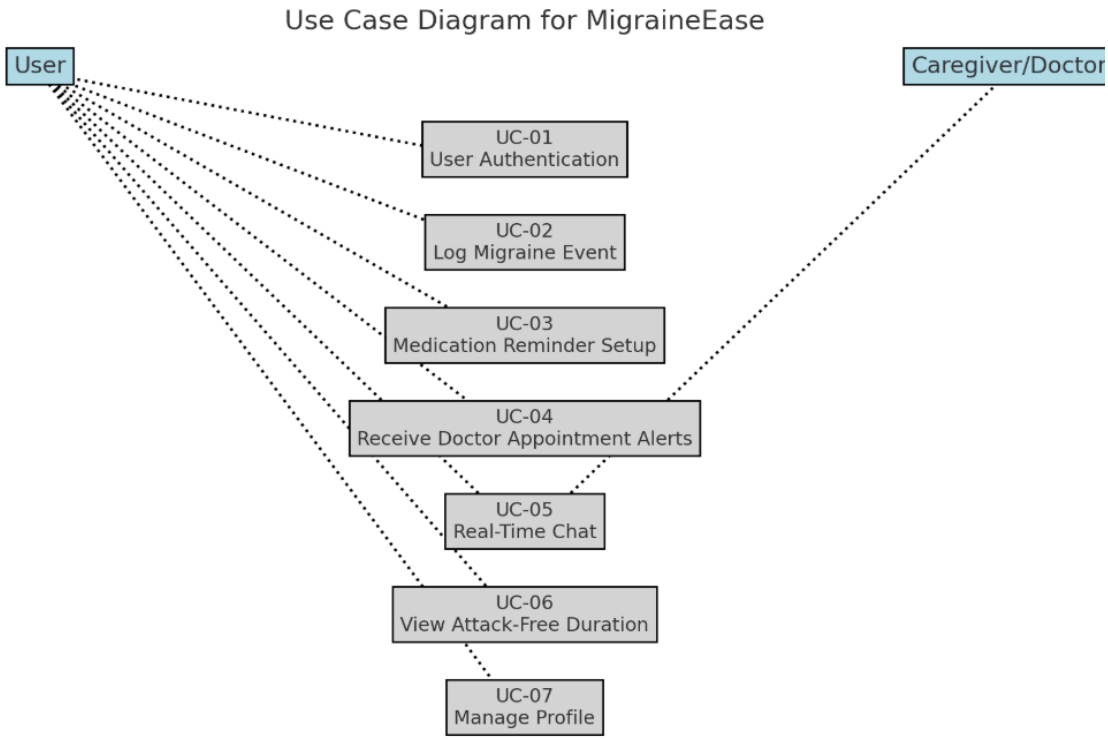
Scalability:

- The backend infrastructure should be able to support an increasing number of users and health data logs over time.
- As the user base grows, the app should scale to handle larger numbers of concurrent users, health data records, and real-time messages.

Entity Relationship Diagram



Use case Diagram for MigraineEase:

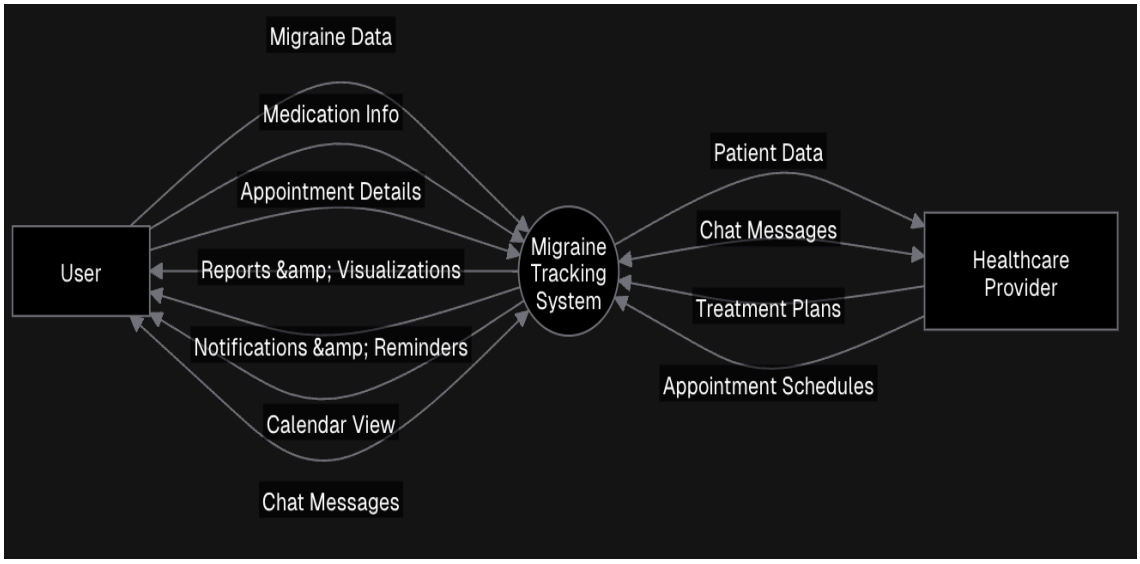


Use case table for MigraineEase:

