GOVERNMENT COLLEGE OF TECHNOLOGY, COIMBATORE

B.E – ELECTRONICS AND COMMUNICATION ENGINEERING

REAL-TIME COMMUNICATION SYSTEM POWERED BY AI FOR SPECIALLY ABLED

PROJECT REPORT

Submitted by

TEAM ID : PNT2022TMID06911

TEAM MEMBERS

Aruna P

Binushya Prakash E

Deepashree S

Dhanuja A

1. INTRODUCTION

1.1 Project Overview:

Real-time communications (RTC) are any mode of telecommunications in which all users can exchange information instantly. Communication plays as significant role in making the world better place. It creates a bonding and relations among the people. People get to know one another by sharing their ideas, thoughts, and experiences with those around them. There are numerous ways to accomplish this, the best of which is the gift of "Speech." Everyone can very convincingly transfer their thoughts and understand each other through speech. It will be unjust if we overlook those who are denied this priceless gift : the deaf and dumb. In such cases ,the human hand has remained the preferred method of communication.

1.2 Purpose:

The Project's purpose is to create a system that translates sign language into a human understandable language so that ordinary people may understand it. In our society, we have people with disabilities. The technology is developing day by day but no significant developments are undertaken for the betterment of these people. Communications between deaf-mute and a normal person has always been a challenging task. It is very difficult for mute people to convey their message to normal people. Since normal people are not trained on hand sign language. In emergency times conveying their message is very difficult. The human hand has remained a popular choice to convey information in situations where other forms like speech cannot be used. Voice Conversion System with Hand Gesture Recognition and translation will be very useful to have a proper conversation between a normal person and an impaired person in any language. The project aims to develop a system that converts the sign language into a human hearing voice in the desired language to convey a message to normal people, as well as convert speech into understandable sign language for the deaf and dumb. We are making use of a convolution neural network to create a model that is trained on different hand gestures. An app is built which uses this model. This app enables deaf and dumb people to convey their information using signs which get converted to human-understandable language and speech is given as output.

2.LITERATURESURVEY:

A literature review is a comprehensive summary of previous research on a topic. The literature review surveys scholarly articles, books, and other sources relevant to a area of research. There view should enumerate, describe, summarize, objectively evaluate and clarify this previous research.

In our project, We have taken the literature survey on IEEE papers. An intelligent communication device is developed to assist nonverbal, motor-disabled persons in the generation of written and spoken messages. The device is centered on knowledge base of the grammatical rules and message elements. A belief reasoning scheme based on both the information from external sources and the embedded knowledge is sued to optimize the process of message search.

2.1 EXISTING PROBLEM:

Some of the existing solutions for solving this problem are:

Communicationsbetweendeaf-muteandanormalpersonhasalwaysbeenachallenging task. It is very difficult for mute people to convey their message to normal people.

Technology:

One of the easiest ways to communicate is through technology such as a phone or laptop. A deaf person can type out what they want to say and a person who is blind or has low vision can use a screen reader to read the text out loud.

A blind person can also use voice recognition software to convert what they are saying into text so that a person who is Deaf can then read it.

Interpreter:

If assign language interpreter is available, this facilitates easy communication if the person who is deaf is fluent in sign language. The deaf person and person who is blind can communicate with each other via the interpreter. The deaf person can use sign language and the interpreter can speak what has been said to the person who is blind and then translate anything spoken by the blind person in to sign language for the deaf person.

However, this is often not the most effective form of communication, as it is very dependent on the individual circumstances of both people and their environment (for example, some places may have too much back ground noise).

2.2 REFERENCES:

Rajamohan, A., Hemavathy, R., and Dhana lakshmi, M., “Deaf-Mute Communication Interpreter”, International Journal of Scientific Engineering and Technology, Vol.2, No.5, pp.336-341,2013.

Artificial Intelligence Enhances Accessibility for people with disabilities, Bayan Mohammed Saleh1, Reem Ibrahim Al-Beshr2, Muhammad Usman Tariq3 YEAR : 2020

Sign Language Recognition System for people with disabilities using AI, Dalia Nashat1, Abeer Shoker1, Fowzyah Al-Swat2 and Reem AlEbailan2 YEAR : 2014

