AI EYE GUIDE

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Date: [date of final presentation]

Final Approval

This is to certify that we have read the report submitted by ***Usama Ahsan (25279)***, ***Muhammad Hassan (22956), Suleman Amjad (24913)*** for the partial fulfillment of the requirements for the degree of the Bachelors of Science in Computer sceince (BSCS). It isour judgment that this report is of sufficient standard to warrant its acceptance by Riphah International University, Islamabad for the degree of Bachelors of Science in Computer Science (BSCS).

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Declaration

We hereby declare that this document **"AI EYE GUIDE"** neither as a whole nor as a part has been copied out from any source. It is further declared that we have done this project with the accompanied report entirely on the basis of our personal efforts, under the proficient guidance of our teachers especially our supervisor **Prof. IhteshamUllah**. If anypart of the system is proved to be copied out from any source or found to be reproduction of any project from anywhere else, we shall stand by the consequences.

Usman Ahsan 25279

Muhammad Hassan 22956

Suleman Amjad 24913

Dedication

To our parents whom have always been there to ensure that our financial and morale needshave never gone unfulfilled and taught us that even the biggest job can be completed whenit is done in bits. In this project, the name of each individual who made efforts for the completion of this project is dedicated to, especially the name of our supervisor Sir Ihtisham Ullah. This project is particularly dedicated to the teachers who helped us and guided us on how to complete this project work. This Project is also dedicated to our University, Riphah International University.

Acknowledgement

First of all we are obliged to Allah Almighty the Merciful, the Beneficent and the sourceof all Knowledge, for granting us the courage and knowledge to complete this Project.

Students will acknowledge here anyone who has helped in the project. It can includeSupervisor(s), Teachers, Class mates, Friends and Family

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Abstract

As the world is advancing with the use of technology in daily life, life of people has become very easy as compared to how it was like 4 5 decades before. Almost everyone is taking benefit from the modern technology but a person who is disable and helpless to use it by himself. One of those people are visually impaired person, who are unable to use mobile or modern gadgets easily are unable to make their lives easier by the use of modern technology.

We have developed an app AI EYE GUIDE will make the life of a visually impaired person easier. A visually impaired person has major issues like in guessing an object, recognizing currency and reading some text. Our app will give ease to visually impaired person in theirdaily life.

This app will give following advantages:

1. It is easy to install.

2. It will detect objects around visual impaired person

3. It will recognize the Pakistani currency note accurately to help in financial deals

4. It will convert the text written into voice.

5. App will detect real time

It will be user friendly, simple and easy to use for a visually impaired person.

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Chapter1:

Introduction

Chapter 1:

Introduction

AI Eye Guide uses modern technology to help visually impaired person in their daily life by helping them in reducing obstacles in their way. The system uses Yolo algorithm which is used to detect objects. When the system will detect objects it will tell the user in voice note. This also detects the currency and will tell the user about the amount of currency. This will make visually impaired person to detect easily.

This app will use machine learning and deep learning techniques to help user by detectingobjects in real time. This app will reduce the risks of people from getting in to trouble in their surroundings.

1.1 Opportunity and Stakeholders

1.1.1 Opportunity:

1.1.1.1 **Object Detection for Support:**

One way is through the use of object detection technology that enhances assisting people suffering with visual deficiencies in their homes as well as in public places. In addition, itmay help in locating objects. Among its features is its suitability to outdoor use where it facilitates visually challenged persons' recognition of landmarks, signals and essential things as they go about their affairs which makes them feel mobile and independent.

1.1.1.2 **Conversion of text into voice:**

Translation of print and electronic text into speech allows more people, including the visually impaired, to have open access to information on all sorts of subjects. The technology enables them to retrieve news, books and educational materials swiftly withoutrestriction and thus creates a more liberal learning as well as informed setting.

1.1.1.3**Currency recognition in financial matters:**

The currency recognition technology opens new doors for blind individuals to enjoy financial independence. This technology allows the visually impaired to manage their money themselves by being able to identify the different denominations. Furthermore, support through financial transactions enables them to have a choice for themselves on their finance issues hence enhancing their economic liberation.

1.1.2Stakeholders

1.1.2.1**Visually impaired person:**

Nonetheless, programs aimed at enhancing the self-reliance level and quality of life among visually impaired people are the most notable recipients. These programs intend to provide them with a chance at improved living and independence. This involves giving them independent lifestyle by giving them resources and techniques for living on their own despite their blindness. Such issues are relating to availability of assistive technologies, technology accessibility, provision of transportation services, and many more.

What these blind people think or need should be understood as a basic requirement of any undertaking that they should be satisfied on a one-on-one basis. This means an individual-focused perspective that considers the various encounters and needs of visually challenged population. It ensures any of supported solutions such as the some solutions are developed with participation of people involved to have customized support for them based on their own wishes and to feel like a member of the team, where their rights are respected.

1.2 Motivation and Challenges

1.2.1 Motivation:

1.2.1.1 Empowering Independence:

This app is developed to enable persons with visual impairment become independent through a useful tool. Features of the app entail real time object detection and currency recognition aimed at orienting the users within their environment; enabling access to printed materials and self-transaction.

1.2.1.2 Facilitating Access to Information:

With this in mind, the app is dedicated to removing these barriers towards education and job. The app makes it possible to read texts through a voice. This creates access to many topics for learning and employment.

1.2.1.3 Enhancing Security and Streamlining Transactions:

It aims at helping in wider national targets and the issue of currencies acceptance. It not only assists blind persons in proper handling money matters but also aids in fighting againstcorruption, enhancing transaction efficiency as well as preventing money falsification.

1.2.2 Challenges:

1.2.2.1 Technological Complexity

The technology challenges involved in developing an effective deep learning based objectdetection system are immense. Real-time detection accuracy and dependability must be refined continuously as they change in response to variable surroundings.

1.2.2.2 Currency Recognition Accuracy:

Creating a currency recognition module, which can recognize currency notes and dictate their denomination is an intricate process. Attainment of high precision is essential not onlyfor enhancing the user's autonomy, but also for ensuring the validity of financial transactions.

1.2.2.3 User Interface Design:

The challenge is in creating a convenient interface compatible. Considering the varied demands and inclinations of vision-impaired users, the design should be instinctive,convenient and easy to access.

1.2.2.4 Reliability and User Trust:

Reliability is crucial, especially when users rely on it for navigation and financial transactions. Testing should be conducted on an ongoing basis in order to ensure that the users will remain to trust the site with time.