Use Case ID	Use Case Name	Actors	Description	Preconditions	Postconditions
UC-01	User Authentication	User	Users can securely register, log in, and manage their accounts.	The user must have a valid email address and internet connection.	User can access their personal dashboard and features after successful login.
UC-02	Log Migraine Event	User	Users log migraine details (date, time, severity, duration, triggers).	User must be logged into the app.	Migraine event is saved in the database and reflected in the user's migraine history.
UC-03	Medication Reminder Setup	User	Users set reminders for medications to manage migraine symptoms.	User must be logged in and input medication details (name, timing, dosage).	App sends timely notifications as per the scheduled reminders.
UC-04	Receive Doctor Appointment Alerts	User	App notifies users of upcoming doctor appointments.	User must have scheduled appointments and allowed notifications.	Notification sent to the user with details of the appointment (date, time, location).
UC-05	Real-Time Chat	User, Caregiver, Doctor	Users engage in real-time messaging for support or consultation.	Both sender and receiver must be online and authenticated.	Messages are delivered instantly, fostering real-time communication.
UC-06	View Attack-Free Duration	User	Users view the duration since their last logged migraine episode.	User must have logged at least one migraine episode in the past.	The home screen displays the "attack-free" duration in days.
UC-07	Manage Profile	User	Users update their profile information, including caregivers and preferences.	User must be logged in to access profile settings.	Profile updates are saved and reflected in the system.

DataFlow Diagrams

Level 0:



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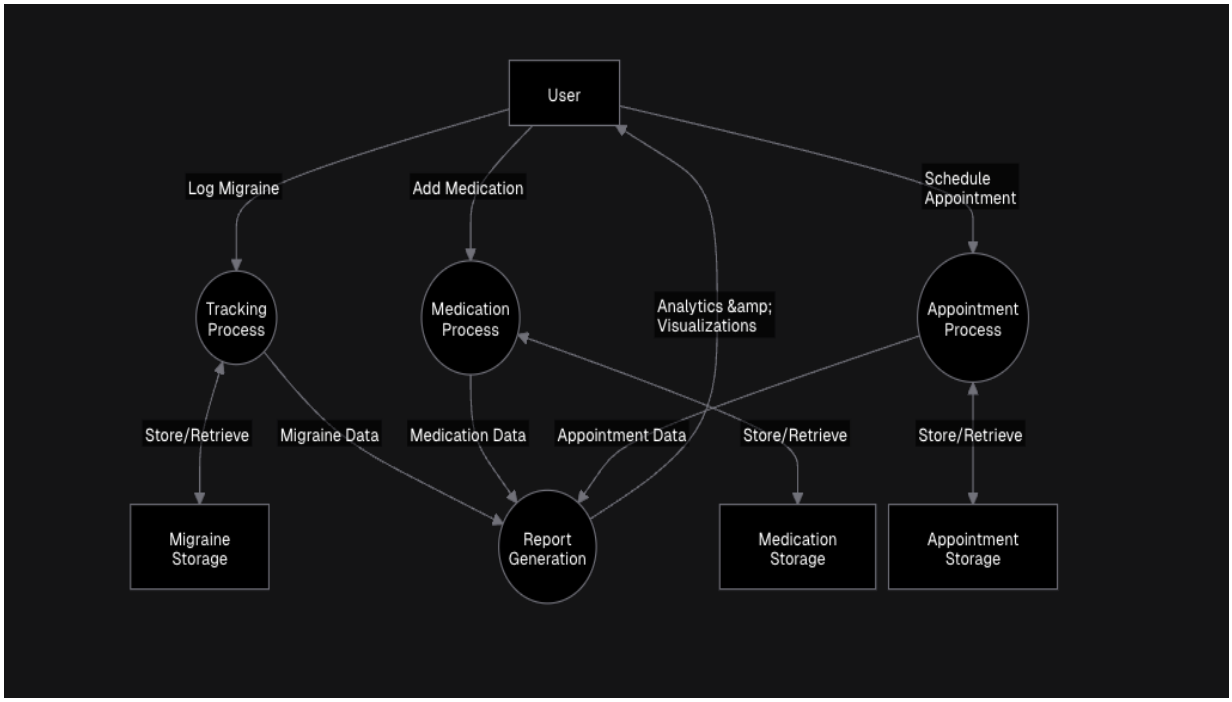
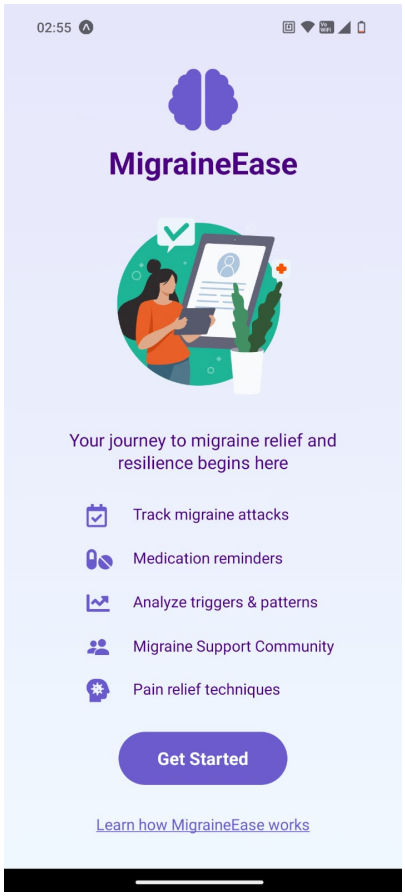
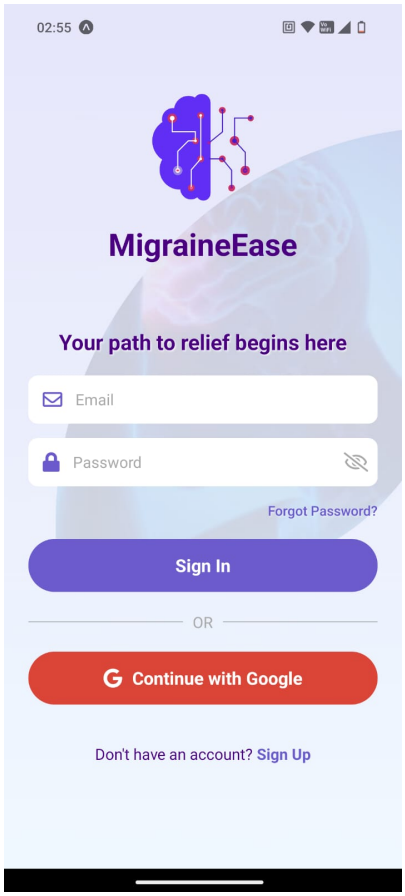


