

DEPARTMENT OF INFORMATION AND COMMUNICATION TECHNOLOGY

DIPLOMA IN INFORMATION TECHNOLOGY

(DIGITAL TECHNOLOGY)

DFT50114: INTEGRATED PROJECT

I-HANDLY

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SESSION: II 2022/2023 (SHORT SEMESTER)

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1.0 Abstract

An app-based system called I-Handly focuses on instructing users in learning sign language. Mrs. Mas, a client from the Federation of Deaf People in Malaysia, consented to participate in our project because it will aid the community of the deaf and mute in learning sign language. Due to the lack of resources or study methods available to them, it is challenging for the deaf and mute community's younger members to concentrate and learn effectively. The community will benefit from this project by having access to a sign language application that enables them to learn and use sign language at their own pace. Our team creates a preliminary prototype, which is then presented to the client for their input, using the RAD (Rapid application development) method that focusing on creating a prototype and enhance it according to client's feedback. Android Studio, Adobe Illustrator, Canva Premium, Camera, and Java programming language are the tools we used to create our app. Our project aims to make sign language learning easier for the deaf and mute community and give them access to a better learning environment. The purpose of our project is to assist the deaf and mute community in learning and understanding sign language more effectively as well as in communicating with others more easily.

2.0 Project Plan

2.1 Problem Statement

The communication gap between hearing people and deaf or hard of hearing people has long been a serious barrier. Even though sign language is a widely recognized visual language, there are still few problems faced by this community such as,

- 1) Many people find it difficult to learn and utilize it owing to a lack of resources, exposure, or other impediments. Deaf and mute people want to learn sign language but find it hard because the source to learn sign language is limited.
- 2) It is expensive to have an access to professional sign language interpreter. Deaf and mute people who want to be guide or learn sign language in a correct way, unable and hard to find an expert due to expensive cost of hiring them.
- 3) Communication barrier between deaf people with other individual, it is hard for deaf people to communicate with hearing people or even with other deaf people because of the limitations of understanding each other language.

2.2 Objectives

We would want to provide solutions for our clients based on the challenges listed above.

As a result, our project's goals are as follows:

- 1) To create an android-based app (i-Handly) that shall display variety features such as quizzes, games and also dictionary that contains sign language in alphabet, number and phrases.
- 2) To create an android-based app (i-Handly) that shall display demonstration videos of sign language phrases for user to learn and understand.
- 3) To create an android-based app (i-Handly) that shall display option between video or picture for learners to choose to learn sign language.

2.3 Scope

2.3.1 User Scope

- The app (i-Handly) shall provide users several option of categories for sign language to learn.
- The app (i-Handly) shall allow users to choose either video or picture of sign language.
- The app (i-Handly) shall provide games and quizzes for users to play
- The app (i-Handly) shall generate score after playing quizzes or games of sign language.

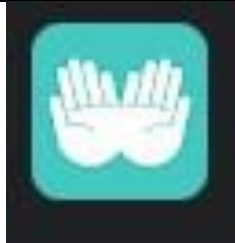
2.3.2 System Scope

- The system shall display image of sign language to learn.
- The system shall receive the input entered by the user and display the output as desired by the user.
- Access to the system shall be restricted to authorized user based on designation.
- The system shall display quizzes and games for the users to play interactively.

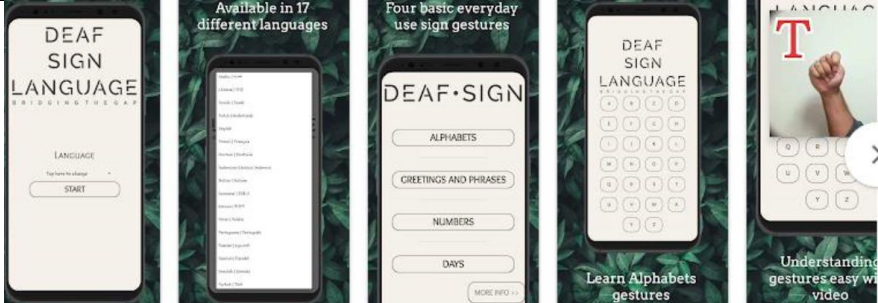
2.4 Literature Review

We did some research for 3 apps named StorySign, Deaf Sign Language App (ASL), Sign Language for Beginners and has listed its function, interface, user-friendly, cost, advantages and disadvantages and compared it with our app, i-Handly and has listed out the uniqueness of our app compared to the other 3 apps.

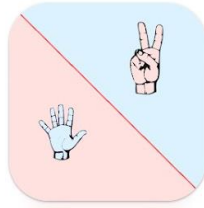
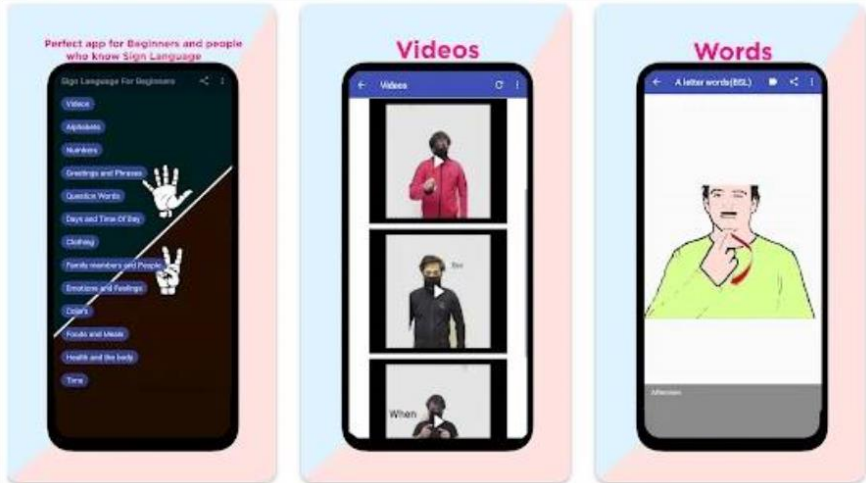
1. First App - StorySign

NAME	 StorySign
FUNCTION	StorySign helps to open the world of books to deaf children. It translates children's books into sign language, to help deaf children learn how to read. StorySign has been developed in close partnership with the European Union of the Deaf, local deaf associations and deaf schools, and developed with classic children's titles from Penguin Books.
INTERFACE	
USER-FRIENDLY	No
COST	Free
ADVANTAGE	Use interesting animation
DISADVANTAGE	Only can scan limited book

2. Second App – Deaf Sign Language App (ASL)

NAME	 Deaf Sign Language App (ASL)
FUNCTION	An app that allows users to learn sign language by word or phrase as well as they can use it to communicate with the deaf. Our app is an offline app so it can be used without any requirement of internet once downloaded.
INTERFACE	
USER-FRIENDLY	No
COST	Free
ADVANTAGE	Available in multiple language
DISADVANTAGE	The interface has bland colour

3. Third App – Sign Language for Beginners

NAME	 Sign Language for Beginners
FUNCTION	Sign language for beginners consists of a huge array of signs accompanied with clear images describing the respective action. The signs have been organized into various sections which start with basics such as alphabets and numbers.
INTERFACE	
USER-FRIENDLY	No
COST	Have two version free and pro version
ADVANTAGE	Have video demonstration
DISADVANTAGE	An inaccurate information

Compared to the other 3 apps, our app, i-Handly will have,

I-HANDLY
Hand Gesture Scanner
Accurate sign language
Have quizzes to test user

Hand Gesture Scanner that can scan the gesture of a sign language and an indicator will show the designated sign language on the screen. We also will have more accurate sign language since we have contacted an Interpreter, Mrs. Suriati from The Federation of Deaf People in Malaysia and she had validated the information of the sign language that are used in Malaysia. Quizzes are also being provided in order to test user knowledge about sign language.

2.5 Methodology

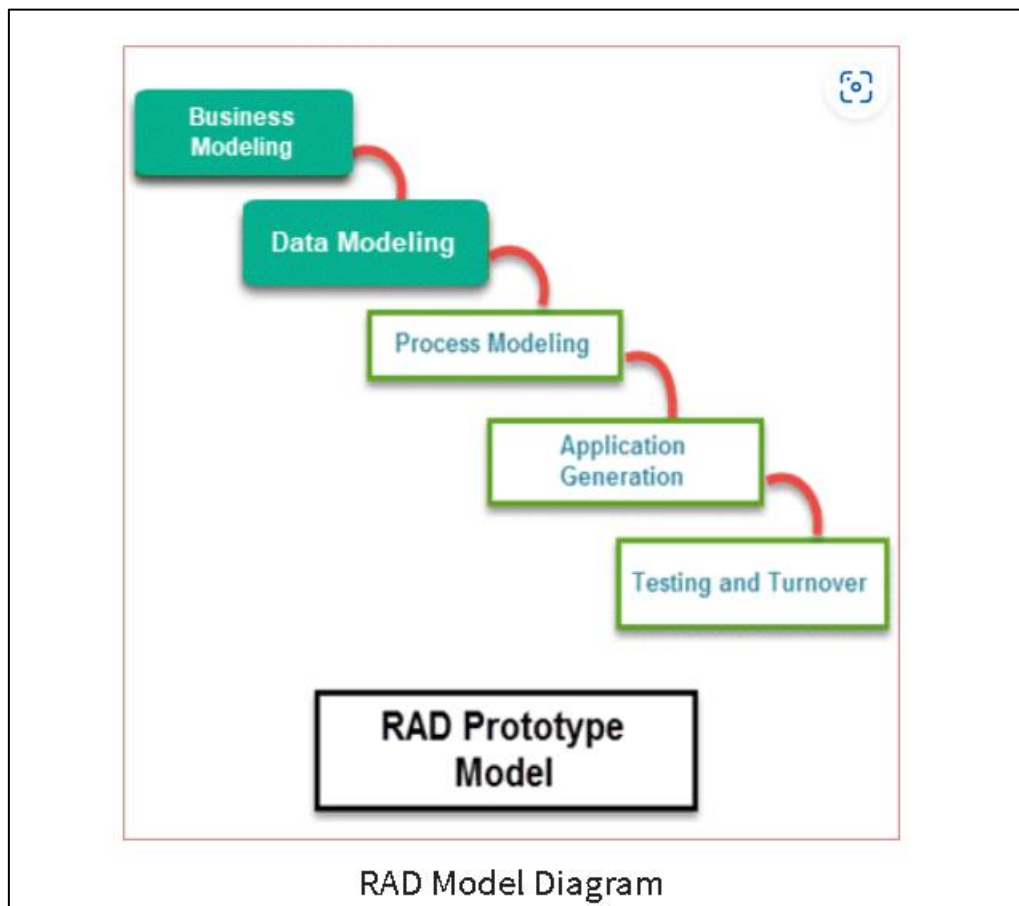


Figure 2.0 Rapid Application Development (RAD) Model Diagram

Rapid Application Development (RAD) is an agile methodology that are used for this project. This methodology aims to produce quality results at low-cost investment. The process prioritizes rapid prototyping and frequent iteration.

By using RAD methodology, the development time of the project will be reduced, and could encourages client feedback. An early or imperfect prototype could be built and presented to the client. This process will be repeated over and over until the product is complete and meets client requirements. This methodology is ideal for small project with well-defined objectives.

Phases	Activity
Business Modelling	• Initiate idea and planning for project i-Handly. • Determine the project scope for user and system. • Requiring system requirements. • Designing the interface of the project i-Handly. • Project functionality.
Data Modelling	• Analyzing information and requirements from the client and supervisor. • Creating an early prototype of i-Handly.
Process Modelling	• Changes of requirements from the client and supervisor. • Enhancements of the early prototype.
Application Generation	• The project i-Handly being developed by using tools such as Android Studio, to convert process and requirements from the client into actual prototypes.
Testing and Turnover	• Complete test runs of the project i-Handly.

2.6 Gantt Chart

This is the Gantt Chart of the project of developing an app to help deaf and mute people to learn sign language. Based on our methodology used, which is RAD, we have break down the task into 18 important tasks which is preparing our project proposal, proposal presentation, designing the app, developing and early prototype, supervisor evaluation, refining the prototype until it meets our supervisor satisfaction and finally the final product. By using RAD method, we will frequently develop a prototype after every supervisor evaluation.

i-Handly		MR. AZROL HISHAM		21/6/2023				2/8/2023		
PROJECT NAME		SUPERVISOR		START DATE				END DATE		
Task ID	Task Name	Start Week	End Week	WK01	WK02	WK03	WK04	WK05	WK06	WK07
01	Proposal Preparation	WK01	WK01							
02	Proposal Presentation	WK01	WK01							
03	Design	WK02	WK02							
04	Development	WK02	WK02							
05	Prototype	WK02	WK02							
06	Supervisor Evaluation	WK02	WK02							
07	Refined Prototype	WK03	WK03							
08	Design	WK03	WK03							
09	Prototype	WK03	WK03							
10	Supervisor Evaluation	WK03	WK03							
11	Refined Prototype	WK04	WK04							
12	Design	WK04	WK04							
13	Prototype	WK04	WK04							
14	Supervisor Evaluation	WK04	WK04							
15	Refined Prototype	WK05	WK06							
16	Design	WK06	WK06							
17	Development	WK06	WK06							
18	Final Product	WK07	WK07							

Figure 2.1 I-Handly Gantt Chart

3.0 Requirement Specification

3.1 Functional Requirement

Functional Requirement is a function that defines what function an app is likely to perform in the first place, we have listed the functional requirement of our app, i-Handly.

1. User shall be able to choose between images or videos of sign language
2. User shall be able to open camera detection to detect the hand gesture
3. User shall be able to see the questions and answer the quizzes
4. User shall be able to see the quizzes result
5. User shall be able to search alphabet and number in the search bar

3.2 Non-Functional Requirement

Non-Functional Requirement is a specification that describes the app's operational capabilities and constrains that enhance its functionality and determine how the app must perform, it may be speed, reliability, security, etc. The non-functionality requirement for this system are as follows,

1. Usability – the system must be easy to use and not complicated the use
2. Reliability – The system must be available 24hours a day, 7 days a week
3. Performance – The response time of the system must not exceed 10 seconds with good internet connection
4. Maintainability – The system must be easy to be updated and modified in order to add new phrases
5. Compatibility – The system must be compatible with device that has 64GB ROM, 3GB RAM and run on Android 11 and above

3.3 Hardware and Software Requirement

The cost of this project included the cost of the devices use in developing the app and software used in running the code and app. The table below will include all the name, software and hardware specifications and also the cost of the devices and software.

No.	Hardware	Specification	Price
1.	Laptop Dell Inspiron 15 3515	• AMD Ryzen 5 3500U • 2.10 GHz • AMD Radeon Graphics • 8GB DDR4 RAM • 512GB SSD ROM	RM 2499.00
2.	Laptop Acer Aspire E 14	• INTEL I5-7200U • GEFORCE 940MX 2GB • 12GB RAM DDR4 • 128 GB SSD • 1 TB HDD	RM1899.00
3.	Laptop Gigabyte 5 2021	• INTEL i5-11400H 11th Gen • 2.70GHz • NVIDIA GeForce RTX 3050 • 16GB RAM DDR4 • 512 SSD	RM 3600.00
4.	Wi-Fi	• Unifi • 100 Mbps – 5G	RM 150.00/ month
No.	Software	Specification	Price
1.	Android Studio	Developing app using java language	FREE
2.	Microsoft Word	Typing proposal and report	RM 27.00/ month
3.	Adobe Illustrator	Creating and designing image	RM 59.35/ month
5.	Canva Pro	Editing image and slide	RM 29.90/ month
Total for first month			RM 8264.25
Total monthly after first month			RM 266.25

3.4 System Configuration

The configuration needed for the system to be fully functional and accessible are as below,

1. Hardware components

Our app consumes small amount of storage, any device that starts with 64GB ROM and 3GB RAM can run this app just fine

2. Software configuration

Since our app was build using Android Studio, so our application i-Handly only can be run on Android Device with Android 11 and above.

