“SpeechDekho – An App that converts Speech into Indian Sign Language”

A PROJECT REPORT

Submitted by

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In partial fulfilment for the award of the degree of

DIPLOMA ENGINEERING

in

Computer Engineering

Faculty of Diploma Studies

Marwadi University, Rajkot

Marwadi University, Rajkot

Faculty of Diploma Studies

Computer Engineering Department

2019-20

CERTIFICATE

This is to certify that the project entitled **SpeechDekho – An App that converts Speech into Indian Sign Language** has been carried out by **BHARGAV HITENDRAKUMAR MODHA (91800938039)** under my guidance in partial fulfilment of the degree of Diploma Engineering in Computer Engineering (5th Semester) of Marwadi University, Rajkot during the academic year 2019-20.

Date: 15th October 2020

Internal Guide	**Head of the Department**
Prof. Kumar Parmar	Prof. Mittal Joiser
Assistant Professor	Computer Engineering

Marwadi University, Rajkot

Faculty of Diploma Studies

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This is to certify that the project entitled **SpeechDekho – An App that converts Speech into Indian Sign Language** has been carried out by **SIDDHANTKUMAR SANJAYBHAI CHAVADIYA (91800938035)** under my guidance in partial fulfilment of the degree of Diploma Engineering in Computer Engineering (5th Semester) of Marwadi University, Rajkot during the academic year 2019-20.

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Acknowledgement

We have taken efforts in this project. However, it would not have been possible without the kind support and help of many individuals and organizations. We would like to extend our sincere thanks to all of them.

We are highly indebted to our project guide **Prof. Kumar Parmar** for their guidance and constant supervision as well as for providing necessary information regarding the project & also for their support in completing the project.

We sincerely acknowledge that without their support this project would not have been feasible. **Prof. Mittal Joiser** (Head of Department), Diploma Computer Engineering, has been a source of moral support throughout all times and we articulate our special thanks to him.

We would like to express our gratitude towards our **Parents** & all the helpful & friendly **Faculty members** of our college (**Marwadi University**) for their kind co-operation and encouragement which helped us in completion of this project.

We would like to express our special gratitude and thanks to **Industry persons** for giving us such attention and time.

Our thanks and appreciations also go to our **colleagues** in developing the project and people who have willingly helped us out with their abilities.

Bhargav H Modha
Siddhant S Chavadiya
Soham C Joshi

Abstract

The deaf and hearing-impaired make up a sizable community in our country making a sum of 14 million people in which more than 1 million deaf adults and around 0.5 million deaf children use the ISL as a mode of communication.

Sign Language might be regarded as primary means of communication through bodily movements, especially of the hands and arms, rather than through speech, for majority of the Deaf and Hard-of-hearing communities.

Current approaches in this area have focused specifically either on sign language recognition or translation of sign language to text. No freely or reasonably priced software translates speech into sign language in real time.

Hence, its results inability in accessing complete information through common broadcast modes or in common public places which makes it all the more difficult for the differently able citizens of our country.

The goal of project is to explore sign language translation, i.e. translating from spoken language to sign language and vice versa. We believe that SpeechDekho App would facilitate the acquisition of English/Hindi as a second language for deaf people and help to fill the gap between deaf and nondeaf communities.

List of Figure

1.1 Use case diagram

Use case diagrams are a set of use cases, actors, and their relationships. They represent the use case view of a system.

A use case represents a particular functionality of a system. Hence, use case diagram is used to describe the relationships among the functionalities and their internal/external controllers. These controllers are known as actors.

The symbols used in Use Case diagrams are: -

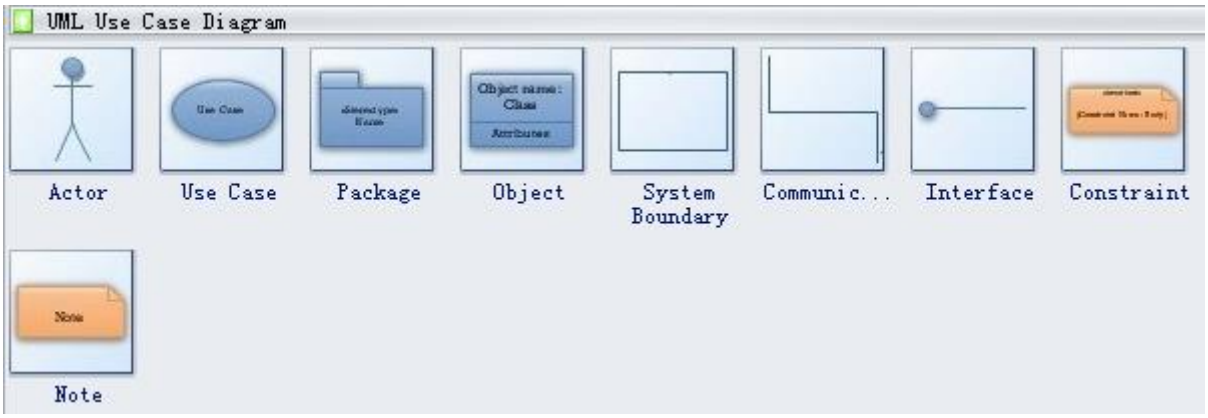


Figure 1.1.1: Use case Symbols

Proposed Use Case Diagram for our system is: -

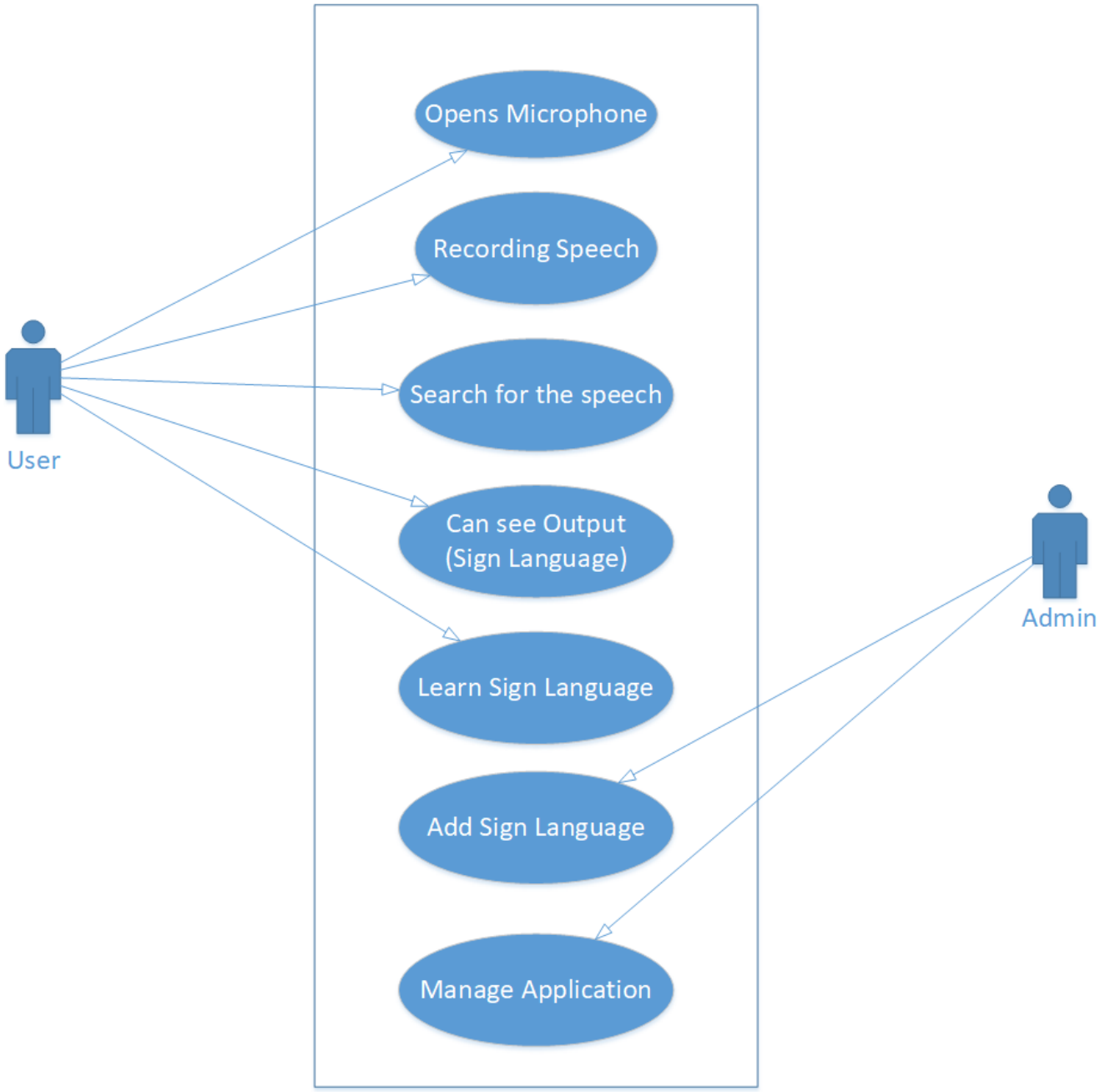


Figure 1.1.2: Use case Diagram

1.2 ER diagram

An Entity–relationship model (ER model) describes the structure of a database with the help of a diagram, which is known as Entity Relationship Diagram (ER Diagram). An ER model is a design or blueprint of a database that can later be implemented as a database. The main components of E-R model are: entity set and relationship set.