Snapshots of screens

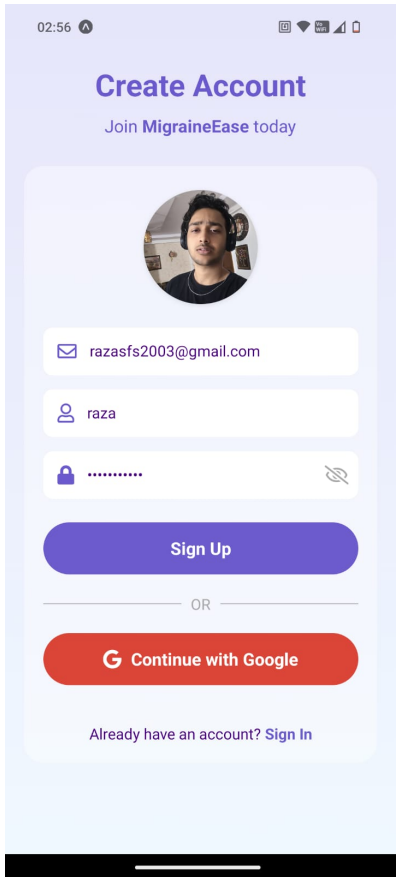
Welcome Screen



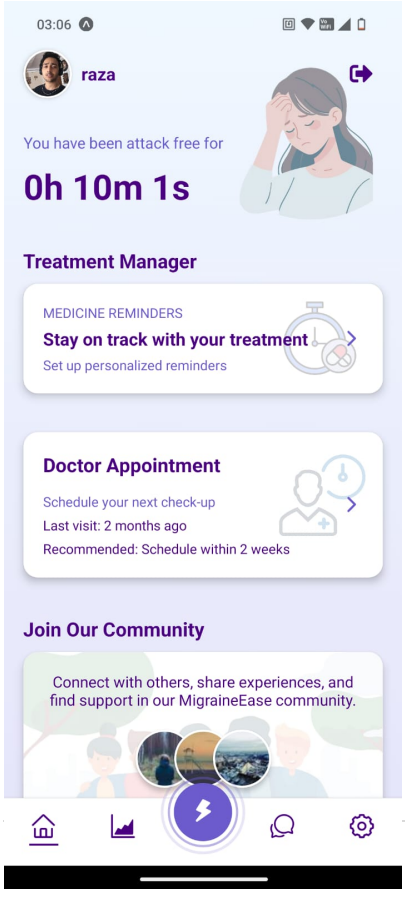
Sign In Screen



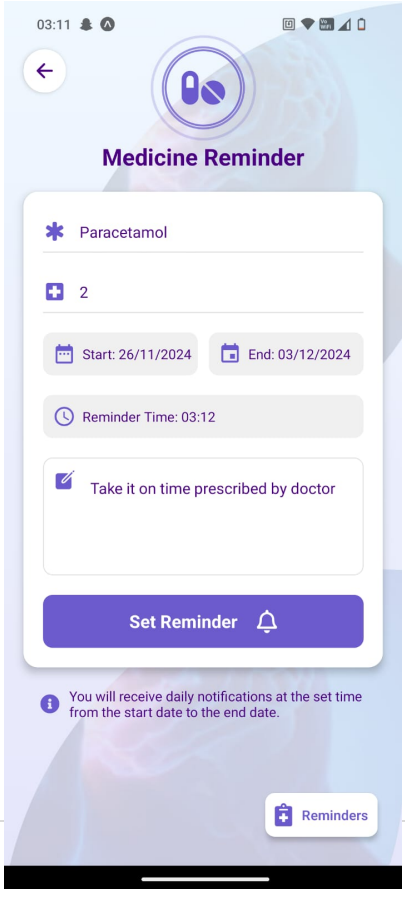
Sign Up Screen



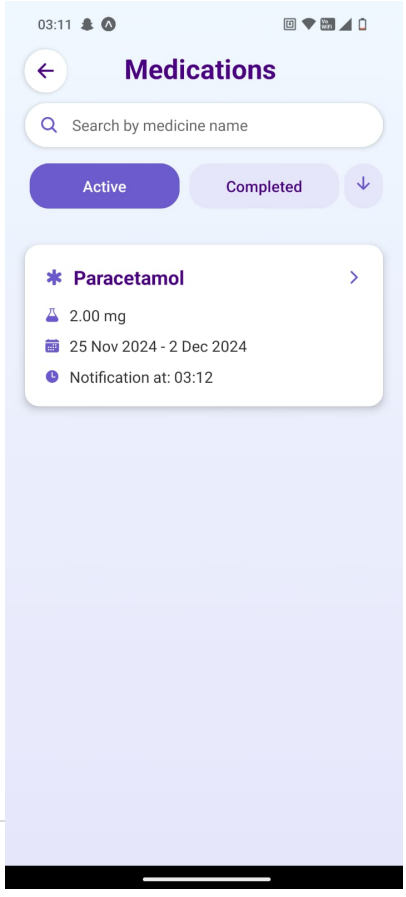
Home Screen