3. Network configuration

Since our app is not a stand-alone app, our app needs to connected to the network always because during login page, the data will be sent to the database and will be transmitted back to allow the user to enter if the credentials match with the data in the database.

3.5 Security Requirement

The security requirement and exceptional handling applied in this app are;

1. Account

- i. Users need to create an account before do login to i-Handly.
- ii. Account is being create in firebase so that only registered user an login to the system.

2. Login

- i. User must enter email and password before login into the system successfully.
- ii. User who enters the wrong credentials cannot login into the system.

3. Register

- i. User can fill email and password to register to the system.
- ii. If user don't put the correct format for their email, the system will notify the user to enter the correct format such as putting the symbol @.
- iii. If the password did not meet the requirement of length minimum 6-characters.

4. Update

- i. User can reset their password by enter their email when clicked reset password button, a link will be sent to the email and a reset password form will be shown.

4.0 Final Design

4.1 Logical Design

This section will provide the logical design that were prepared during system analysis phase to give in-depth understanding of logical interaction of data and process involves before designing and development of the system start.

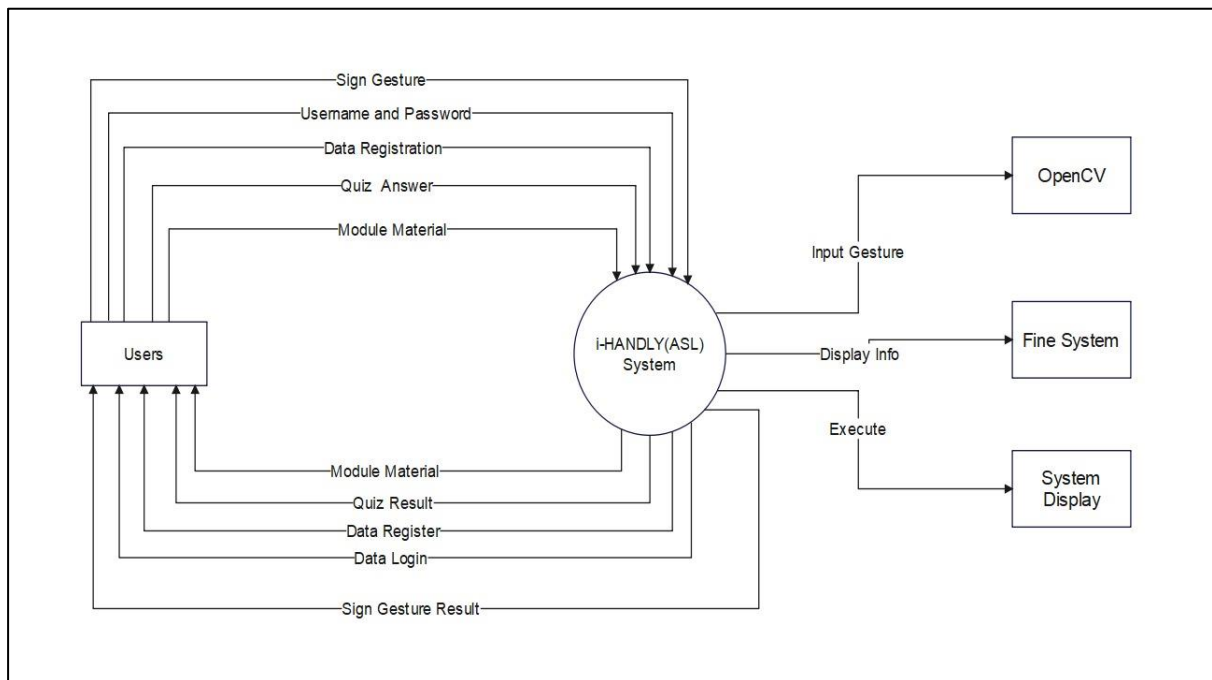


Figure 4.0 Data Flow Diagram – Context Diagram

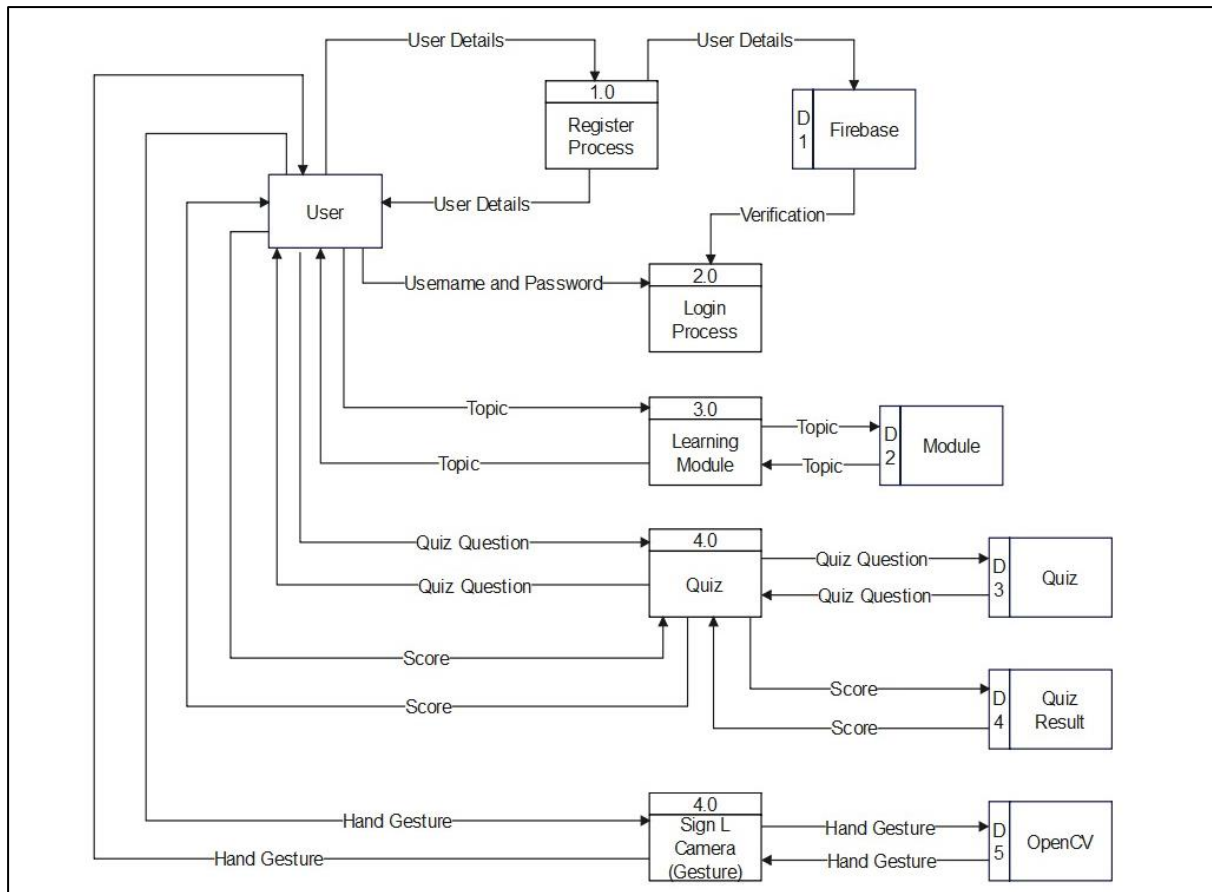


Figure 4.1 Data Flow Diagram – Diagram 0

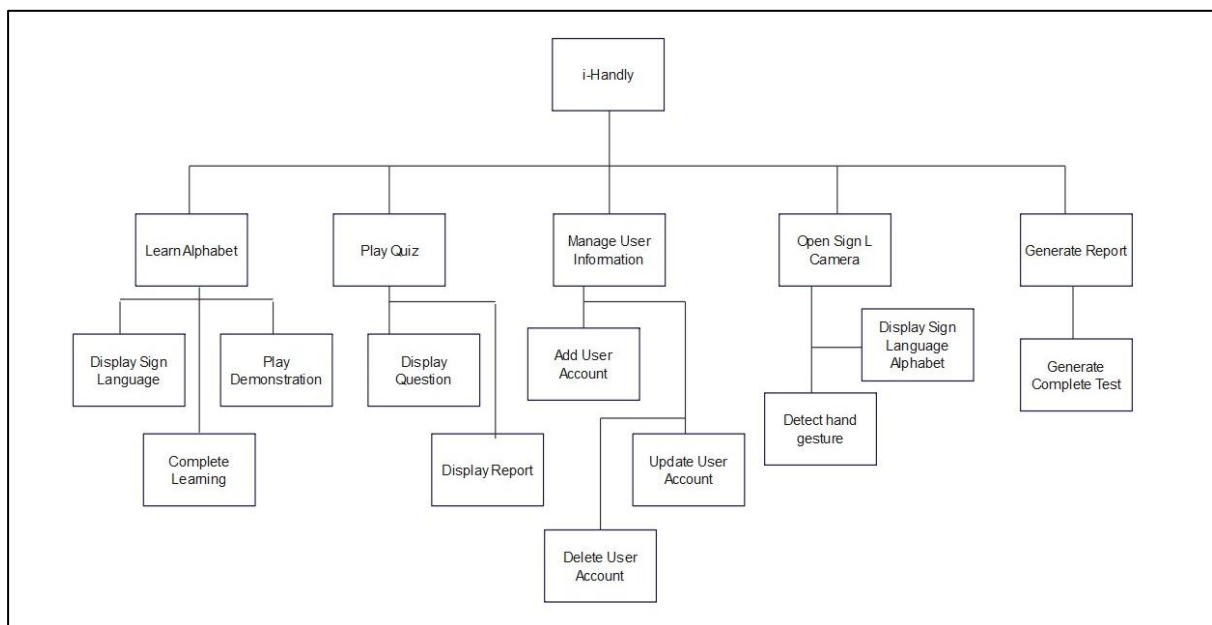


Figure 4.2 Functional Decomposition Diagram

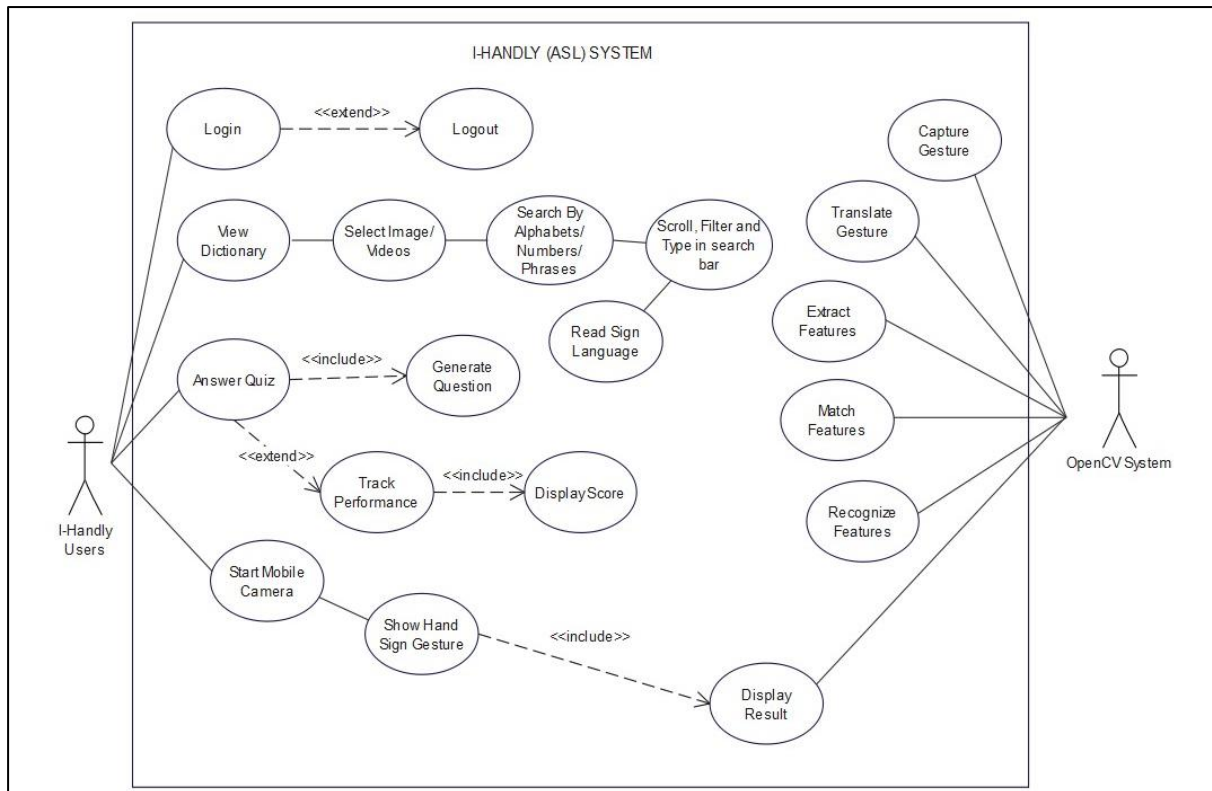


Figure 4.3 Use Case Diagram

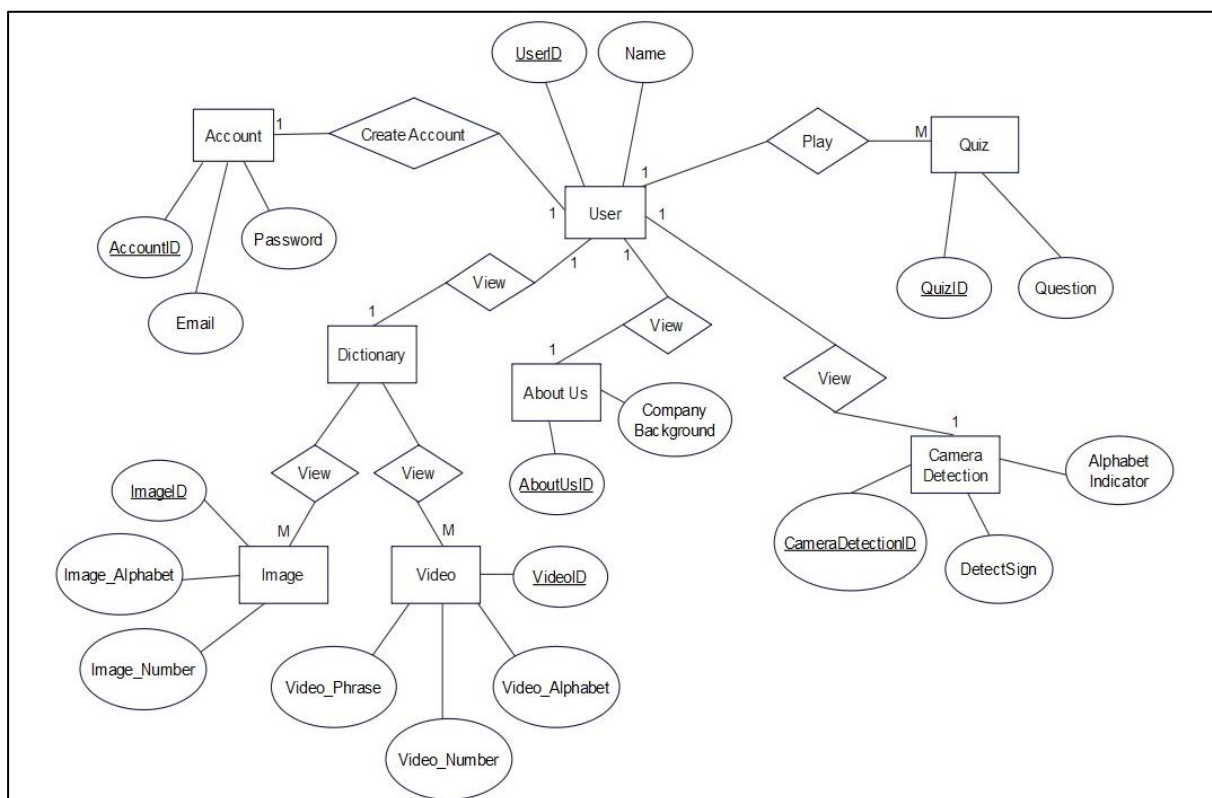


Figure 4.4 Entity Relationship Diagram (ERD)