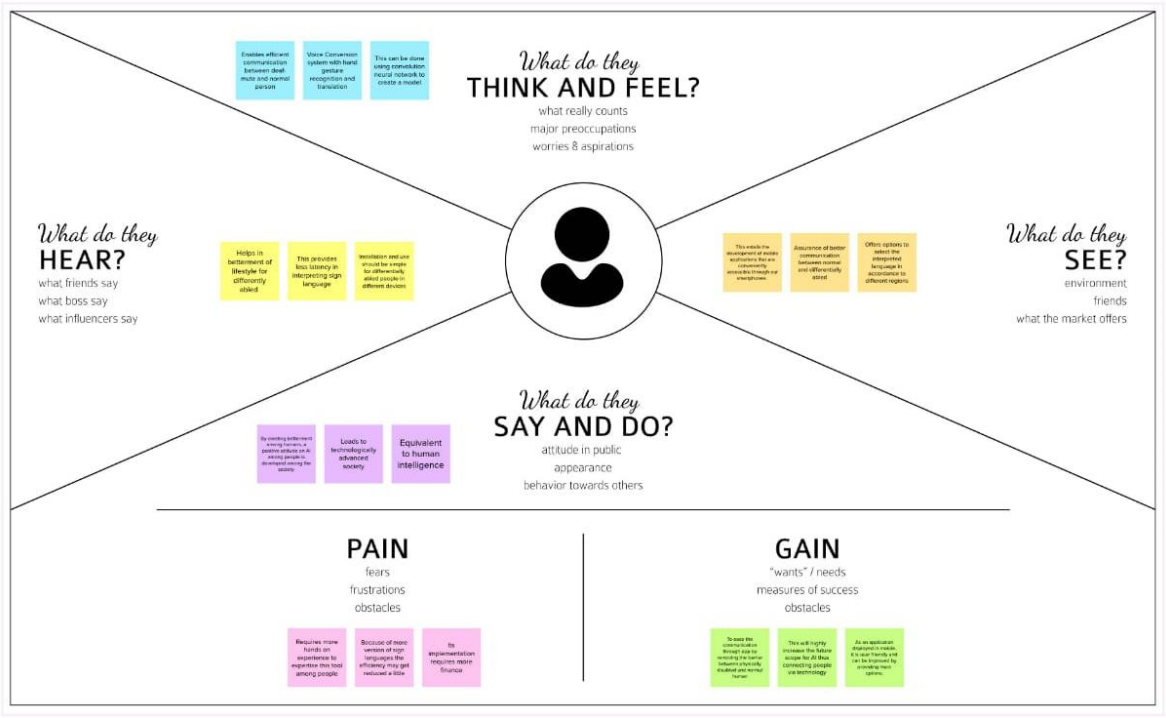
2.3 PROBLEM STATEMENT DEFINITION:

The specially abled people (user) needs a way to converts the sign language into a human hearing voice in the desired language to normal people, as well as converts speech into understandable sign language for the deaf and dumb (user need) so that the deaf-mute people can communicate their messages with normal people easily (benefits) because it is difficult for deaf-mute people to convey their messages to normal people(insights).

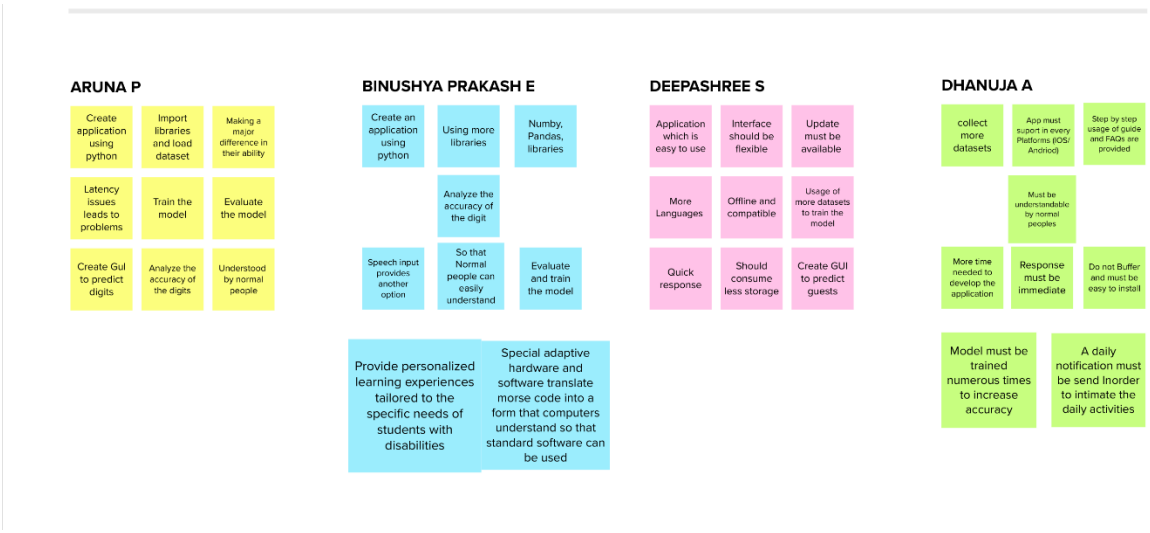
3 IDEATION & PROPOSED SOLUTION:

Ideation is the process where you generate ideas and solutions through techniques such as Empathy Map Canvas, Brainstorming. Ideation is also the third stage in the Design Thinking Process.