The symbols used in Entity–relationship diagrams are: -

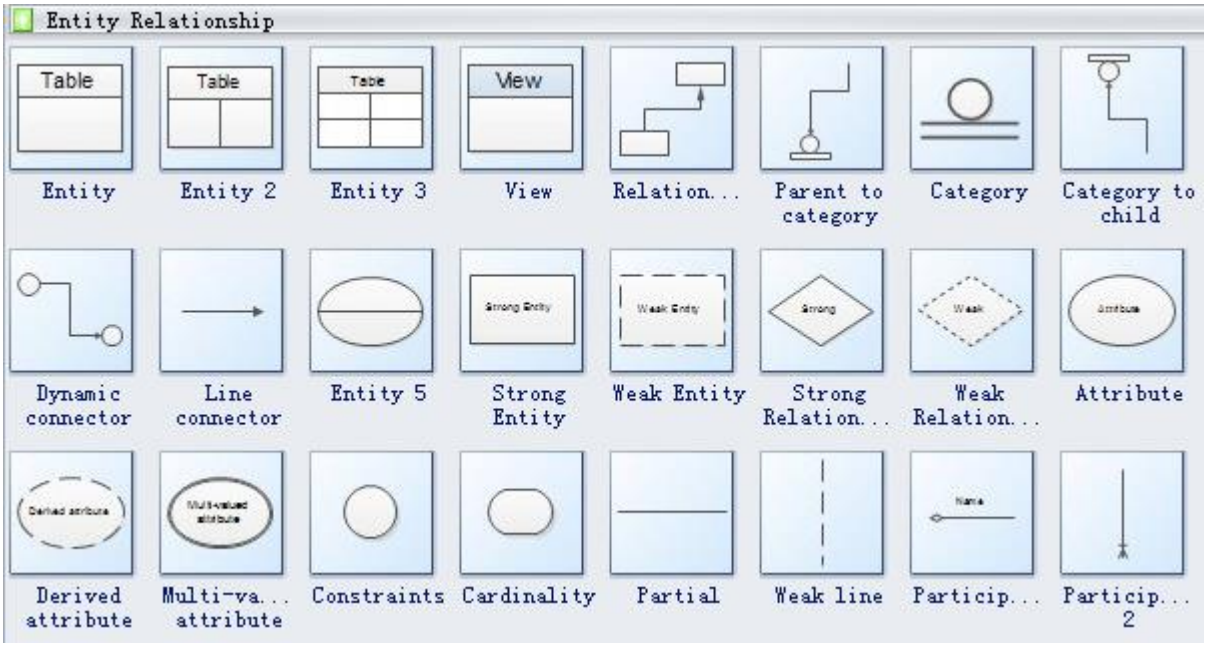


Figure 1.2.1: ER Diagram Symbols

Proposed Entity–relationship Diagram for our system is: -

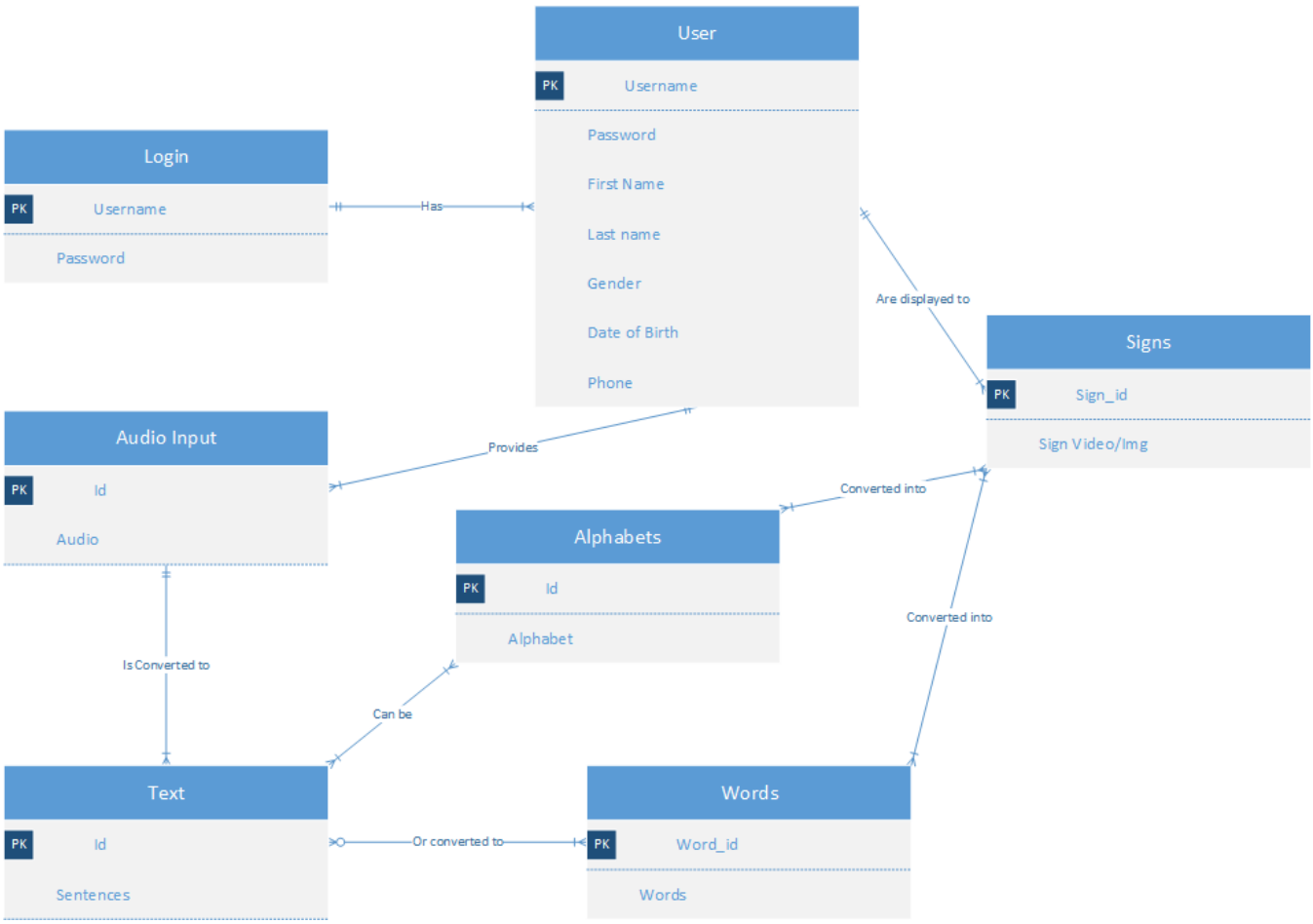


Figure 1.2.2: ER Diagram

1.3 Activity diagram

Activity diagram describes the flow of control in a system. It consists of activities and links. The flow can be sequential, concurrent, or branched.

Activities are nothing but the functions of a system. Numbers of activity diagrams are prepared to capture the entire flow in a system.

Activity diagrams are used to visualize the flow of controls in a system. This is prepared to have an idea of how the system will work when executed.

The symbols used in Activity diagrams are: -

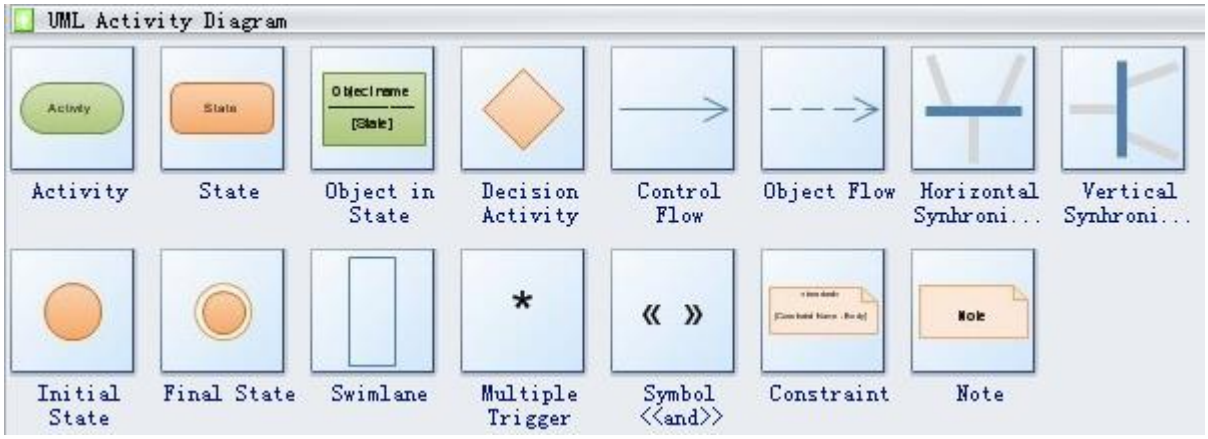


Figure 1.3.1: Activity Diagram Symbols

Proposed Activity Diagram for our system is: -

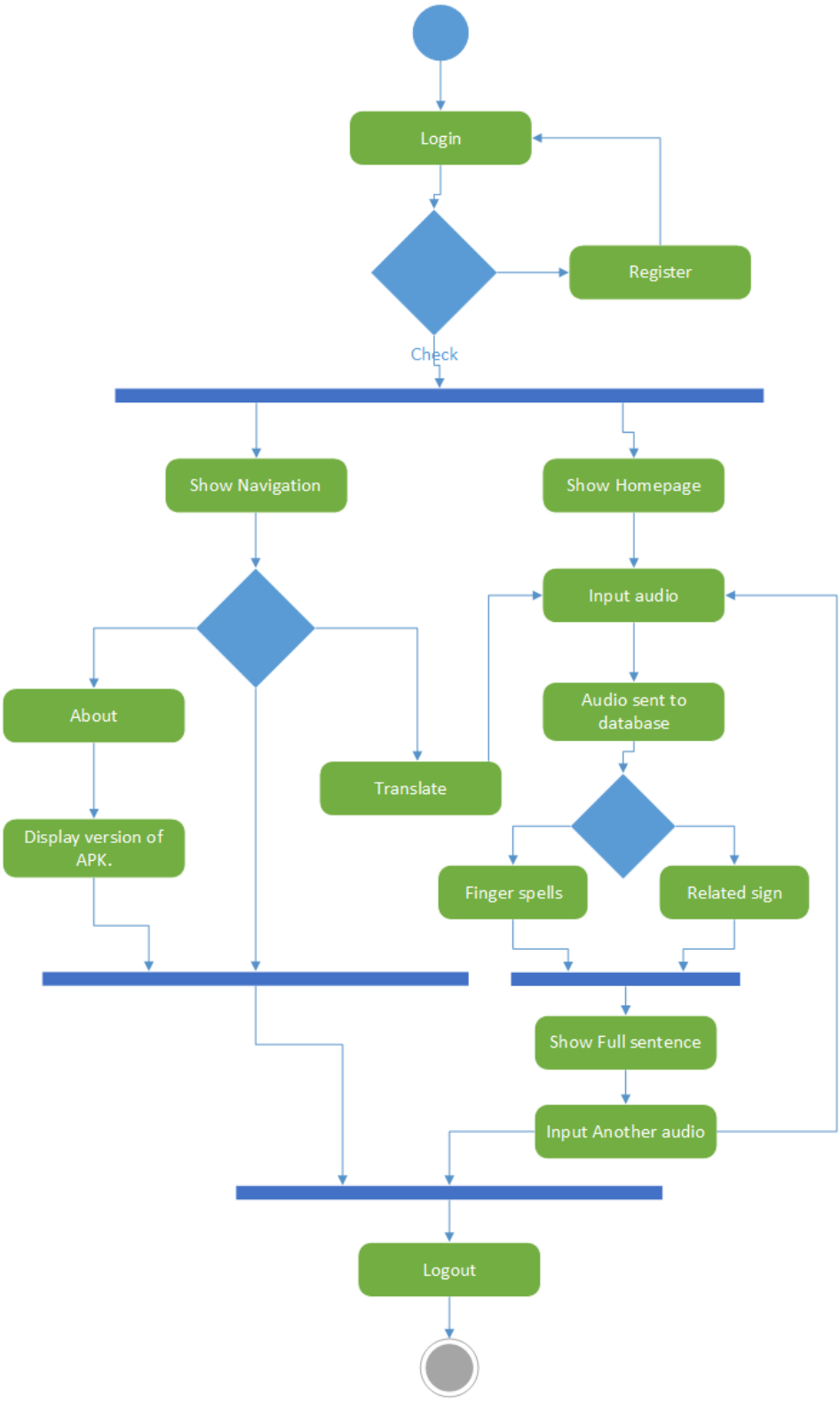


Figure 1.3.2: Activity Diagram

1.4 Sequence diagram

A sequence diagram is an interaction diagram. From the name, it is clear that the diagram deals with some sequences, which are the sequence of messages flowing from one object to another.

Interaction among the components of a system is very important from implementation and execution perspective. Sequence diagram is used to visualize the sequence of calls in a system to perform a specific functionality.