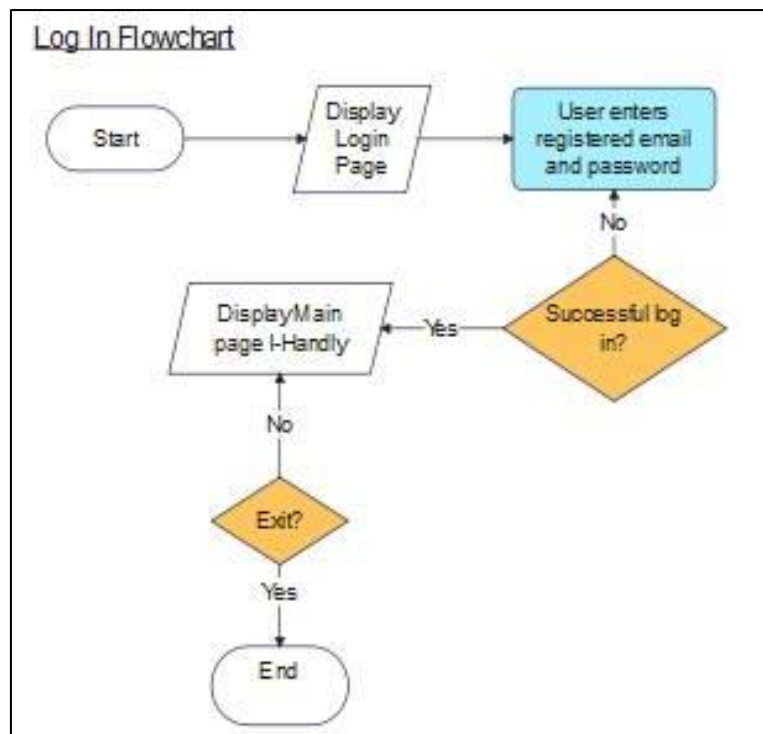


Figure 4.5 Flowchart – Log In

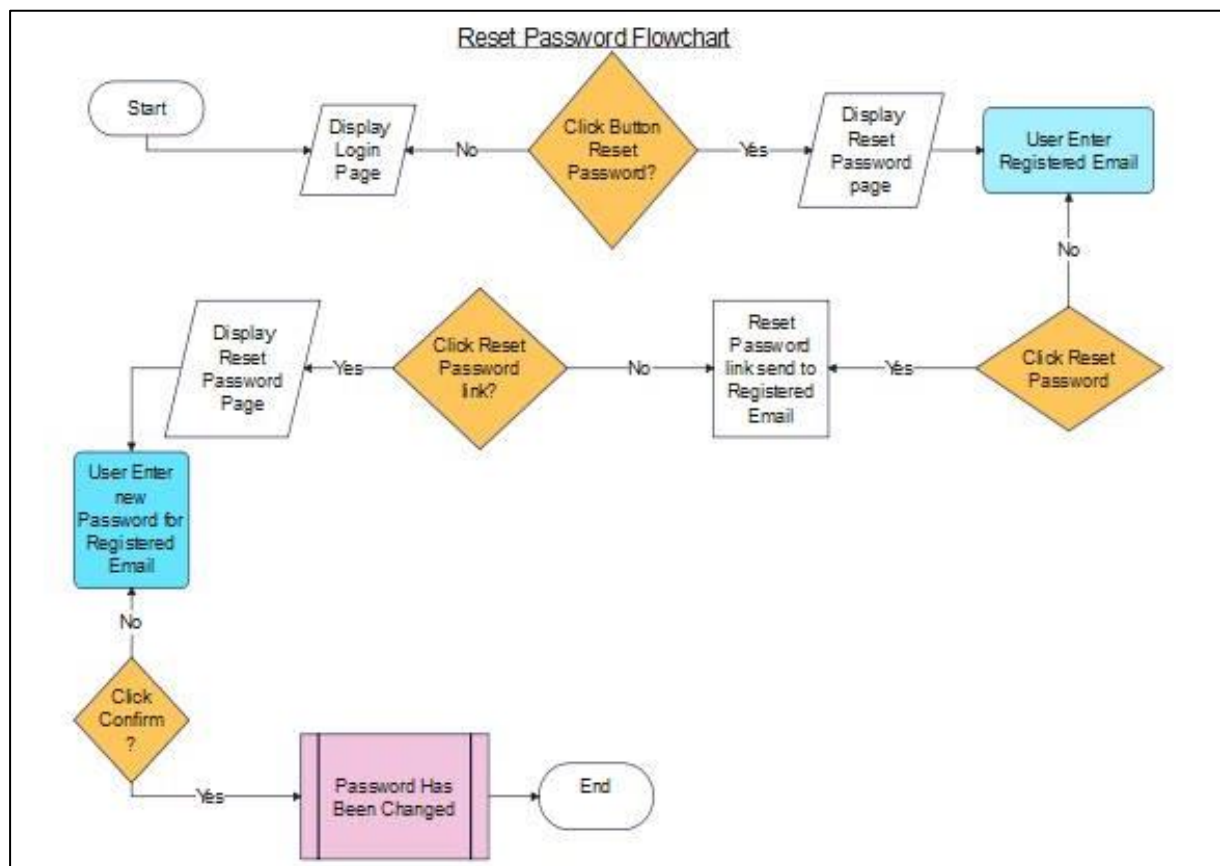


Figure 4.6 Flowchart – Reset Password

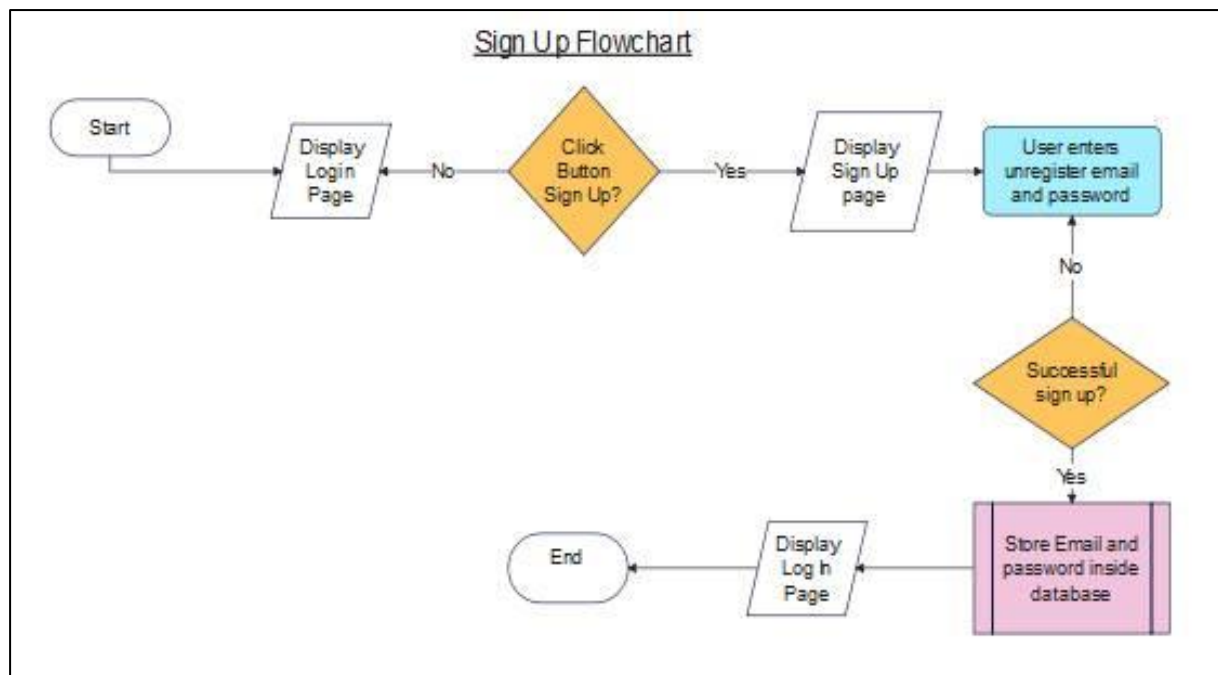


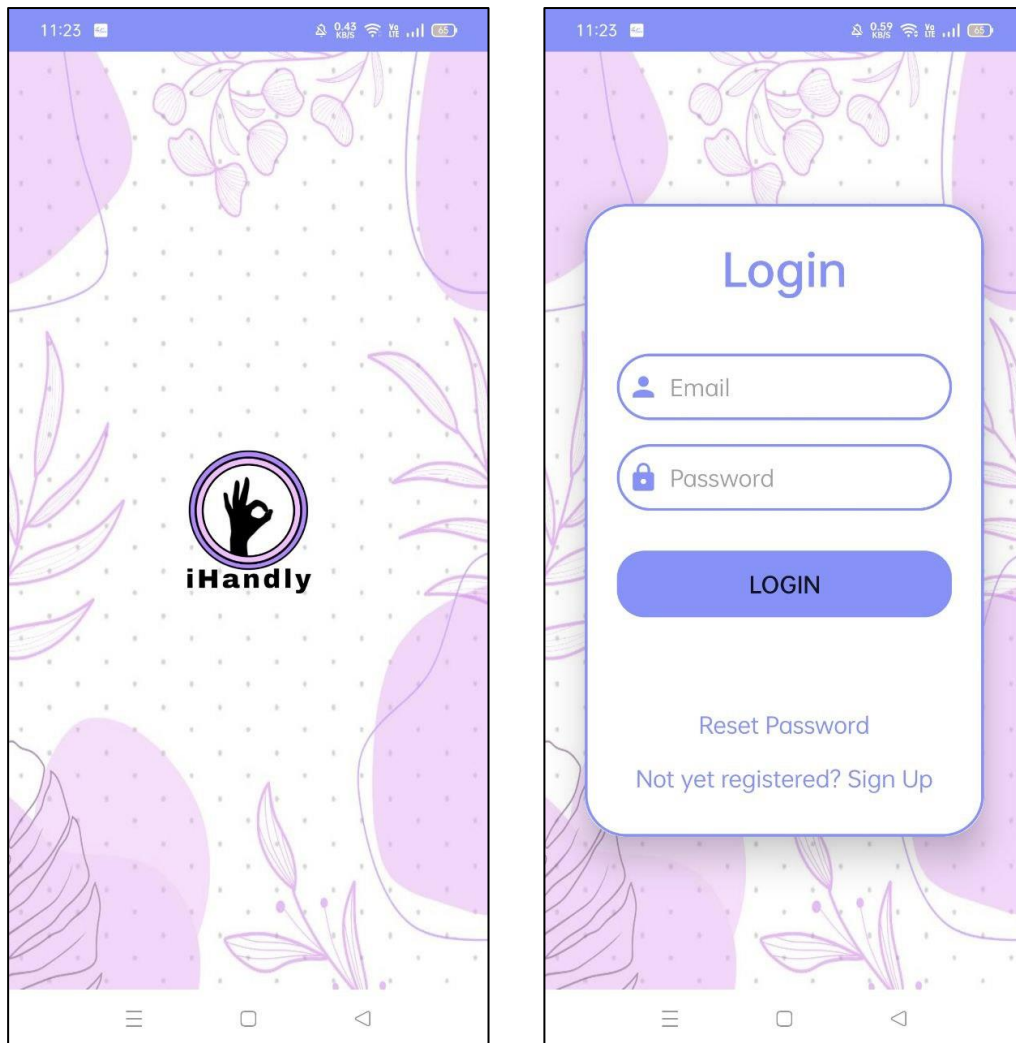
Figure 4.7 Flowchart – Sign Up

4.2 Physical Design

4.2.1 Login

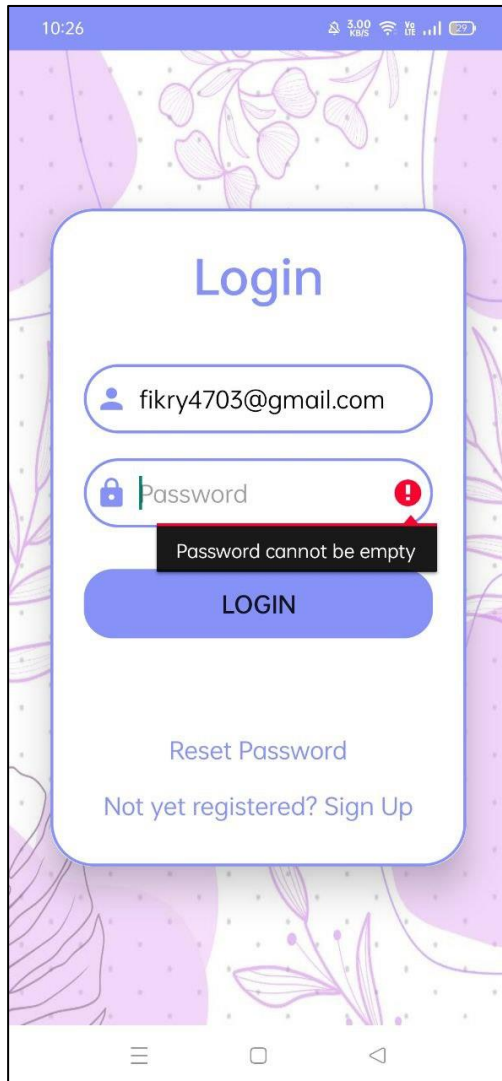
i. Login Interface

This is the splash screen and interface for the login of I-Handly.