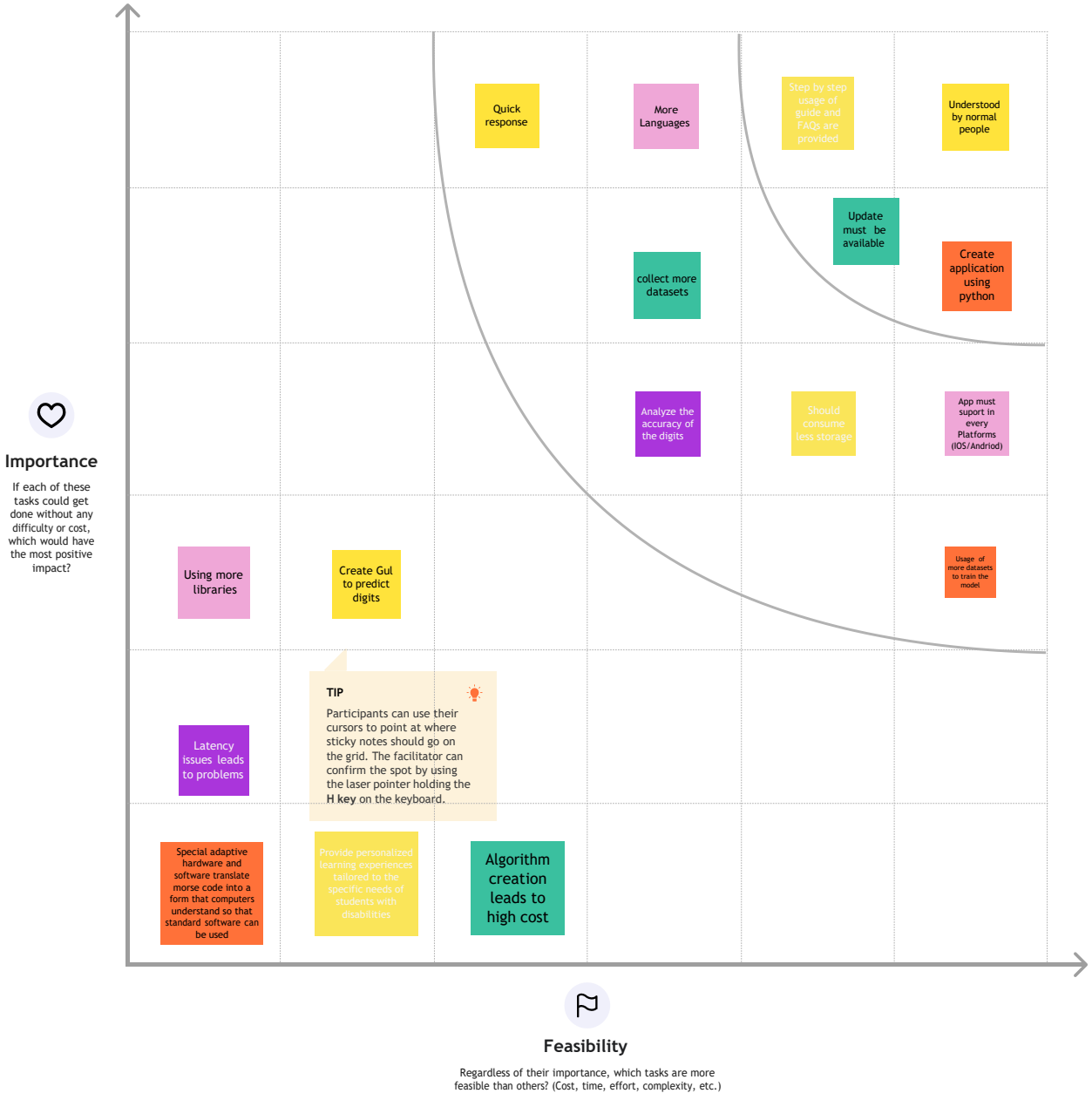
3.1 EMPATHY MAP CANVAS:



3.2 IDEATION & BRAINSTORMING :



PRIOROTIZING IDEAS:

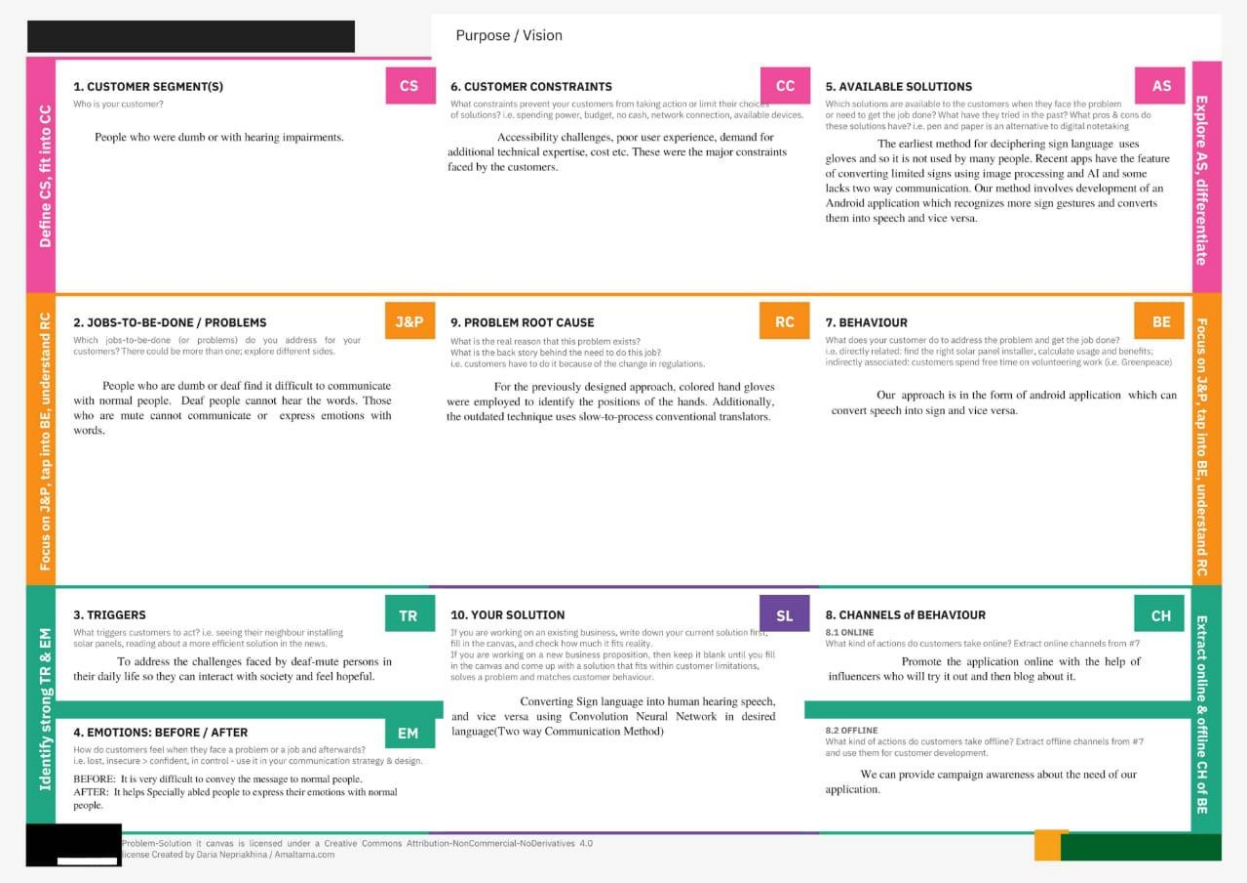


3.3 PROPOSED SOLUTION :

The motive of our application is to make deaf-dumb people communicate easily with the

S.No	Parameter	Description
1	Problem statement (problem to be solved)	To address the challenges faced by deaf-mute persons in their daily life so they can interact with society and feel hopeful.
2	Idea / Solution description	Converting Sign language into human hearing speech, and vice versa using Convolution Neural Network in desired language(Two way Communication Method).
3	Novelty / Uniqueness	Deploying and improving our solution to provide Faster response in Desired language.
4	Social Impact / Customer Satisfaction	• The Application provides good Interfacing. • Improves the Communication between Normal People and Deaf-Dumb. • It leads to the development of technologically advanced society. • It will shatter all the barriers and will help to enhance their skills in a positive manner.
5	Business Model (financial Benefit)	• We will provide campaign awareness about the need of our application. • The application will be made available to more recipients, which will accelerate growth.
6	Scalability of Solution	• The user will find it very simple to use and update. • Encoding the errors and decoding with better accuracy.

people by the help of real-time system.