The symbols used in Sequence diagrams are: -

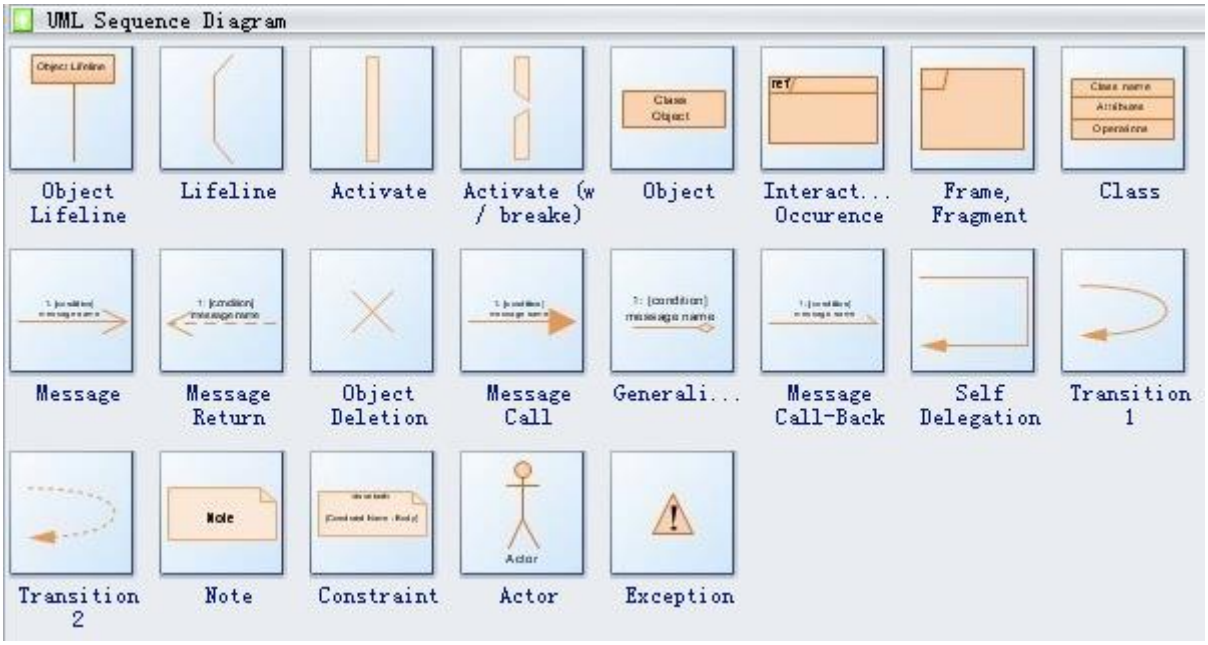


Figure 1.4.1: Sequence Diagram Symbols

Proposed Sequence Diagram for our system is: -

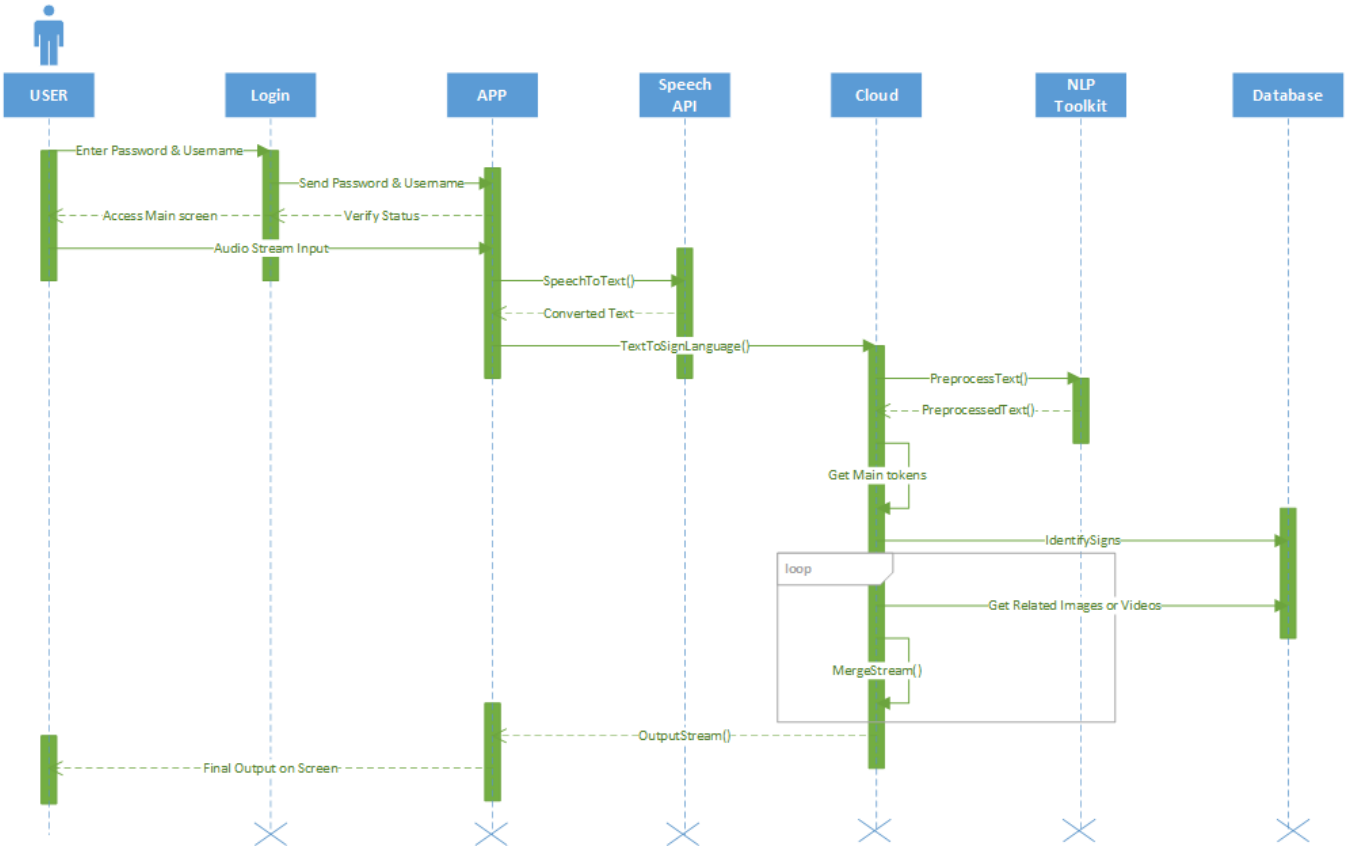


Figure 1.4.2: Sequence Diagram

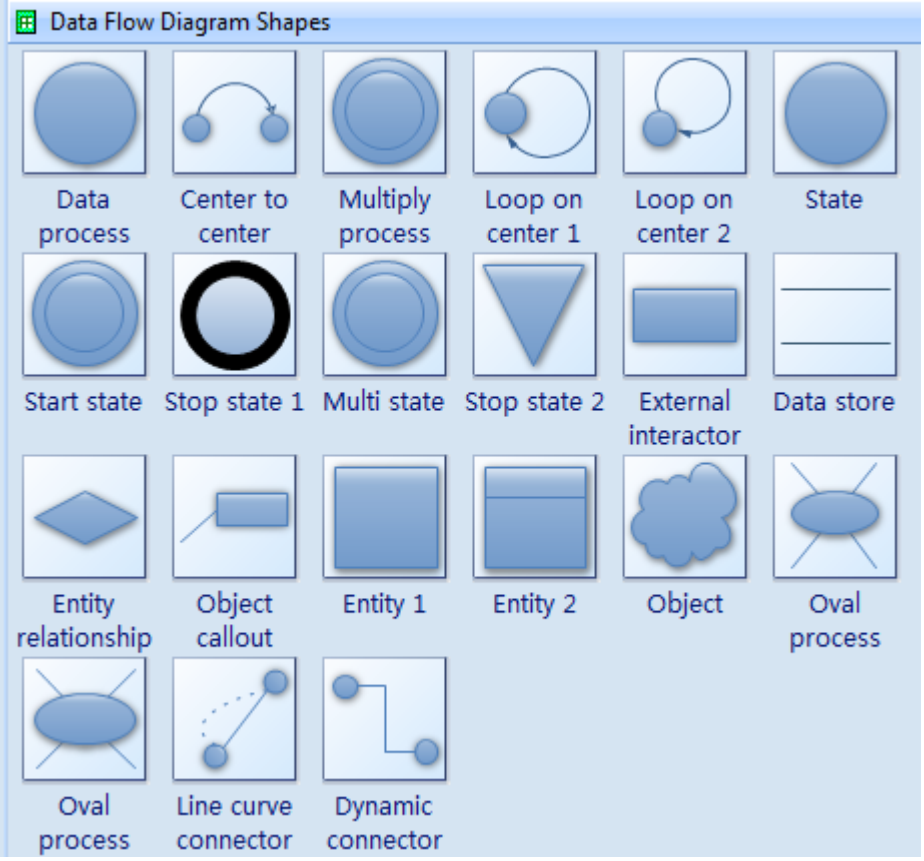
1.5 DFD Diagram

Also known as DFD, Data flow diagrams are used to graphically represent the flow of data in a business information system. DFD describes the processes that are involved in a system to transfer data from the input to the file storage and reports generation.

Data flow diagrams can be divided into logical and physical. The logical data flow diagram describes flow of data through a system to perform certain functionality of a business. The physical data flow diagram describes the implementation of the logical data flow.