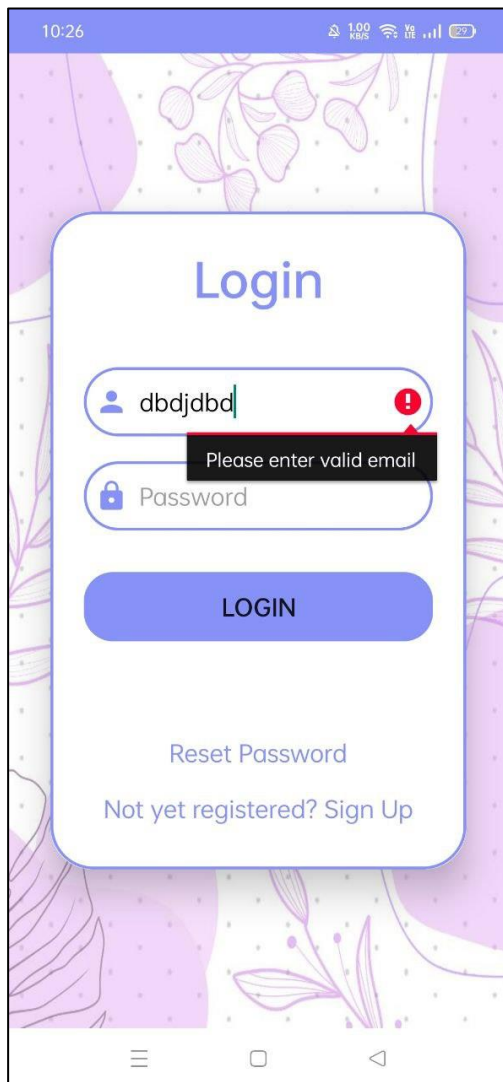


ii. Login Error Message

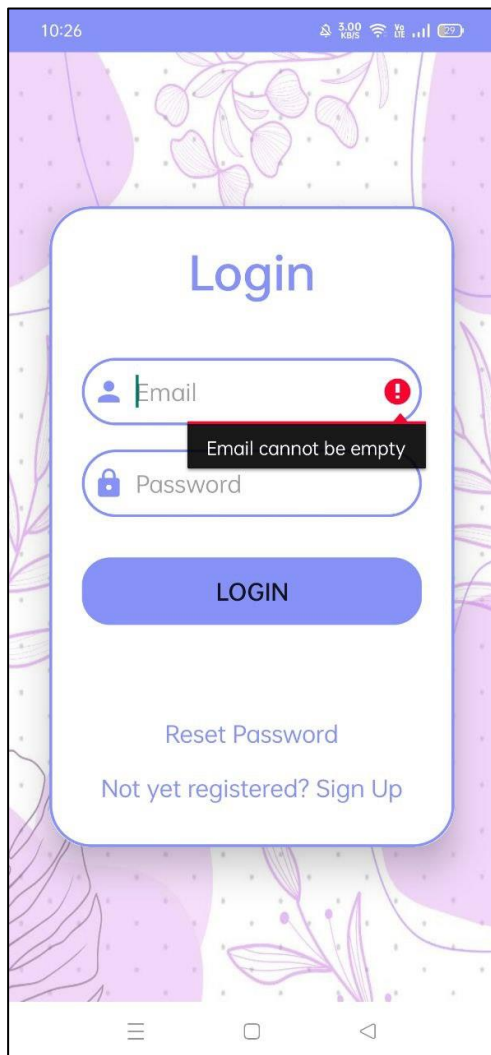
This error message appears when the user does not enter a password.



This error message appears when the user does not enter the correct email.



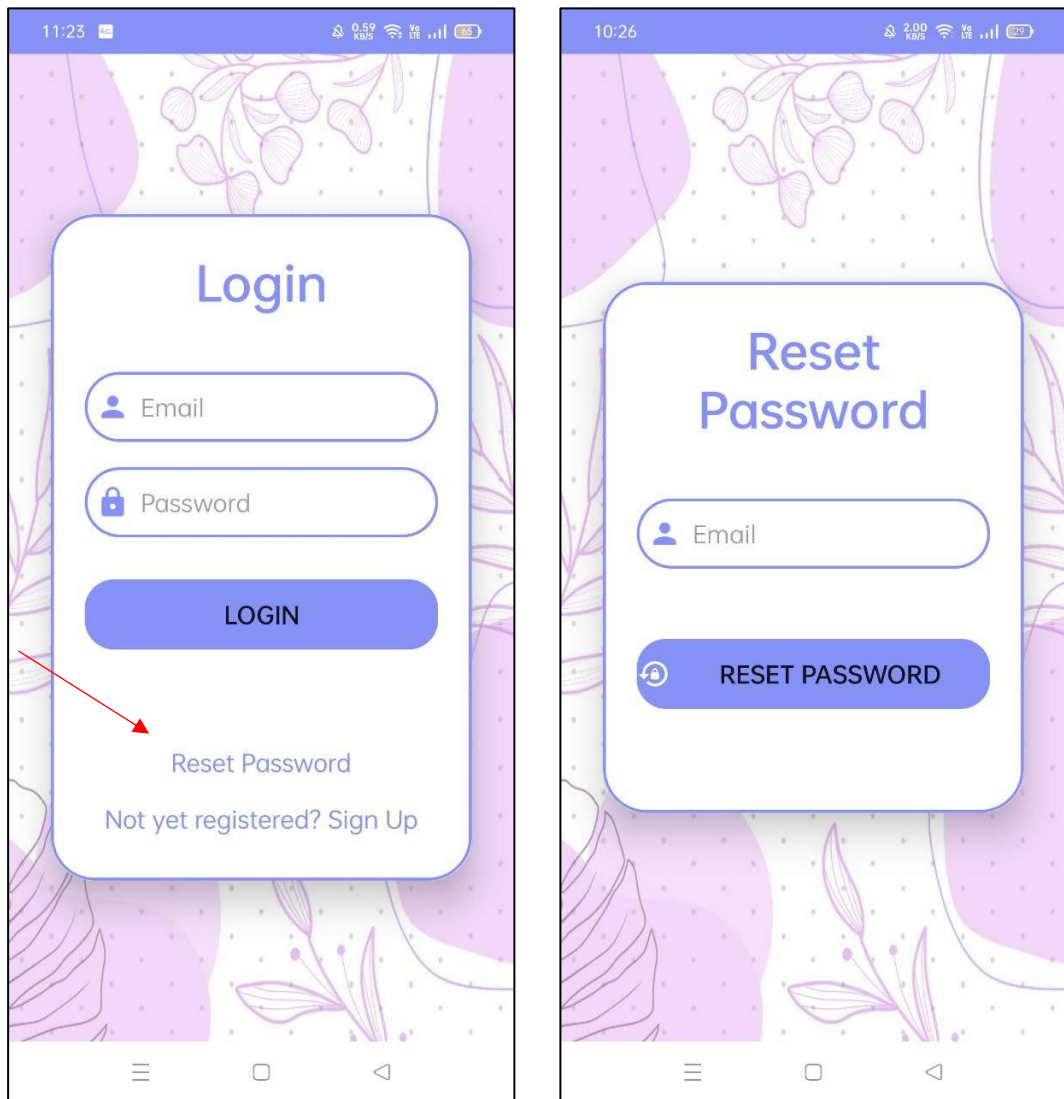
This error message appears when the user does not enter an email.



4.2.2 Reset Password

i. Reset Password Interface

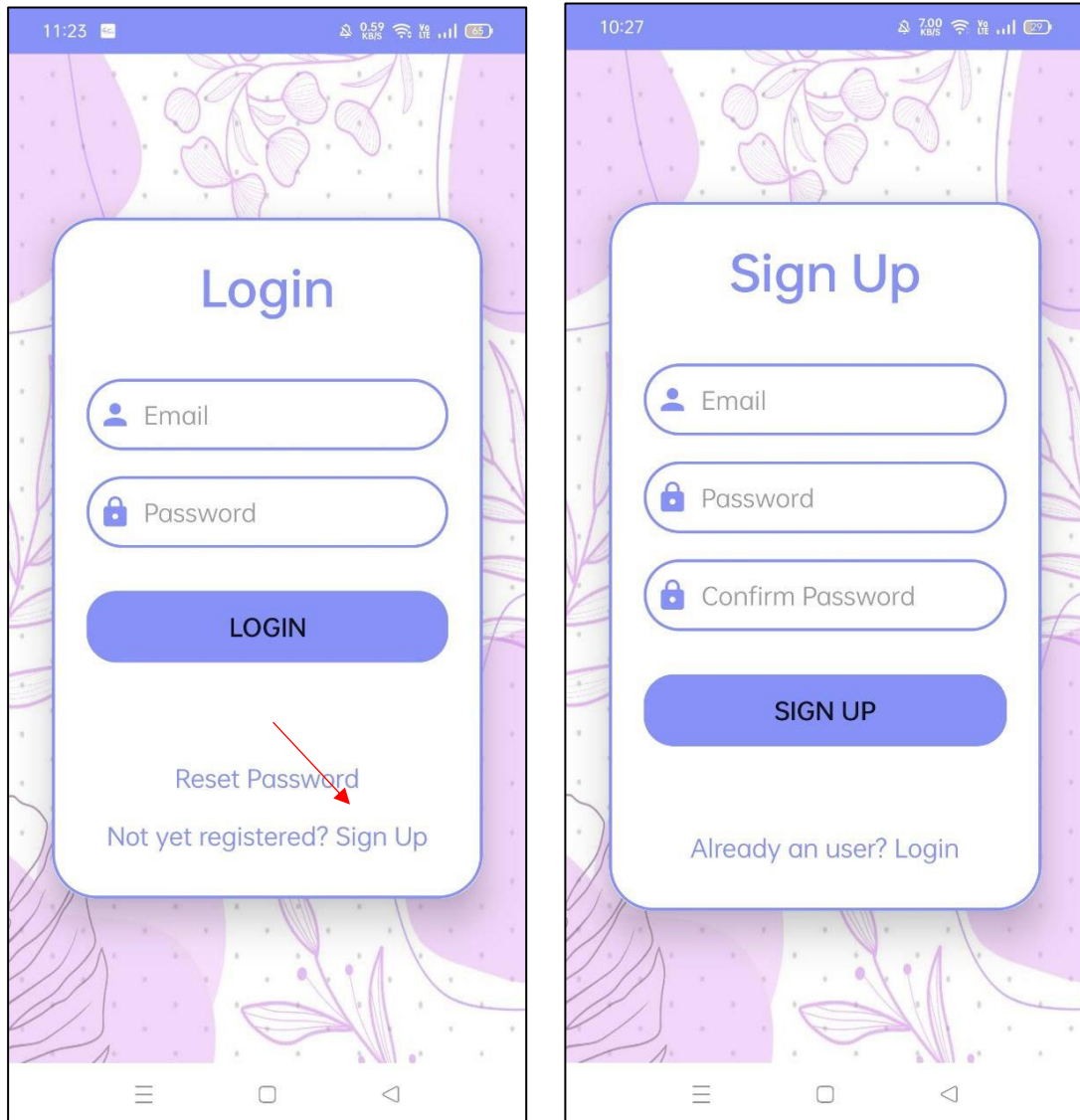
The password reset interface will appear when the user clicks on the sentence "Reset Password".



4.2.3 Sign Up

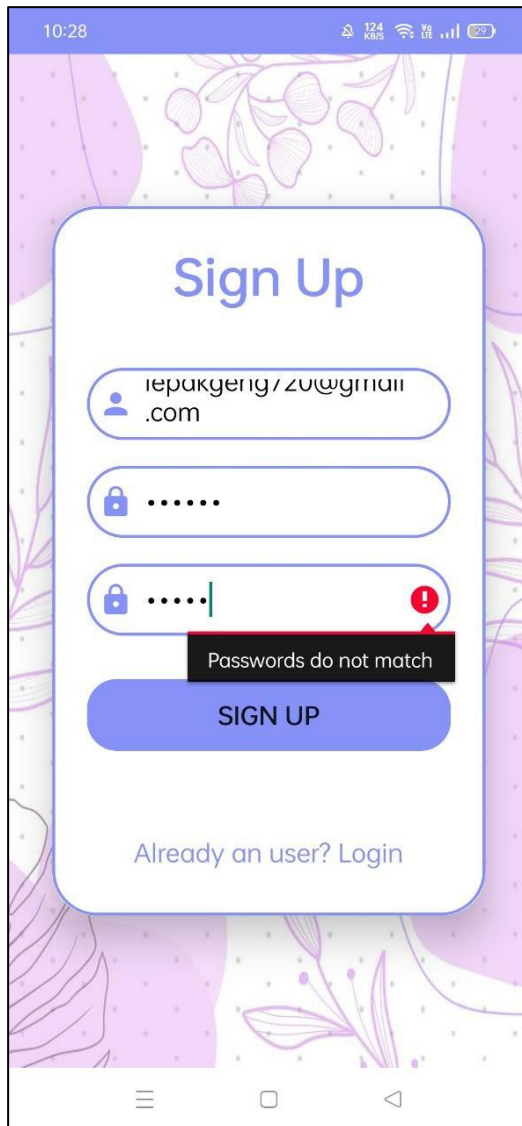
i. Sign Up Interface

The sign-up interface will appear when the user clicks on the sentence "Sign Up".



ii. Sign Up Error Message

This error message will appear when the user does not enter a confirmation password that is the same as the password.



4.2.4 Main Page

i. Main Page Interface

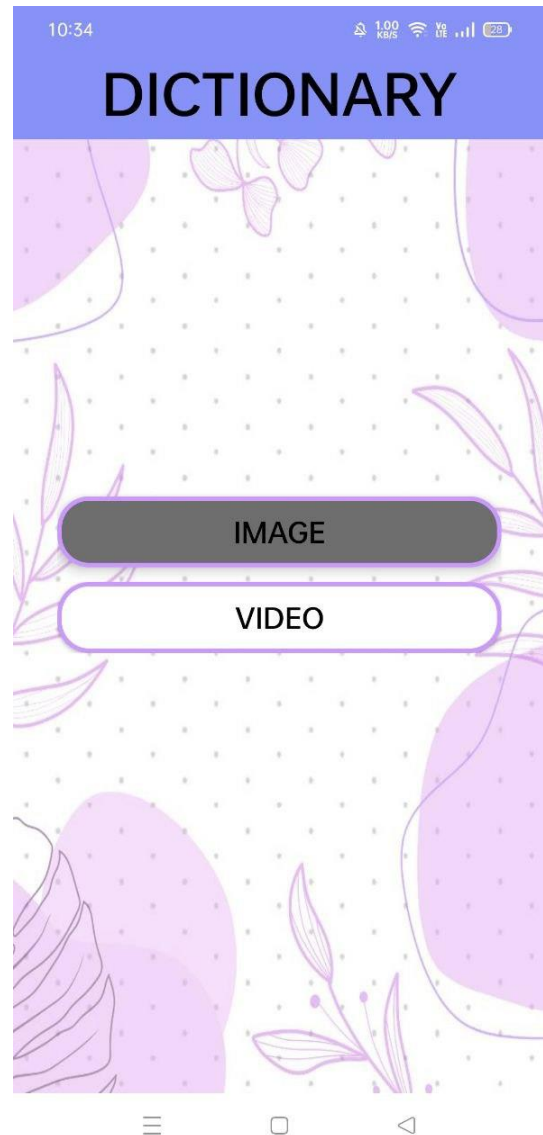
The main page interface will appear when the user successfully logs in.



