BSCS FINAL PROJECT
<Software Design Specification>

<INSIGHT-MATE>

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Software Design Specification

SDP Phase II

<INSIGHT-MATE>

Advisor: <SAHER ZIA>

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Shafqat Ali	4.2, 4.3, 3.3, 3.4, 5

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Revision History

Name	Date	Reason For Changes	Version

Abstract

Insight Mate is an innovative mobile application designed to provide comprehensive assistance and support for individuals with visual impairments. The project addresses the critical challenges faced by blind individuals in navigating their surroundings, identifying objects, and performing daily tasks independently. By leveraging advanced technologies such as artificial intelligence (AI), image recognition, and voice interaction, Insight Mate aims to enhance accessibility and improve the quality of life for visually impaired users. The primary focus of Insight Mate is to empower blind individuals with comprehensive navigation capabilities, object recognition functionalities through a user-friendly mobile interface. The application integrates a small, external IP-based camera to capture real-time images, which are then processed using MI algorithms to identify objects, read text, and provide contextual information. Additionally, Insight Mate features robust navigation support through Mapbox, offering turn-by-turn directions to ensure safe and efficient travel. The significance of Insight Mate lies in its potential to address the day-to-day challenges faced by visually impaired individuals, including difficulties in wayfinding, shopping, and social interactions. By harnessing the power of AI and modern mobile technologies, Insight Mate offers a holistic solution that promotes independence, safety, and inclusion for users with visual impairments. The application also includes features such as currency recognition, facial recognition, emergency assistance, and shopping assistance, all of which are accessible through intuitive voice commands. Key knowledge areas utilized in the development of Insight Mate include mobile app development, AI and machine learning, computer vision, and human-computer interaction. Through collaborative efforts in software engineering, data analysis, and user experience design, the project aims to achieve tangible results in the form of a functional and impactful mobile application tailored to the needs of blind users. Insight Mate not only aspires to be a practical tool for its users but also aims to set a precedent for future innovations in accessibility technology, contributing to a more inclusive society.

1. Introduction

1.1 Product

Insight Mate is a groundbreaking mobile application aimed at revolutionizing accessibility and independence for individuals with visual impairments. The software addresses significant challenges such as navigating surroundings, identifying objects, and performing daily tasks without sighted assistance. By leveraging cutting-edge technologies like artificial intelligence (AI), image recognition, and voice interaction, Insight Mate provides accurate turn-by-turn navigation, object and product identification, currency recognition, and facial recognition. Additionally, it offers emergency assistance. Insight Mate aims to enhance the quality of life for visually impaired individuals, promoting independence, safety, and social inclusion.

1.2 Background

According to the World Health Organization (WHO), approximately 2.2 billion people worldwide suffer from vision impairment or blindness, with profound implications for their mobility, safety, and overall quality of life. In response to this pressing societal issue, our project aims to harness the potential of cutting-edge technology to develop a groundbreaking solution: an Android application utilizing React Native and an external camera system. This application will serve as a vital tool for visually impaired individuals, offering real-time object detection and navigation assistance. Through this introduction, we provide context to the challenges faced by the visually impaired community and highlight the significance of our project in addressing these challenges. By leveraging machine learning algorithms and mobile application development expertise, we seek to empower visually impaired individuals with newfound independence and safety in their daily lives. The domain of assistive technology for visually impaired individuals encompasses a range of solutions designed to mitigate the barriers faced by this community in everyday activities. Traditional aids such as canes and guide dogs offer physical support, but technological advancements have opened up new possibilities for enhancing accessibility and autonomy through software solutions. With the proliferation of smartphones and wearable devices, there is a growing interest in developing applications that leverage these platforms to provide intelligent assistance to individuals with visual impairments.

1.3 Objective(s)/Aim(s)/Target(s)

The primary objectives of Insight Mate are as follows:

- To provide visually impaired individuals with a reliable and intuitive tool for navigating their surroundings independently.
- To enhance accessibility and inclusion by leveraging AI and mobile technologies to assist users in identifying objects and accessing information.
- To improve the overall quality of life for individuals with visual impairments by empowering them with tools for everyday tasks and social interactions.
- To continuously enhance and update the AI algorithms and databases for object recognition and navigation, ensuring accuracy and relevance in various environments and scenarios.
- To promote awareness and education about the challenges faced by visually impaired individuals and the potential of technology to address these challenges, advocating for greater inclusivity and accessibility in society.
- To explore potential expansions or adaptations of Insight Mate for other user groups with disabilities or specific needs, broadening the impact and reach of the project beyond its initial scope.

1.4 Scope

The scope of Insight Mate encompasses a comprehensive suite of features tailored to the needs of blind and visually impaired users. Key functionalities include:

- Real-time map navigation with turn-by-turn guidance.
- Object detection and recognition using MI algorithms trained on the COCO dataset.
- Voice-activated commands for hands-free interaction.
- Currency recognition for assistance with financial transactions.
- Facial recognition for identifying familiar individuals.
- Integration with external hardware such as IP-based cameras for image capture.
- Audio alerts for navigation cues, obstacle detection, and notifications.
- Shopping assistance with product identification.

1.5 Business Goals

Insight Mate addresses several business and corporate goals, including: Social Impact: Enhancing accessibility and inclusion for individuals with visual impairments aligns with corporate social responsibility initiatives and contributes to a more inclusive society. Market Differentiation: Providing a unique and innovative solution in the assistive technology market strengthens the company's position as a leader in accessible software development. Customer Satisfaction: Meeting the needs of visually impaired users by offering a comprehensive and user-friendly application enhances customer satisfaction and loyalty. Brand Reputation: Developing solutions that positively impact individuals' lives fosters a positive brand image and strengthens customer trust and loyalty.

1.6 Document Conventions

This SRS follows the standard format for software requirements specifications. The document utilizes the following conventions:

Font Styles:

Section headings are in bold font of 14 Arial, while subsection headings are in bold of size 11. Regular text is used for descriptions and content.

Highlighting:

Important terms or concepts may be highlighted using bold or italic font for emphasis.

Numbering:

Sections and subsections are numbered sequentially for organization and reference purposes.

Nomenclature:

Where applicable, technical terms or acronyms are defined upon first use to ensure clarity and understanding throughout the document.

1.7 Miscellaneous

Insight Mate is designed to operate within a specific environment that includes hardware platforms, operating systems, and other software components. The operating environment for the software is as follows:

Hardware Platform:

- Insight Mate is primarily intended for use on mobile devices, including smartphones and tablets.
- The application should be compatible with a range of hardware configurations, including devices with different processing power, memory capacity, and screen sizes.
- External hardware components, such as IP-based cameras or wearable sensors, may be integrated with the application to enhance its functionality.

Operating System and Versions:

- The application should be compatible with popular mobile operating systems, including:
- IOS: Versions 11 and above (for compatibility with iPhones and iPads).
- Android: Versions 10.0 and above (for compatibility with a wide range of Android devices).

- Compatibility with the latest operating system versions is preferred to ensure access to the latest features and security updates.

Other Software Components or Applications:
Insight Mate may require integration with external software components or applications to provide certain functionalities, such as:
Map services:
Integration with map APIs or services for real-time navigation and location-based services.
Voice recognition services:
Integration with speech recognition APIs or services for voice-controlled interactions.
Image processing libraries:
Integration with image recognition and computer vision libraries for object detection and analysis.
System Requirements:
The specific system requirements, including minimum hardware specifications and recommended configurations, will be detailed in the application documentation and user guides provided with the software.

2. Overall Description

2.1 Product Features

Insight Mate offers a comprehensive set of features designed to enhance accessibility and independence for visually impaired individuals. The major features of the product include:
Navigation Assistance:
- Turn-by-turn guidance for walking navigation.
- Voice-activated commands for destination input and route selection.
- Real-time updates on nearby points of interest and obstacles.

Object Recognition:
- Identification of common objects and environmental obstacles using MI algorithms.
- Audio feedback on object characteristics, such as shape, color etc.
- Integration with external hardware, such as IP-based cameras, for real-time image capture and analysis**.**

Voice Interaction:
- Natural language processing for voice commands and queries.
- Hands-free operation for accessing features and receiving information.
- Personalized voice assistant for tailored assistance and support**.**

Financial Assistance:
- Currency recognition for assisting with cash transactions.
- Detection and denomination of banknotes for accurate payment calculations.
- Audio feedback on transaction details and change received.

Social Recognition:
- Facial recognition for identifying familiar individuals, such as family members and friends.
- Personalized alerts and notifications when recognized individuals are detected.

2.2 Functional Description.

i. User Authentication and Profile Management

This functionality allows users to securely access the Insight Mate application. It includes user registration, login, and profile management features. Users can create and update their profiles, which store personal settings and preferences, ensuring a personalized and secure user experience.

ii. Navigation Assistance

Insight Mate provides turn-by-turn navigation assistance, leveraging Mapbox services. Users can input destinations via voice commands and receive audio cues to guide them safely and efficiently. The system provides real-time updates on nearby points of interest and obstacles, ensuring a smooth navigation experience.

iii. Object Recognition

Using an external IP-based camera, Insight Mate captures real-time images and processes them with machine learning algorithms. The system can identify common objects and environmental obstacles, offering audio feedback on the characteristics of identified objects, such as shape, color, and size, aiding users in their daily tasks.

iv. . Voice Interaction

The application supports hands-free operation through natural language processing. Users can control the app, input commands, and receive information entirely through voice interaction. This feature enhances convenience and accessibility, allowing users to interact with the app without needing to use a touchscreen.

v. Currency Recognition

Insight Mate assists users with financial transactions by recognizing and identifying different denominations of banknotes. The system provides audio feedback on the currency value, facilitating accurate payment and change calculations. This feature ensures that visually impaired users can handle cash transactions independently.

vi. Facial Recognition

The system includes facial recognition capabilities to identify familiar individuals, such as family members and friends. When recognized individuals are detected, the system provides personalized alerts, enhancing social interactions and ensuring user safety.

vii. Accessibility Features

Insight Mate includes various accessibility features designed to meet the needs of visually impaired individuals. These features include adjustable audio alerts, high-contrast text, and customizable voice command settings, ensuring that the application is intuitive and easy to use for all users.

viii. Audio Alerts

The application provides audio alerts for navigation cues, obstacle detection, and notifications. These alerts help users stay informed and aware of their surroundings, enhancing their safety and independence while using the application.

ix. **Shopping Assistance**

Insight Mate assists users during shopping by identifying products through barcode scanning and image recognition. It provides detailed product information, helping users make informed purchasing decisions. This feature ensures that visually impaired users can shop independently and confidently.

x. **Language Support**

The application supports multiple languages to cater to a diverse user base. Users can select their preferred language for voice commands and audio feedback, ensuring that the application is accessible and usable for individuals from different linguistic backgrounds.

xi. Offline Mode Support

Insight Mate includes offline mode support for essential features like navigation and object recognition. This functionality allows users to continue using the application even without internet connectivity, ensuring continuous assistance and support in various scenarios.

2.3 User Classes and Characteristics

Insight Mate is designed to cater to a diverse range of user classes, each with unique characteristics and requirements. The anticipated user classes for the product are as follows:

Blind or Visually Impaired Individuals:

- These users have varying degrees of visual impairment, ranging from partial sight loss to total blindness.
- They rely on assistive technologies and accessibility features to navigate their surroundings and perform daily tasks independently.
- Characteristics may include familiarity with assistive technology, reliance on auditory feedback, and varying levels of mobility.

Caregivers and Assistants:

- Caregivers or assistants may include family members, friends, or professional caregivers who provide support and assistance to visually impaired individuals.
- Their role may involve setting up and configuring the application, providing guidance and assistance during initial use, and troubleshooting technical issues.
- Characteristics may include technical proficiency, familiarity with the user's needs and preferences, and a willingness to assist with application usage.