The symbols used in DFD diagrams are: -

Figure 1.5.1: DFD Diagram Symbols



Proposed DFD Diagram for our system is: -

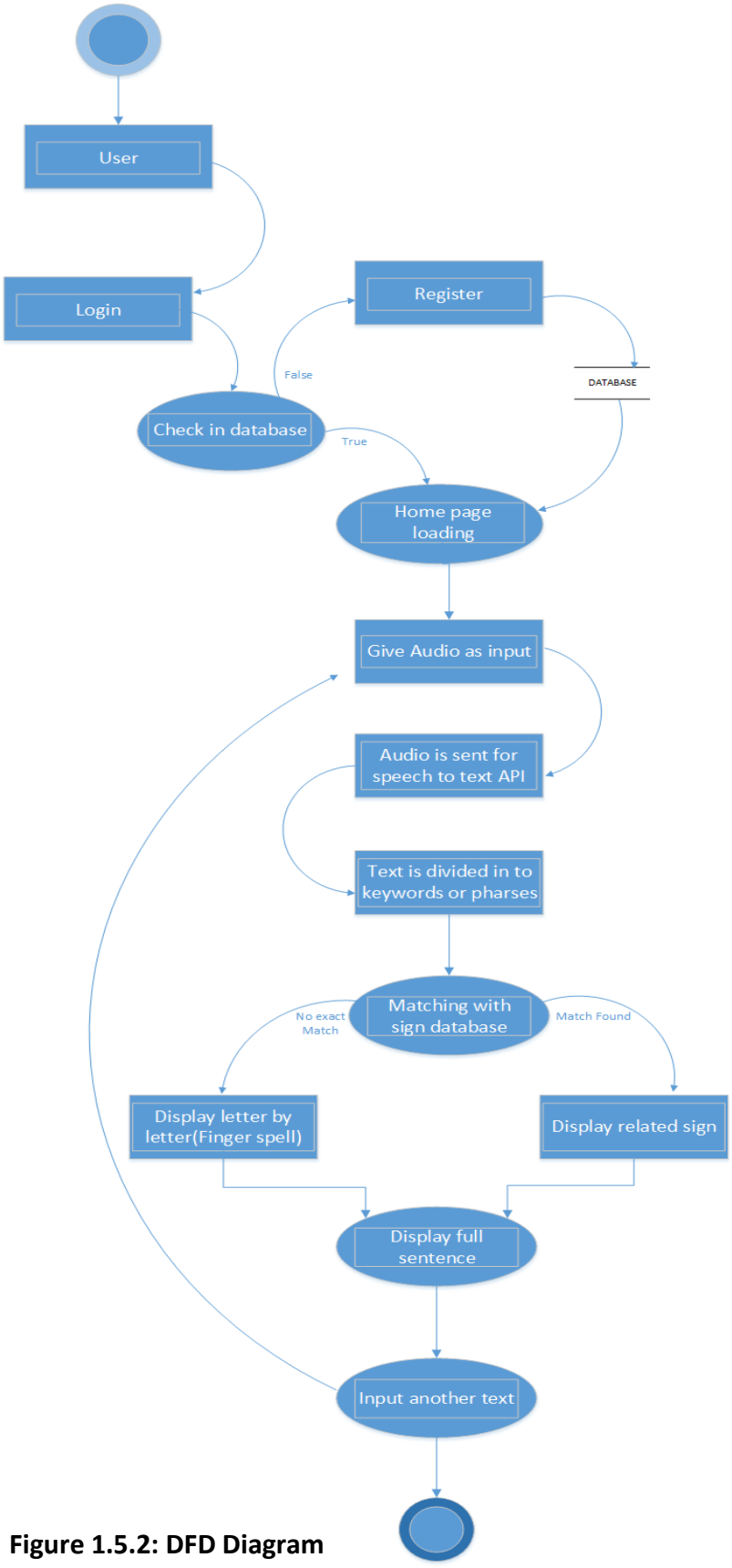


Figure 1.5.2: DFD Diagram

1.6 Class Diagram

Class diagrams are the most common diagrams used in UML. Class diagram consists of classes, interfaces, associations, and collaboration. Class diagrams basically represent the object-oriented view of a system, which is static in nature.

Active class is used in a class diagram to represent the concurrency of the system.

Class diagram represents the object orientation of a system. Hence, it is generally used for development purpose. This is the most widely used diagram at the time of system construction.

The symbols used in Class diagrams are: -

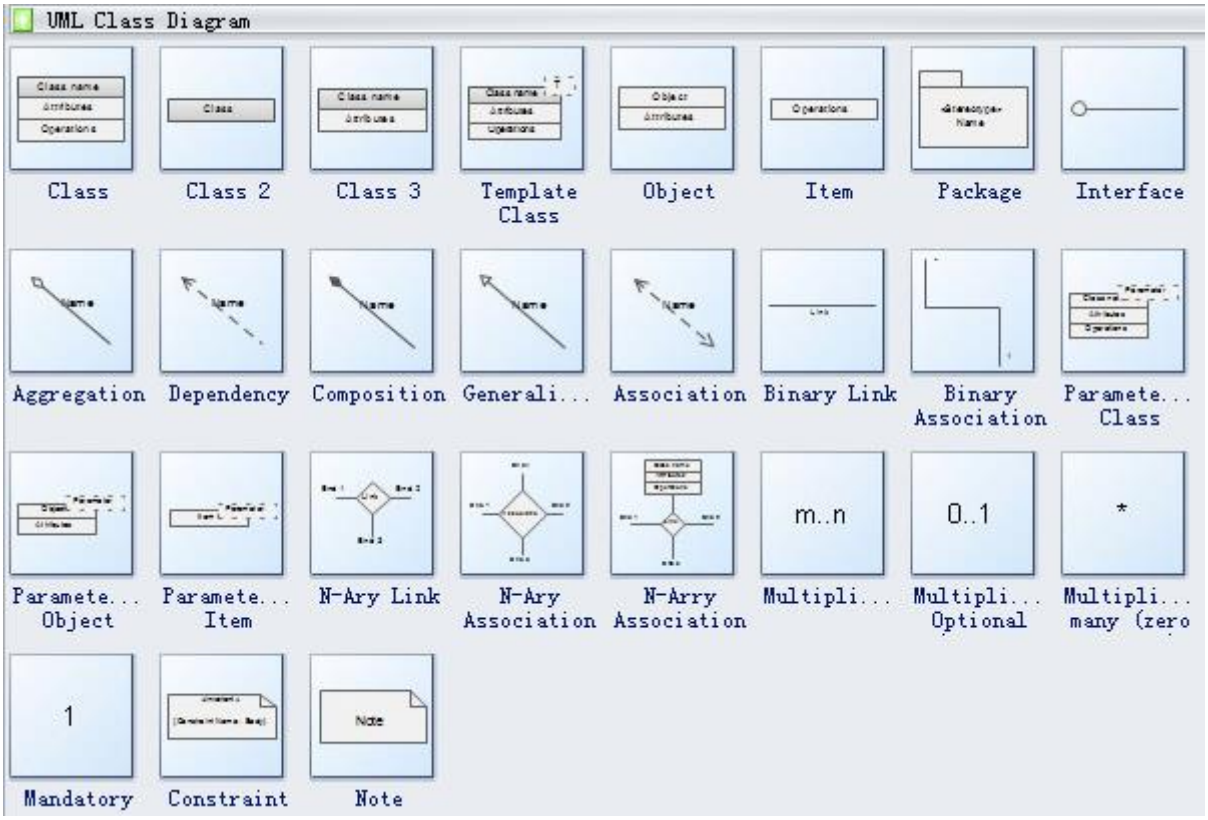


Figure 1.6.1: Class Diagram Symbols

Proposed Class Diagram for our system is: -

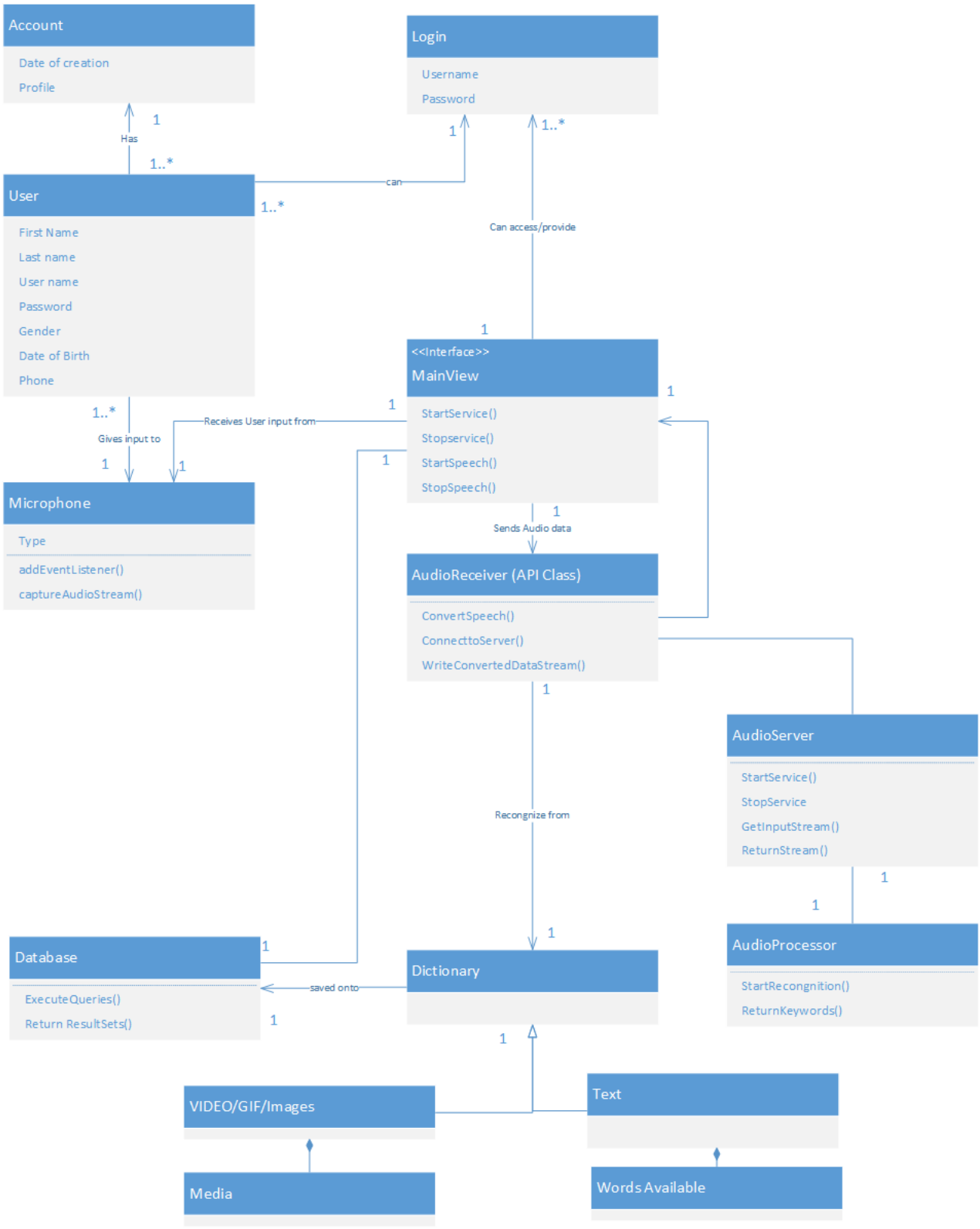


Figure 1.6.2: Class Diagram

1.7 Flowchart

Flowchart is a graphical representation of an algorithm. Programmers often use it as a program-planning tool to solve a problem. It makes use of symbols which are connected among them to indicate the flow of information and processing. The process of drawing a flowchart for an algorithm is known as "flowcharting".