4.2.5 Dictionary Page

i. Dictionary Page Interface

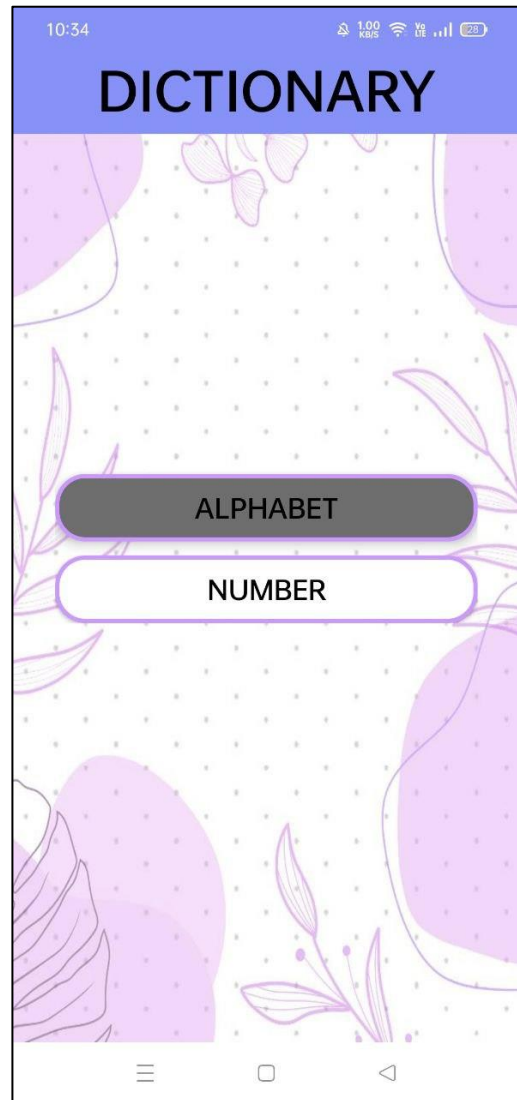
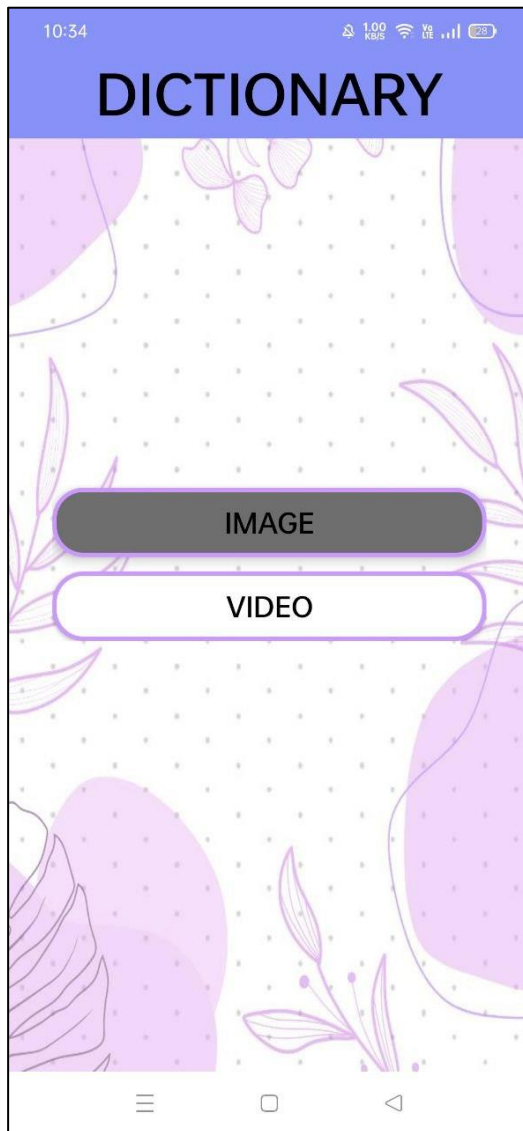
The dictionary page interface will appear when the user presses the dictionary button on the main page interface.



4.2.6 Dictionary Image

i. Dictionary Image Interface

when the user presses the image button it will go to the next page that contains alphabet and number button for image.



ii. Dictionary Image Alphabet Interface

The Alphabet Image interface will appear when the user presses the alphabet button.

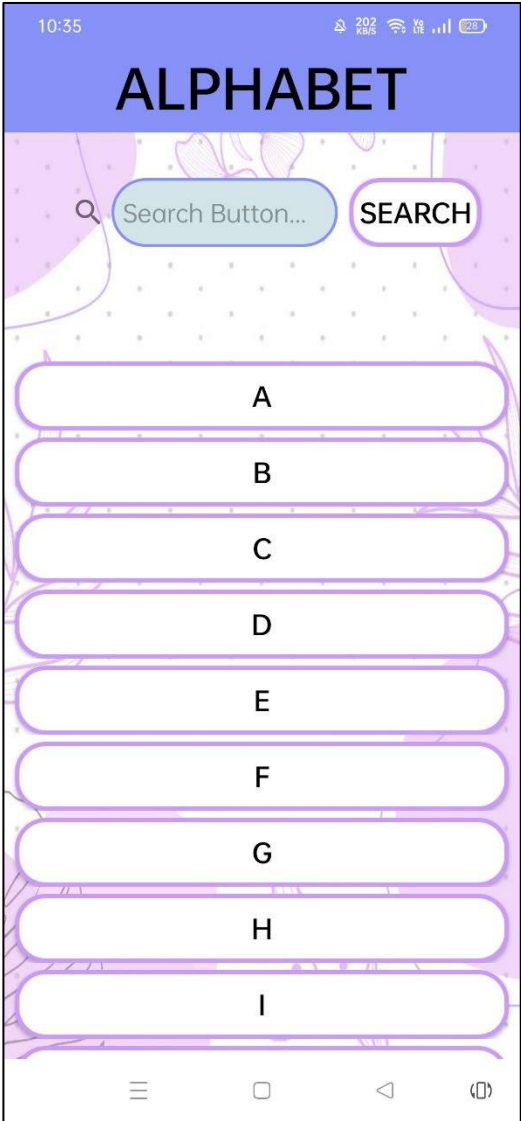
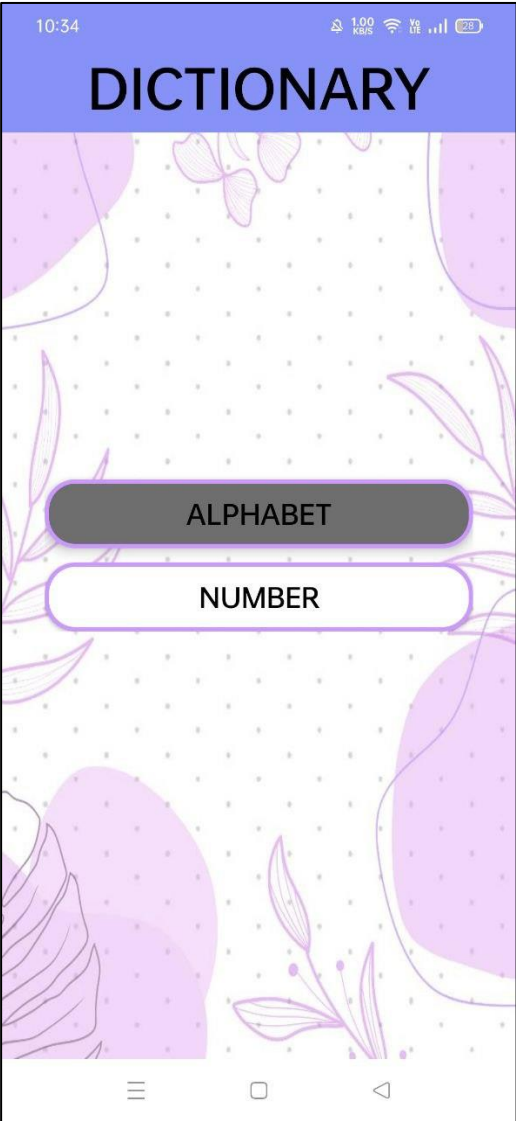
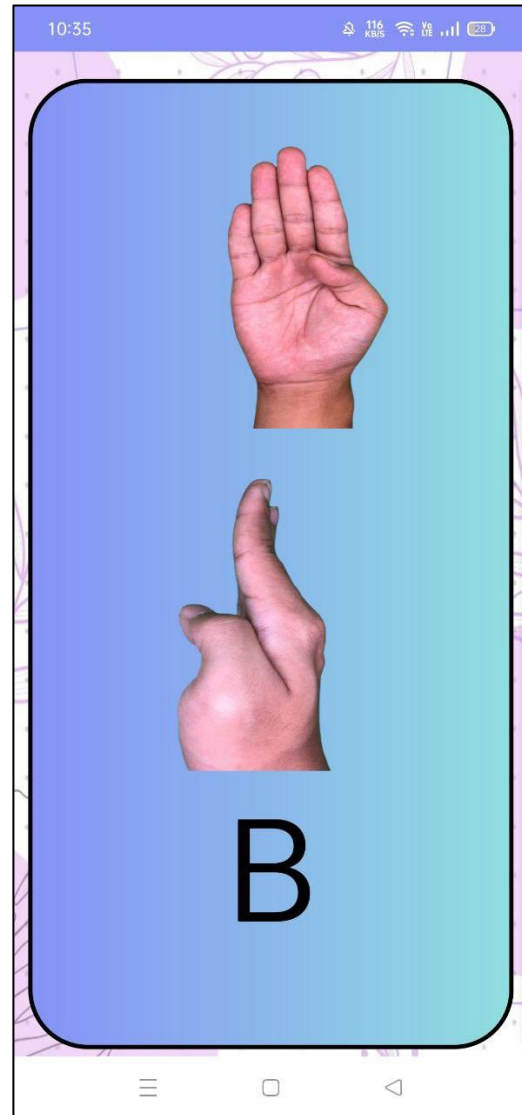
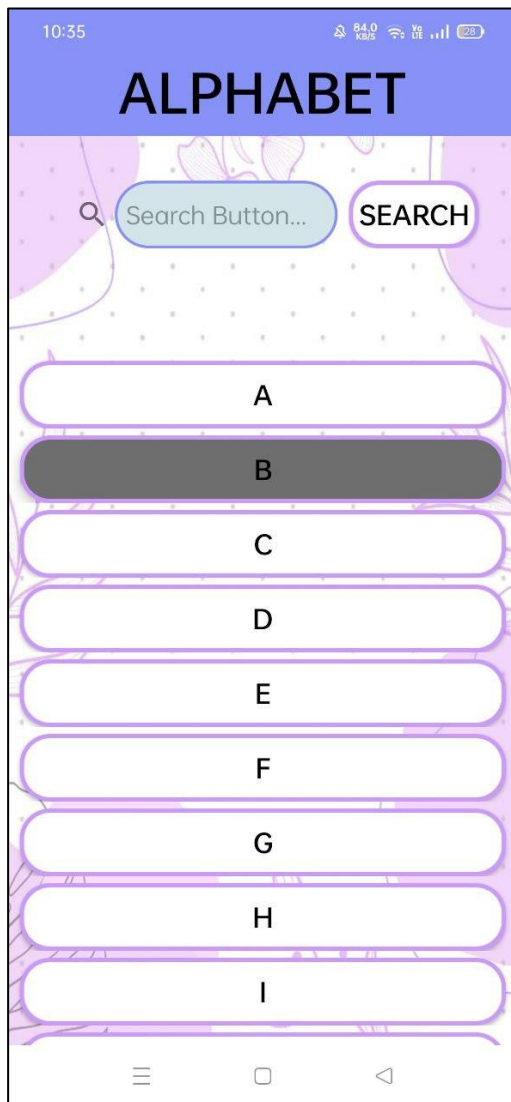
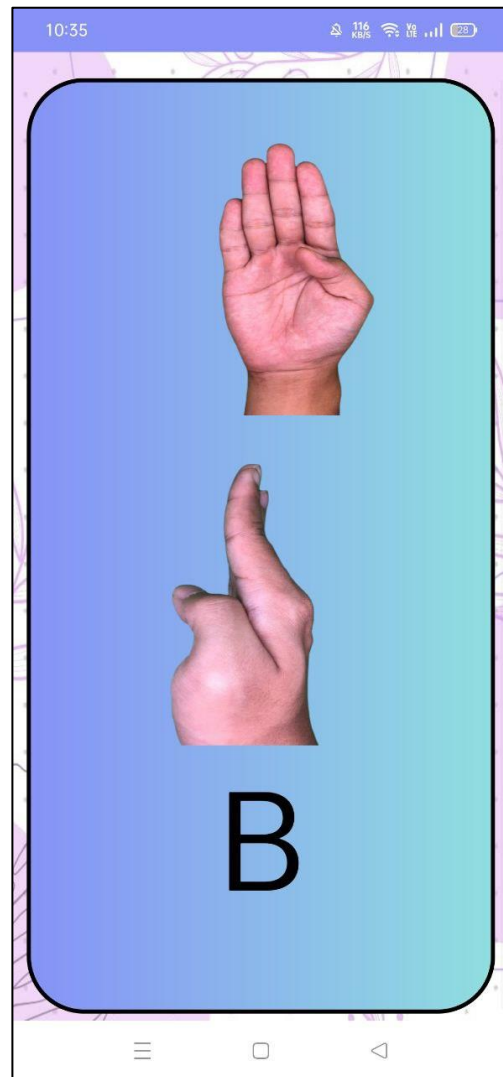
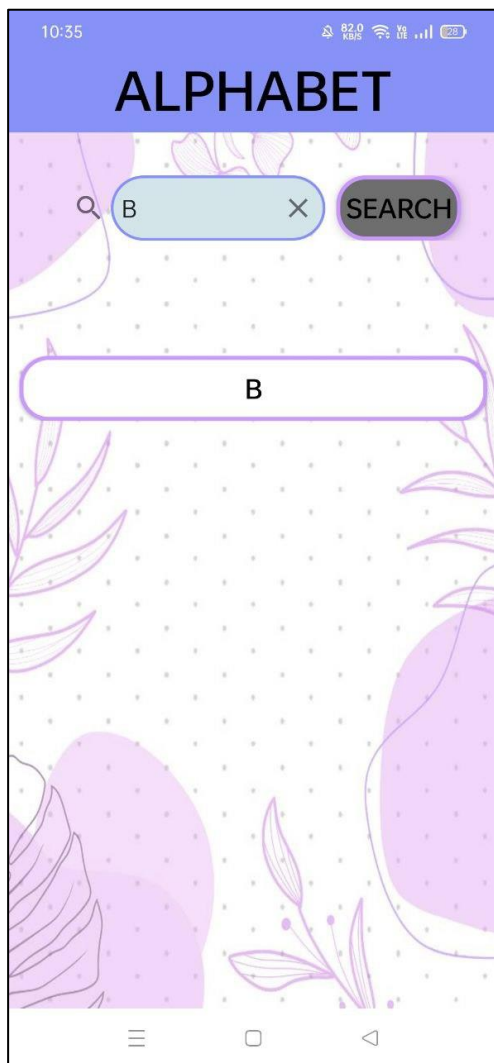


image B will appear when the user presses button B.



when we write B in the search bar and press the search button, it will take us to page B.