3.3 PROBLEM SOLUTION FIT:

4 REQUIREMENT ANALYSIS:

4.1 FUNCTIONAL REQUIREMENT:

- System is presented as black box
- Hearing impaired is the person that performs the signs
- Normal hearing is the passive user of the system The System Requirements Can Be Specified

1. Hearing impaired person should be able to perform sign that represent digit number
2. Hearing impaired person should be able to perform sign that represent alphabet letter 29
3. Hearing impaired person should be able to perform sign that represent word

4. Hearing impaired person should be able to perform sign that represent sentence
5. Hearing impaired person should be able to see the translation of sign to text
6. Hearing impaired person should be able to change the component (number/alphabet or word/sentence) for which translation to speech is provided

NORMAL FLOW :

1. User comes in front of camera and performs the alphabet letter
2. System analyzes the performed sign
3. System shows the sign meaning as text and speech

ALTERNATIVE FLOWS :

- System indicates that user is not within field of view of Kinect

1. System shows that user is not detected

2. User enters the field of view

3. System shows that user is detected

- Sign not recognized

1. System does not react to indicate that sign was not recognized

2. User performs again the alphabet letter until it is recognized

- Enabling speech for this component:

1. Enable speech component

4.2 NON FUNCTIONAL REQUIREMENT:

NFR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The designed system is easy to use for specially abled persons as it is portable and platform independent.
NFR-2	**Security**	Converted information using signs into speech is accessed only by the user.
NFR-3	**Reliability**	System is tested with large number of data and Provides insight into issues.
NFR-4	**Performance**	Quick Launch time of application and faster in converting signs into speech

NFR-5	**Availability**	Provides automatic recovery and user access.
NFR-6	**Scalability**	Standard network condition the device should convert information within second.

5. PROJECT DESIGN:

5.1 DATA FLOW DIAGRAM:

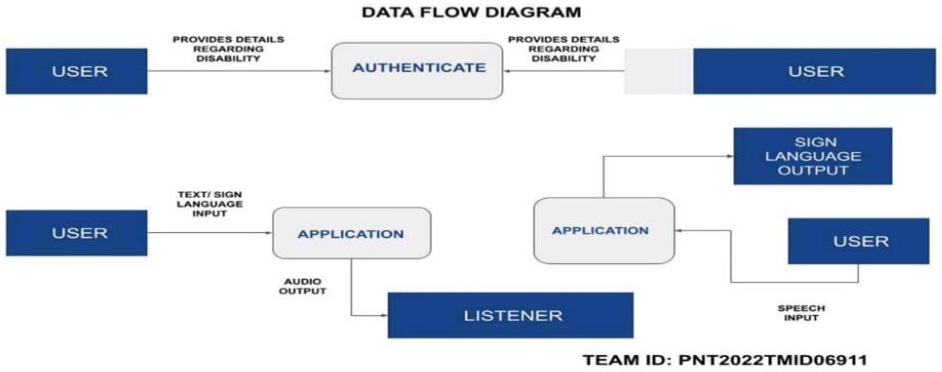
A data flow diagram is a traditional visual representation of the information flow within a system. It shows how data enters and leaves the system. It uses defined symbols like rectangles, circles and arrows, plus short text labels, to show data inputs, outputs, storage points and the routes between each destination.

Project Design Phase-II
Data Flow Diagram

Date	15 October 2022
Team ID	PNT2022TMID06911
Project Name	Real Time communication system powered by AI for Specially Abled
Maximum Marks	4 Marks

Data Flow Diagrams:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.



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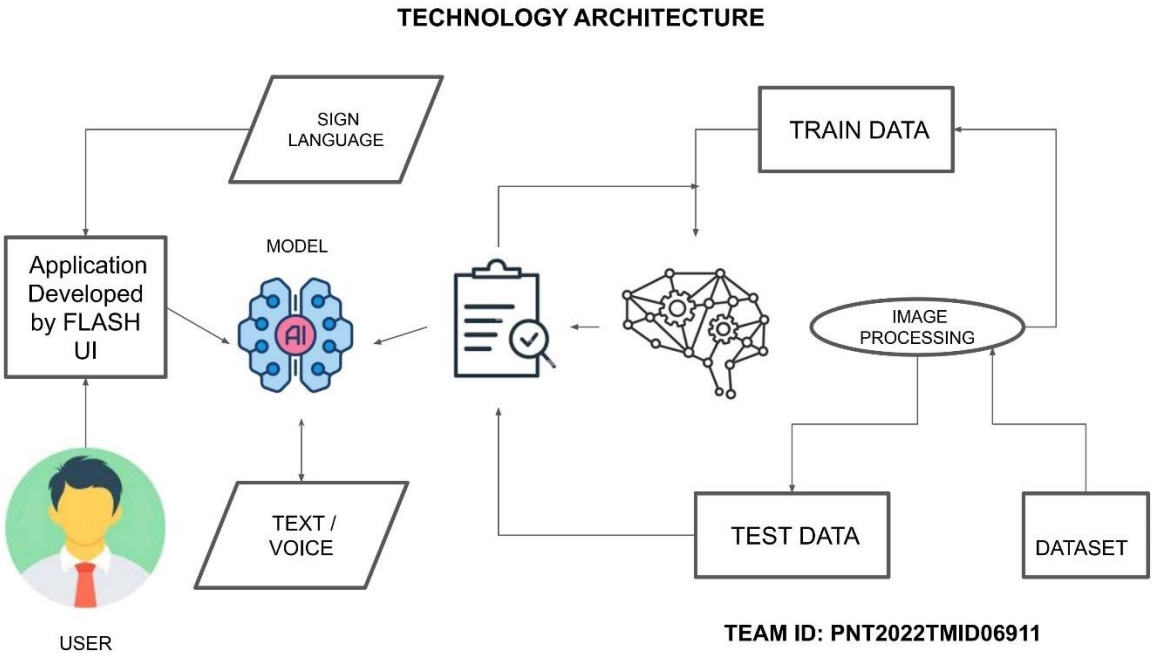
User Stories