The symbols used in Flowchart are: -

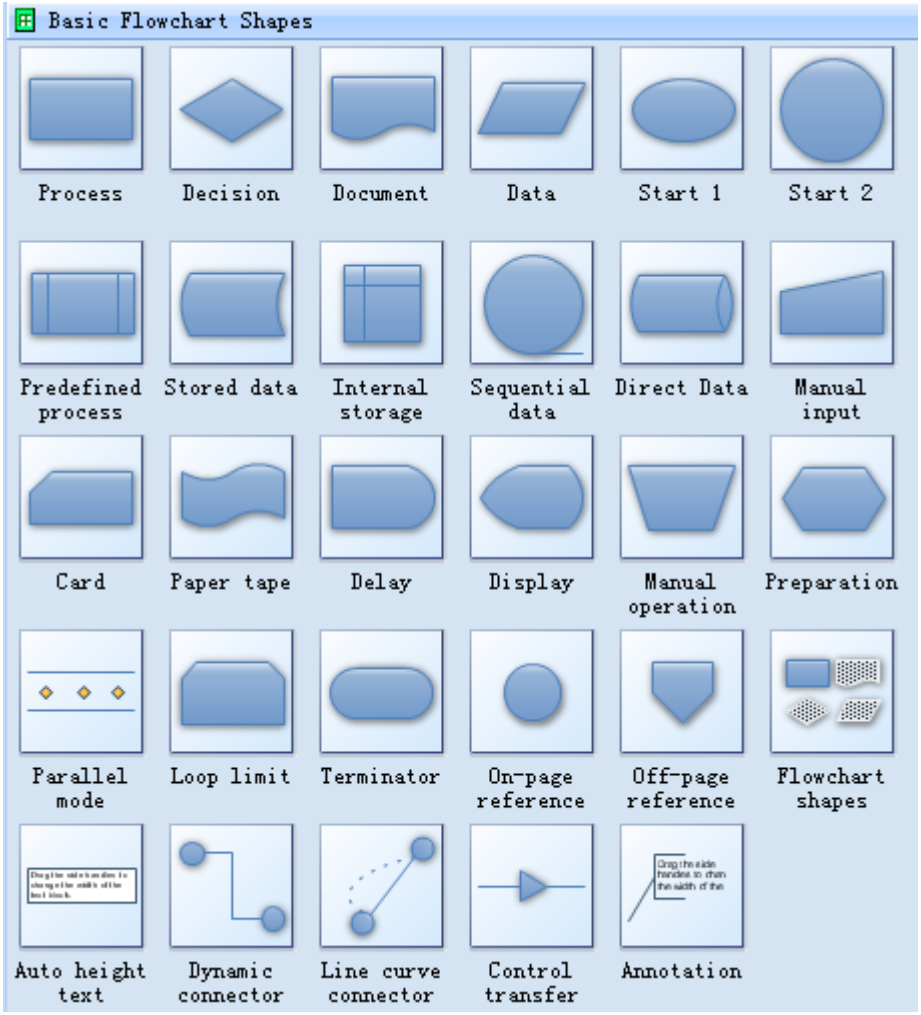


Figure 1.7.1: Flowchart

Proposed Flowchart for our system is: -

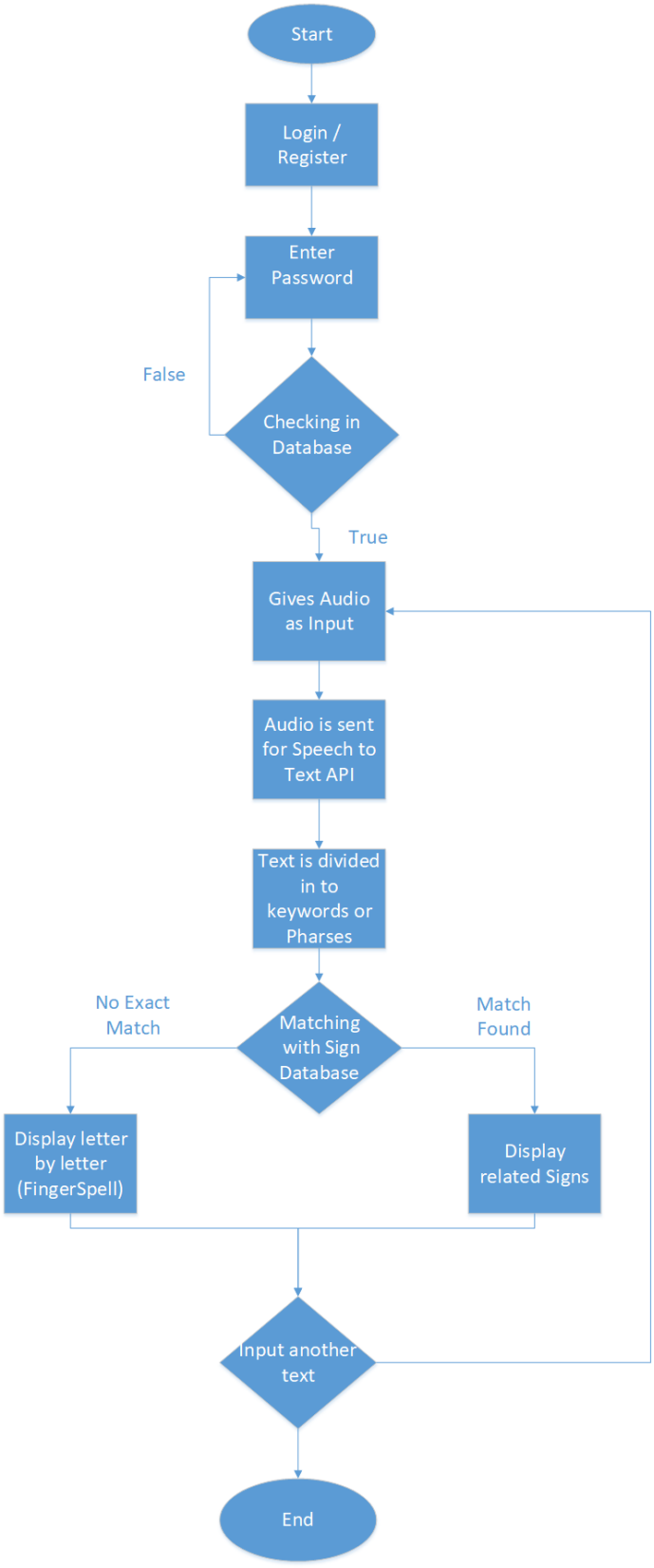


Figure 1.7.2: Flowchart

1. Introduction

The introduction of the Software Requirements Specification document in particular provides a comprehensive overview of the Software requirements document. This includes the purpose, scope, acronyms, abbreviations, references and overview of SRS.

1.1 Document Purpose

This document is used to understand the flow and working of the system. It describes the features of the system, flow of the system working, and how to use the application. This document can used by the user to understand what he is doing with the app, what the app is used for and why this app was being developed.

1.2 Product Scope

This app presented here is Speechdekho whose main purpose is to convert speech into the ISL, it'll be recognizing the Alphabets and words which can be converted into signing .This application is planned to be used by hear-impaired people in order to ease their life, or by normal user who can convey their message to deaf user. This application will be helpful for deaf people to understand the conversation and announcements. This application will work on the Android Smartphones.

1.3 Intended Audience and Document Overview

This is an android based application. Mainly two types of user will run this application, one is deaf user and the another one is normal user. This application will mainly useful to the deaf user in many ways like daily conversation or to understand the speech of the opposite person.

1.4 Definitions, and Abbreviations

- **API**: - Application program interface (API) is a set of routines, protocols, and tools for building software applications. An API specifies how software components should interact.
- **GIF: -** The Graphics Interchange Format is a bitmap image and lossless format for image files that supports both animated and static images.
- **Hardware:** An electronical component referring to something link to the computer.
- **Machine Learning: -** Machine learning is a type of artificial intelligence that provides computers with the ability to learn without being explicitly programmed. Machine learning focuses on the event of computer programs which will change when exposed to new data.

- **Natural Language Processing: -** Natural language processing is a field of computer science, artificial intelligence and computational linguistics concerned with the interactions between computers and human (natural) languages.
- **SDK:** A software development kit (SDK or "devkit") is typically a set of software development tools that allows for the creation of applications for a certain software package, software framework.
- **Sign language:** A language which chiefly uses manual communication to convey meaning, as opposed to acoustically conveyed sound patterns. This can involve simultaneously combining hand shapes, orientation and movement of the hands, arms or body, and facial expressions to precise a speaker's thoughts.
- **Software:** A computer program / application.
- **SRS: -** A software requirements specification is a description of a software system to be developed. It lays out functional and non-functional requirements, and should include a group of use cases that describe user interactions that the software must provide.
- **XML**: Extensible Markup Language (XML) which is a programming language with markers.

API	**Application Program Interface**
GIF	Graphic Interchange Format
NLP	Natural Language Processing
RAM	Random Access Memory
SRS	**Software Requirement Specification**

1.5 Document Conventions

This document is used for to understand the flow of the system. It described the system characteristics, flow of software, how to use the system. Document is mainly used for user to understand what about system do, what is the system used for and why this system being developed.

1.6 References and Acknowledgments

https://www.youtube.com/c/isldictionary/videos?view=0&sort=da&flow=grid

https://www.youtube.com/channel/UC3AcGIlqVI4nJWCwHgHFXtg/playlists

https://www.edrawsoft.com/uml-use-case-symbols.html

https://www.edrawsoft.com/er-diagram-symbols.html

https://www.edrawsoft.com/uml-class-symbols.html

https://www.edrawsoft.com/flowchart-symbols.html

https://www.edrawsoft.com/uml-sequence-symbols.html

https://www.edrawsoft.com/data-flow-diagram-symbols.html

https://www.edrawsoft.com/uml-activity-symbols.html

https://air.imag.fr/index.php/Proj-2013-2014-Sign2Speech-SRS

http://project.sliit.lk/redmine/attachments/download/2482/SRS_Document-Shenali.pdf

2. Overall Description

2.1 Product Perspective

- Our software is divided in two main different parts.
- The first one is about the speech recognition, and textual translation. The second part is for Text to sign translation.
- Requests for translations will be generated from client side and text to sign will be done with help of database connectivity.
- This app will be helpful to many users who are deaf or are part of hard-of hearing community. This app or product developed can provide real-time translations of spoken words.
- App will serve to hearing-impaired people to learn ISL easily and not to have difficulty in communication by getting ISL gestures from the text/audio for people who does not know ISL.
- The app can be used for both communication and education. Main functionality is for translating text/audio to the Gestures. Text will be searched in database for existing gestures available.