Developers and Technical Support:

- Developers and technical support personnel are responsible for maintaining and enhancing the application, as well as providing assistance to users in case of technical issues or queries.
- They may require access to technical documentation, development tools, and debugging capabilities to troubleshoot issues and implement new features.
- Characteristics may include software development skills, familiarity with mobile app development frameworks, and the ability to communicate technical concepts effectively to nontechnical users.

Administrators and Moderators:

- Administrators or moderators may be responsible for managing user accounts, overseeing data privacy and security measures, and enforcing community guidelines or terms of service.
- Their role may involve monitoring user activity, responding to user inquiries or complaints, and implementing policies to ensure a safe and inclusive environment for all users.
- Characteristics may include administrative privileges, knowledge of data protection regulations, and the ability to enforce policies consistently and fairly.

Distinguishing Characteristics:

- While all user classes are important to consider, the primary focus of the product is on meeting the needs of blind or visually impaired individuals, who are the primary end-users of the application.
- Caregivers and technical support personnel play a crucial role in facilitating the adoption and usage of the application, but their requirements may differ from those of the end-users.
- Developers and administrators contribute to the ongoing maintenance and improvement of the application but may have specialized roles and responsibilities distinct from end-users.

2.4 Design and Implementation Constraints

Insight Mate development will need to consider various constraints that may limit the options available to the developers. These constraints include:

1. **Hardware Limitations:**
   - Memory and processing constraints on mobile devices may impact the performance and scalability of the application, requiring optimization techniques and resource management strategies.
   - Compatibility with a diverse range of mobile devices with varying hardware specifications, screen sizes, and input methods must be ensured.

2. Interfaces to External Applications and Services:

- Integration with external APIs, services, or databases, such as map services, voice recognition APIs, and image processing libraries, may be subject to availability, access restrictions, or usage limits.
- Compatibility with third-party applications or systems, including operating system updates and changes to APIs or SDKs, may introduce dependencies or interoperability issues.

3. Technological Constraints

- Use of specific technologies, tools, and development frameworks, such as React Native for cross-platform app development, TensorFlow for object detection, and Mapbox for map services, may be mandated by project requirements or organizational preferences.
- Adherence to design conventions, programming standards, and best practices, including code quality, documentation, and version control, may be enforced to ensure maintainability and scalability of the software.

6. Operational Considerations:

- Consideration of operational aspects, such as deployment, monitoring, and maintenance, including support for over-the-air updates, crash reporting, and remote troubleshooting.
- Design for scalability and reliability to accommodate potential growth in user base and usage patterns over time.

2.5 Assumptions and Dependencies

Assumptions

1. Availability of Third-Party Components:

- The availability and functionality of third-party components, such as map services, voice recognition APIs, and image processing libraries, are assumed to meet project requirements and specifications.
- Assumption that third-party components will continue to be supported and maintained throughout the development lifecycle of Insight Mate.

2. Stable Operating Environment:

- Assumption that the operating environments for iOS and Android platforms, including hardware configurations and operating system versions, remain stable and consistent during the development and deployment of Insight Mate.
- Assumption that changes to external factors, such as mobile device hardware or operating system updates, will not significantly impact the functionality or performance of the application.

3. Compliance with Regulations:

- Assumption that the development and deployment of Insight Mate will comply with relevant regulatory requirements and standards, including accessibility guidelines, data protection laws, and mobile app distribution policies.

Dependencies

1. Third-Party APIs and Services:

- Dependency on external APIs and services, such as map services (e.g., Mapbox), voice recognition APIs (e.g., Google Cloud Speech-to-Text), and image processing libraries (e.g., TensorFlow), for core functionalities of Insight Mate.
- Dependency on the availability, reliability, and performance of third-party components, which may impact the overall functionality and user experience of the application.

2. Hardware and Operating System Compatibility:

- Dependency on compatibility with a wide range of mobile devices, hardware configurations, and operating system versions for iOS and Android platforms.

Dependency on device-specific features and capabilities, such as camera hardware for image capture and processing, which may vary across different devices and manufacturers.

3. Technical Architecture

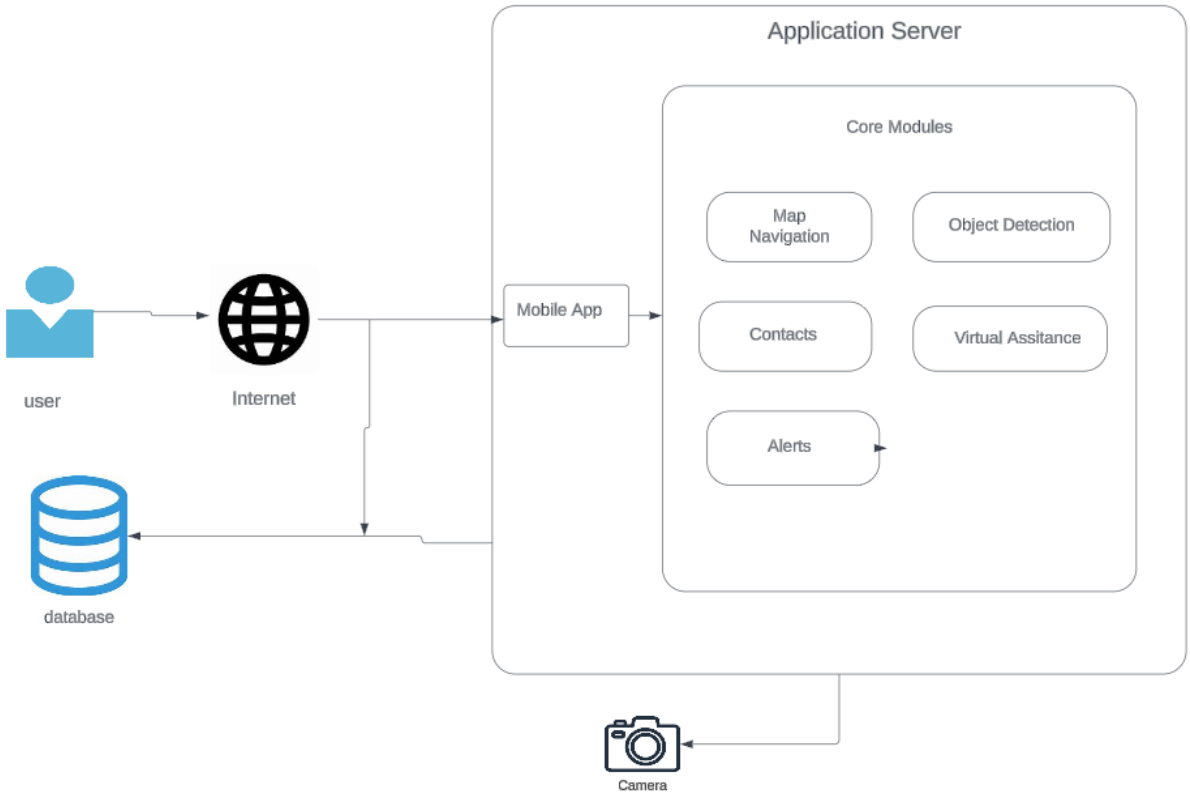

Figure #1: Technical Architecture

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3.1 Application and Data Architecture