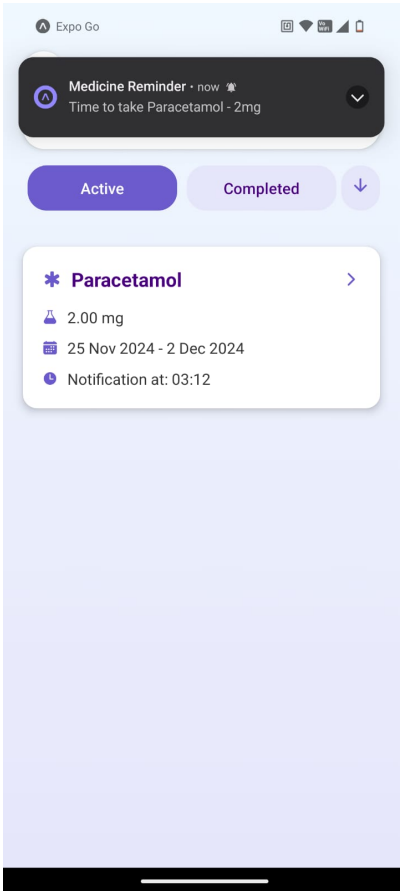


Meds Notification Setup

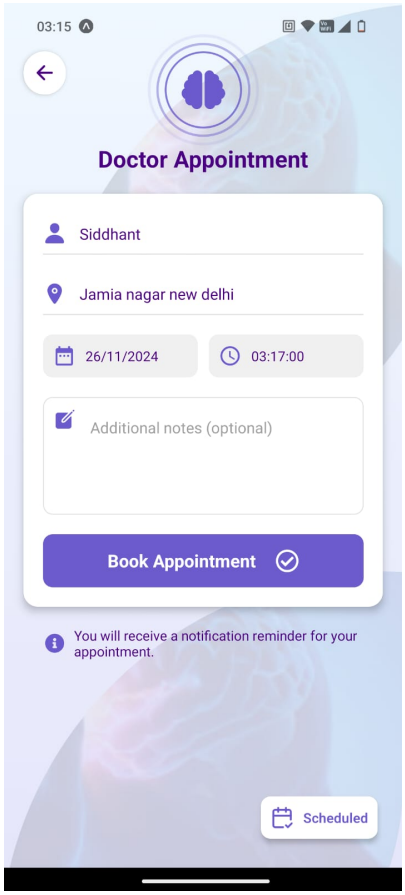


Meds Notification Records

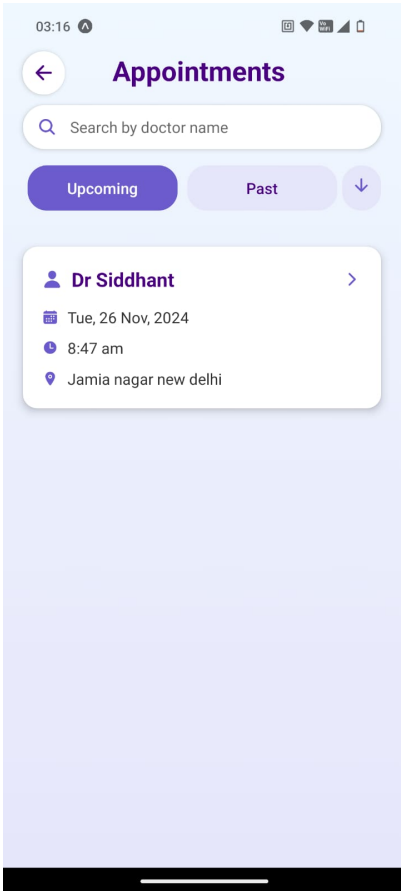




Meds Notification



Dr Appointment Notification

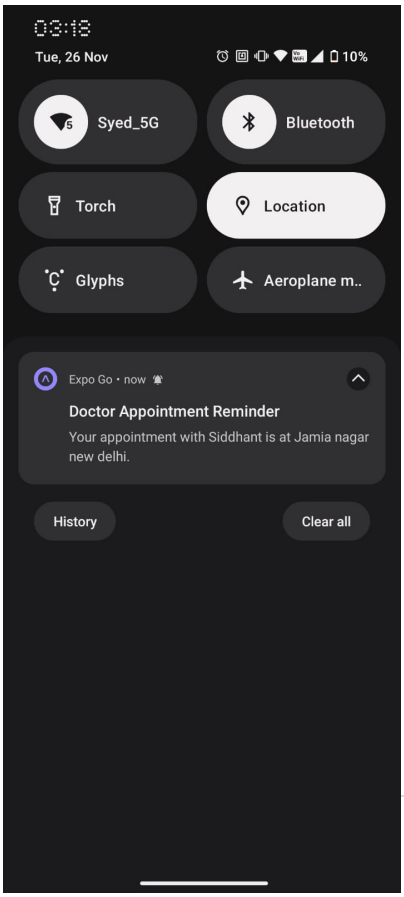