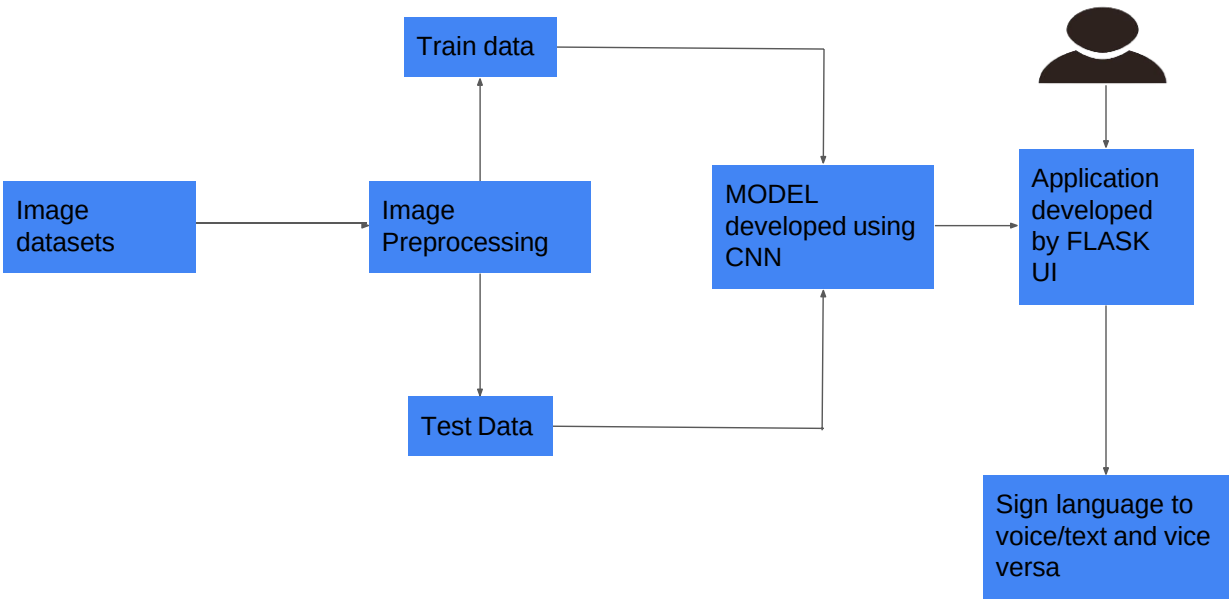
User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Deaf people)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can registered my account.	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can received confirmation gmail & click confirm.	High	Sprint-2
	Login	USN-3	As a user, I can log into the application through gmail .	I can registered & access the dashboard with gmail Login.	Low	Sprint-1
		USN-4	As a user, I can see my application and made changes in any browsers.	I can login and see my Account at anywhere.	Medium	Sprint-2
	Dashboard	USN-5	As a user, I can create my account in a given dashboard.	I can access my account / Dashboard.	High	Sprint-1
Customer (Dumb people)	Registration	USN-6	As a User, I can regiser my application through gmail.	I can registered my account .	High	Sprint-2
		USN-7	As a User, I can receive confirmation mail and get verification code from OTP and gmail.	I can received confirmation mail & click confirm.	Low	Sprint-2
	Login	USN-8	As a User, I can log into my account by any web browsers.	I can login and see my account.	Medium	Sprint-1
	Dashboard	USN-9	As a User, I can create my account in a given Dashboard.	I can created my account & access into dashboard.	High	Sprint-2
Customer care Executive	User interface	USN-10	Professional responsible for user requirements & Needs.	Communicate and resolve customer complaints.	High	Sprint-1
Administration	Objective	USN-11	The goal is to describe all the inputs and outputs.	Leading customer Fields from admin.	High	Sprint-2
Cyber Security	privacy	USN-12	The developed application should be secure for the users .	The application is fully managed.	High	Sprint-3