1.3 Goals and Objectives:

It is good to the people. Give user-friendly app to empower visually impaired

to enhanceindependent access to information for the financial security.

Here are some following points:

1. Integrate a strong object detection unit for real-time navigation.

2. Develop an accurate currency recognition module for independent financial transactions.

3. Construct a multilingual text-to-voice module for provision of access to printed material.

4. Make intuitive and user-friendly mobile apps for the Android and iOS systems.

5. Carry out extensive tests of reliability and receive users' feedback for improvement.

6. Inclusivity by aligning to accessibility standards.

7. Promote financial security by providing for accurate currency recognition thus minimizecounterfeiting.

8. Let the employees know how the app can benefit them.

9. Consistent innovation in line with user feedback and new technologies.

1.4 Solution Overview:

Mobile application solution for the day-to-day challenges of the visually impaired people improving their independence and information access. It includes advanced technologies such as deep learning to develop a versatile instrument that meets the requirements of the blind and visually impaired community.

1.4.1 Object Detection Module:

Real-Time Navigation: It has a high-end object detection framework that is based upon deep learning where it is possible to identify common objects in real time. **Audible Descriptions:** This allows users to hear audio descriptions of their surroundings which assists in independent navigation, reducing obstructions within unknown spaces.

1.4.2 Currency Recognition Module:

Financial Independence: This app is fitted with an instant detection system, which correctly detects Pakistani money.

Voice Notes for Amount: Through the app, the app informs users about value in recognized currencies notes.

1.4.3 Text-to-Voice Module:

Access to Printed Information: Printed text from newspapers, books and other reading material is converted into audible speech using a text-to-voice module.

Testing and User Feedback:

Reliability Assurance: The app goes through rigorous testing to ensure its dependabilityin different circumstances and settings.

Continuous Improvement: The app collects active user feedback, which drives thecontinuous improvement to ensure that the app remains responsive to user needs.

Chapter 2:

Literature / Market Survey

Chapter 2:

Literature/Market Survey

The first phase is the literature and market survey which is very important in guiding the research process. It provides valuable information on prevailing technologies that target people with visual disabilities. In this survey, an exploration of literature as well as empirical research is conducted and a landscape of the market for assistive technologies. This stage involves analysis of strengths, weaknesses, opportunity, and threat presented in current solutions in order to determine gaps, trends, and user needs. Such understanding will help in designing a new intelligent mobile application which will not only meet the needs of blind but also satisfy their desires. Therefore, the literature and market survey provides information on the technical and market aspects within which the suggested solution will take place.

2.1 Introduction

Significantly, over the last few years, a dramatic shift has occurred in addressing problems of the visually impaired people since time immemorial. This chapter will therefore lay down the foundation upon which a new AI mobile application that caters for the needs and challenges of visually impaired individuals. Firstly, it will look at certain technologies like an object detection system, currency recognition program and text to voice translators. These technologies are useful for the visually impaired people who enjoy their independency, getting the information, or handling money. This entails studying literature and the market about existing solutions so as to evaluate their strengths and weaknesses. This will help ascertain whether one can

develop new innovations or they can be improved. The issues discussed in the previous paragraph will guide the development of a usable and flexible AI product that will significantly change the lifestyle of blind people.

Table 2.1 Exiting Applications

Apps	NoteTaking	Voice-Recorder	Speech-to-Text	AudioBook-Listening	Camera Translation	Accessible Documents sharing
AccessNote	✓	✓	✗	✗	✗	✗
Dragon Dictation	✗	✗	✓	✗	✗	✗
EverNote	✓	✓	✓	✗	✗	✗
Kindle	✓	✓	✗	✓	✗	✗
Google Translate	✗	✗	✓	✓	✗	✗
Money Detector	✓	✗	✓	✗	✓	✗
Object Detection	✗	✗	✗	✗	✓	✗

2.1.1 Understanding Assistive Technologies:

Personalized assistive technologies for blind people help in making them more independentand accessible. The next section gives a brief description of some notable technology like object detection system, currency recognizing software, and voice to text convertors.

2.1.1.1 Object Detection Systems:

With the advancement of deep learning, object detection systems prove to be effective in providing real time object recognition. Some of these systems improve one's navigation abilities, and this makes a visually impaired person feel the presence of the environment around and move in it easily. Seamless navigations require accuracy and efficiency in object recognition as shown in the literature.

2.1.1.2 Currency Recognition Software:

Accurate currency recognition forms an integral part of financial independence in visually impaired people. Literature highlights the importance of currency recognition software in real-time recognition of currency denomination. Some of these technologies empower individuals in day-to-day financial transactions and also minimize risks brought about by forged money.

2.1.1.3 Text-to-Voice Converters:

Text-to-voice converters are bridges for comprehension of print information and listening. These converters are made for changing the printed text from newspapers, books, and other sources into spoken speech. Accessibility and inclusiveness should, therefore, not only consider multilingual support but also accurate pronunciation on these technologies.

2.1.2 Technological Advancements in Visual Impairment Assistance

In this section, there are discussions of recent technological breakthroughs in the field of help for visual impairments. Deep learning, real-time identification of objects and the development of navigation technology adapted for blind people.

2.1.2.1 Deep Learning Applications

Deep learning applications have brought a new revolution in the use of accurate and moreefficient assistive technologies. The studies show that deep learning models can be taught over time and can help objects see and recognize for actual circumstances.

2.1.2.2 Real-Time Object Identification

Object identification in real time is critical for supplying current data to visually challenged Persons. Technology has aimed at reducing processing delays and allowing the user to getimmediate information of his environment for him to be able to navigate quickly and intelligibly.

2.1.2.3 Navigation Technologies

The development of navigation technologies has sought to address issues related to movement. The integration of GPS, indoor mapping, and voice guided navigation technology would empower vision impaired individuals with precise and situationalawareness based navigation support.

2.2 Summary

The next section offers a detailed examination of supportive technologies for the blind. This chapter begins with major assistive technologies such as object detectors, currency recognition programs, and text-to-voice converter. Real time object detection is possible in this part of object detection system that is based on deep learning. Accurate object recognition is critical to ensure smooth navigation. Literature reveals that visually impaired people are supposed to be economically independent and hence the need for currency recognition software. The other is that it alsobuilds the users confidence that is can detect money. The most important is the link between readable text and hearing understanding, which is realized by text-to-voice converters. The universities of these technologies must be universal, multilingual and pronounceable correctly. Finally, the literature review identifies the modern technological innovations to help the visually impaired people. Deep learning applications have revolutionized object detectionand recognition and made it possible to continue learning. Real time object identification and navigation technologies have advanced, making it easy to assist the visually impaired.