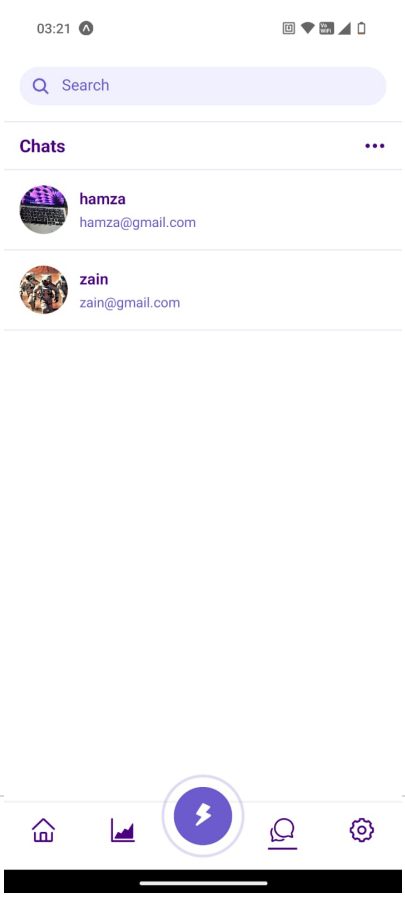
Appointments Records

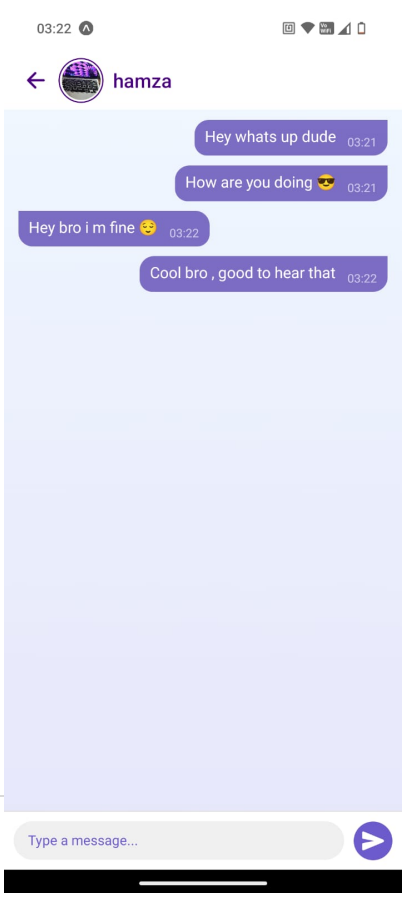
Appointments Notification

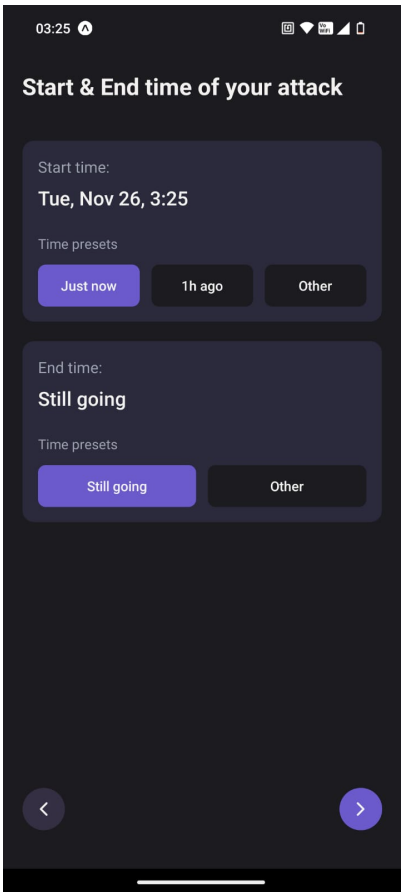
Chat Room

Friend Chat Dm

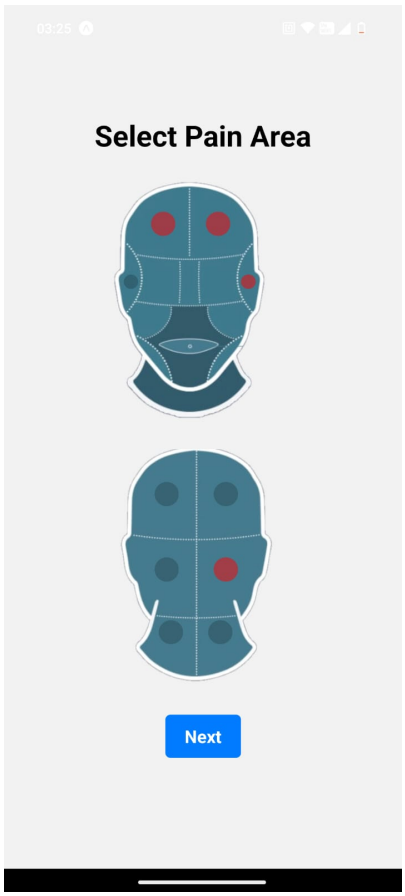