Component Diagram

Figure #2:
Com

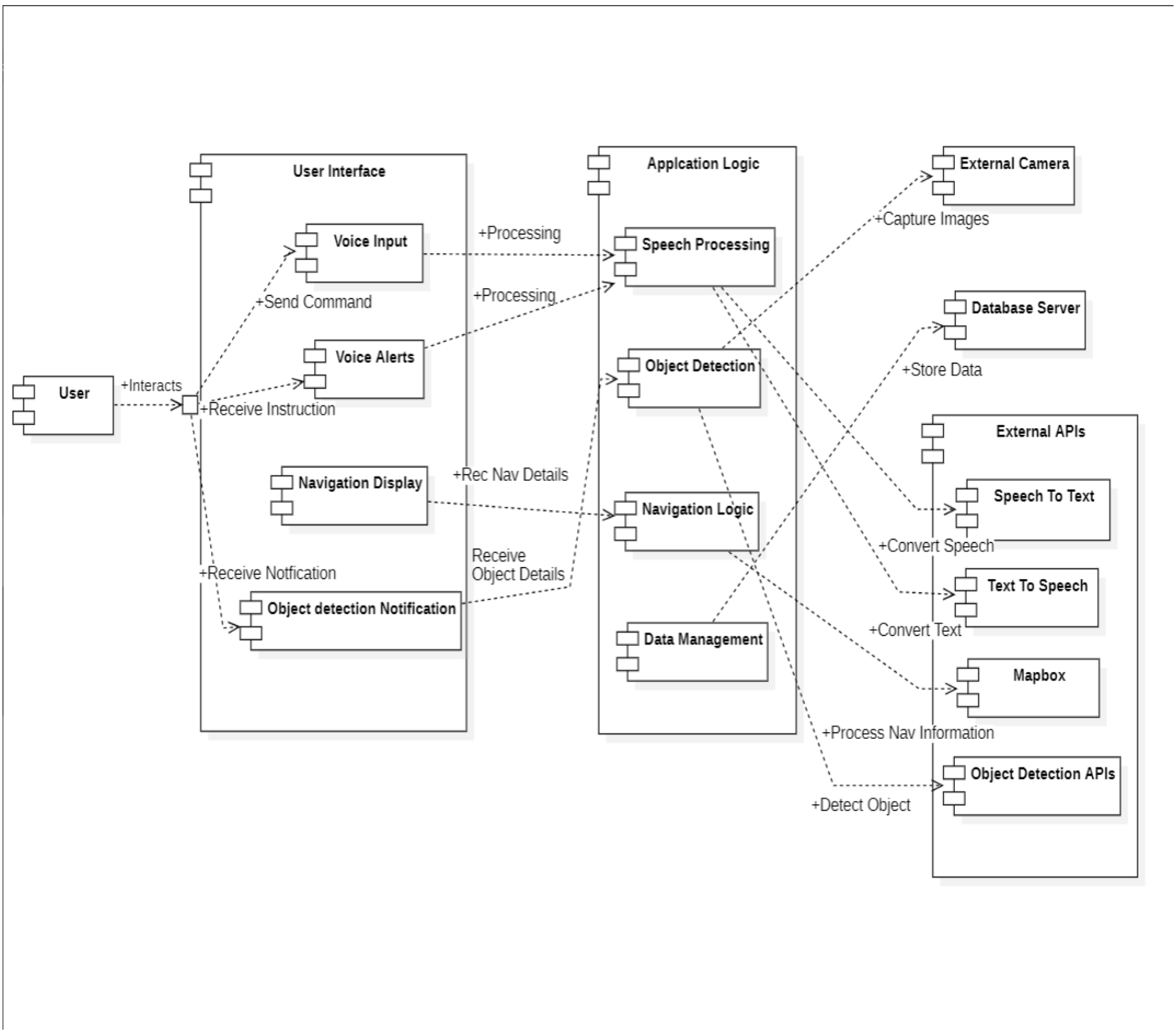


Figure #2: Component Diagram

Activity Diagram

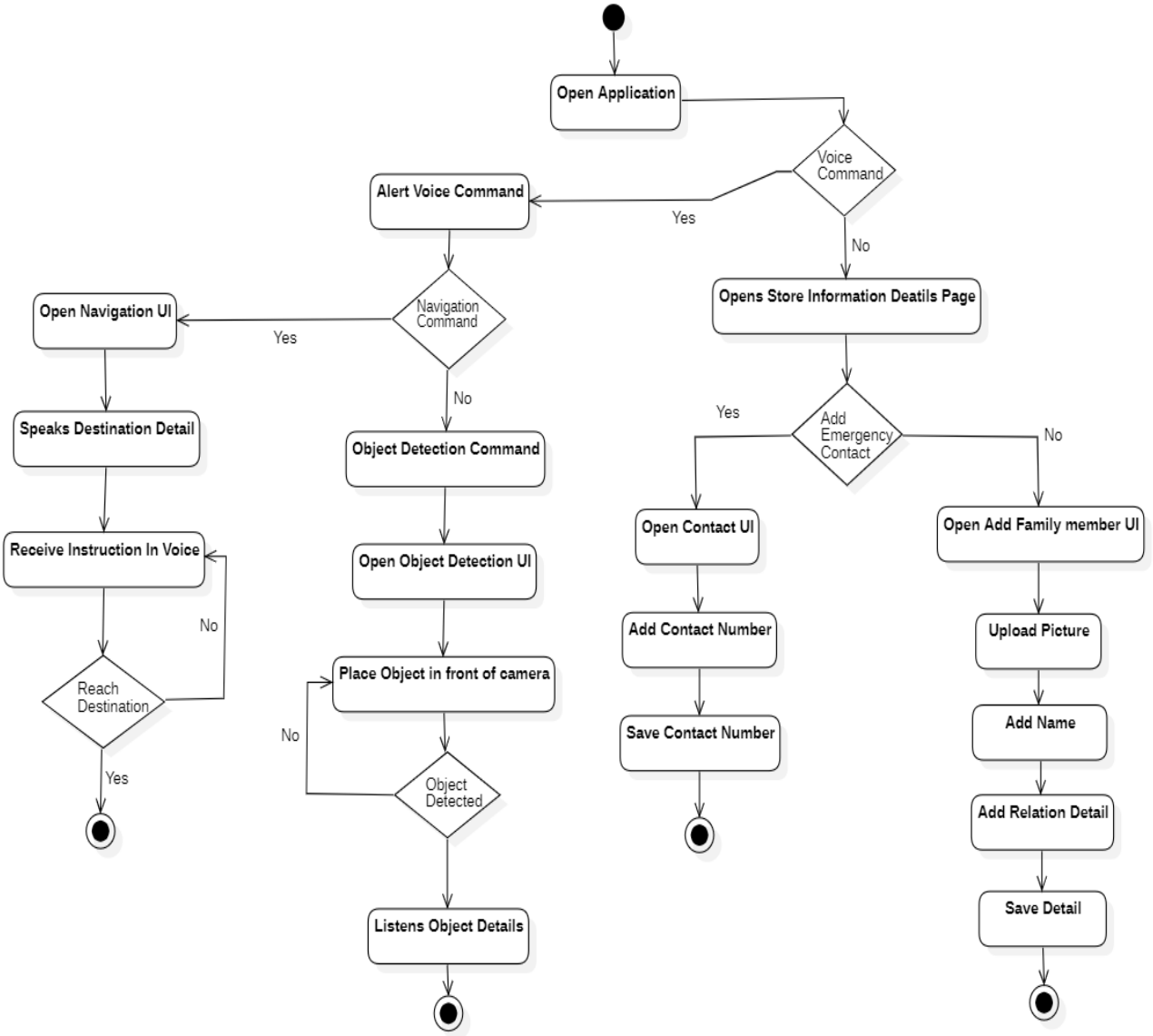


Figure #3: Activity

ER Diagram

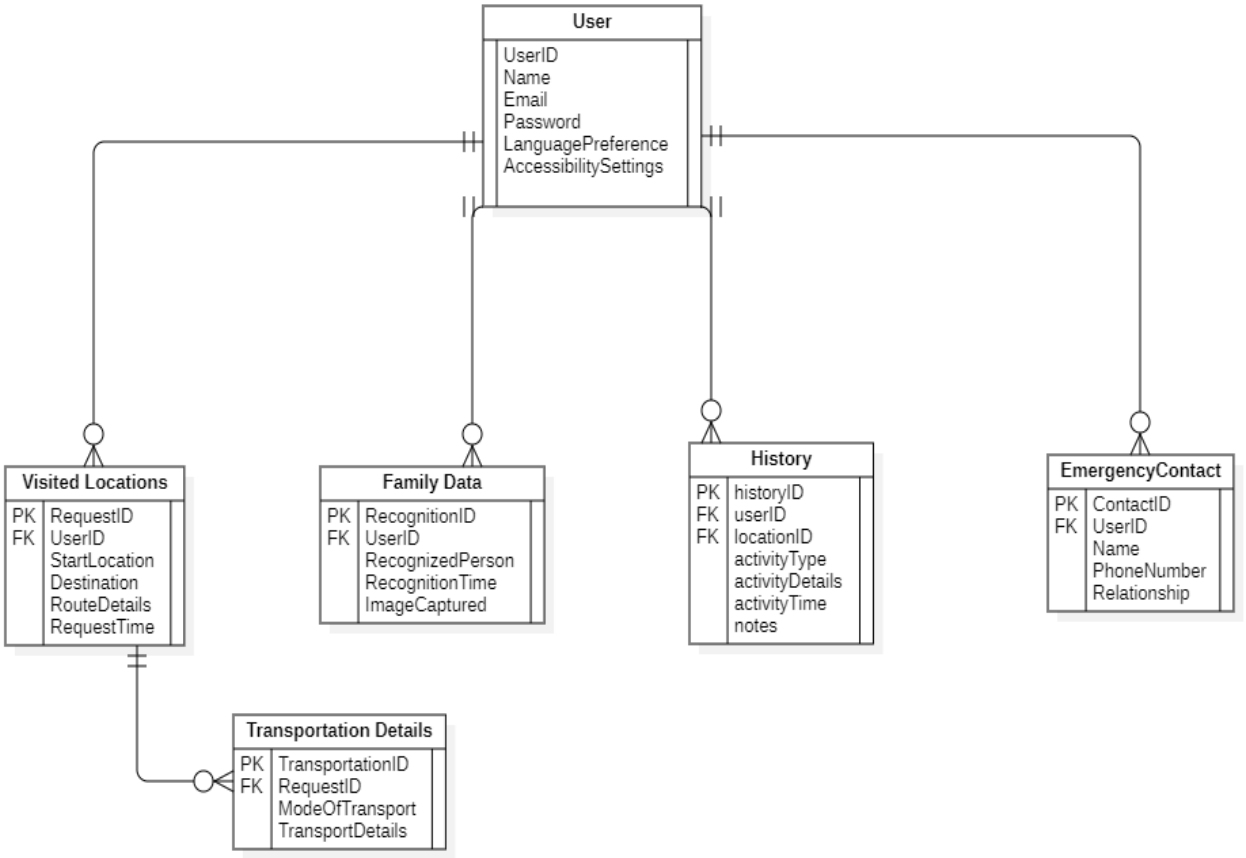


Figure #4: ER

Class Diagram

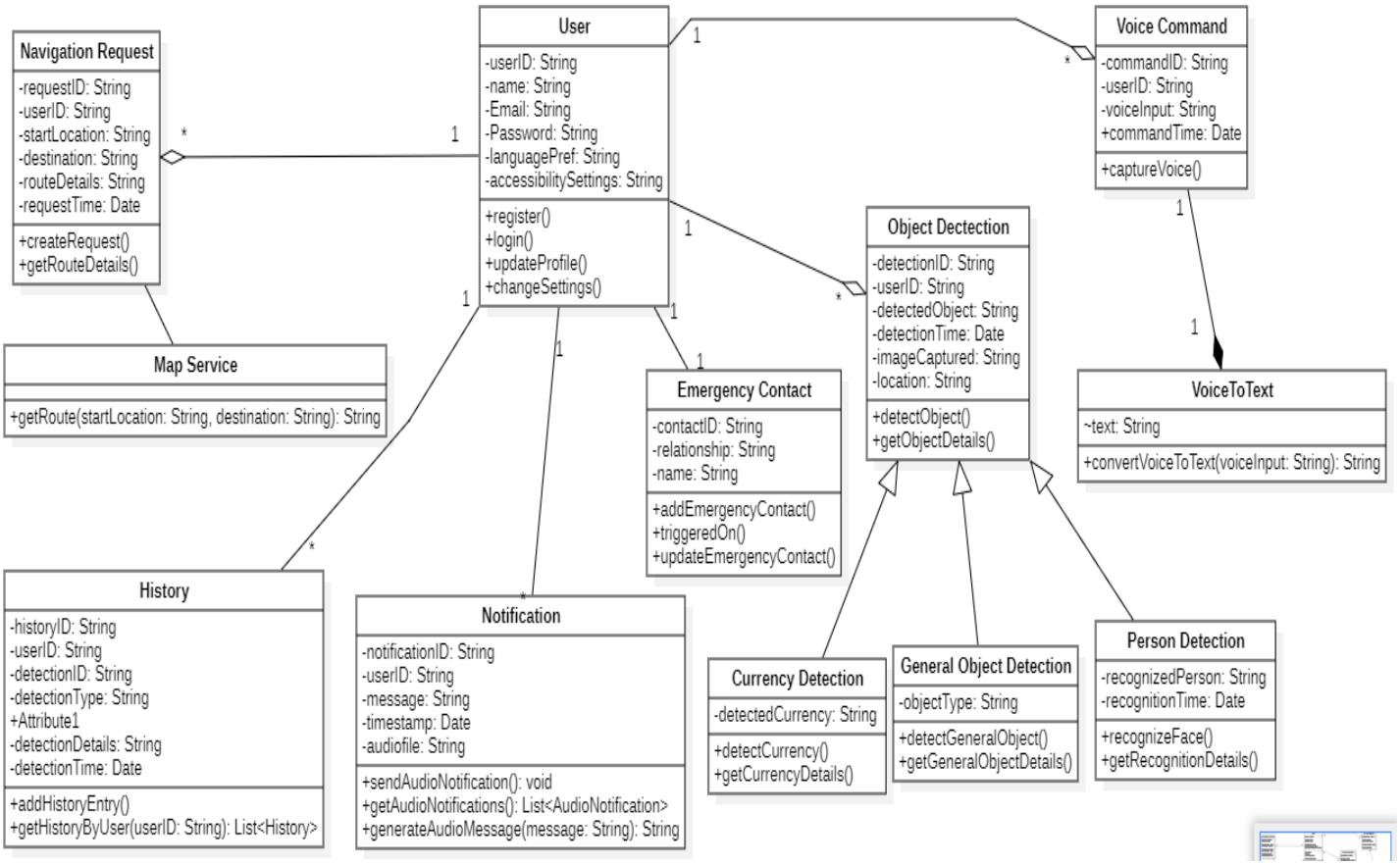


Figure #5: Class Diagram

Decision Table

Condition	User Speaks Destination	GPS Available	Internet Available	Obstacle Detected	Path Saved
Rule 1	Yes	Yes	Yes	No	No
Rule 2	Yes	Yes	Yes	Yes	No
Rule 3	Yes	Yes	No	No	Yes
Rule 4	Yes	Yes	No	Yes	Yes
Rule 5	No	Yes	Yes	No	Yes
Rule 6	No	No	Yes	Yes	Yes
Rule 7	Yes	No	No	No	No
Rule 8	No	No	No	Yes	No

Actions

Action	Rule 1	Rule 2	Rule 3	Rule 4	Rule 5	Rule 6	Rule 7	Rule 8
Request Navigation	Yes	Yes	No	No	No	No	No	No
Provide Directions	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Alert Obstacles	No	Yes	No	Yes	No	Yes	No	Yes
Use Offline Path	No	No	Yes	Yes	Yes	Yes	No	No
Display Error	No	No	No	No	No	No	Yes	Yes