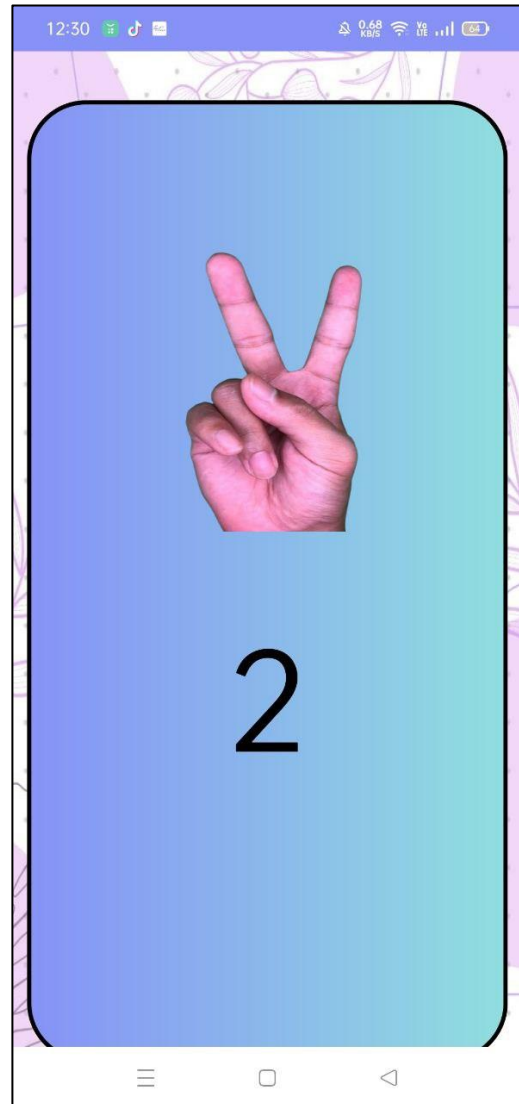
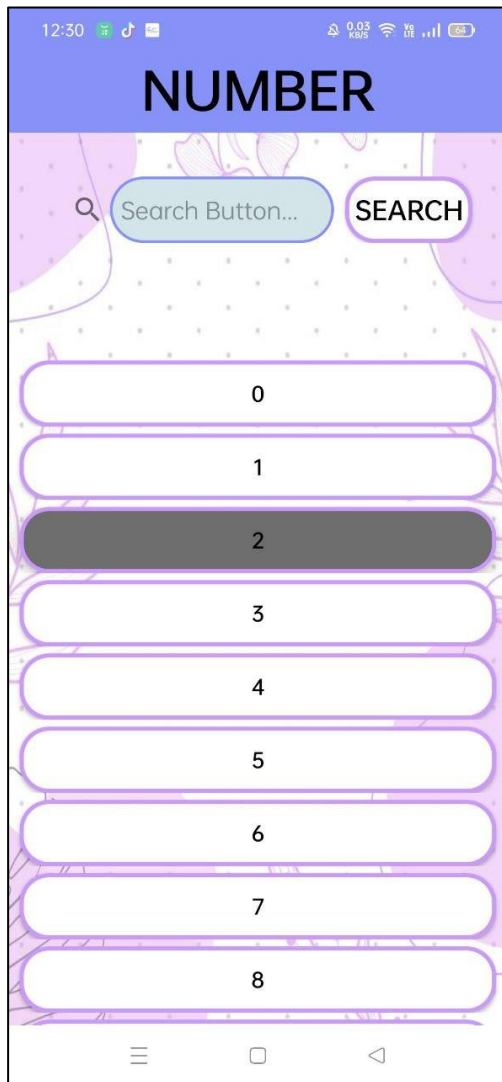


iii. Dictionary Image Number Interface

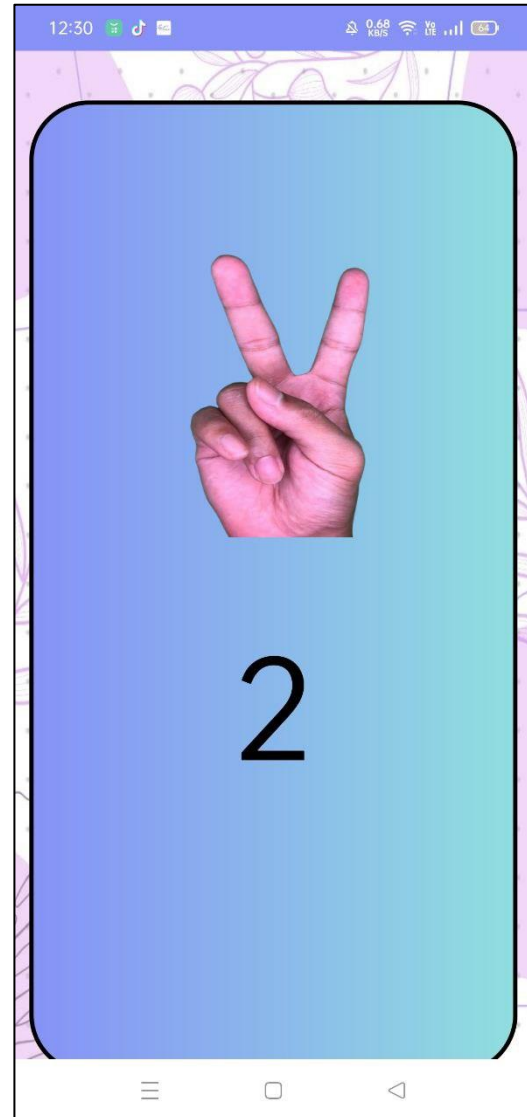
The Number Image interface will appear when the user presses the number button.



image 2 will appear when the user presses button 2.



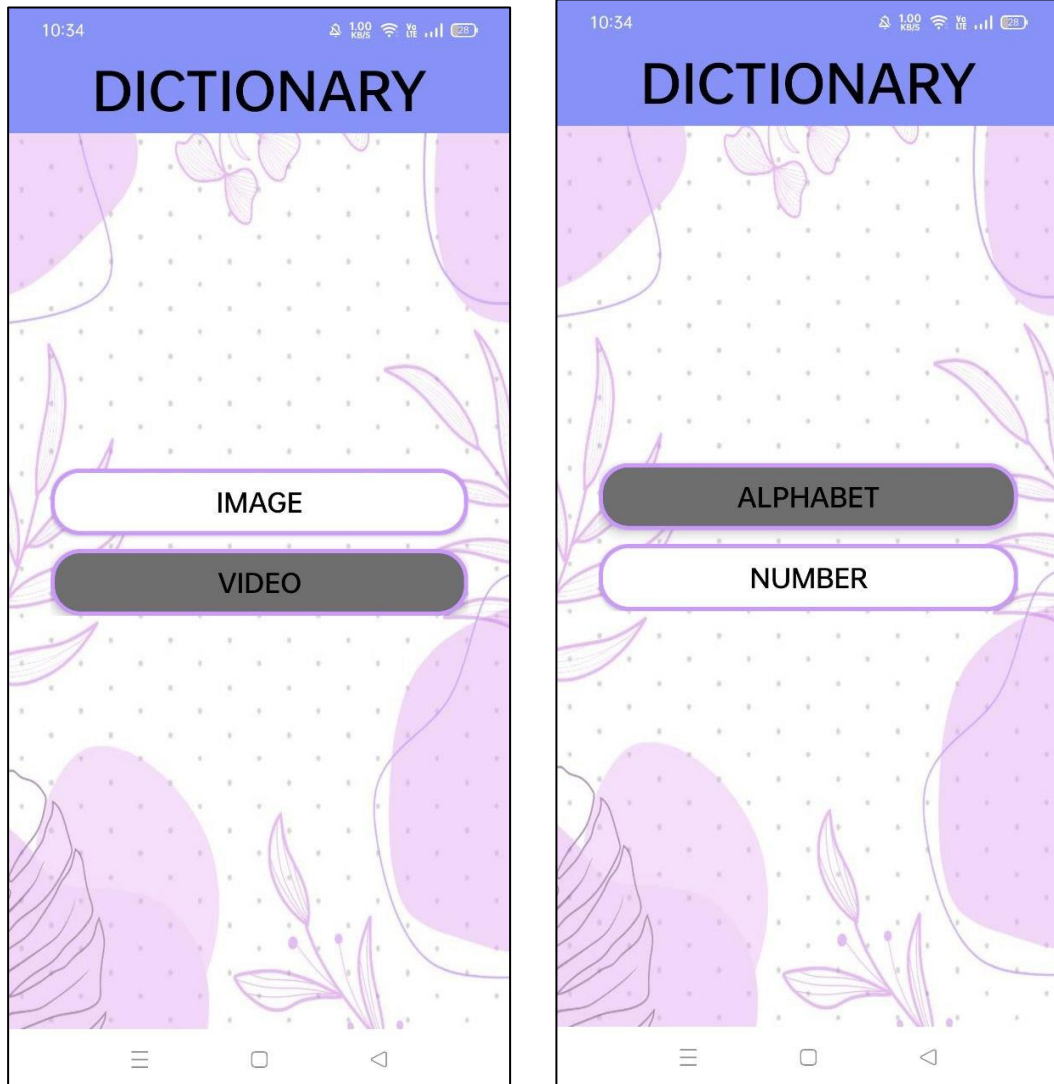
when we write 2 in the search bar and press the search button, it will take us to page 2.



4.2.7 Dictionary Video

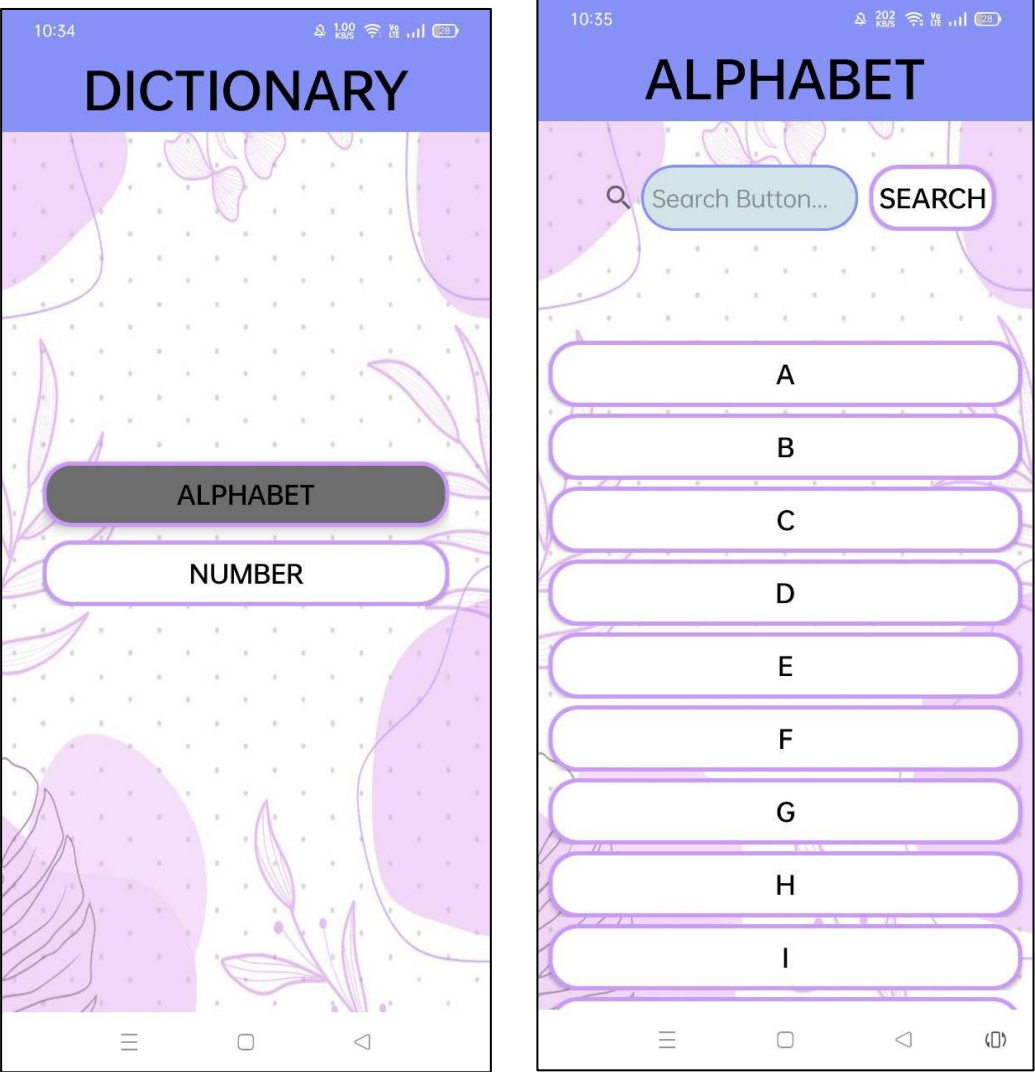
i. Dictionary Video Interface

when the user presses the video button it will go to the next page that contains alphabet, number and phrase button for video.

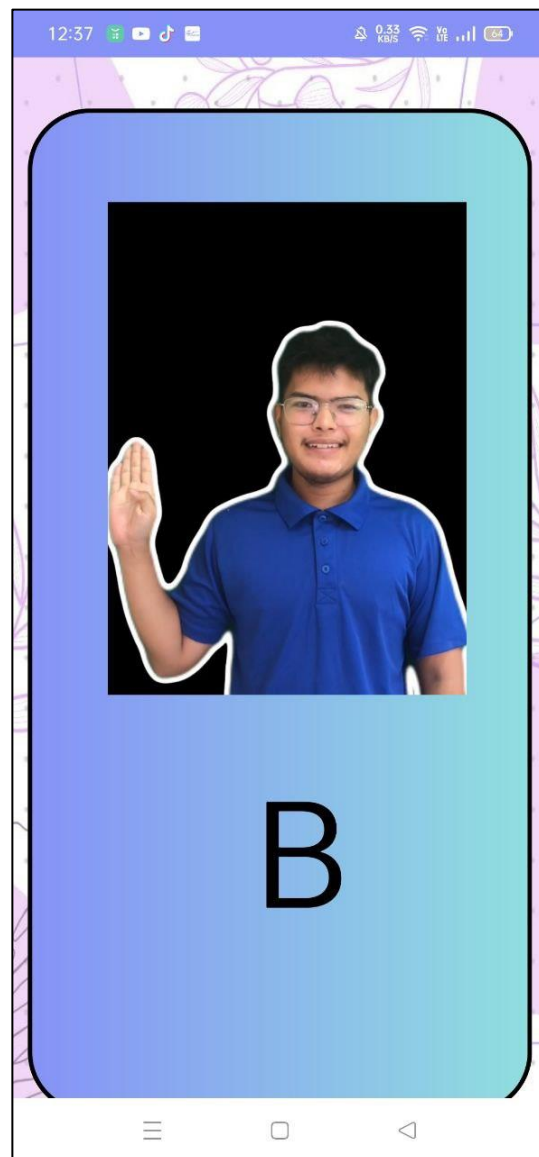
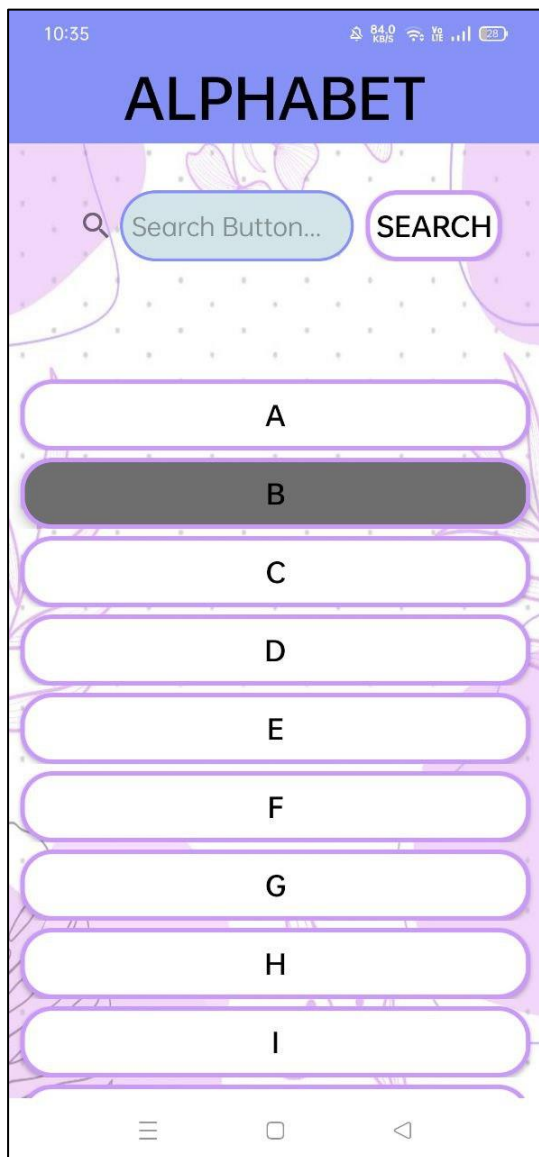