Chapter 3:

Requirement Engineering

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Requirement Engineering

3.1 Introduction

Requirement Engineering is a crucial stage in developing an AI mobile app for visually impaired people. This is a stage of transition from theory to practice, which involves transformation of the literature findings into concrete requirements. A good developmental team must be directed by its “compass”. Requirement Engineering that will ensure the alignment of the aspirations highlighted in the literature review and the functionalities andfeatures needed by the end-users.

3.2 Problem scenario

Requirement Engineering involves predicting the problematic situations and ensuring thatthe proposed solutions meet the needs of the visually challenged. This part discusses several possible incidents and challenges that the users could experience, preparing a way for the creation of comprehensive needs.

3.2.1 Inaccurate Object Detection:

3.2.1.1 Scenario:

However, the system used in the object detection fails to detect crucial items in the user’s environment.

3.2.1.2 Challenge:

The system should be reliable in its ability to recognize information about the surrounding environment and inform users of obstacles they might face they might encounter.

3.2.2 Currency Recognition Ambiguity:

3.2.2.1 Scenario:

Damaged currency notes or notes that are alike pose a problem to the currencyrecognition module.

3.2.2.2 Challenge: These can pose problems of accuracy in transaction and financial decisions.

3.2.3 Text-to-Voice Pronunciation Issues:

3.2.3.1 Scenario: Some languages or dialects, the text-to-voice converter mispronounceswords or is not accurate, especially.

3.2.3.2 Challenge: Printed text may also give users trouble in understanding what is meant.This may hinder the accessibility of the printed text.

3.3 Functional Requirements

The formulation of specific functional requirements is essential while translating aspirations outlined in the literature review and addressing the problem scenarios identified. Functional requirements define the individual specific features and the capabilities that the AI-based mobile application must possess for the needs if visually impaired person. Each need is

customized to improve the usability, accessibility, and overall effectiveness to the application.

3.3.1 Object Detection System:

3.3.1.1 Requirement: Develop a real-time system for object detection capable ofpinpointing common objects both inside and outside.

3.3.1.2 Rationale: This attribute allows the users to learn about their surroundings andtherefore enables them to move independently.

3.3.2 Currency Recognition Module:

3.3.2.1 Requirement: Create a currency recognition module that can identify andannounce all Pakistani currency notes (and denominations) in real-time.

3.3.2.2 Rationale:

This gives users independence in financial transactions and ensurestheir security.

3.3.3 Text-to-Voice Conversion:

3.3.3.1 Requirement: Develop a multilingual text-to-voice module that faithfullyproduces oral words from newspaper articles, books, and other printed materials.

3.3.3.2 Rationale: This makes it possible for the users to have direct access to printedinformation.

3.3.4 User-Friendly Mobile Applications:

3.3.4.1 Requirement: Create intuitive and easy-to-use mobile applications.

3.3.4.2 Rationale: The interface is easy to navigate, and the visually impaired users canuse the application freely hence increasing the user experience.

3.3.5 Audible Descriptions for Objects:

3.3.5.1 Requirement: Include audible descriptions for identified objects to enable users tonavigate their environment.

3.3.5.2 Rationale: Providing clear and descriptive feedback makes the user understandtheir environment better, which increases the overall safety of navigation.

3.3.6 Voice Notes for Currency Amounts:

3.3.6.1 Requirement: Integrate voice notes which inform of recognized currency units'denomination and value in the course of the financial transactions.

3.3.6.2 Rationale: This helps ensure that users can do this with ease of mind and precision.

3.4 Non-functional Requirements

The non-functional requirements outline on how reliable, safe, easy to use as well as efficient the AI-based mobile application will be. These requirements are crucial for ensuring that the application not only offers the required functionalities for the visually impaired but also adheres to other standards aimed at enhancing the overall usefulness anduser satisfaction.

3.4.1 Usability:

3.4.1.1 Requirement: In such a case, the application should be designed with user-friendlyinterface and should be easy to navigate for the people with visual impairments.

3.4.1.2 Rationale: Usability is the most important factor to the effectiveness

of the application, allowing independent and competent use of the application by users with varied

3.4.2 Reliability:

3.4.2.1 Requirement: Object detection, currency recognition as well as text-to-voice modules must be accurate and work reliably in diverse environmental conditions.

3.4.2.2 Rationale: Reliability is a key aspect that enables users to trust the app's information. As a result, an application can be used for critical tasks.

3.4.3 Performance:

3.4.3.1 Requirement: Performance of the application should be optimal, providing real- time feedback and wayfinding guidance, with virtually no latency.

3.4.3.2 Rationale: User experience is highly dependent on performance, especially where prompt information is imperative for safe navigation.

3.4.4 Scalability:

3.4.4.1 Requirement: The application should be scalable, so that it can handle increasingnumber of users and new features without affecting performance.

3.4.4.2 Rationale: The application can be scaled to meet the needs of an increasing numberof users and as technological progression continues.

3.4.5 Accessibility:

3.4.5.1 Requirement: The application should be accessible so that it is compatible withscreen readers, braille displays or other assistive devices.

3.4.5.2 Rationale: Accessibility is fundamental and it ensures the application's usability by persons with different visual impairment levels and different assistive devices to them.