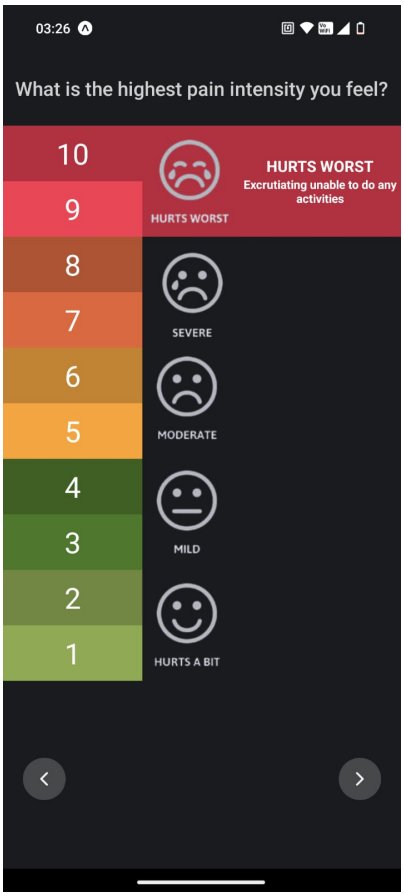




Migraine Attack Timings (1)



Pain Areas (2)

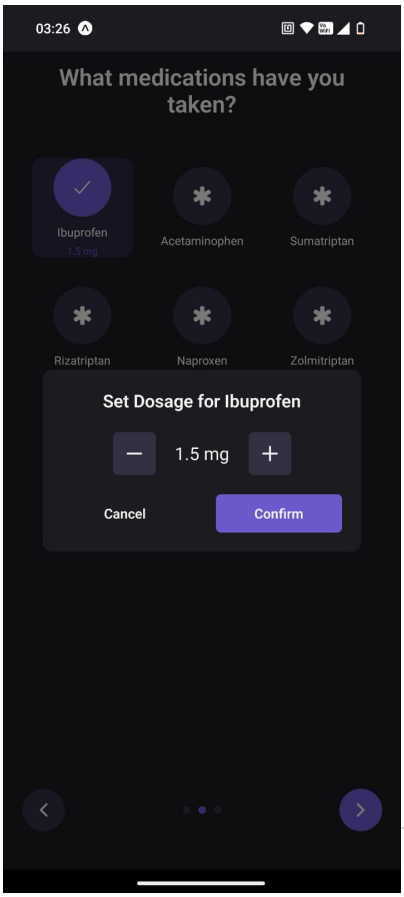


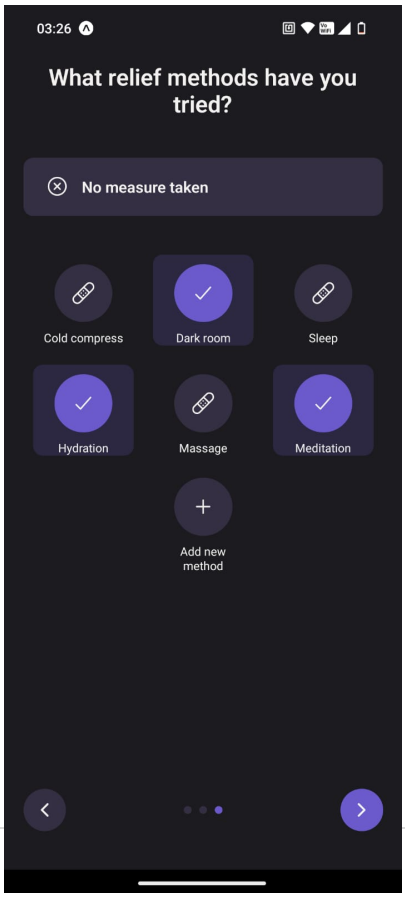
Pain Scale (3)

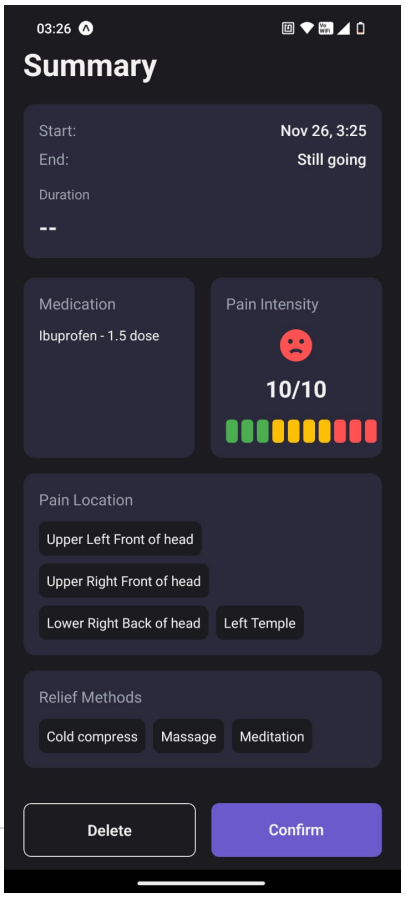
Medications Taken (4)