Figure #6:Decesion Table

3.2 Component Interactions and Collaborations

Collaboration Diagram

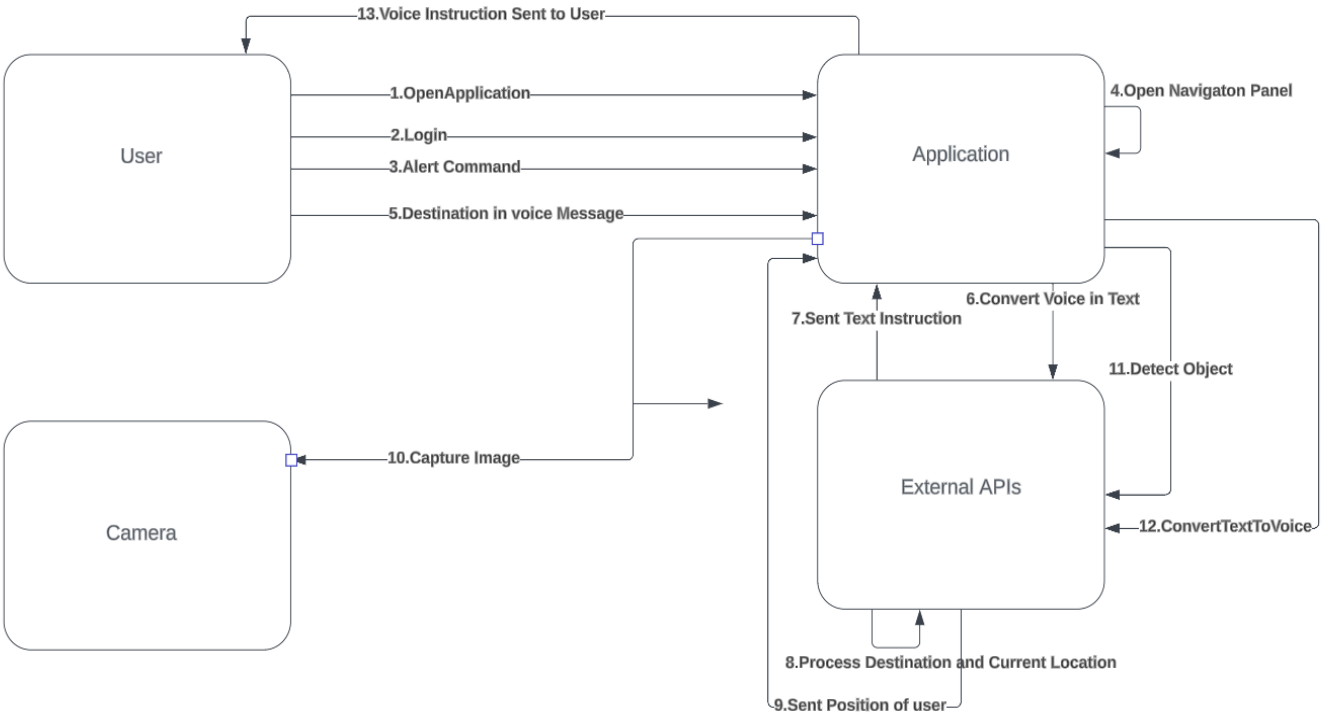


Figure #7: collaboration Diagram

Event Traces

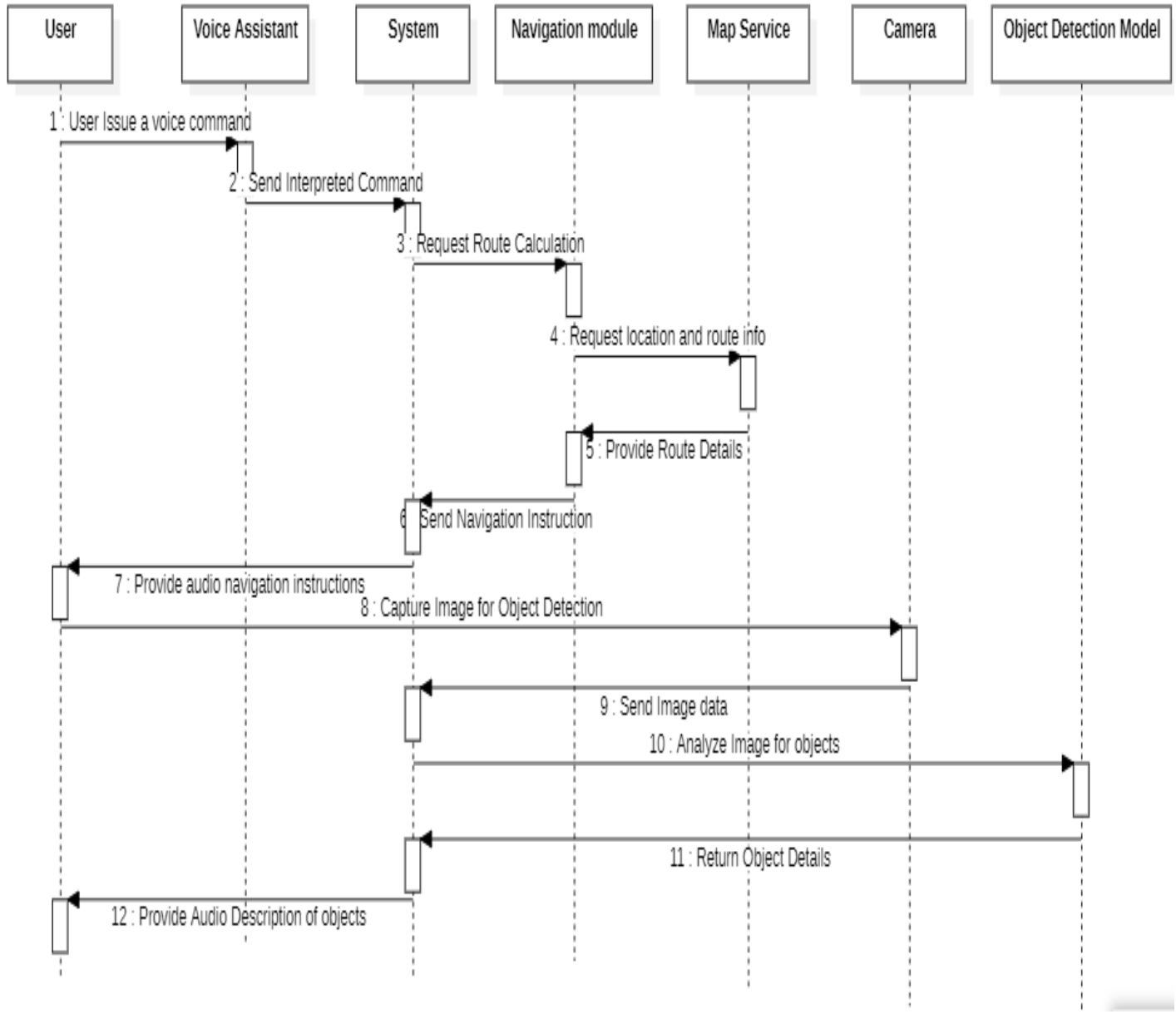


Figure #8: Event Traces

DFD level-0

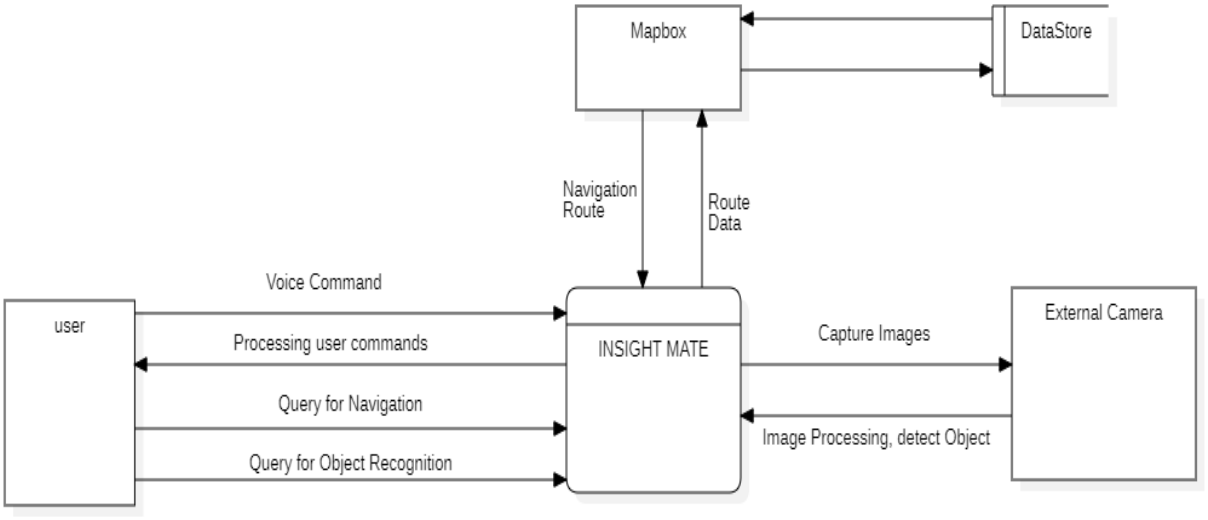


Figure #9: DFD level 0

DFD level-1

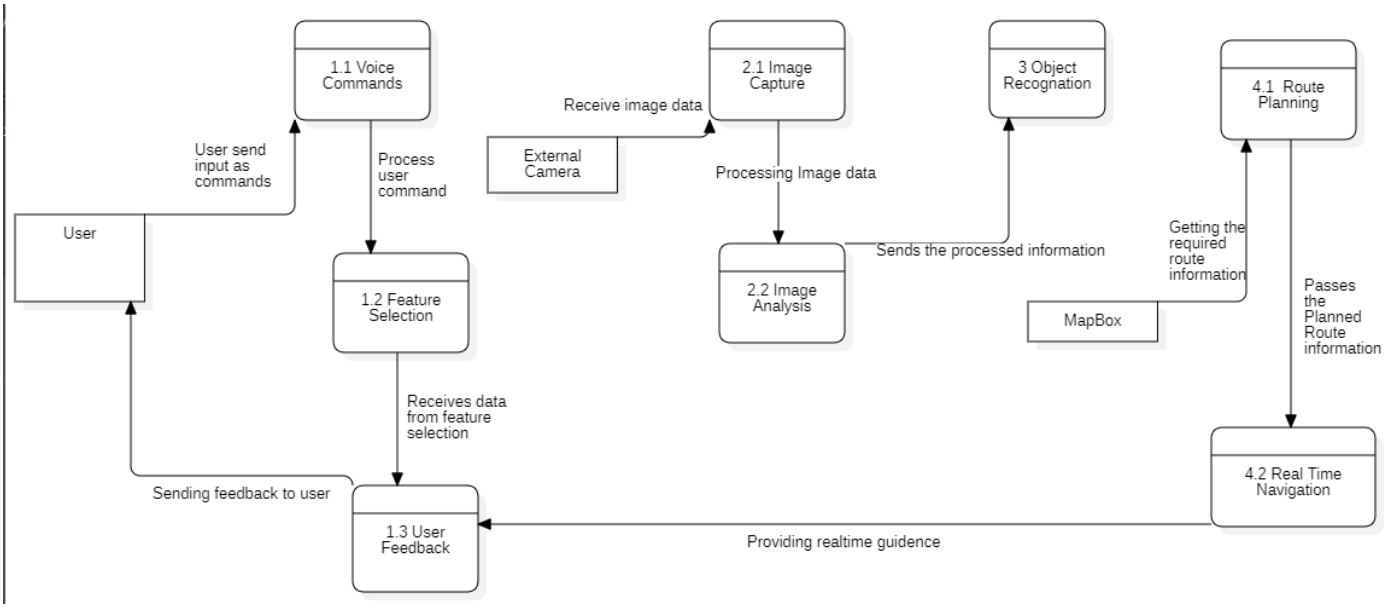


Figure #10: DFD level 1

DFD level-2

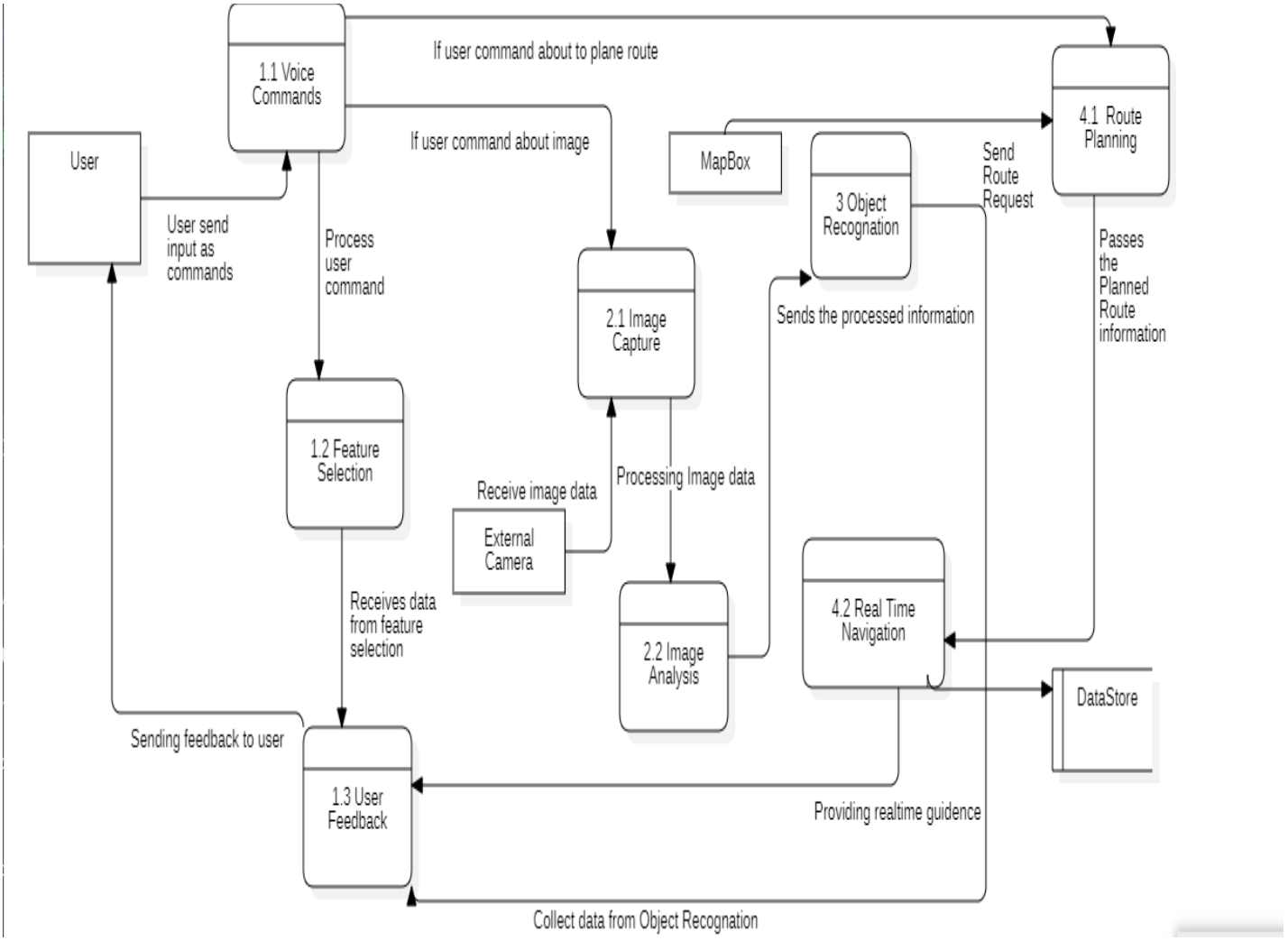


Figure #11: DFD level 2

Sequence Diagram

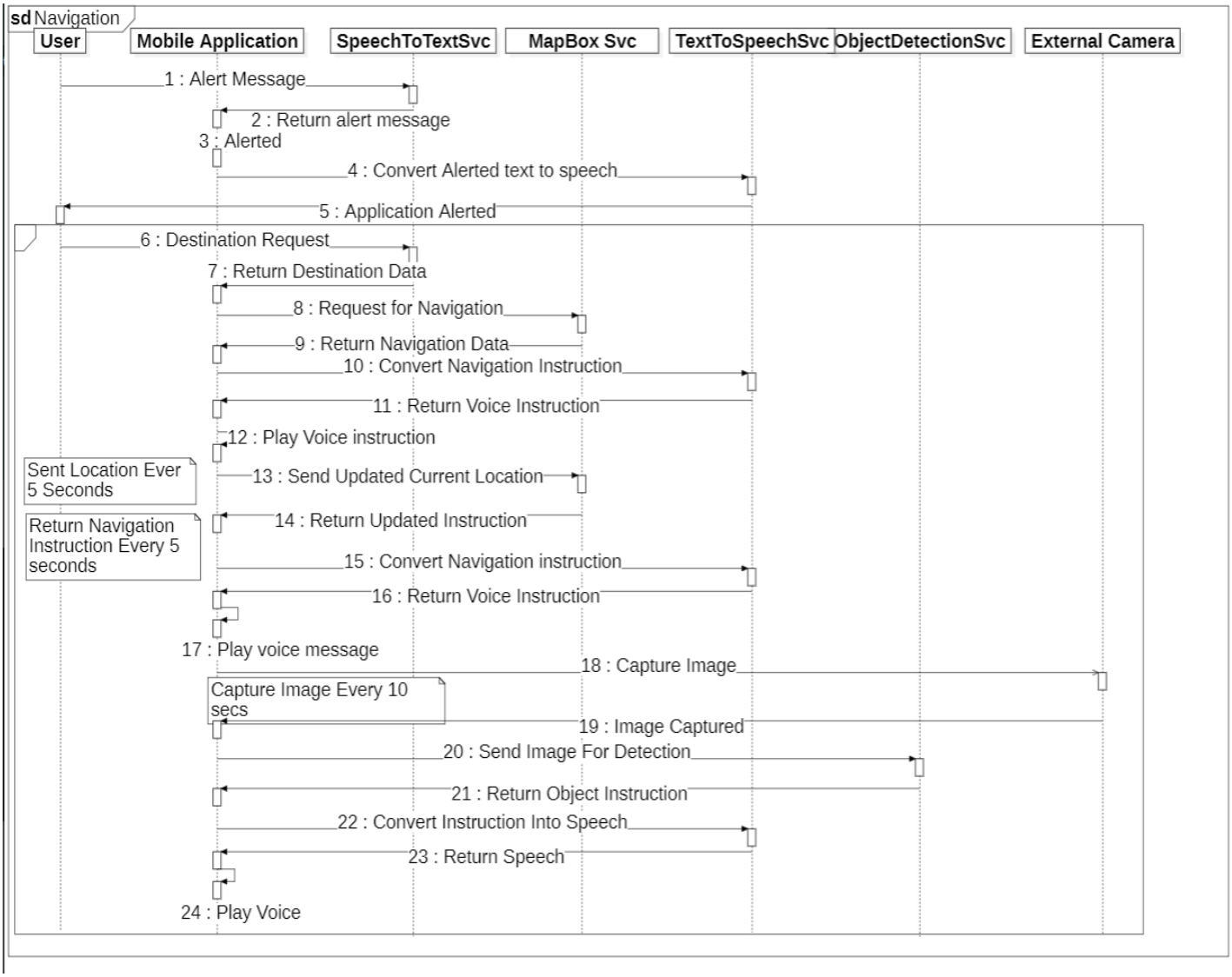


Figure #12:Sequence Diagram

3.3 Design Reuse and Design Patterns

Third-Party APIs and Libraries:

- Insight Mate integrates various third-party APIs and libraries, such as map services (like Mapbox), AI and machine learning libraries (possibly TensorFlow for object recognition), and voice recognition services. These APIs and libraries encapsulate design patterns and reusable components for functionalities like real-time navigation, object recognition, and voice interaction.

Data Models and Algorithms:

- Machine learning algorithms used for object recognition (trained on datasets like COCO) represent reusable patterns in data processing and AI integration. These algorithms and models are designed to be flexible and applicable to various scenarios, contributing to the overall system's reusability in different contexts.

Hardware Integration Patterns:

- Integration with external hardware components, such as IP-based cameras, involves design patterns for communication protocols, compatibility testing, and real-time data processing. These patterns ensure that the application can seamlessly interact with different hardware configurations, promoting scalability and extensibility.

Mobile Application Development Frameworks:

- The project mentions using React Native for Android application development. React Native itself promotes reuse of components and business logic across platforms (iOS and Android). This framework allows developers to use the same codebase for different operating systems, thereby reusing components and patterns for UI design and application logic.

3.4 Technology Architecture

1. **Platform:**

Insight Mate is designed as a mobile application targeting both iOS and Android platforms. It utilizes cross-platform development frameworks like React Native to ensure code reusability and consistent user experience across different operating systems.

2. **System Hosting:**

The application itself runs on end-user devices (smartphones and tablets) rather than requiring centralized server hosting for core functionalities. However, it integrates with various external services and APIs that may require cloud hosting. For example:

- **Map Services**: Integration with Mapbox or similar map services for real-time navigation and location-based services.

- **AI and Machine Learning Services**: Integration with cloud-based AI and ML platforms (e.g., TensorFlow, Google Cloud AI) for object recognition and other AI-driven functionalities.
- **Voice Recognition**: Integration with cloud-based voice recognition services (e.g., Google Cloud Speech-to-Text) for voice interaction features.

3. Connectivity Requirements:

Insight Mate relies heavily on internet connectivity for real-time data processing, updates, and integration with external services. Key connectivity requirements include:

- **Internet Access**: Users need access to stable internet connections (3G/4G/5G or Wi-Fi) for seamless functionality, especially for features like real-time navigation, updates, and cloud services integration.
- **API Calls**: Continuous interaction with external APIs (such as map services, AI services, and voice recognition) requires reliable connectivity to fetch and process data.

4. Modes of Operation:

The application supports various modes of operation tailored to meet the needs of visually impaired users:

- **Real-time Navigation**: Provides turn-by-turn directions and updates based on the user's current location and destination. This mode requires continuous interaction with map services and GPS data.
- **Object Recognition**: Utilizes on-device or cloud-based AI algorithms to recognize objects and provide audio feedback. This mode may require intermittent connectivity for updates and algorithm refinements.
- **Voice Interaction**: Enables hands-free operation through voice commands for navigation, object identification, and other functionalities. This mode relies on internet connectivity for real-time speech recognition and processing.

5. Information Architecture:

Insight Mate's information architecture revolves around real-time data processing and seamless interaction between the application's components:

- **Data Flows**: User inputs (voice commands, gestures) trigger actions processed locally or via cloud services. Responses (navigation directions, object descriptions) are communicated back to users in audio format.
- **Integration Points**: Integration with external hardware (IP-based cameras) and software components (third-party APIs) ensures comprehensive functionality and data exchange.
- **Scalability and Performance**: The architecture supports scalability to accommodate increasing user bases and evolving technology demands. Performance optimizations focus on minimizing latency in data retrieval and processing.