Chapter 4:

System Design

Chapter 4:

System Design

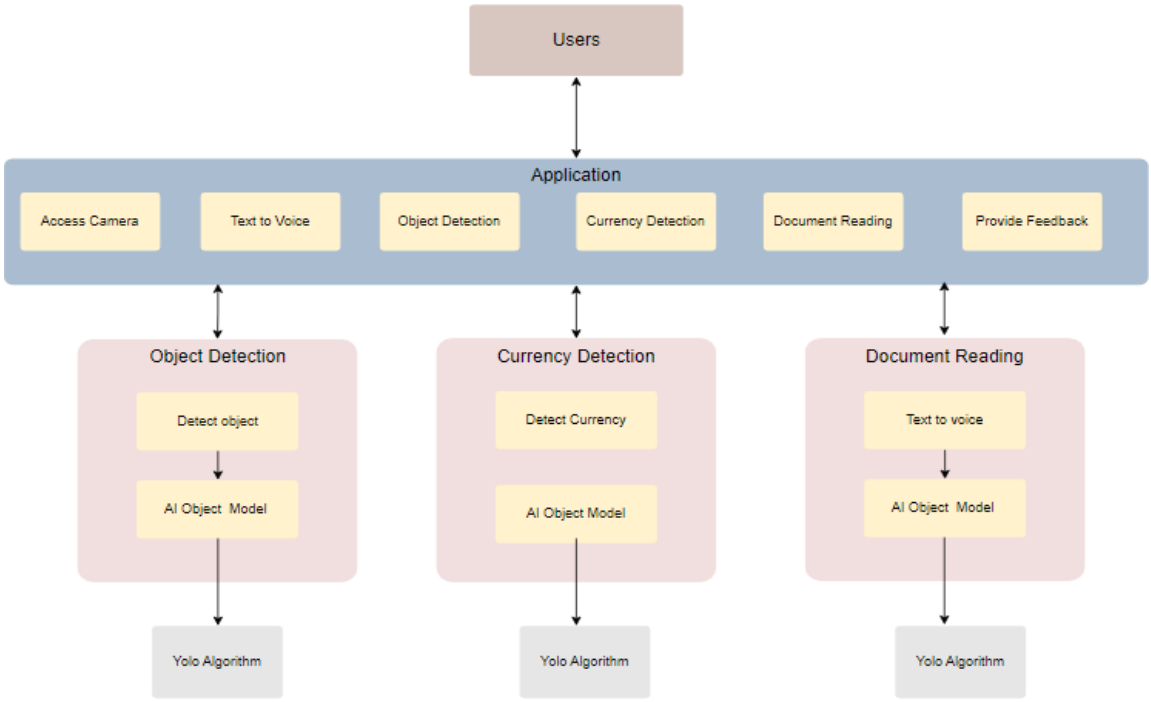
4.1 Introduction

The chapter on System Design is a crucial stage in the course of development, from idea creation to the tangible draft of the AI-mobile app for visually impaired people. This chapter includes the architectural, detailed design perspectives to give an overall picture how the imagined solution will be structured and applied.

4.2 Architecture Design

Architecture design will contain an architecture diagram will show architecture flow of thesystem.