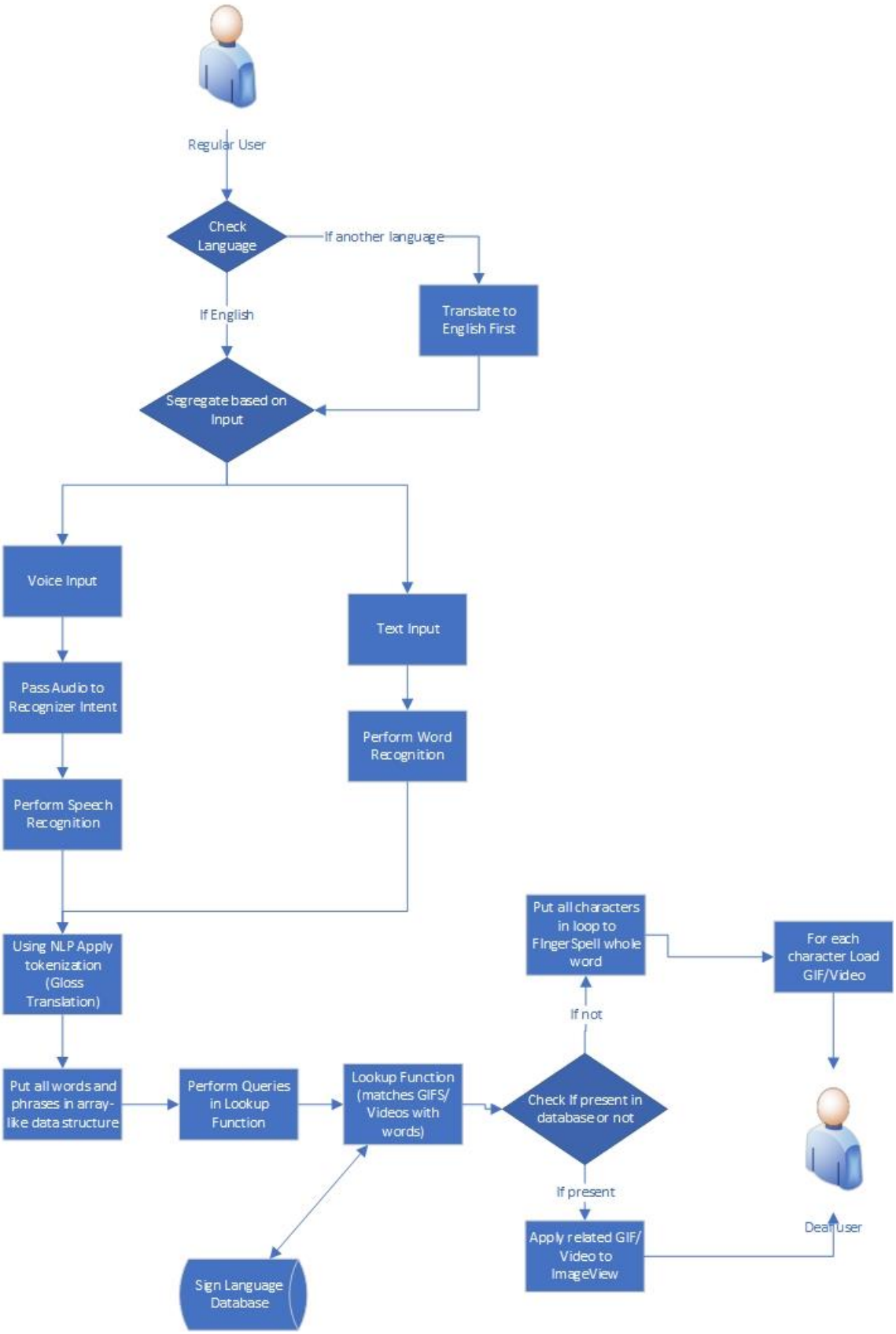


Fig. 2.1.1 Proposed System Working Diagram

2.2 Product Functionality

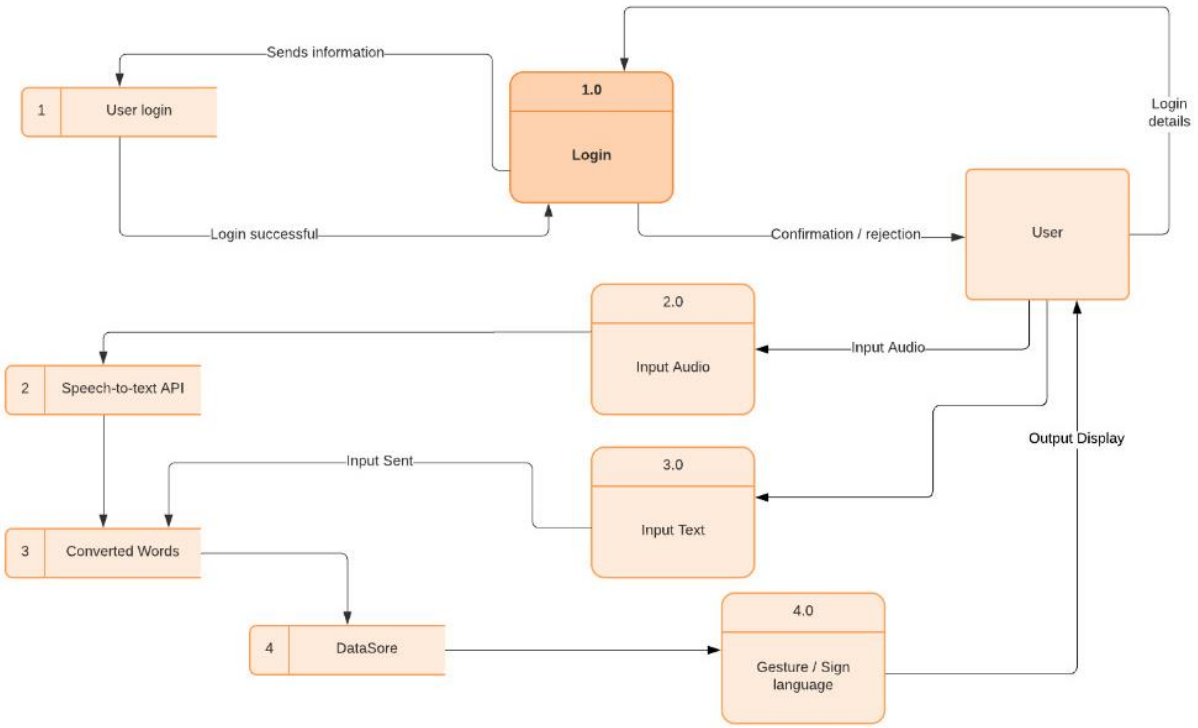


Fig 2.2.1 DFD Level 1 Diagram

Main Functionalities of the product will be: -

- Login/Sign up Feature will be provided
- User would be able to check/update profile
- User would be able to change Input Language
- User would be able to check History of translations
- User would be able to share app APK File.
- User would be able to Provide feedback & suggestions

2.3 Users and Characteristics

There will be 2 different type of users:

- **Normal user:** a user who can speak but might use this app to convey their messages to deaf or hearing-impaired user.
- **Sign language speaker user:** a user who uses ISL as their primary language in day-to day life.

Main Functionalities for different users: -

1. Deaf user can get output as sign language.
2. Deaf user can see or share the output.
3. Deaf user can learn ISL from the app.
4. Normal user can give input as audio.
5. Normal user can give input as text.

2.4 Operating Environment

- **Software requirements:**
  - Operating system: Android 7.0 or higher
  - Database: Firebase.
- **Hardware requirements:**
  - RAM: 2 GB or higher
  - Storage: 60 Mb or higher
  - Internet connectivity: Sim Card or Wi-Fi.

2.5 Design and Implementation Constraints

- Audio source should be clear.
- Program will work only on android devices.
- Application will work on android 7.0 and higher versions.
- Microphone should work in a proper way.

- RAM 2GB or higher
- Requires an Active internet connection

2.6 User Documentation

In this application user will convert speech to sign language but they cannot modify the dataset or other changes. User will be changing the language as an input but output cannot change.

2.7 Assumptions and Dependencies

When designing this application there are some assumptions observed.

- Most of the deaf people uses mobile phones and prefer to update with the modern technologies.
- All deaf people and ordinary people who are willing to interact with the deaf community will download and install the application to the mobile phone.
- Users have at least sight knowledge to operate the mobile phone and the application properly.
- Normal persons will help those deaf persons to communicate using the application.(user involvement)

Dependencies observed throughout the application are as follows,

- The accuracy of the application depends on the input text/audio. Thus, it is very important to have a meaningful sentence of English/Hindi Language.
- The user should provide input that is clear, concise and understandable.
- User must provide input in languages supported by app.
- The speed of the GIF file transfer depends on the network connection and the
- processing power of the mobile phone.
- App may need Good internet connection in case of online translation and database connectivity to load output.
- The reactivity of the program depends on the Android in-built function of speech translation.
- The application does not have any safety and security concerns.

3. Specific Requirements

3.1 External Interface Requirements

3.1.1 User Interfaces

- Proposed system is a mobile application connected with a remote database. Additional libraries will be used to improve the appearance of the GUIs and overall app experience.
- User need to login or register itself with email id and password. Then he/she need record the speech and after recording they can see the output in the form of GIF/Video. User have their own profile built in after login. They can have the access to their history records also.

3.1.2 Hardware Interfaces

- Hardware requirements will need to run the developed application without having any problem.
- For the designing, implementation and testing purposes we have identified few hardware requirements. Suchlike,
    - Mobile phones – Android OS
    - Microphone
    - 2 GB RAM

3.1.3 Software Interfaces

These software components are mainly used created in this application.

- Android 7.0 Operating System
- Google Firebase
- Android Studio
- GitHub for VCS

3.1.4 Communications Interfaces

- 3G - 4G connection of the mobile phone will be used for data transmission between the mobile app and the web server.
- Wi-Fi - If the mobile data is not available, user can connect to an available Wi-Fi router to get the internet connection in order to use the application. And this will also be used for data transmission between the mobile app and the web server.
- Required Connection bandwidth might differ time to time. Since large data load is travelling through the network, having a high bandwidth internet connection will help a lot for the users to use the application with ease.

3.2 Functional Requirements

- User Speech Input:

  This feature will Input the Speech or sentence converted into the textual meaning of the gesture or Sign language and The Input sent to the Speech-to-text API.

- Display output:

  Mainly the Speech or sentence output is display into the gesture or Sign language and Alphabets can display output as a sign language.

- Language selection:

  Language selection is used to the change the language as an input from the user and that speech sent to the converting API.

- Login / Sign Up:

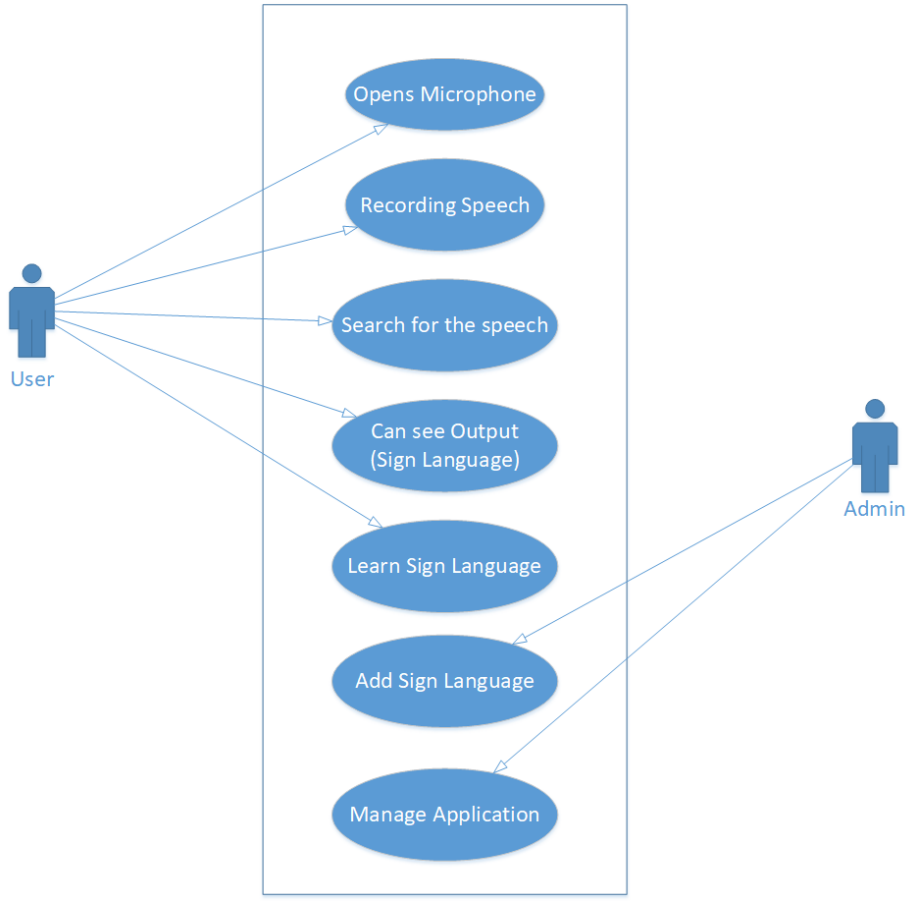
  For one user the login-state can be either logged in, if not logged in then Create the user ID.