5.2 SOLUTION AND TECHNICAL ARCHITECHTURE:

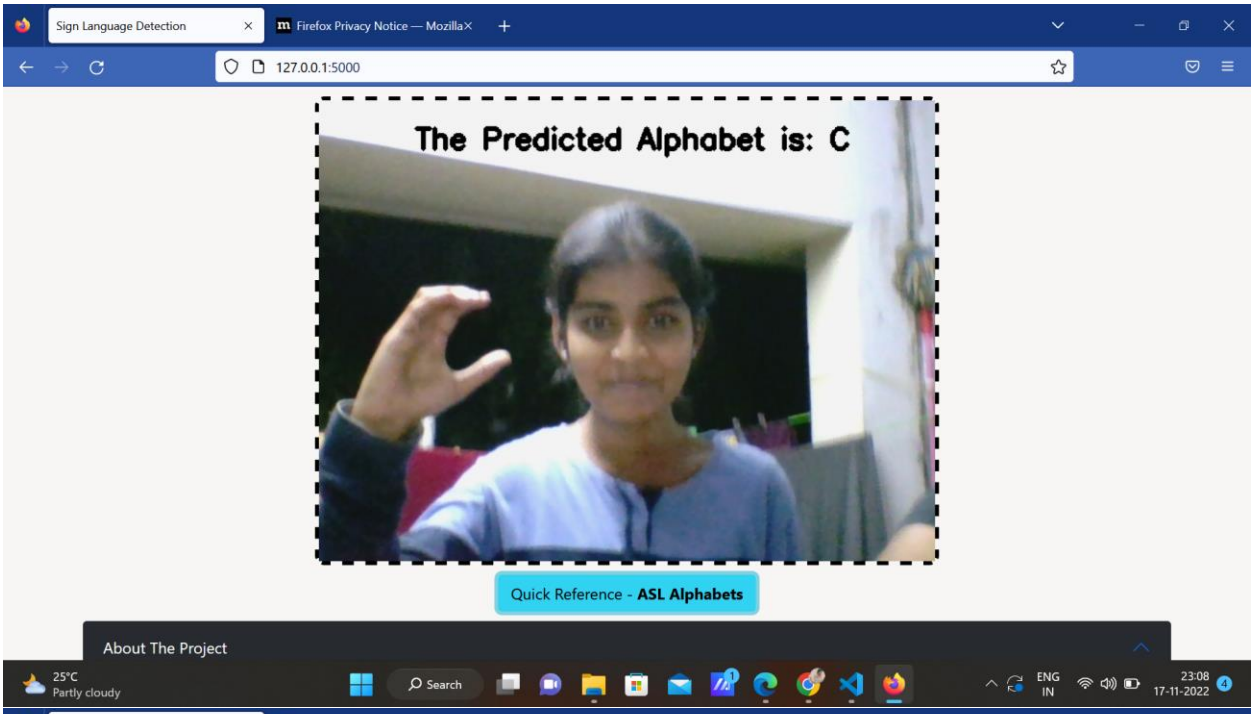


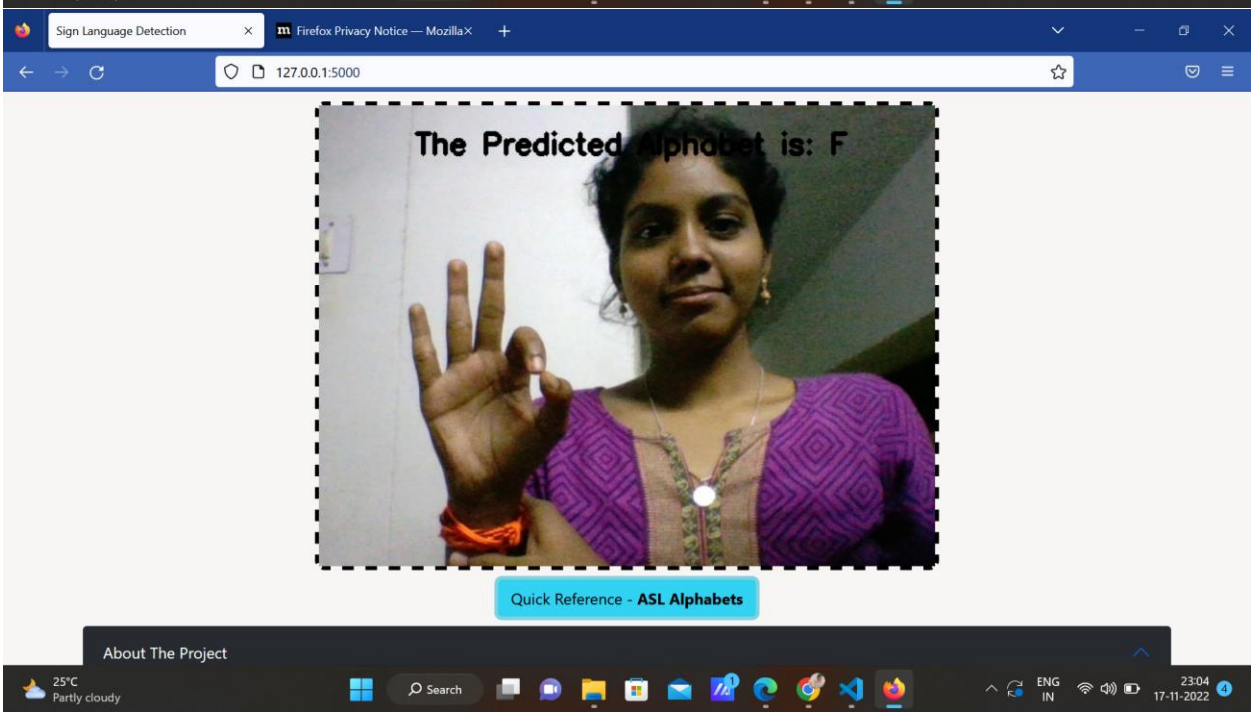
SOLUTION ARCHITECTURE:

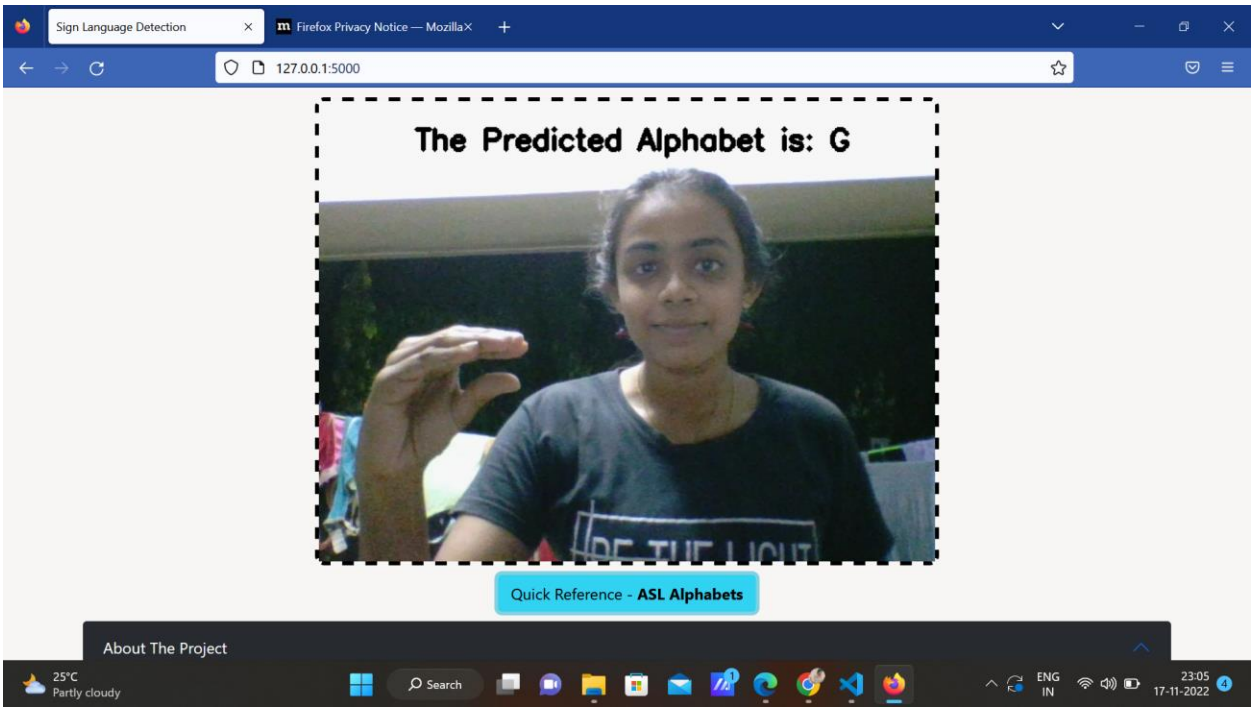
Real-Time Communication System Powered By AI For Specially Abled - Solution Architecture



PREDICTED OUTPUT:-







GitHub link:

https://github.com/IBM-EPBL/IBM-Project-7023-1658845349