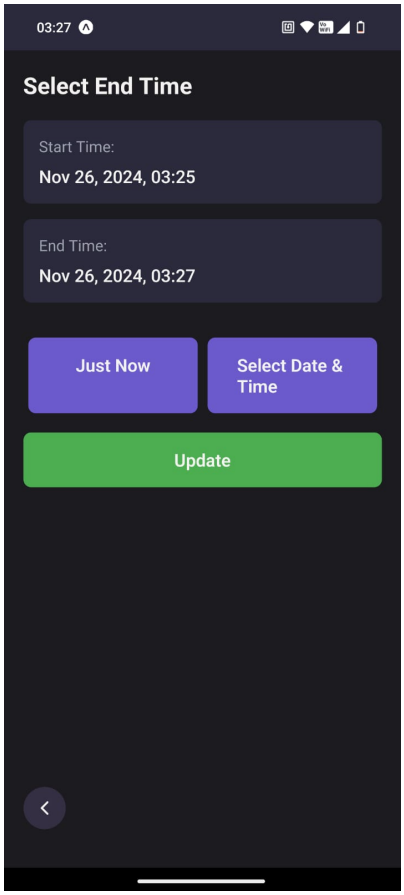
Relief Methods Tried (5)

Report Summary (6)

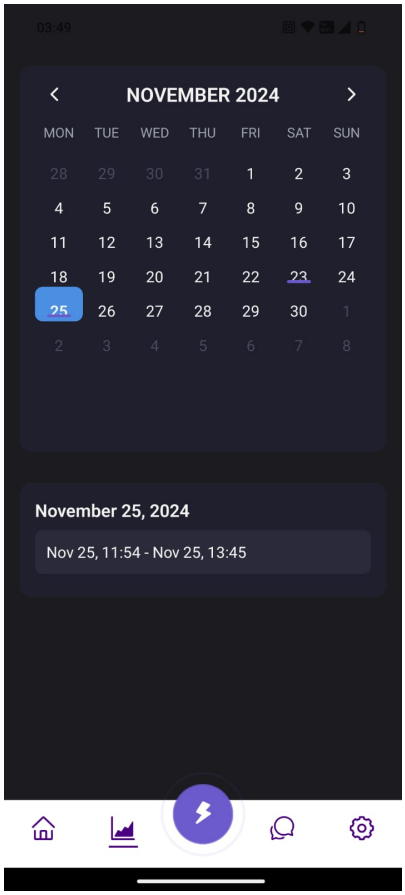




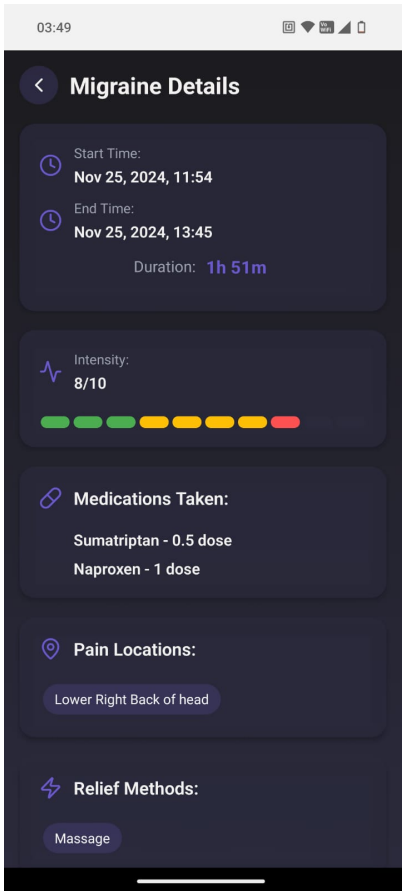




End Attack Time (if Still going) (7)