- Suggestions & feedback:

  This function is used to any query and some types of changes suggestion and giving feedback to the administrator.

3.3 Behaviour Requirements

3.3.1 Use Case View



- **User**
  - User can record their speech
  - User can search for the recorded speech
  - User can see the output
  - User can learn the sign language

- **Admin**
  - Admin can add sign language
  - Admin can manage the whole application and controls it

4. Other Non-functional Requirements

4.1 Performance Requirements

- The application will be loaded and will be usable within 5 seconds
- The application should update the interface on interaction within 3 seconds
- The database can normalize to prevent redundant data and improve performance

4.2 Safety and Security Requirements

This application provides the login page to use the application if user enters correct credentials then he/she can have their user rights. User can login through email id and password.

4.3 Software Quality Attributes

4.3.1. Reliability

Reliability is an important issue in system architecture. To be a reliable application it has to have minimum number of failures. Before releasing the final product, application must test and fix each and every possible bug incessantly. Each and every component will be tested and finally, the integrated application will also be test under different conditions.

We define two operating states that relate to the application's ability to perform its function.

• **Success:** The application performs its function satisfactorily for a given period of time, where the criterion for success is clearly defined.

• **Failure:** The application fails to perform its function acceptably.

The database of the application is updated by the administrator once a day.

4.3.2. Availability

- Availability is the ratio of time an application or component is functional to the total time it is required or expected to function. This can be expressed as a direct proportion (for example, 9/10 or 0.9) or as a percentage (for example, 90%).
- A good network must be available for smooth running of app.

4.3.3. Security

- Improving application security is a complex task. To provide a better service we need to have a good security to the application. Consequently, to fulfill the main purpose of this application providing a good service to the users including well defined safety. This includes avoiding the unwanted problems and keep precarious details securely. Developers must implement good security features to avoid unauthorized access to the application. The development teams decide to improve the application security by using following methods.
- One of the best ways to improve the application security is upgrade the application monthly.
- Give unique username, password for each member. Application provides a logging to users. From that we give good security. For the password, the users must include characters and letters. The whole data stored in the database. Thus, username and password should be valid for the application and if it is not valid, the users can't log the application. This security requirement we include to ensure security of users.
- Password protection: - Passwords are a unique and easy way to increase app security instantly.

Appendix B – Plagiarism Report

SmallSEOTools

PLAGIARISM SCAN REPORT

Words	950	Date	October 14,2020
Characters	6074	Exclude URL	

25% Plagiarism	75% Unique	10 Plagiarized Sentences	30 Unique Sentences

Words	1030	Date	October 14,2020
Characters	6675	Exclude URL	

16% Plagiarism	84% Unique	8 Plagiarized Sentences	43 Unique Sentences

Words	734	Date	October 14,2020
Characters	4819	Exclude URL	

0% Plagiarism	100% Unique	0 Plagiarized Sentences	33 Unique Sentences

Content Checked for Plagiarism

Introduction The introduction of the Software Requirements Specification document in particular provides a comprehensive overview of the Software requirements document. This includes the purpose, scope, acronyms, abbreviations, references and overview of SRS. Document Purpose
This document is used to understand the flow and working of the system. It describes the features of the system, flow of the system working, and how to use the application. This document can used by the user to understand what he is doing with the app, what the app is used for and why this app was being developed. Product Scope This app presented here is Speechdekho whose main purpose is to convert speech into the ISL, it'll be recognizing the Alphabets and words which can be converted into signing. This application is planned to be used by hear-impaired people in order to ease their life, or by normal user who can convey their message to deaf user. This application will be helpful for deaf people to understand the conversation and announcements. This application will work on the Android Smartphones. Intended Audience and Document Overview This is an android based application. Mainly two types of user will run this application, one is deaf user and the another one is normal user. This application will mainly useful to the deaf user in many ways like daily conversation or to understand the speech of the opposite person. Definitions, and Abbreviations

- API: - Application program interface (API) is a set of routines, protocols, and tools for building software applications. An API specifies how software components should interact.

GIF: - The Graphics Interchange Format is a bitmap image and lossless format for image files that supports both animated and static images.
Hardware: An electronical component referring to something link to the computer.
Machine Learning: - Machine learning is a type of artificial intelligence that provides computers with the ability to learn without being explicitly programmed. Machine learning focuses on the event of computer programs which will change when exposed to new data.
Natural Language Processing: - Natural language processing is a field of computer science, artificial intelligence and computational linguistics concerned with the interactions between computers and human (natural) languages.
SDK: A software development kit (SDK or "devkit") is typically a set of software development tools that allowsfor the creation of applications for a certain software package, software framework.
Sign language: - A language which chiefly uses manual communication to convey meaning, as opposed toacoustically conveyed sound patterns. This can involve simultaneously combining hand shapes, orientation and movement of the hands, arms or body, and facial expressions to precise a speaker's thoughts.
Software: A computer program / application.
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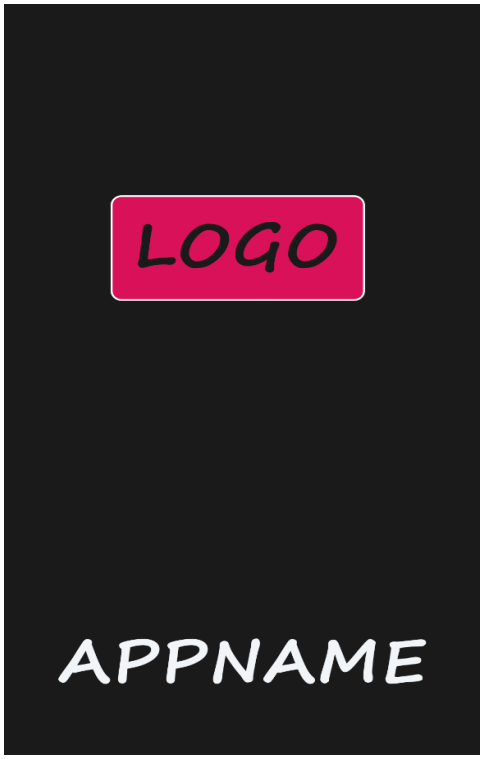
SRS: - A software requirements specification is a description of a software system to be developed. It lays out functional and non-functional requirements, and should include a group of use cases that describe user interactions that the software must provide.
XML: Extensible Markup Language (XML) which is a programming language with markers.
API Application Program Interface
GIF Graphic Interchange Format
NLP Natural Language Processing
RAM Random Access Memory
SRS Software Requirement Specification Document Conventions
This document is used for to understand the flow of the system. It described the system characteristics, flow of software, how to use the system. Document is mainly used for user to understand what about system do, what is the system used for and why this system being developed.
References and Acknowledgments
https://www.youtube.com/c/isldictionary/videos?view=0&sort=da&flow=grid
https://www.youtube.com/channel/UC3AcGIlqVI4nJWCwHgHFXtg/playlists

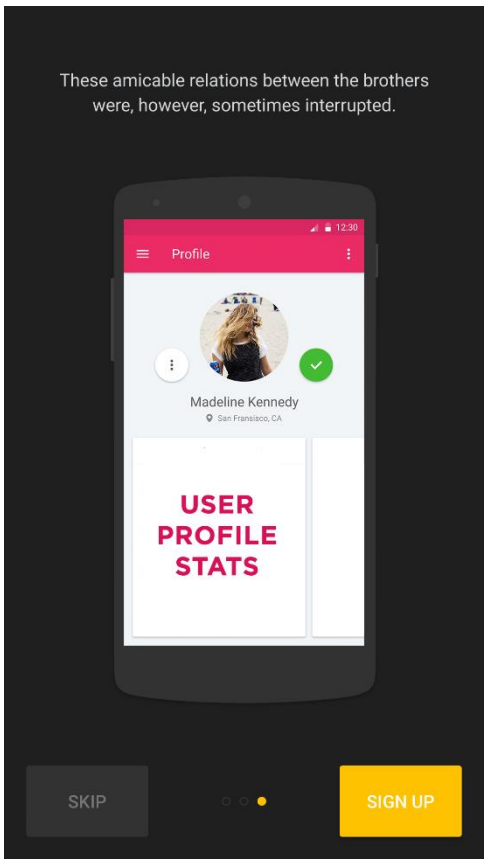
Overall Description 2.1 Product Perspective Our software is divided in two main different parts.
The first one is about the speech recognition, and textual translation. The second part is for Text to signtranslation. Requests for translations will be generated from client side and text to sign will be done with help of databaseconnectivity. This app will be helpful to many users who are deaf or are part of hard-of hearing community. This app orproduct developed can provide real-time translations of spoken words. App will serve to hearing-impaired people to learn ISL easily and not to have difficulty in communication bygetting ISL gestures from the text/audio for people who does not know ISL. The app can be used for both communication and education. Main functionality is for translating text/audio tothe Gestures. Text will be searched in database for existing gestures available.
Product Functionality Users and Characteristics There will be 2 different type of users:
Normal user: a user who can speak but might use this app to convey their messages to deaf or hearing-impaired user. Sign language speaker user: a user who uses ISL as their primary language in day-to day life. Main Functionalities for different users: 1. Deaf user can get output as sign language.
Deaf user can see or share the output. Deaf user can learn ISL from the app.
Normal user can give input as audio. Normal user can give input as text.2.4 Operating Environment • Software requirements: o Operating system: Android 7.0 or higher o Database: Firebase.
Hardware requirements:o RAM: 2 GB or higher o Storage: 60 b
or higher o Internet connectivity: Sim Card or Wi-Fi. 2.5 Design
and Implementation Constraints Audio source should be clear.
Program will work only on android devices. Application will work on android 7.0 and higher versions.
Microphone should work in a proper way. RAM 2GB or higher
Requires an Active internet connection User Documentation
In this application user will convert speech to sign language but they cannot modify the dataset or other changes. User will be changing the language as an input but output cannot change.
Assumptions and Dependencies When designing this application there are some assumptions observed. Most of the deaf people uses mobile phones and prefer to update with the modern technologies. All deaf people and ordinary people who are willing to interact with the deaf community will download andinstall the application to the mobile phone. Users have at least sight knowledge to operate the mobile phone and the application properly. Normal persons will help those deaf persons to communicate using the application. (user involvement) Dependencies observed throughout the application are as follows, The accuracy of the application depends on the input text/audio. Thus, it is very important to have ameaningful sentence of English/Hindi Language. The user should provide input that is clear, concise and understandable. User must provide input in languages supported by app. The speed of the GIF file transfer depends on the network connection and theprocessing power of the mobile phone. App may need Good internet connection in case of online translation and database connectivity to load output. The reactivity of the program depends on the Android in-built function of speech translation. The application does not have any safety and security concerns.
Specific Requirements External Interface Requirements 3.1.1 User Interfaces Proposed system is a mobile application connected with a remote database. Additional libraries will be used toimprove the appearance of the GUIs and overall app experience. All user interfaces are described in detailed in section 3.1.1. User need to login or register itself with email id and password. Then he/she need record the speech and afterrecording they can see the output in the form of GIF/Video. User have their own profile built in after login. They can have the access to their history records also.
can have the access to their history records also. 3.1.2 Hardware Interfaces
Hardware requirements will need to run the developed application without having any problem.
For the designing, implementation and testing purposes we have identified few hardware requirements.Suchlike, Mobile phones – Android OS Microphone 2 GB RAM 3.1.3 Software Interfaces These software components are mainly used created in this application. Android 7.0 Operating System Google Firebase Android Studio GitHub for VCS 3.1.4 Communications Interfaces 3G - 4G connection of the mobile phone will be used for data transmission between themobile app and the web server.