6. Security Considerations:

- **Data Privacy**: Ensures user data (location, personal preferences) is securely managed and protected according to relevant data protection regulations.
- **Secure Communications**: Utilizes encryption protocols (HTTPS, TLS) for secure data transmission between the application and external servers/APIs.
- **Authentication and Authorization**: Implements robust authentication mechanisms to ensure authorized access to sensitive functionalities (e.g., personal information, payment details).

4. Screenshots/Prototype

4.1 Workflow

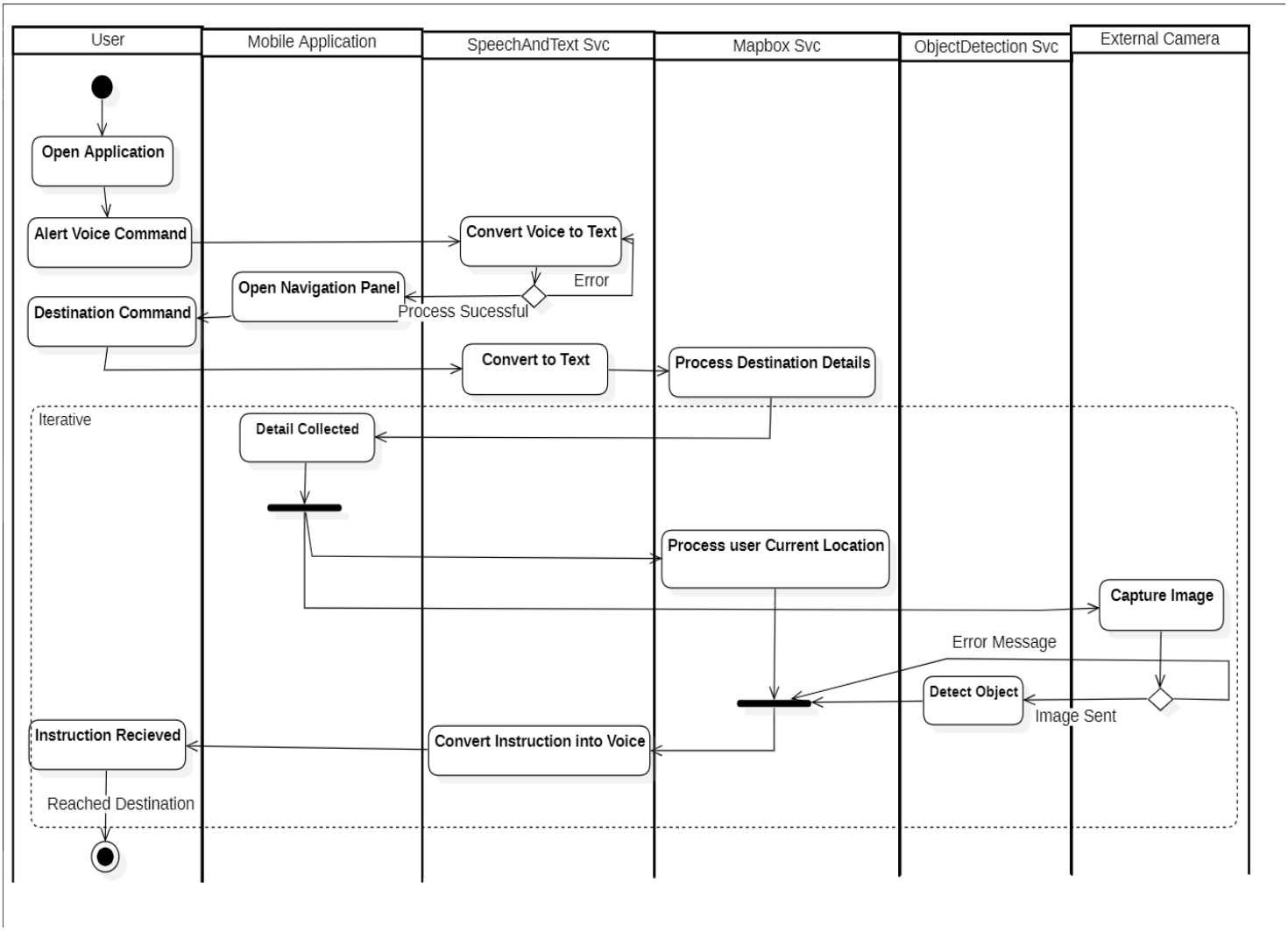
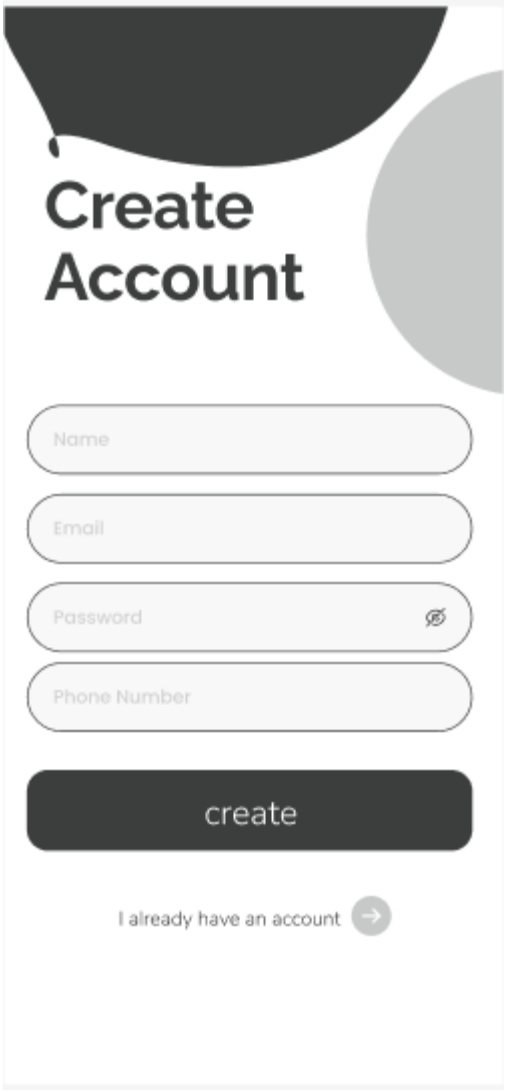