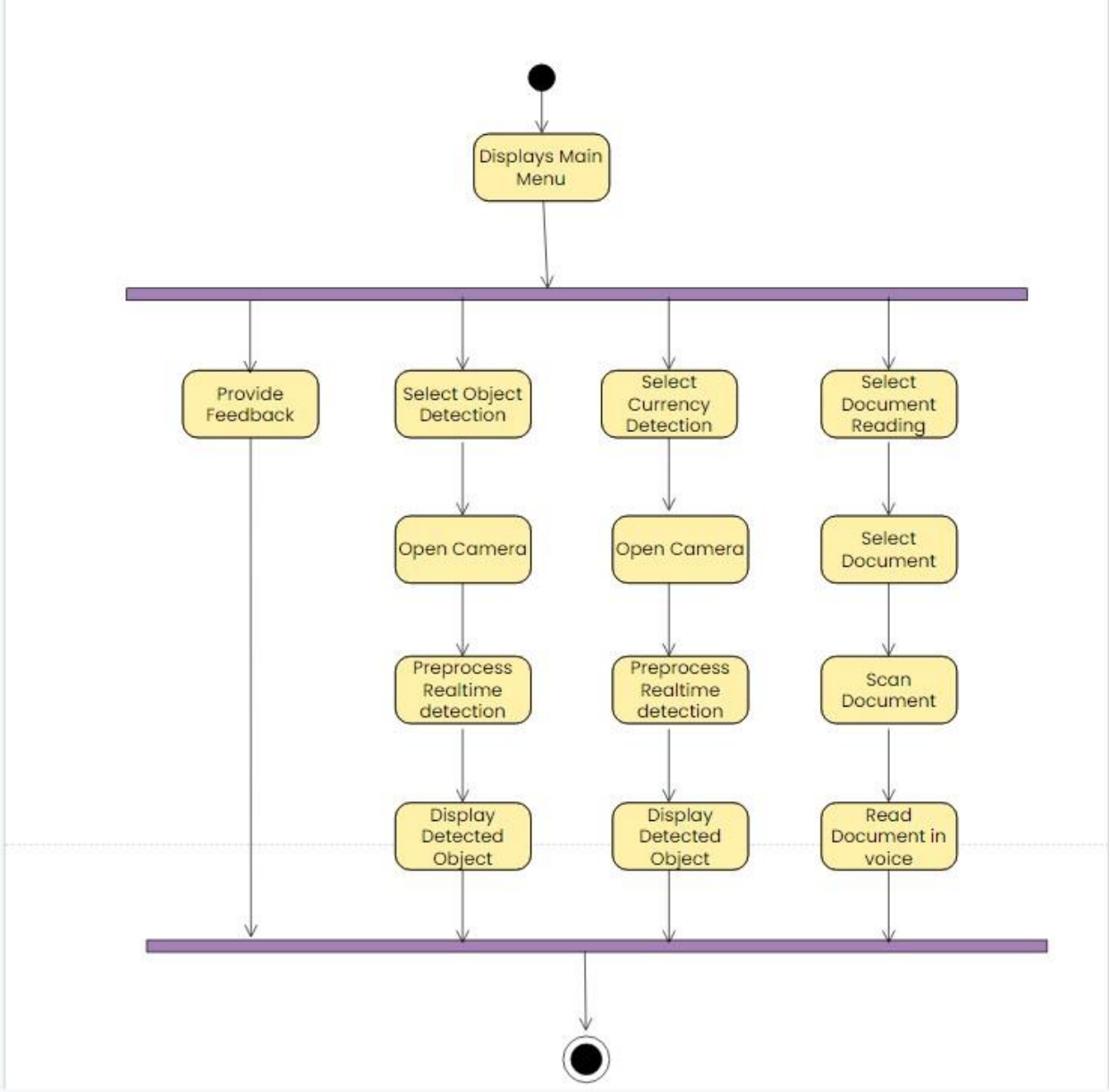
4.2.1 Architecture Diagram



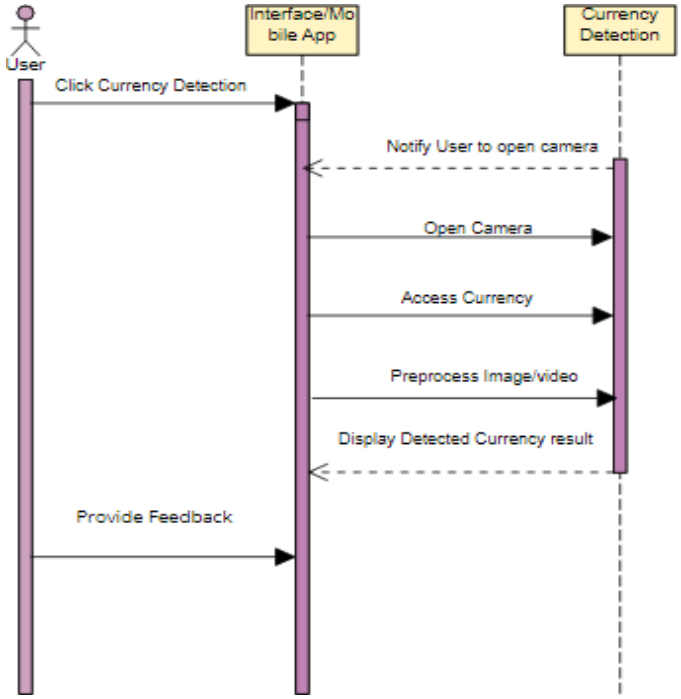
4.1 Detailed Design

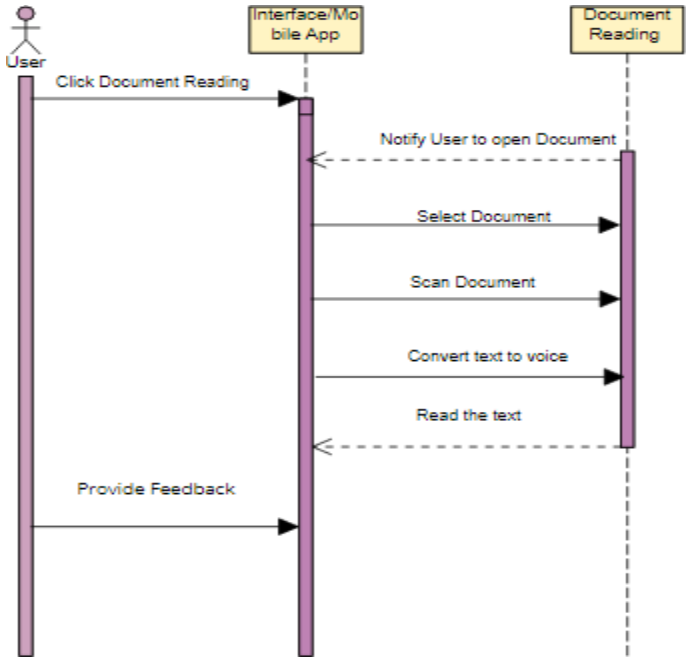
Detailed design will contain a detailed class, use case, activity, sequence diagram, whichwill the in depth detail of the system.

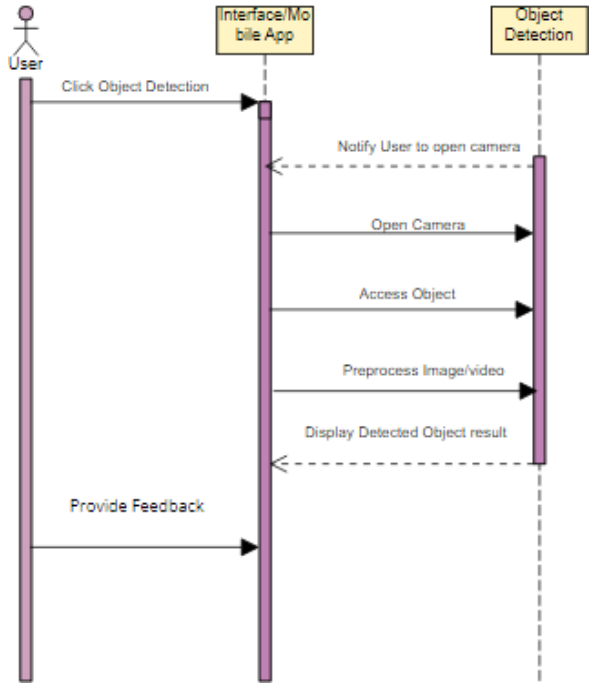
4.1.1 Activity Diagram



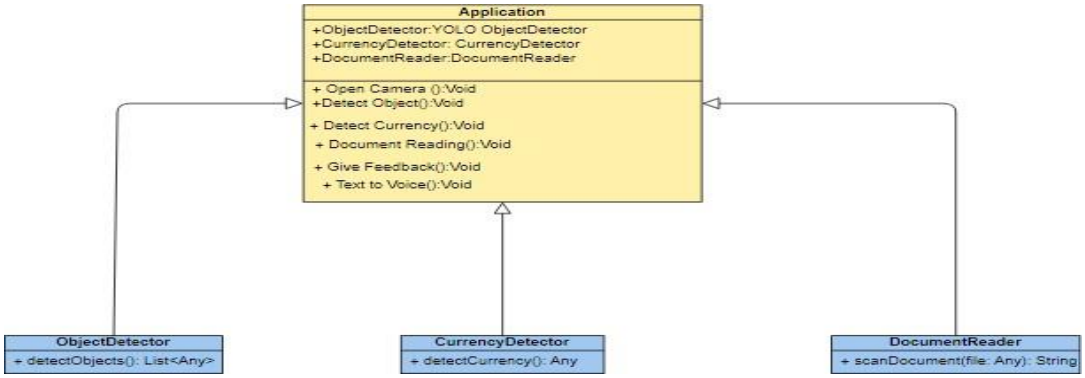
4.2.2 Sequence diagram




User
Interface/Mobile App
Document Reading
Click Document Reading
Notify User to open Document
Select Document
Scan Document
Convert text to voice
Read the text
Provide Feedback


User
Interface/Mobile App
Object Detection
Click Object Detection
Notify User to open camera
Open Camera
Access Object
Preprocess Image/video
Display Detected Object result
Provide Feedback