ii. Dictionary Video Alphabet Interface

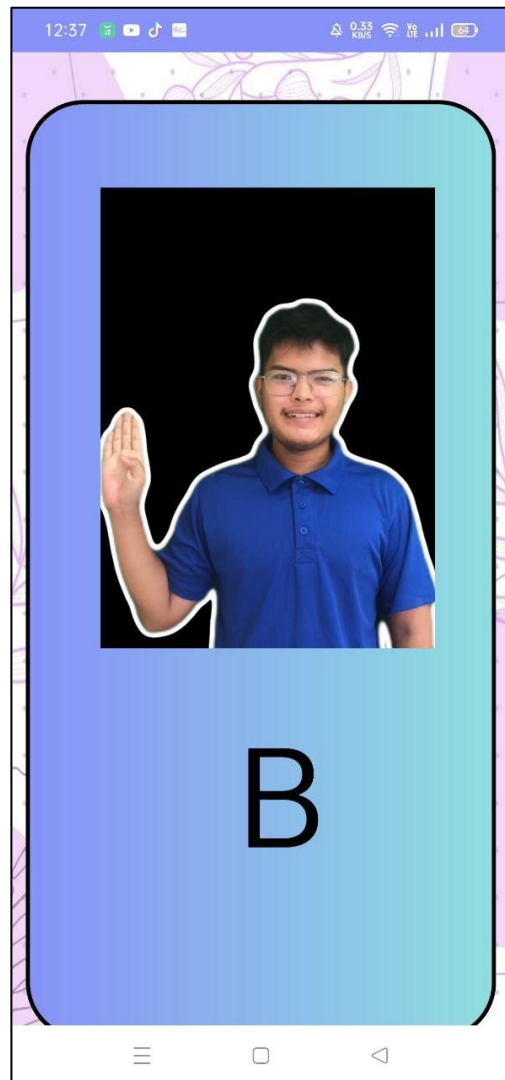
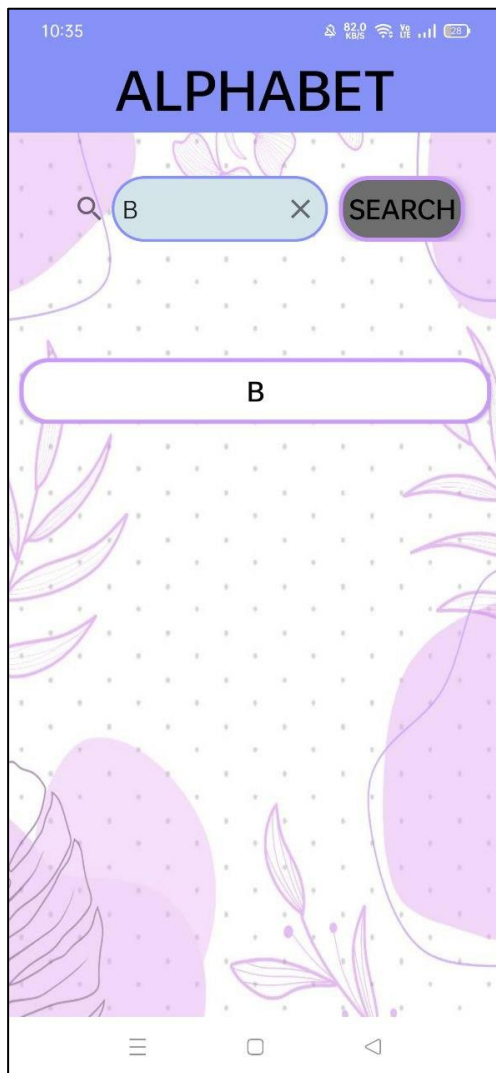
The Alphabet Video interface will appear when the user presses the alphabet button.



video B will appear when the user presses button B.

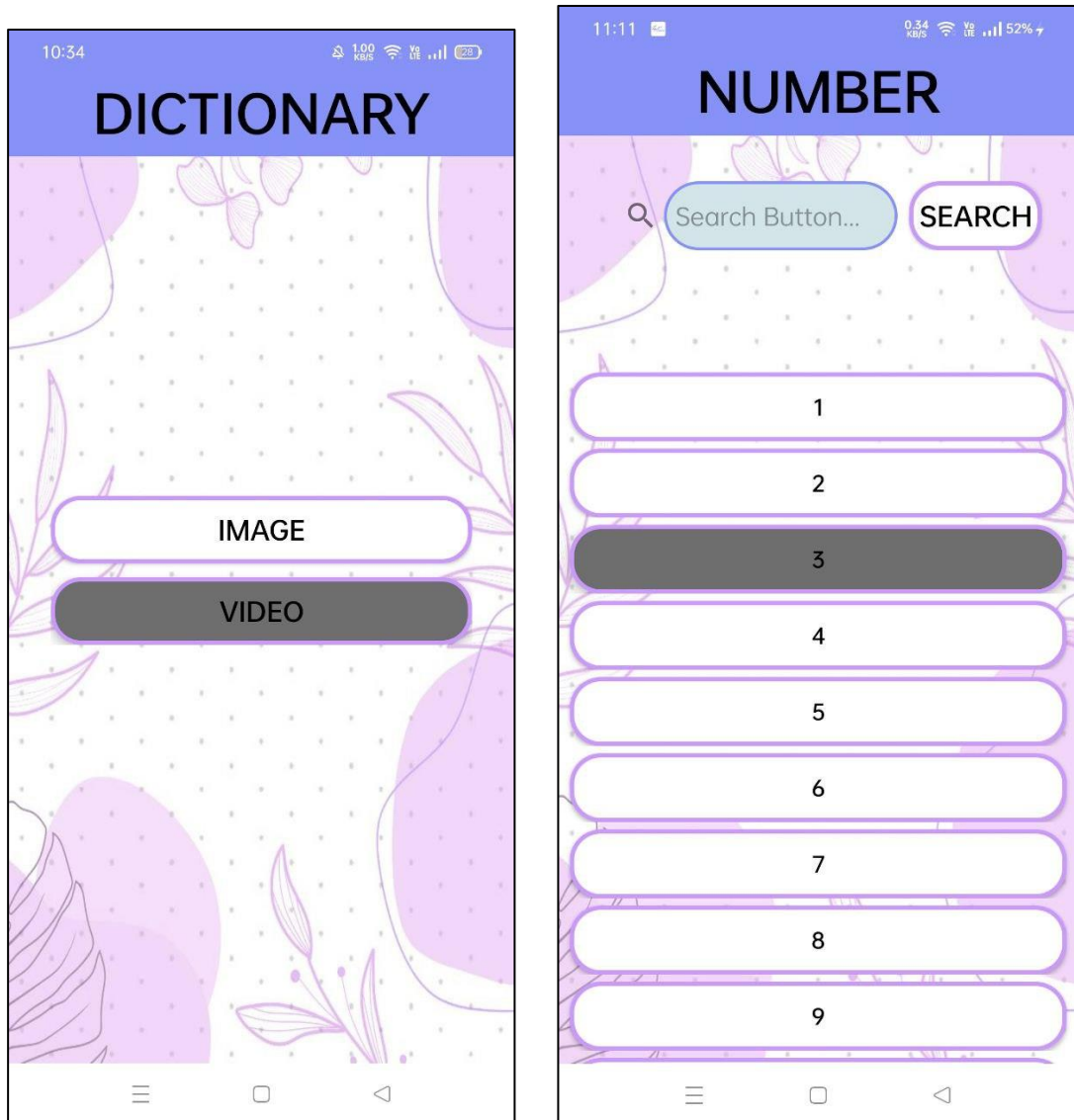


when we write B in the search bar and press the search button, it will take us to page B.

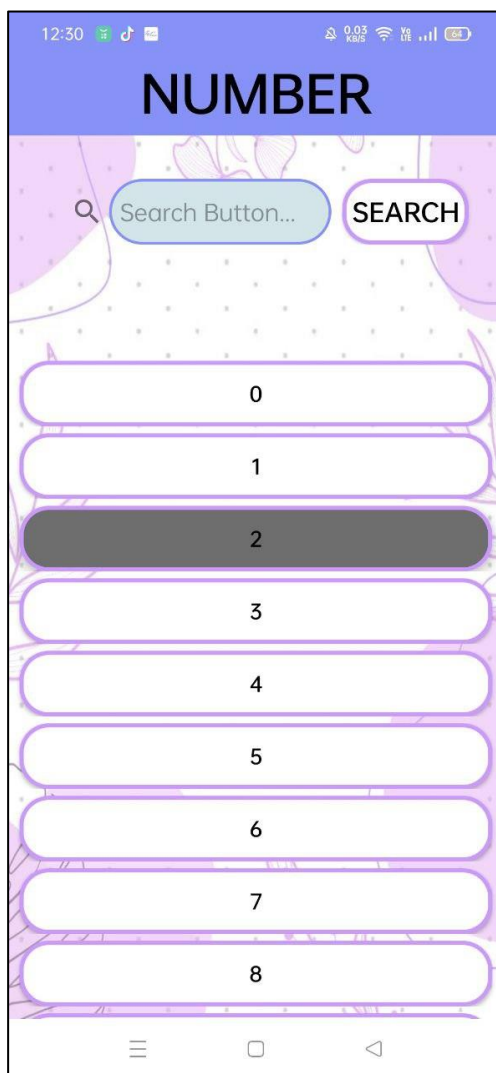


iii. Dictionary Video Number Interface

The Number Video interface will appear when the user presses the number button.



video 2 will appear when the user presses button 2.

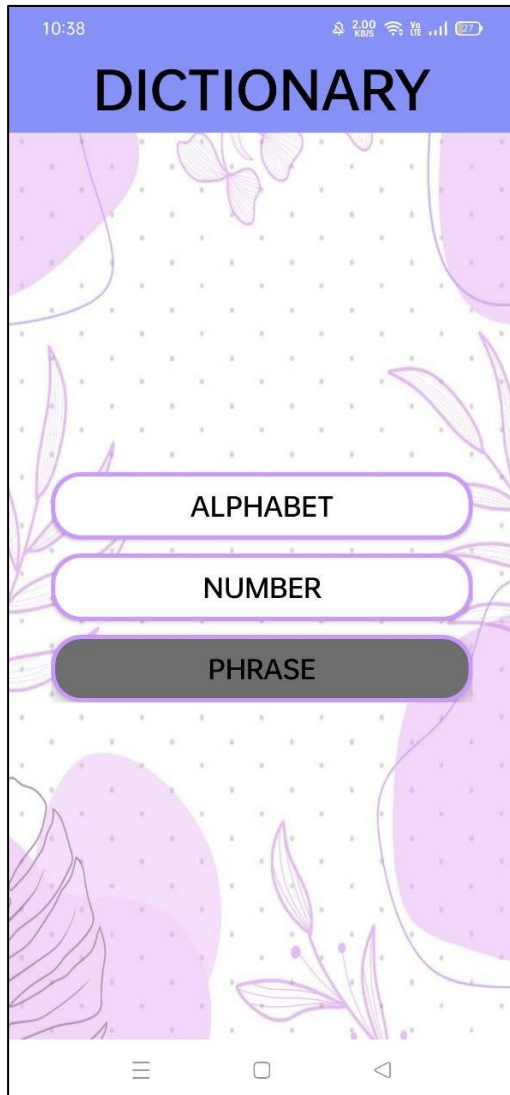


when we write 2 in the search bar and press the search button, it will take us to page 2.

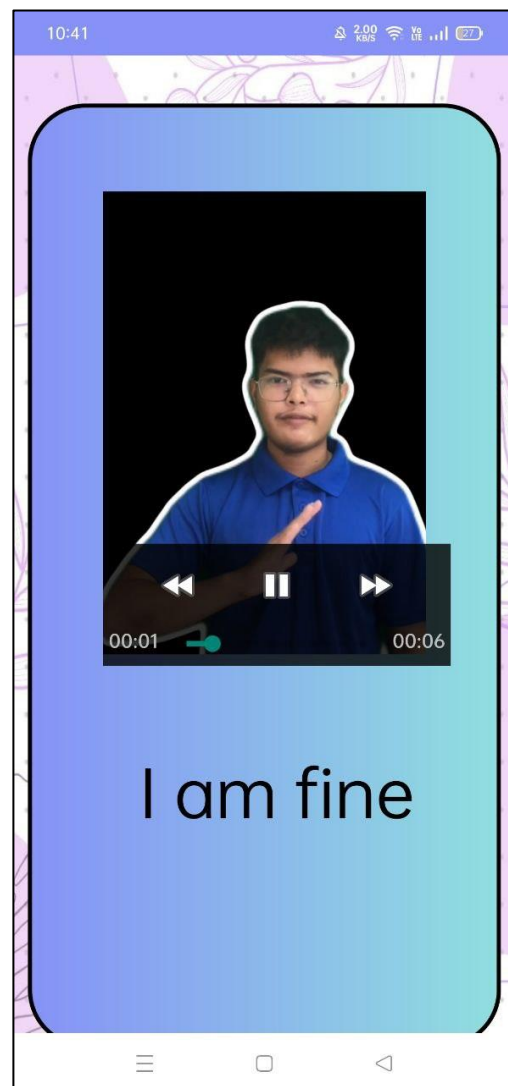


iv. Dictionary Video Phrase Interface

The Phrase Video interface will appear when the user presses the Phrase button.



video “I am fine” will appear when the user presses button “I am fine”.