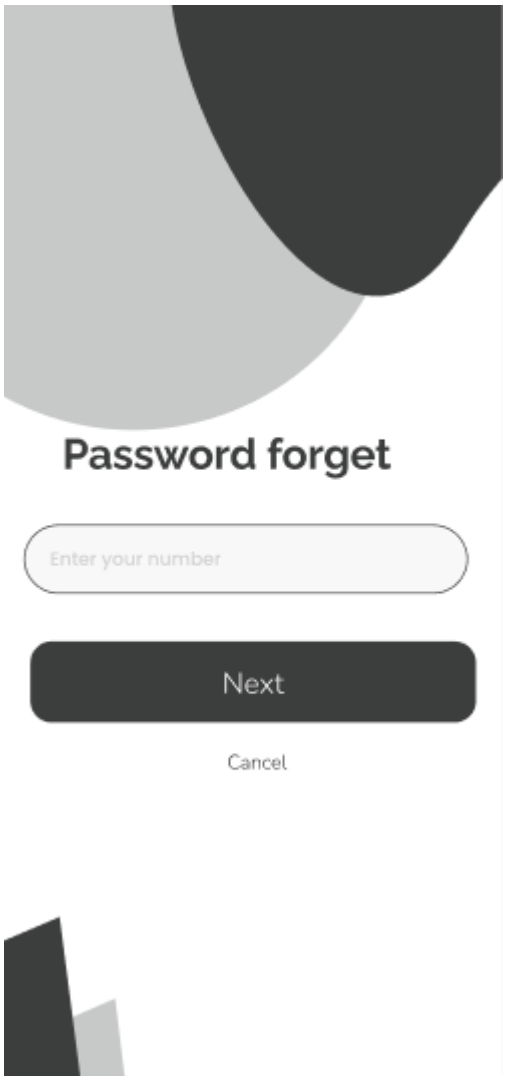
Figure #13: Workflow

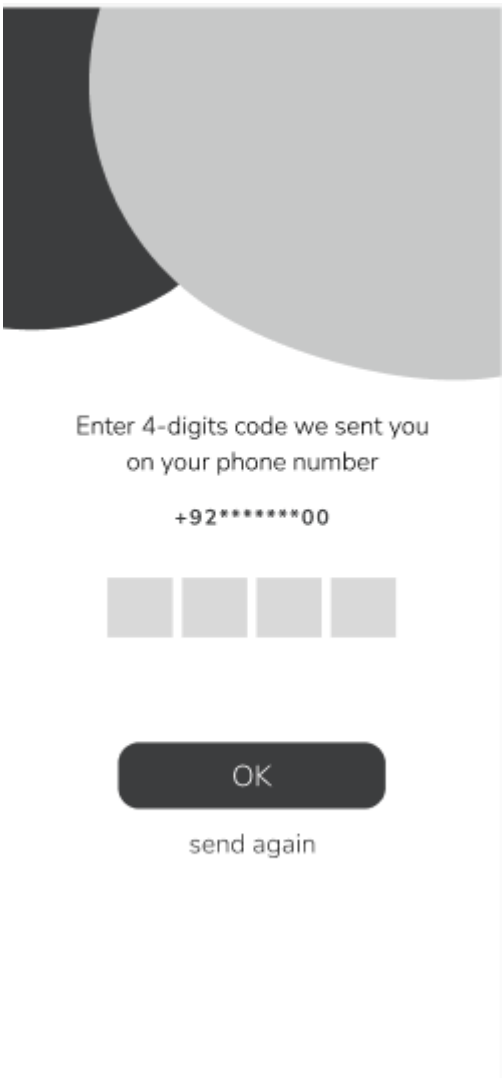
4.2 Screens

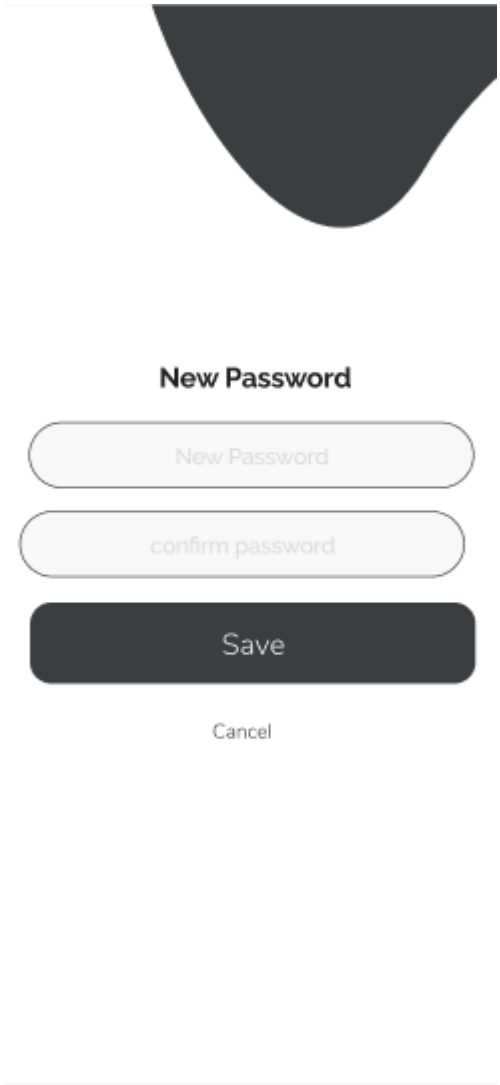

Insight Mate

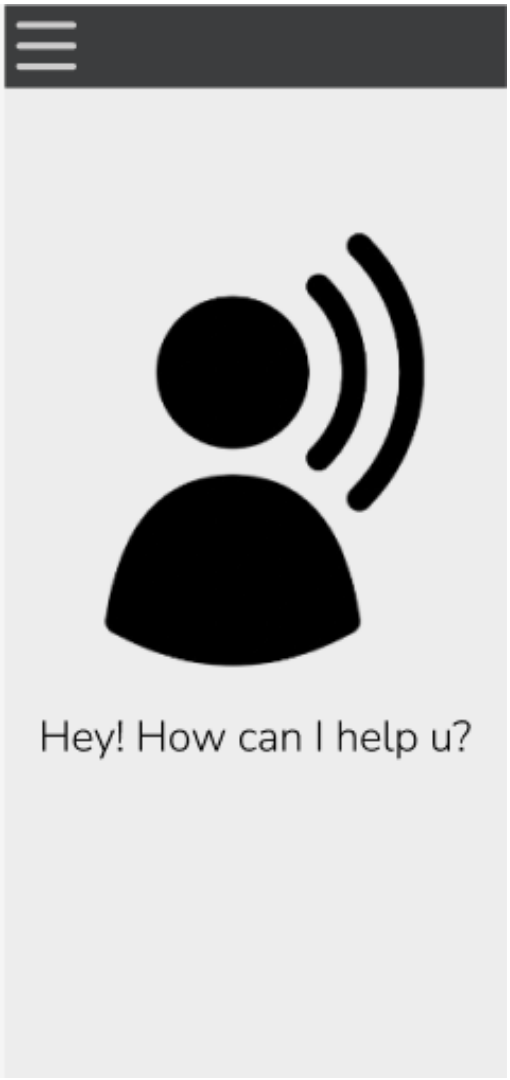

Create Account
Name
Email
Password
Phone Number
create
I already have an account

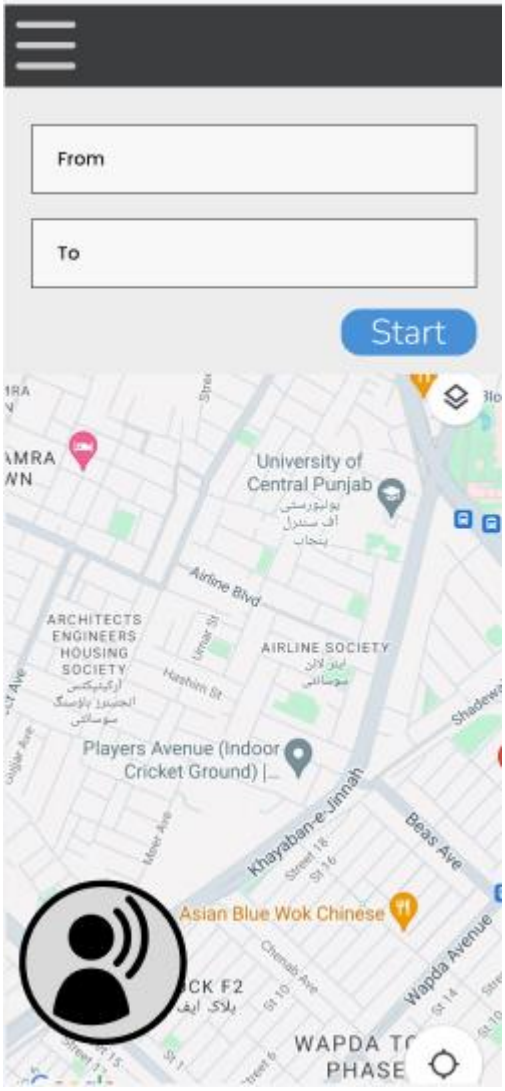

Login
username
password
forget?
Login
I don't have account

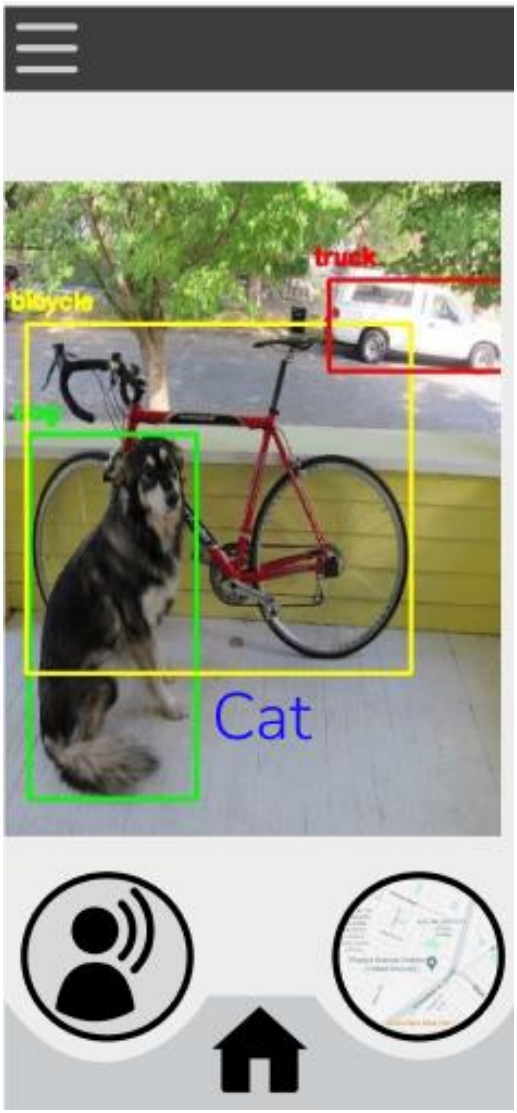

Password forget
Enter your number
Next
Cancel


Enter 4-digits code we sent you
on your phone number
+92*******00
OK
send again

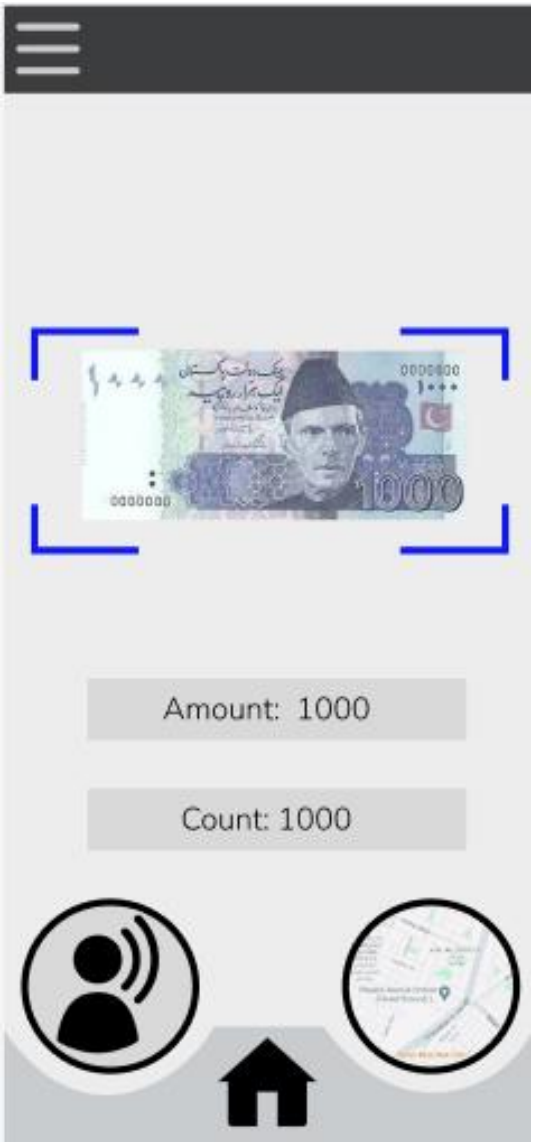

New Password
New Password
confirm password
Save
Cancel


Hey! How can I help u?


From
To
Start
University of Central Punjab
Airline Blvd
ARCHITECTS ENGINEERS HOUSING SOCIETY
AIRLINE SOCIETY
Hashim St
Players Avenue (Indoor Cricket Ground)
Khayaban-e-Jinnah
Beas Ave
Asian Blue Wok Chinese
Wapda Avenue
Chenab Ave