4.1.1 Class Diagram



4.1.1 Use Case Diagram

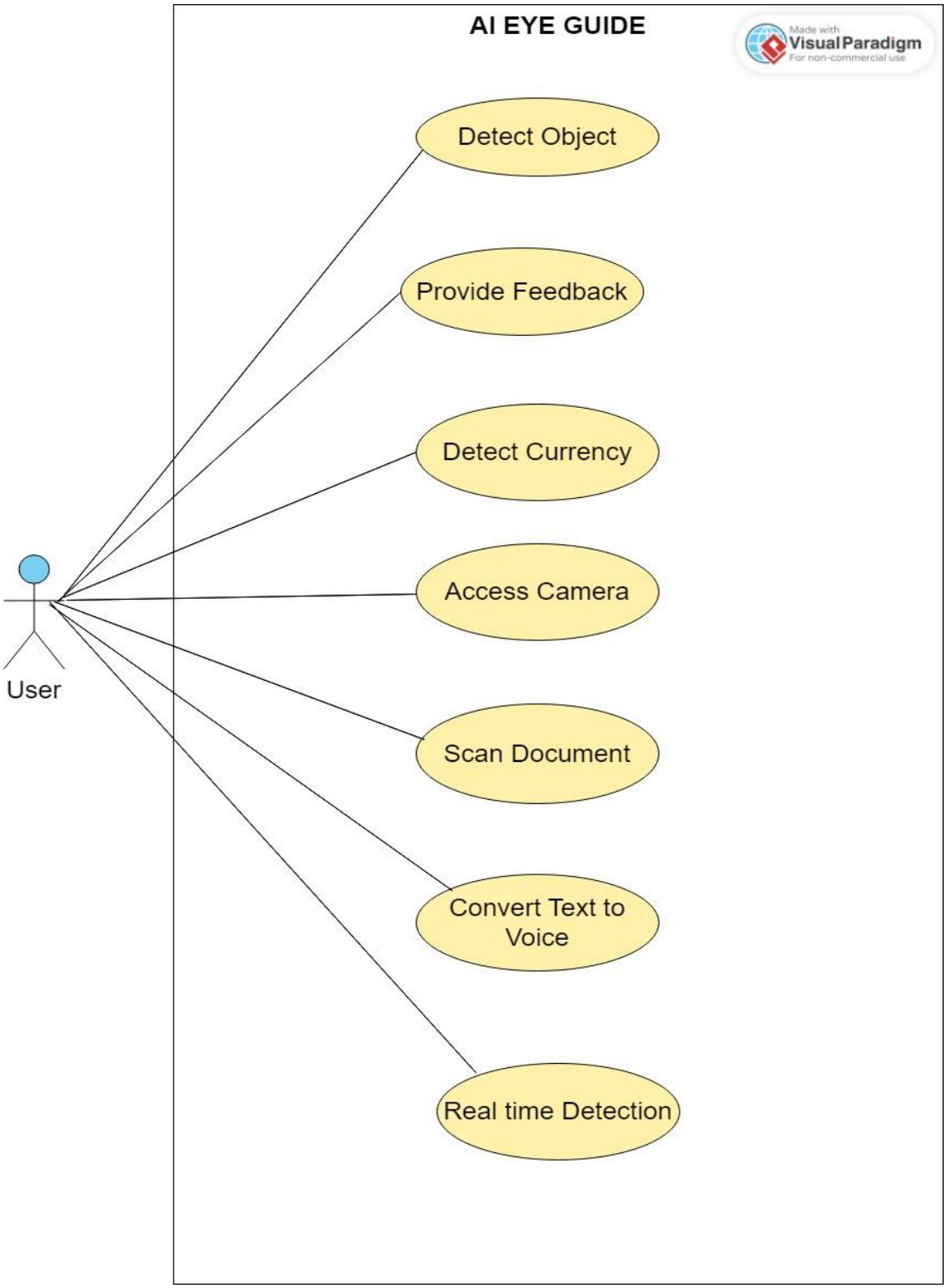


Figure 4.7 Use Case Diagram

4.2.2.1 Detailed Use case Description:

4.2.2.1.1 UC.01 Detect object

Section	**Content / Explanation**
Designation	UC_01
Name	Detect Object
Authors	Muhammad Hassan
Priority	High
Criticality	High
Source	Usama ahsan
Person responsible	Suleman amjad
Description	The system detects objects through camera input and displays the identified objects in real-time.
Actors	User
Pre-conditions	1. Functional camera is connected and operational. 2. System is operational. 3. User have stable internet connection.
Post-conditions	Objects in the camera feed are successfully detected and displayed.
Result	The system successfully identifies and displays objects from the camera feed.

Main scenario	1. User initiates the object detection process. 2. System activates the camera feed. 3. System starts the object detection algorithm. 4. Detected objects are displayed in the live camera feed. 5. User can interact with the displayed objects for further actions. 6. User requests to end the object detection process. 7. System stops the camera feed and concludes the object detection process.

Alternative scenarios	4a. No objects detected 4a.1 System displays a message indicating no objects were detected. 4a.2 User is informed that no action is required. 4b. Camera not available 4b.1 System displays an error message indicating the camera is not available. 4b.2 User is prompted to ensure the camera is properly connected and operational. 4c. Technical difficulties during detection 4c.1 System displays an error message indicating technical difficulties in object detection. 4c.2 User is advised to retry or contact technical support.

4.2.2.1.2 UC.02 Detect Currency:

Section	**Content / Explanation**
Designation	UC_02

Name	Detect Currency
Authors	Muhammad Hassan
Priority	High
Criticality	High
Source	Usama Ahsan
Person responsible	Suleman amjad
Description	The system detects and identifies currency from images or live camera feed and provides information about the recognized currency.
Actors	User
Pre-conditions	1. Functional camera is connected and operational. 2. System is operational. 3. User have stable internet connection.
Post-conditions	Currency in the camera feed is successfully detected and information about the recognized currency is provided.

Result	The system successfully identifies and provides information about the detected currency in the camera feed.
Main scenario	1. User initiates the currency detection process. 2. System activates the camera feed or accepts an image input. 3. System starts the currency detection algorithm. 4. Detected currency is displayed along with relevant information (e.g., currency type, denomination). 5. User can request additional details about the recognized currency. 6. User requests to end the currency detection process.