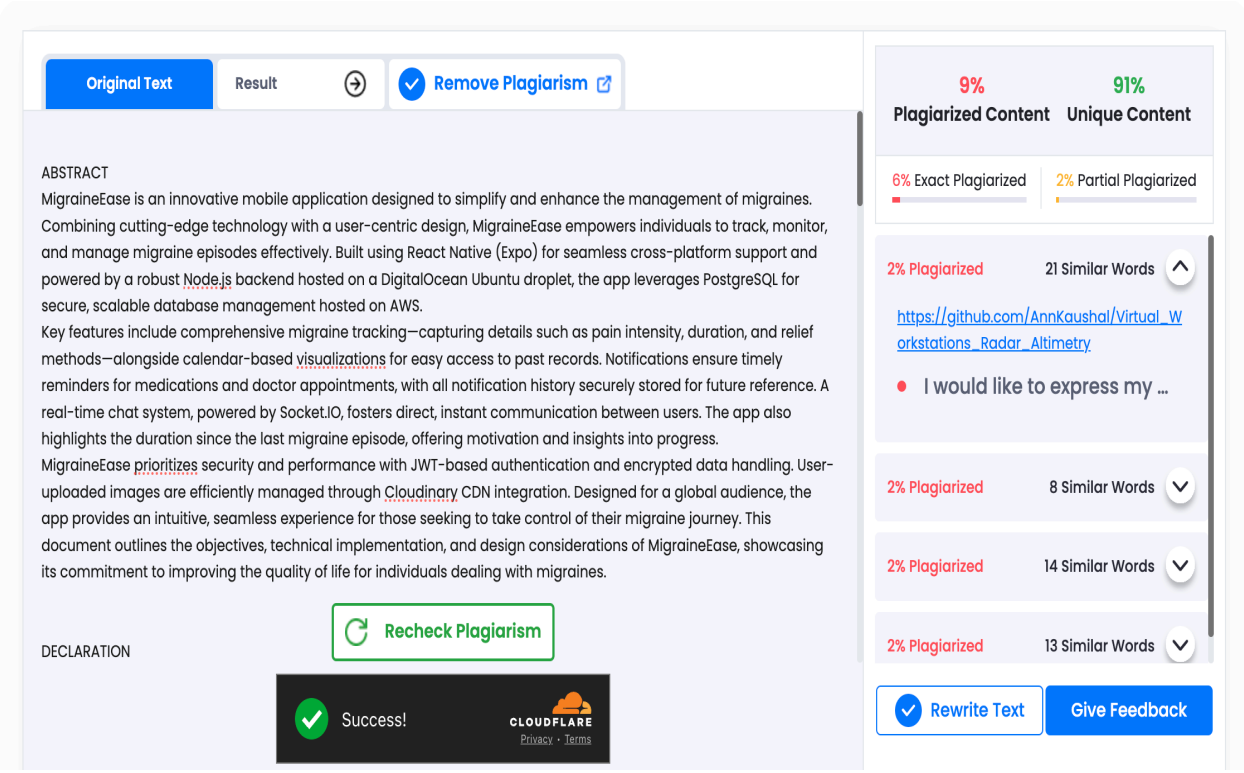


Calendar For Migraine Attacks (8)



Migraine Attack Information For Selected Date (9)

Plagiarism check



Conclusion

MigraineEase is thoughtfully designed to address the unique challenges faced by individuals with migraines, their caregivers, and healthcare providers. By offering a secure and user-friendly platform, it simplifies migraine management through efficient tracking, timely notifications, and real-time communication. Leveraging modern technologies and robust security standards, MigraineEase provides a safe and reliable environment for monitoring migraine episodes, managing medications, and improving collaboration with healthcare professionals.

With a focus on accessibility, simplicity, and scalability, MigraineEase serves not only as a comprehensive tool for migraine management but also as a stepping stone for future advancements in digital healthcare. As the platform evolves, it will continue to enhance the user experience, meeting the growing needs of users and healthcare providers alike.

This document outlines the core functional and non-functional requirements that will guide the development, deployment, and continuous improvement of MigraineEase, ensuring it remains an indispensable resource for its users.

Limitation

While MigraineEase provides a comprehensive solution for migraine management, there are certain limitations that users and stakeholders should be aware of:

1. **Data Accuracy and User Input:**
    - The accuracy of migraine tracking heavily relies on the user's ability to consistently and accurately log their symptoms, triggers, and medication usage. Inaccurate or incomplete data can affect the quality of insights provided by the app.
2. **Limited Scope of Diagnosis:**
    - MigraineEase is not a diagnostic tool. It helps users track and manage migraine episodes, but it cannot replace professional medical advice, diagnosis, or treatment. Users should always consult healthcare providers for medical advice.
3. **Dependence on User Participation:**
    - Many features of the app, such as medication reminders and real-time communication, depend on user engagement. If users do not interact with the app regularly, certain functions may not be fully effective.
4. **No Direct Integration with Healthcare Systems:**
    - While MigraineEase facilitates tracking and communication with healthcare providers, it currently does not have direct integration with electronic health records (EHR) or medical systems for seamless data sharing with clinics and hospitals.

5. **Notifications Limitations:**
    - The medication and appointment reminder notifications depend on the device's notification system, which may be affected by users' device settings (e.g., Do Not Disturb mode) or app permissions, potentially leading to missed reminders.
6. **Geographical and Language Limitations:**
    - The app may not be fully optimized for all regions or languages, potentially limiting accessibility for non-English speaking users or those in regions with varying healthcare systems.

Bibliography

Tech Stack Documentation:

- **React Native:** https://reactnative.dev/
- **Node.js:** https://nodejs.org/
- **Express.js:** https://expressjs.com/
- **PostgreSQL:** https://www.postgresql.org/docs/
- **Socket.IO:** https://socket.io/docs/
- **DigitalOcean (droplet):** https://www.digitalocean.com/
- **AWS:** https://aws.amazon.com/
- **Cloudinary CDN:** https://cloudinary.com/

Frontend Tools and Libraries:

- **React Navigation:** https://reactnavigation.org/
- **Styled Components:** https://styled-components.com/
- **TailwindCSS:** https://tailwindcss.com/
-

Http Requests:

- **Axios:** https://axios-http.com/docs/intro
- **Fetch Api:** https://www.w3schools.com/js/js_api_fetch.asp