Wi-Fi - If the mobile data is not available, user can connect to an available Wi-Fi routerto get the internet connection in order to use the application. And this will also be used for data transmission between the mobile app and the web server. Required Connection bandwidth might differ time to time. Since large data load istravelling through the network, having a high bandwidth internet connection will help a lot for the users to use the application with ease. 3.2 Functional Requirements
User Speech Input: This feature will Input the Speech or sentence converted into the textual meaning of the gesture or Sign language and The Input sent to the Speech-to-text API. Display output:
Mainly the Speech or sentence output is display into the gesture or Sign language and Alphabets can display output as a sign language. Language selection: Language selection is used to the change the language as an input from the user and that speech sent to the converting API.
Login / Sign Up: For one user the login-state can be either logged in, if not logged in then Create the user ID. Suggestions & feedback: This function is used to any query and some types of changes suggestion and giving feedback to the administrator.
3.3 Behaviour Requirements 3.3.1 Use Case View User User can record their speech User can search for the recorded speech User can see the output User can learn the sign language Admin Admin can add sign language Admin can manage the whole application and controls it Other Non-functional Requirements Performance Requirements The application will be loaded and will be usable within 5 seconds The application should update the interface on interaction within 3 seconds
The database can normalize to prevent redundant data and improve performance
Safety and Security Requirements This application provides the login page to use the application if user enters correct credentials then he/she can have their user rights. User can login through email id and password. Software Quality Attributes
Reliability Reliability is an important issue in system architecture. To be a reliable application it has to have minimum number of failures. Before releasing the final product, application must test and fix each and every possible bug incessantly. Each and every component will be tested and finally, the integrated application will also be test under different conditions.
We define two operating states that relate to the application's ability to perform its function.
Success: The application performs its function satisfactorily for a given period of time, where the criterion forsuccess is clearly defined. Failure: The application fails to perform its function acceptably. The database of the application is updated by the administrator once a day.
Availability Availability is the ratio of time an application or component is functional to the total time it is required orexpected to function. This can be expressed as a direct proportion (for example, 9/10 or 0.9) or as a percentage (for example, 90%).

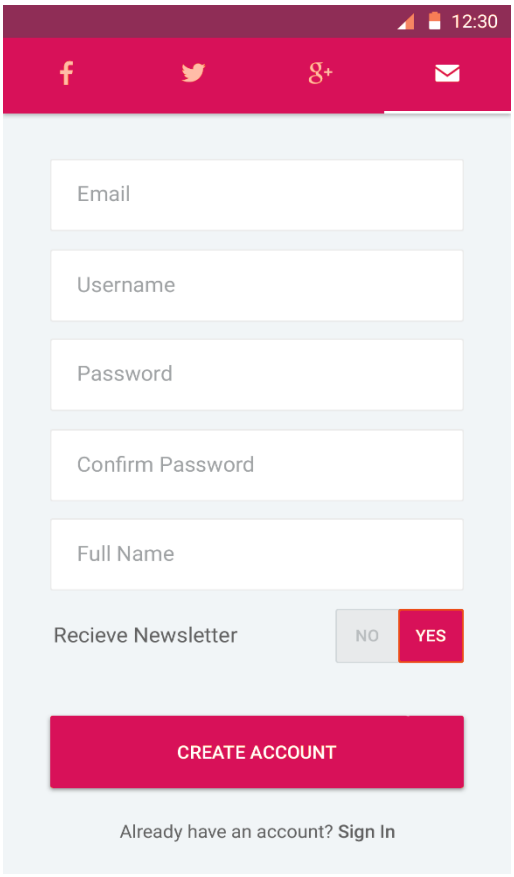
Appendix C – User Manual



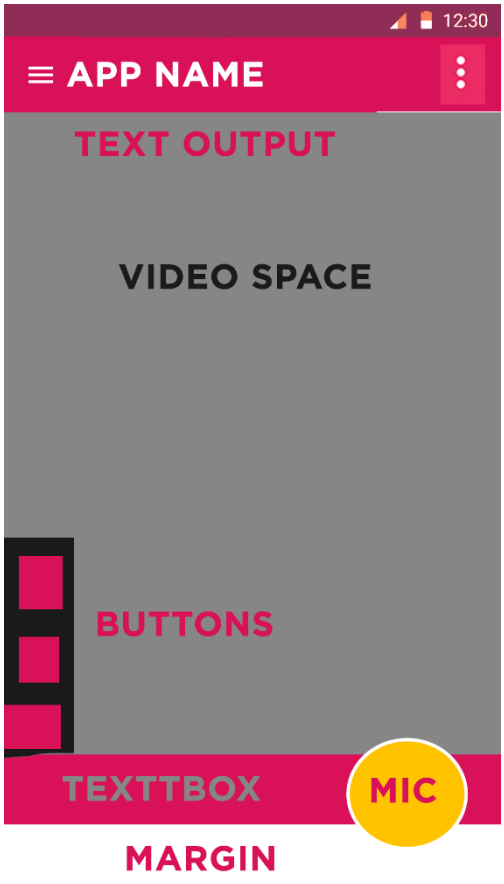
Splash Screen:- When user opens the application it will show this type of screen. There will be logo in between and at the bottom of the screen it will show “SpeechDekho” as the name of the application.



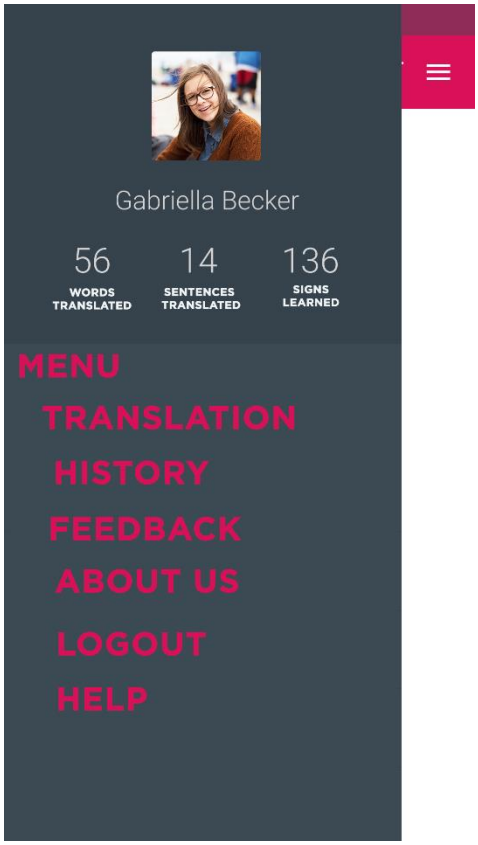
Tutorial:- Before Login or Register in the application you will find a tutorial for the application and will able to see how you need to work on the application. Although you can skip the tutorial if you already been to this application.



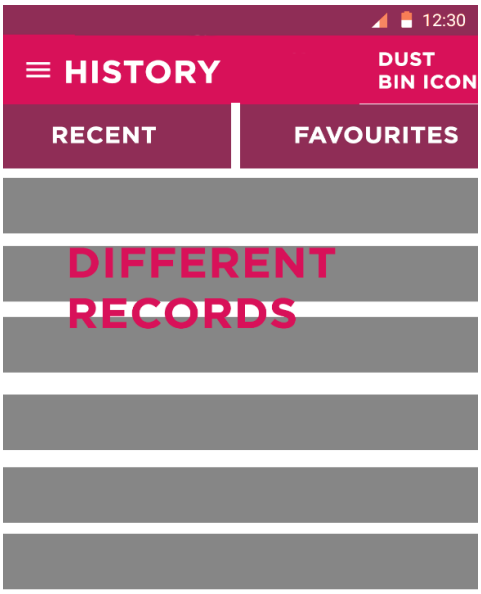
Login:- After the tutorial ends user need to be register itself with the application and after registering, he/she can access to use the application. In register process user need to enter his/her email id, password and name.



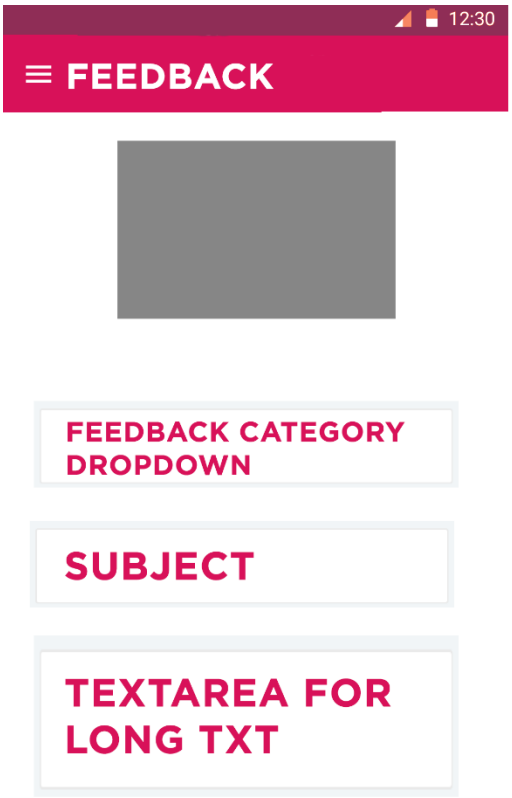
Home Screen:- Here the main work of application comes. When user press the mic button then he/she will able to record the speech of what of he/she wanted then at the center of the screen he/she gets the output of the recorded speech respectively.



Navigation Screen:- When user will click the toggle button then he/she will able to see the menu of application. When user clicks on translation then he/she will be back to the home screen. When user clicks on history it will redirect him/her to the history page. When user clicks on feedback then he/she can write us the problems/issues which they are facing in our application. When user clicks on about us then he/she can able to view the information about the developers like who are they. When user clicks on logout button then they just simply logout themselves. And when the clicks on help button then he/she can able to see that how does the application works.



History:- This is the history page of our application. User can able to see their history of what they recently searched for and they can also add the search items to their favourites. There is a dustbin icon also which used to delete the history.



Feedback:- In the feedback page user will have a dropdown list in which there are the list of common problems/issues faced by other users. If they not found the issue then they can also write us by just mentioning what's the subject is and below that there a message textbox in which they will explain us their issue.