	7. System stops the camera feed or concludes the image analysis process.
Alternative scenarios	4a. No currency detected 4a. 1 System displays a message indicating no currency was detected. 4a.2 User is informed that no action is required or prompted to reposition the camera. 4b. Camera not available 4b.1 System displays an error message indicating the camera is not available. 4b.2 User is prompted to ensure the camera is properly connected and operational.

4.2.2.1.3 UC.03 Scan Document:

Section	**Content / Explanation**
Designation	UC_03
Name	Scan Document
Authors	Muhammad Hassan
Priority	High
Criticality	High

Source	Usama ahsan
Person responsible	Suleman Amjad
Description	The system allows users to upload a document for scanning, extracting information, and making it digitally accessible.
Actors	User
Pre-conditions	1. System is operational. 2. User have stable internet connection.
Post-conditions	Document is successfully scanned, and relevant information is extracted for digital storage.
Result	The system processes the uploaded document, making it digitally accessible for the user.
Main scenario	1. User initiates the document scanning process. 2. User selects a document file for upload. 3. System validates the document format and size. 4. System activates the scanning algorithm to extract information from the document. 5. Extracted information is displayed or made available for user verification. 6. User confirms the accuracy of the extracted information. 7. User submits the document for final processing. 8. System stores the scanned document digitally in the user's account.

Alternative scenarios	3a. Invalid document format 3a.1 System displays an error message indicating an invalid document format. 3a.2 User is prompted to upload a document in a supported format (e.g., PDF). 3b. Document size exceeds limit 3b.1. System displays an error message indicating the document size exceeds the limit. 3b.2 User is prompted to upload a smaller document within the specified size limit.

4.2.2.1.4 UC.04 Convert text to voice:

Section	**Content / Explanation**
Designation	UC_04
Name	Convert text to voice
Authors	Muhammad Hassan
Priority	High
Criticality	High
Source	Usama Ahsan
Person responsible	Suleman amjad
Description	The system allows users to upload a document, scan its text content, and convert it into audible speech for enhanced accessibility.
Actors	User

Pre-conditions	1. System is operational. 2. User have stable internet connection.
Post-conditions	Text from the uploaded document is successfully scanned and converted into audible speech.
Result	The system generates an audio file or initiates real-time speech synthesis based on the document's text content.
Main scenario	1. User initiates the text-to-voice conversion process. 2. User selects a document file for upload. 3. System validates the document format and size. 4. System activates the text scanning algorithm to extract the document's text content.
	5. Extracted text is processed for voice synthesis. 6. User is provided with options to customize voice parameters (e.g., language, speed). 7. User confirms the conversion settings. 8. System initiates the text-to-voice conversion process. 9. The system generates an audio file or initiates real-time speech synthesis. 10. The user can preview the generated audio.

Alternative scenarios	3a. Invalid document format 3a.1 System displays an error message indicating an invalid document format. 3a.2 User is prompted to upload a document in a supported format (e.g., PDF). 3b. Document size exceeds limit 3b.1. System displays an error message indicating the document size exceeds the limit. 3b.2 User is prompted to upload a smaller document within the specified size limit. 6a. Default voice settings 6a.1 If the user does not customize voice parameters, the system uses default settings.

4.2.2.1.5 UC.05 Provide Feedback:

Section	**Content / Explanation**
Designation	UC_05
Name	Provide Feedback

Authors	Muhammad Hassan
Priority	Medium
Criticality	Medium
Source	Usama Ahsan
Person responsible	Suleman amjad
Description	The system allows users to provide feedback, helping improve the overall user experience and address concerns.

Actors	User
Pre-conditions	1. System is operational. 2. User have stable internet connection.
Post-conditions	Feedback is successfully submitted and recorded for analysis and improvement purposes.
Result	The system receives user feedback for evaluation and potential enhancement.
Main scenario	User initiates the feedback submission process. User navigates to the feedback section in the user interface. System provides options for selecting the type of feedback (e.g., suggestion, bug report, general comment). User enters detailed feedback in a provided text box. User has the option to attach relevant files or screenshots (if applicable). User confirms the feedback submission. System records the feedback along with relevant metadata (timestamp, user ID). User receives a confirmation message for successful feedback submission.

Alternative scenarios	3a. Anonymous Feedback 3a.2 If the user prefers to provide feedback anonymously, the system allows for an anonymous submission option. 3a 2 User submits feedback without revealing personal information. 4a. Minimal Feedback Details 4a.1. If the user provides minimal details, the system accepts the feedback but encourages more detailed input. 6a. Feedback Attachment Failure 6a.1. If there is an issue with attaching files or screenshots, the system displays an error message. 6a.2. User is advised to retry attaching files or proceed without attachments.

Chapter 5:

Implementation

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Implementation

5.1 Endeavour (Team + Work + Way of Working)

WBS #	WBS Deliverable	Activity #	Activity to Complete the Deliverable	Duration (# of Days)	Responsible Team Member(s) & Role(s)
1.	Feasibility study	1	Research work	30 days	Muhammad Hassan, Usama Ahsan, Suleman Amjad
2.	Development of application	2	Creating all screen	45 days	Muhammad Hassan, Usama Ahsan, Suleman Amjad
3.	Currency detection	3	developing module of currency detection	45 days	Muhammad Hassan, Usama Ahsan, Suleman Amjad
4.	Object detection	4	Developing module of object detection	50 days	Muhammad Hassan, Usama Ahsan, Suleman Amjad
5.	Text to voice	5	Developing text to voice module	45 days	Muhammad Hassan, Usama Ahsan, Suleman Amjad

6.	Testing and user feed back		Performing testing	20 days	Muhammad Hassan, Usama Ahsan, Suleman Amjad

5.2 Flow control / Pseudo codes

5.2.1 Flow Control:

1. Start: User opens the application.

2. Display main screen with four buttons: Object detection, currency detection, documentreading, user feedback.
3. User selects any of the buttons.

5.2.1.1 If Object Detection:

i. Open camera.

ii. Start object detection.

iii. Announce the detected object.

5.2.1.2 If Currency Detection:

i. Open camera.

ii. Start currency detection.

iii. Announce the currency denomination.

5.2.1.3 If Document Reading:

i. Open camera.

ii. Start document reading.

iii. Announce the text content.

5.2.1.4 If User Feedback:

i. Open feedback form.

ii. Allow user to input feedback.

iii. Submit feedback.