truck
bicycle
Cat


Person 92%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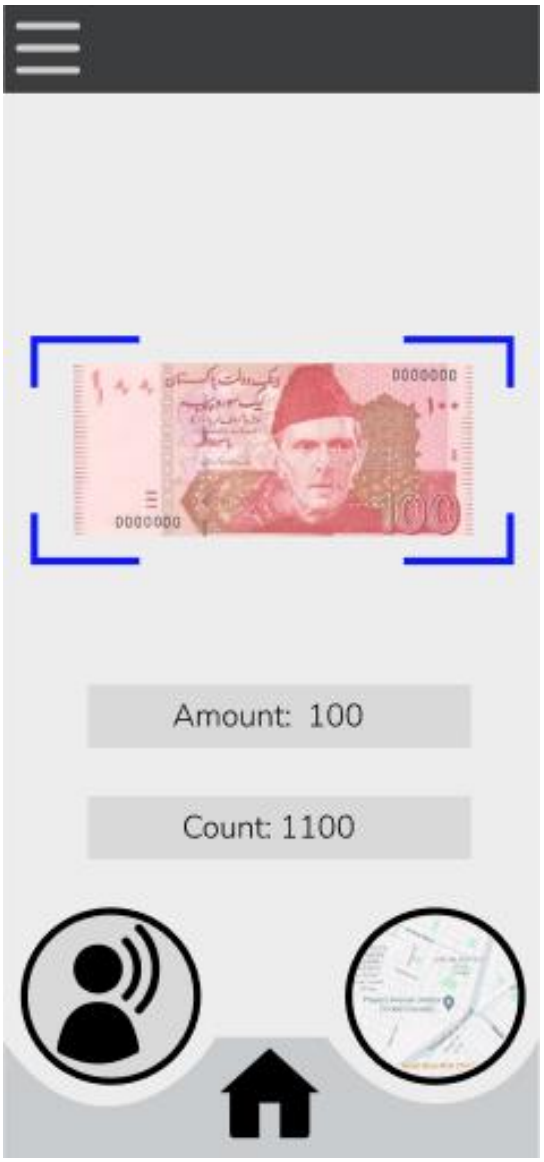
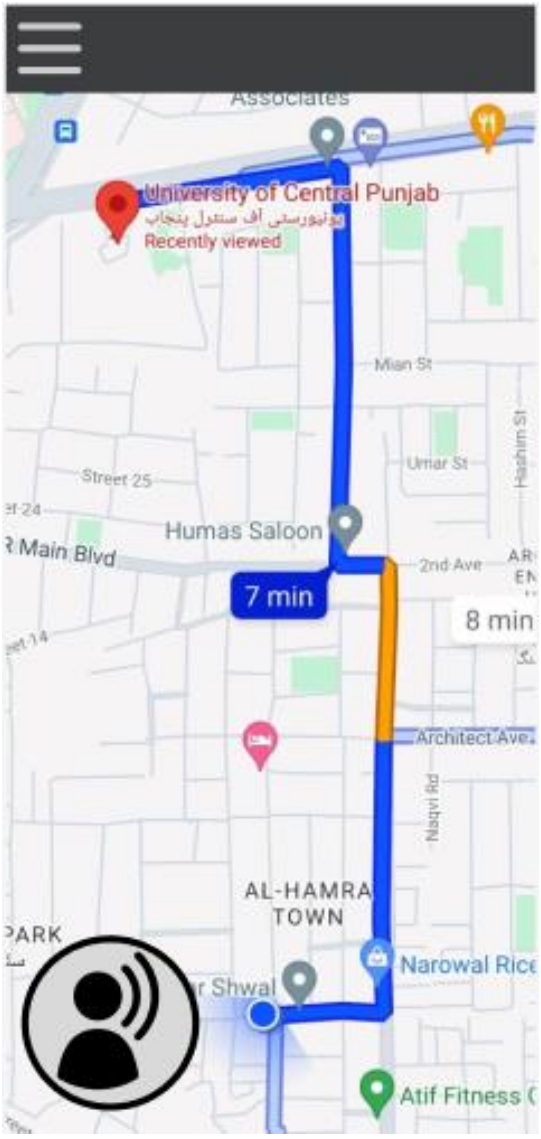
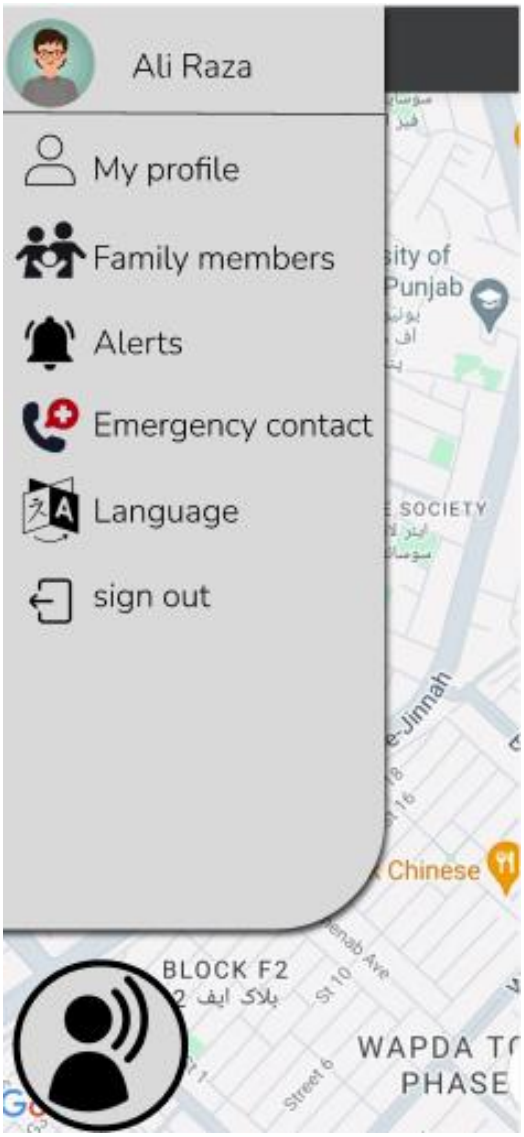
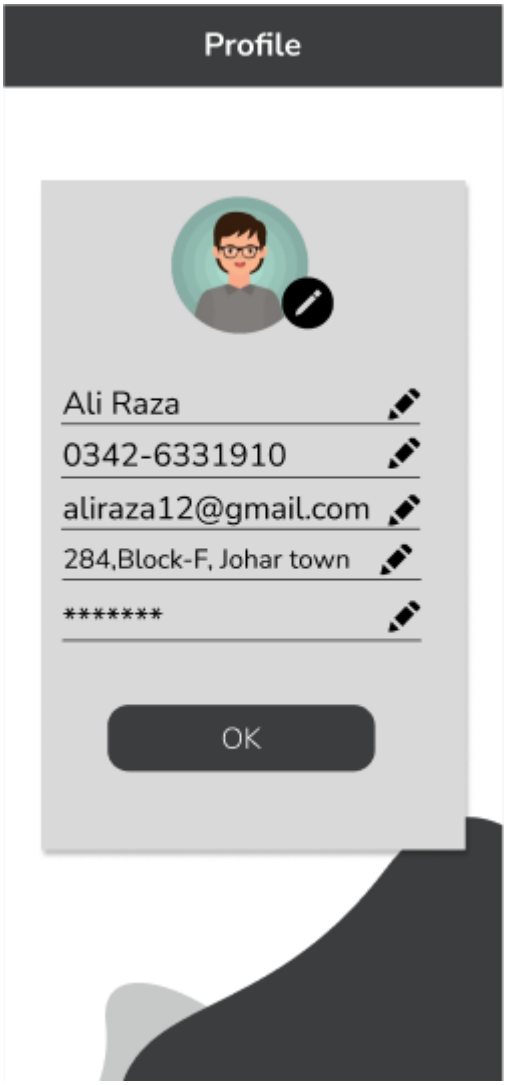
Count: 1000


Amount: 100
Count: 1100


University of Central Punjab
Recently viewed
Humas Saloon
7 min
8 min
Architect Ave
AL-HAMRA
TOWN
Narowal Rice
Atif Fitness


Ali Raza
My profile
Family members
Alerts
Emergency contact
Language
sign out
Chinese
BLOCK F2
WAPDA


Profile
Ali Raza
0342-6331910
aliraza12@gmail.com
284,Block-F, Johar town
****
OK


Family members
+ Add
Ahmed father
Sana mother
Saad brother
Rasheed uncle
Waqsa friend
Ahad friend

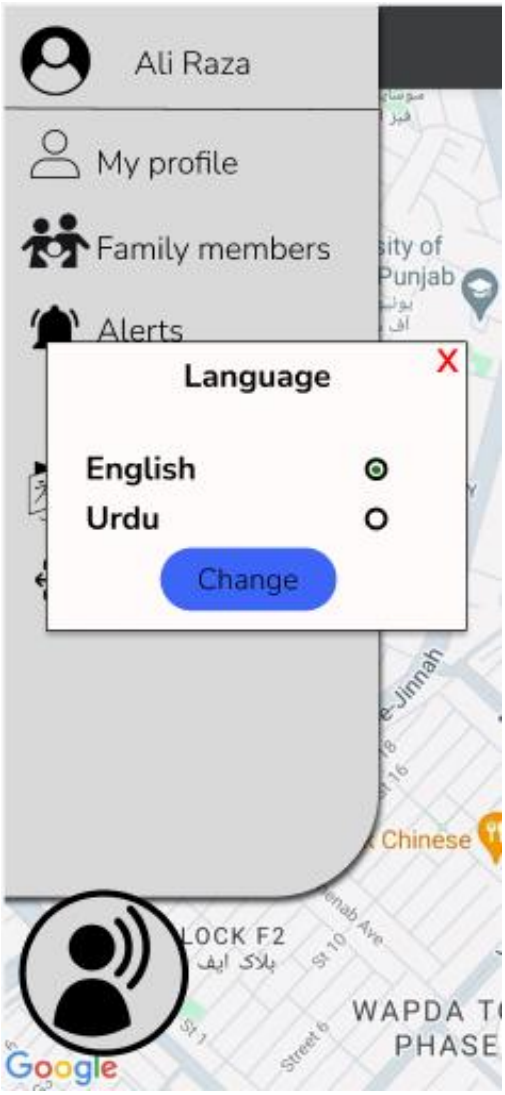

Family members
Name: Ahmed
Relationship: Father
Details:
OK


Add members
Name:
Relationship:
Details:
Add


Alerts
+ Add
Medicine time
Meet up
Friend Birthday


Add alert
Name:
Date:
Time:
Details:
Add


Emergency contact
Ahmed
0342-6431910
Father
Waqas
0311-6431810
Brother
Edit

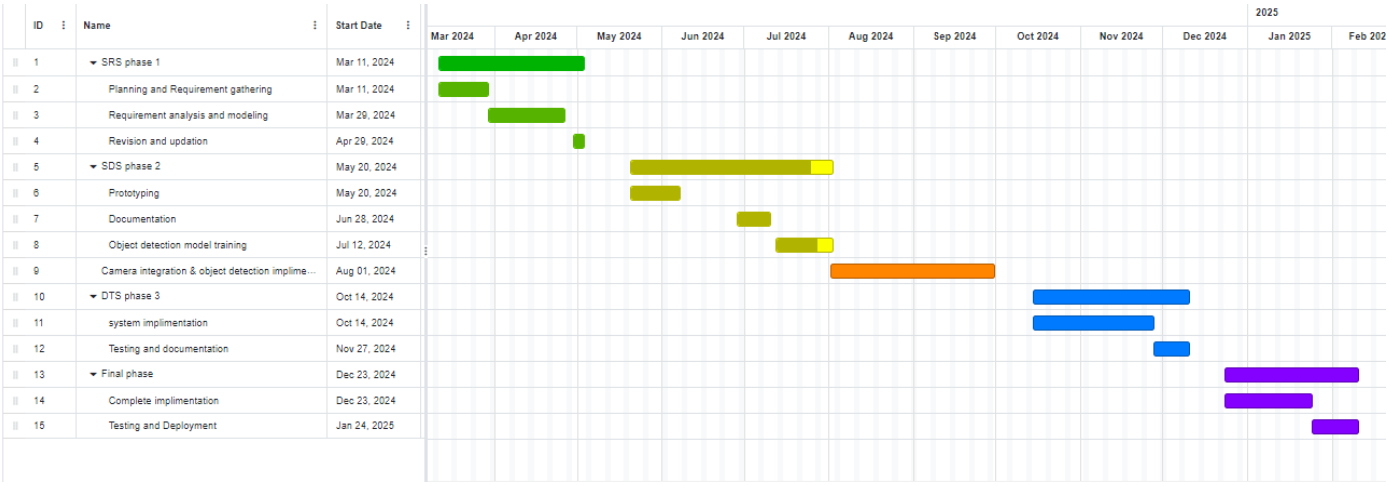

Ali Raza
My profile
Family members
Alerts
Language
English
Urdu
Change
Chinese
Google

4.3 Additional Information

We used Figma for designing these interface.

5. Other Design Details

6. Revised Project Plan



S.No.	Criteria	Weightage %
1	Mobile Application Development	25
2	External Camera Connection	15
3	Communication	20
4	Machine Learning Algorithm Implementation	35
5	User Interface Integration	5

7. References

https://cocodataset.org/
https://docs.mapbox.com/
https://cloud.google.com/speech-to-text
https://cloud.google.com/text-to-speech
https://play.google.com/store/apps/details?id=com.bemyeyes.bemyeyes
https://play.google.com/store/apps/details?id=com.microsoft.seeingai
https://play.google.com/store/apps/details?id=ai.aira.marcopolo

Appendix A: Glossary

Terms	Definition
AI	Artificial Intelligence: The simulation of human intelligence processes by machines, especially computer systems. These processes include learning (the acquisition of information and rules for using the information), reasoning (using rules to reach approximate or definite conclusions), and self-correction.
APIs	Application programing languages: A set of definitions and protocols for building and integrating application software. APIs allow different software applications to communicate with each other.
COCO	Common objects in context: A large-scale object detection, segmentation, and captioning dataset. COCO is widely used in the field of computer vision to train and evaluate models.
GPS	Global Positioning Point: A satellite-based navigation system that allows users to determine their precise location (latitude, longitude, and altitude) anywhere on Earth.
Mapbox	A platform that provides mapping and location data services, including APIs for maps, geocoding, and navigation. Mapbox is known for its customizable maps and robust developer tools.
Insight-Mate	It is name of Our Project. Which will help blind user in Navigation and Object detection.
POI	Point of Interest: Specific locations that someone may find useful or interesting, such as restaurants, parks, museums, or landmarks. POIs are often used in navigation and mapping applications.
Proliferation	The rapid increase or spread of something. In technology, proliferation refers to the quick adoption and widespread use of new technologies, devices, or applications.
SDK	Software Development Kit: A collection of software development tools, libraries, and documentation that developers use to create applications for specific platforms or services.
Tensor Flow	An open-source machine learning framework developed by Google. TensorFlow is used for building and training machine learning models and deploying them in various environments.

Appendix B: IV & V Report

(Independent verification & validation)
IV & V Resource

Name Signature

S#	Defect Description	Origin Stage	Status	Fix Time	
				Hours	Minutes
1					
2					
3					
…					

Table 1: List of non-trivial defects

This document has been adapted from the following:

1. Previous project templates at UCP
2. High-level Technical Design, Centers for Medicare & Medicaid Services. (www.cms.gov)