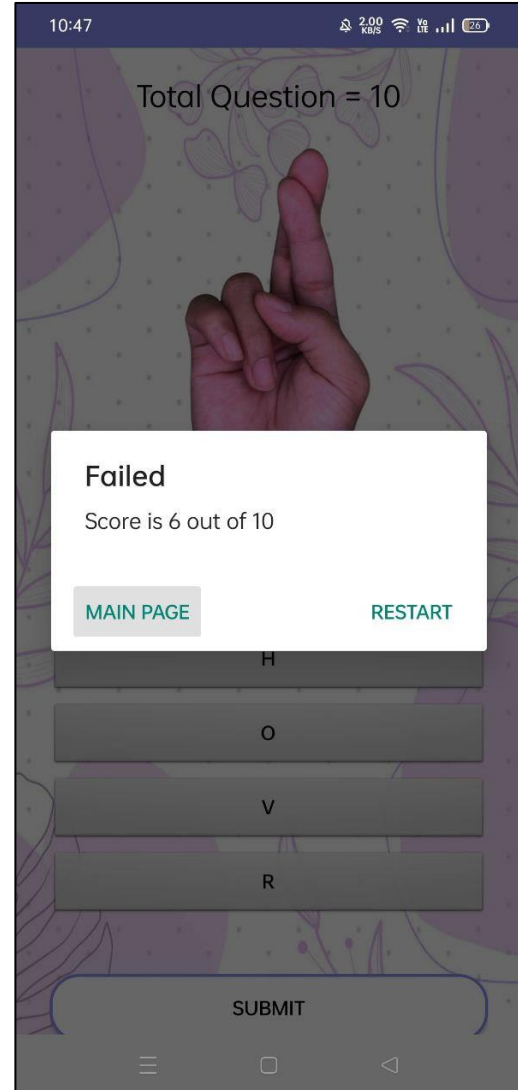
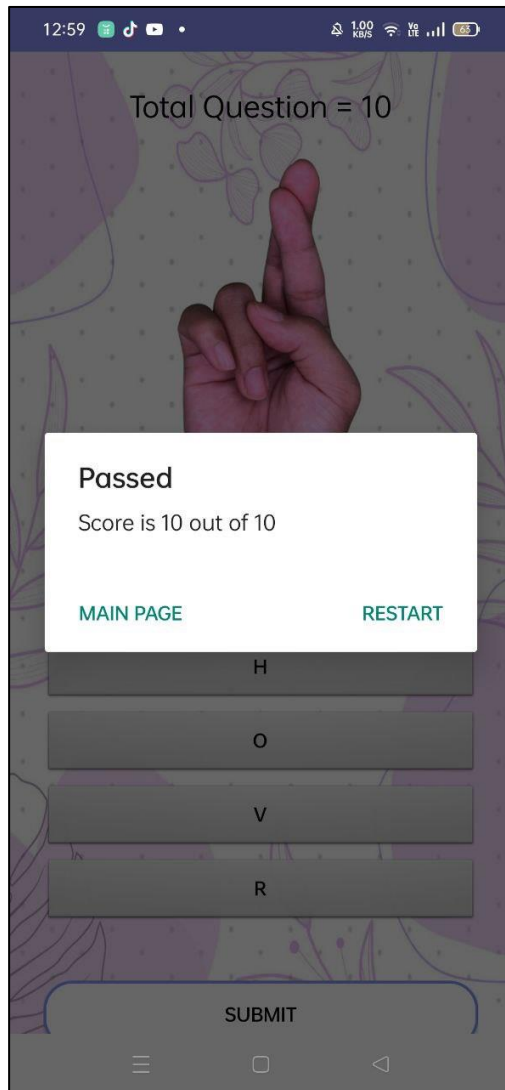
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4.2.8 Quiz Page

when the user presses the quiz button, it will go to the quiz page.



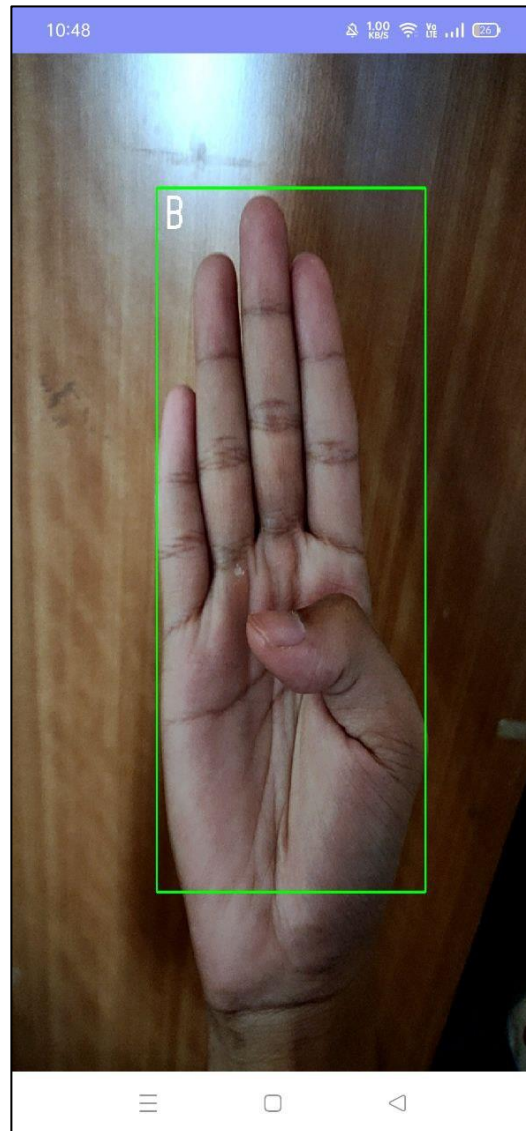
when the user has finished answering the quiz, it will display the message box passed or failed. It will repeat the question when user click restart and it will go back to main page when user click main page.



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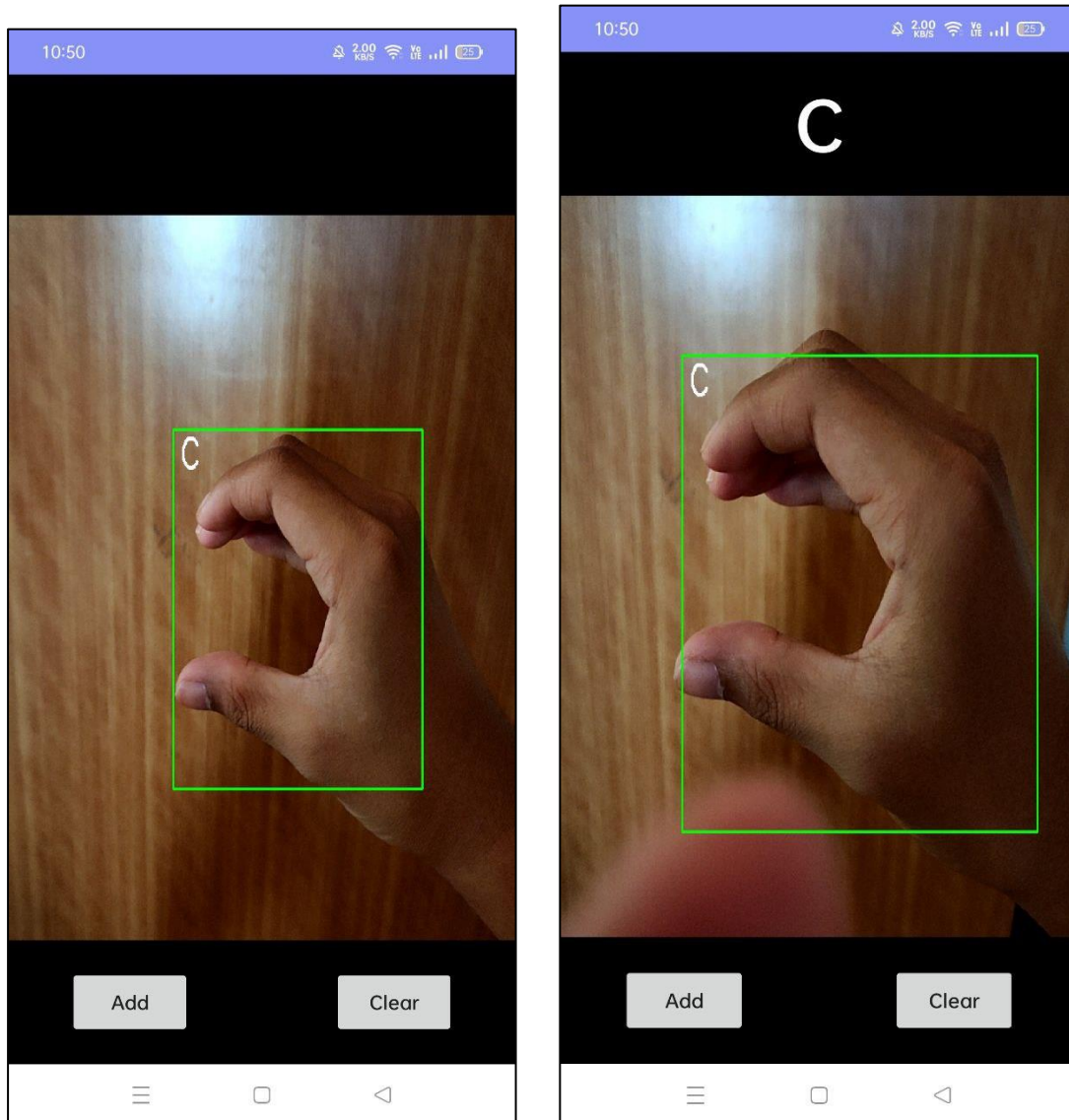
4.2.9 Sign Camera

When user clicks sign camera button, it will open camera that detect sign language based on hand gesture.



4.2.10 Sign Translator

When user click sign translator button, it will open camera that detect sign language base on hand gesture and when user click add, it will write an alphabet but if user click clear, it will clear the writing.



4.2.11 About Us

the About Us page will appear when the user presses the about us button.



4.2.12 Exit

This application will close when the user presses the exit button.



4.3 Experimental Concept

We have listed down three objectives for our project, i-Handy,

- 1) To create an android-based app (i-Handly) that shall display variety features such as quizzes, games and also dictionary that contains sign language in alphabet, number and phrases.
- 2) To create an android-based app (i-Handly) that shall display demonstration videos of sign language phrases for user to learn and understand.
- 3) To create an android-based app (i-Handly) that shall display option between video or picture for learners to choose to learn sign language.

Based on our objectives above, we have done planning and using suitable tools to achieve the objectives.

It is planned to add quizzes in the app in order to test users' knowledge after they have learn the sign language. For our quizzes, we have questions with multiple choice. We also provide sign language of alphabets and numbers; in addition, we also add phrase that are used daily in a form of sign language. We have decided to record videos to show users the hand gesture more accurate so they can understand better, but we also provide options for users to choose either they want to learn sign language using images or videos. Based on our literature reviews, we have collected data which shows that quizzes are not normally implied and it only provided sets of sign language for alphabets and numbers which exclude phrases.

The execution of achieving the objectives is by using Android Studio, where we use java code for functionality and xml code for its design.

We have collected our information about sign language by referring to the latest 2023 American Sign Language (ASL), and asking an Interpreter from our client side to validate our information.

5.0 Test Description and Results

5.1 Unit Testing Plan

Unit testing is a method of testing individual units or components of a software application

Testing page by page (each module) by the users, which in this case by us, the developers.

UNIT TESTING PLAN (UTP)						
No.	Test Case Name	Test Procedure	Pre-condition	Expected Result	Tester	Result (Pass/Failure)
1	Register_Empty	Click on sign up button	None	An alert icon will be shown beside the Email and Password field	Angelo	Pass
2	Register_Wrong	User are required to fill the Email and Password field	User enter wrong format of email	An alert message "Sign Up failed, the email is badly formatted"	Angelo	Pass
3	Reset_Password	Click on the reset password button	User need to fill their Email	User will receive a link in their email	Angelo	Pass
4	Login_Empty	Click the login button	None	An alert message "Email cannot be empty" will be shown	Angelo	Pass
5	Login_Wrong	User are required to fill the	User did not enter a valid	An alert message "Please enter	Angelo	Pass

		Email and Password field	email address	valid email” will be shown		
6	Login_Correct	User are required to fill the Email and Password field	User enter email and password correctly	A pop-up message “Login Successfully” will be shown	Angelo	Pass
7	Alphabet_Search	Click the search bar	User enter an alphabet in the search bar	A button with an assigned alphabet will be shown	Angelo	Pass
8	Number_Search	Click the search bar	User enter a number in the search bar	A button with an assigned number will be shown	Afif	Pass
9	Camera_Sign	User are required to do a sign language hand gesture	User need to exposed the camera to captured movement	An indicator will be shown according to the sign language hand gesture	Afif	Pass
10	Quiz_Score	User answering question about sign language	User need to answer all 10 questions	A message will show the result and option to either restart or go to the main page	Fikry	Pass

11	Sign_Text_Add	Click the add button	User are required to do sign language in front of the camera	For each pressed of the add button will be added as one text	Afif	Pass
12	Sign_Text_Clear	Click the clear button	User are required to add letter of sign language until it forms a text	The text result of the added sign language will be cleared	Afif	Pass

5.2 Integration Testing Plan

Integration testing is a method of testing how each unit or components of the software interact with each other. It is used to verify the software to work together as intended. We are going to test to see of each page related with each other.

INTEGRATION TESTING PLAN (ITP)						
No.	Test Case Name	Test Procedure	Pre-condition	Expected Result	Tester	Result (Pass/Failure)
1.	Register	Click on the sign-up button	User are required to enter a valid email and password	User will be directed to Login Page	Angelo	Pass
2.	Login	Click the login button	User are required to enter correct email and password	User will be directed to Main Page	Angelo	Pass
3.	Dictionary	Click the dictionary button	None	User will be directed to a page that contains Image and Video button	Angelo	Pass
4.	Image	Click the image button	None	User will be directed to a page that contains Alphabet and Number button	Fikry	Pass

5.	Video	Click the video button	None	User will be directed to a page that contains Alphabet, Number and Phrase button	Fikry	Pass
6.	Alphabet	Click the alphabet button	None	User will be directed to a page that contains list of alphabet buttons and search bar	Fikry	Pass
7.	Number	Click the number button	None	User will be directed to a page that contains list of number buttons and search bar	Fikry	Pass
8.	Phrase	Click the phrase button	None	User will be directed to a page that contains list of phrase buttons	Fikry	Pass
9.	Alphabet_Search	Click the search button	User are required to enter an alphabet in the search bar	User will be directed to a desired alphabet page entered by the user	Fikry	Pass
10.	Number_Search	Click the search button	User are required to enter a	User will be directed to a desired number	Fikry	Pass

			number in the search bar	page entered by the user		
11.	Sign_Camera	Click the sign camera button	None	User will be directed to camera page that can detect hand sign language	Fikry	Pass
12	Sign_Translator	Click the sign translator button, and click the add button	None	User will be directed to camera page that can detect hand sign language and contains button add and clear	Fikry	Pass
13	About_Us	Click the about us button	None	User will be directed to a page contains background of the project	Afif	Pass
14	Quiz	Click the quiz button	None	User will be directed to continuous page contains question of sign language	Fikry	Pass
15	Exit	Click the exit button	None	User will exit the application	Afif	Pass

6.0 Major Findings and Discussion

6.1 The Advantages of the Project

1. Hand gesture detection to detect hand sign language
2. Images and videos of sign language for user to choose
3. Quizzes to test user's knowledge
4. Search bar to ease user to find the required sign language

6.2 The Disadvantages of the Project

1. Hand gesture detection unable to captured phrases
2. Camera detection cannot capture alphabet that required movement such as “J” and “Z”
3. Search bar unable to search phrases
4. Not supported on older version of android

7.0 Recommendation and Conclusion

In conclusion, our project is building an application for deaf and mute people in learning sign language. We have a high expectation of the successfulness of this app because this app can be use in the early stage because we have designed the GUI of the app in the most very simple way without adding so much design, colour, shape and animations.

The use of the app in the early stages simply means that started from a young age which is 6 years old, they can use this app to learn sign language because by learning in from the young age, it will be easier to remember the sign language because children learning capability and their curiosity is at its learning stage or in other word their brain is like a white canvas when they are still young.

For this app to became true, we have planned it thoroughly and have prepared the schedule so our progress can be executed on time and our app can be delivered on time.

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