5.2.2 Pseudo Code:

```
onButtonSelect(button):
if button == "Object
Detection":
openCamera()
startObjectDetection
()
announceDetectedObject()
elif button == "Currency
Detection":
openCamera()
startCurrencyDetection()
announceCurrency()
elif button ==
"Document Reading":
openCamera()
startDocumentReading()
announceTextContent()
elif button == "User
Feedback":
openFeedbackForm
()
```

getUserFeedback()
submitFeedback()
openCamera():
Opening the
camera.
startObjectDetec
tion():
Initialize object
detection algorithm.
announceDetectedObjec
t():
The code for reporting the detected object
to the user.startCurrencyDetection():
Initializing currency detection
algorithm."
announceCurrency():
The code to declare the denomination of the
identified currency.startDocumentReading():
Initialize document reading function.

announceTextContent():

Code of announcing the document text
content to be read.openFeedbackForm():
Display user
feedback form code.
getUserFeedback():

Collect the user feedback, either text input or voice
recognition.submitFeedback():
Code to submit the user feedback.

The pseudo code gives a detailed outline on the flow and basic operations of the buttons on the mobile device application. The actual implementation may also incorporate some details and more considerations due to the development platform and technologies.

5.3 Components, Libraries, Web Services and stubs

5.3.1 Mobile Application Components:

5.3.1.1 Main Screen:

Main Screen with four buttons Object Detection, Currency Detection, Document Reading,and User Feedback.

5.3.1.2 Camera Module:

Manually controls the camera opening feature and taking photo or video.

5.3.1.3 Object Detection Module:

It implements the object detection algorithm to detect objects from camera input. Use an object detection model from a pre-trained YOLO V8 model

5.3.1.4 Currency Detection Module:

Detects currency denominations from camera input by implementing the currency detection algorithm. Image processing and pattern recognition techniques possible integration with YOLO V8 model.

5.3.1.5 Document Reading Module:

Handles document OCR functions, that is, reading text from documents using OCR technique. Use OCR libraries such as tesseract with platform-specific wrappers.

5.3.1.6 User Feedback Module:

Provides feedback form and submissions management. Submission of

feedback, standard UI components and backend integration for storing feedback.

5.3.2 Libraries and Frameworks:

5.3.2.1 TensorFlow Lite (Object Detection):

TensorFlow Lite is a lightweight version of the TensorFlow machine learning frameworkfor mobile applications. Use a pre-trained TensorFlow Lite object detection model.

5.3.2.2 OpenCV (Image Processing):

It is a collection of image processing tools and libraries known as OpenCV. Provide pre-processing for currency imaging as part of the vision-related activities.

5.3.2.3 Tesseract OCR (Document Reading):

Tesseract is a text recognition engine for optical character recognition (for reading textfrom images). Use Tesseract OCR in document reading.

5.3.2.4 Speech Synthesis Library (Announcement):

A library for text-to-speech announcements of the objects detected, currency, anddocuments. Enables users to interact with text output as speech.

5.3.2.5 User Interface (UI) Framework (Flutter):

User interface cross-platform frameworks. Use cross-platform development framework toimplement the main screen and user feedback form.

5.3.2.6 Backend Service (User Feedback Submission):

Backend service for submissions of user feedback. Use a backend service to store andmanage user feedback data.

5.4 IDE, Tools and Technologies

5.4.1 IDE

PyCharm, Google Colab, Android studio

5.4.2 Tools

Github for version control and document

5.4.3 Technologies

Python, Flutter, Dart, YOLO V8 algorithm

5.5 Best Practices / Coding Standards

5.5.1 Accessibility Standards:

1. All the text and control should be screen reader compatible.

2. Use a high contrast and adjustable font size for readability.

3. Alternative text for images and buttons.

5.5.2 Button Labels:

For easy navigation use descriptive labels for each button (e.g., “Object Detection”,“Currency Detection”, “Document Reading”, “User Feedback”).

5.5.3 Object Detection:

1. Adopt imaging processing protocols for efficient object identification.

2. Allow users to initiate object detection by incorporating camera functionalities.

3. Clearly identify audio feedback associated with detected objects.

5.5.4 Currency Detection:

1. Introduce a strong currency recognition system.

2. Integrate camera functionality dedicated to currency detection with continuousfeedback.

3. Provide correct audio on the detected currency notes.

5.5.5 Document Reading:

1. Use Optical Character Recognition (OCR) for document reading.

2. Create an easy-to-use interface for document capture using the device camera.

3. Allow the voice assistance to read the document content to the user.

5.5.6 User Feedback:

1. Improve user experience by introducing a dedicated button for user feedback.

2. Give users an option to fill a form, where they can give feedback, suggestions or reportissues.

3. Make audio confirmation upon the successful submission of feedback.

5.5.7 Navigation and UI Design:

1. Keep user-friendly, simple interface with distinct navigation.

2. For smooth navigation consider touch gestures.

5.5.8 Testing and QA;

1. Thoroughly test the application with blind users in order to confirm its usefulness.

2. Frequently improve and change the app to reflect user feedback and the changes inaccessibility standards.

5.5.9 Privacy and Security:

1. Make sure that images and data captured are securely stored and handled.

2. Any personal information should be encrypted using encryption protocols fortransmission.

5.5.10 Documentation:

1. Ensure full documentation on the app functionalities, user guidelines and accessibility.

2. Provide a guide to visually impaired users to help them navigate and use each feature.

5.5.11 Software Engineering Practices

5.5.11.1 Agile Development approach

Using an agile development approach, we've created a visually impaired-friendly app with four buttons: Object Detection, document reading, user feedback, and currency detection. When a user chooses object detection or currency detection, the camera becomes active, and real-time object or document detection commences, making the experience smooth and hassle-free.

5.6 Deployment Environment

The visually impaired application should be deployed on a cloud infrastructure using services like AWS and Azure. The choice guarantees scalability, reliability, and ease of maintenance which allows for inclusive user experience when the object detection, currency detection, document reading, and user feedback functionalities have been relied on by users.

5.7 Summary

This visually impaired-friendly mobile app commences with the user opening it and clicking on any one of Object Detection, Currency Detection, Document Reading, or User Feedback. Pseudo code covering actions such as camera activation, algorithm initiation, and result announcements corresponds to it. Specifically, some of the key components include main screen, a camera module, and specialized detection modules, using libraries such as TensorFlow Lite and Tesseract OCR. Best practices consist of accessibility standards, clear button labels and rigorous testing, deployment on AWS or Azure for scalability.

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