PROJECT REPORT

REAL TIME COMMUNICATION SYSTEM POWERED

BY AI FOR SPECIALLY ABLED

Submitted by

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Real-Time Communication System Powered By AI

For Specially Abled

1. INTRODUCTION

1.1 Project Overview

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. Communication 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 in 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.

1.2 Purpose

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.Our objective is to blend deaf and dumb within society and make them able to use their personal computers more effectively and efficiently. Our idea is to create sign assistance, like many applications which are using voice assistance such as Siri on iOS and Cortana on windows. There is a need to develop an application that will create an interactive platform where the sign language can be translated to voice output and writing, and voice and writing input can also be converted to sign language. The bigger picture is creating an interactive model of communication for deaf and dumb people. Developing an app will support this vulnerable society of impaired people and enhance communication among people. The application will allow ease in communication, improving their interaction, and hence

better life. This project will be a noble cause and translating the sign language into understandable words is the goal.

2. LITERATURE SURVEY

2.1 Existing Problem

The challenge faced by dumb and deaf people while communicating with the system in work place , since they cannot hear it, dangerous to go places alone because they cannot hear car, bikes, or other people coming. They cannot adapt to the surrounding environment quickly and respond to other normal people and expressing themselves is hard. The process of this application can be daunting, but the value is priceless. Being able to create something to serve people in need is uncountable. The focus of this research is to answer questions related to sign recognition. Therefore, we narrow the project to align with this application that will be developed by artificial intelligence to make the right decisions. These trees will be based on images in the database to define our system in a more efficient and effective method to reach the optimal decision. Several questions considered as research questions, which are :

What will happen when the application recognizes the image?

What is the process of recognition of the image by the application?

How is the image recognized by the application?

The Upcoming contents will provide theoretical background of the real time communication for the specially disabled person using artificial intelligence.

2.2 References

- Bayan Mohammed Saleh, Reem Ibrahim Al-Beshr, Muhammad Usman Tariq(September 2020),D-Talk: Sign Language Recognition System for People with Disability using Machine Learning and Image Processing
- Feng Wen, Zixuan Zhang, Tianyi Yi He, Chengkuo Lee(September 2021),AI enabled sign language recognition and VR space bidirectional communication using triboelectric smart glove
- Cecily Morrison, Edward Cutrell, Anupama Dhareshwar, Kevin Doherty, AnjaThieme, Alex Taylo(October 2021),Imagining Artificial Intelligence Applications with People with Visual Disabilities using Tactile Ideation.
- Shari Trewin, Sara Basson, Michael Muller, Stacy Branham, Jutta Treviranus, Daniel Gruen, Daniel Hebert, Natalia Lyckowski, Erich Manser(September 2019),Considerations for AI Fairness for People with Disabilities.
- Nihal Ouherrou, Oussama Elhammoumi, Fatima Ezzahra Ben Marrakchi, Jamal El Kafi(January 2019),Comparative study on emotions analysis from facial expressions in children with and without learning disabilities in a virtual learning environment.
- Murat Arican, Kemal Polat, Kemal Pola(February 2020),Binary particle swarm optimization (BPSO) based channel selection in the EEG signals and its application to speller systems.
- Shari Trewin(November 2018),AI Fairness for People with Disabilities: Point of View
- Oberdan R. Pinheiro, Lynn R. G. Alves, M. F. M. Romero, Josemar R. de Souza(December 2016),Wheelchair simulator game for training people with severe disabilities.
- Trishan Panch, Peter Szolovits, Rifat Atun(October 2018),Artificial intelligence,

machine learning and health systems.

- Matjaz Gams, Irene Yu-Hua Gu, Aki Härmä, Andrés Muñoz, Vincent Tam(January 2019),Artificial intelligence and ambient intelligence.
- Yuankai Zhou, Maoliang Shen, Xin Cui, Yicheng Shao, Lijie Li, Yan Zhang(February 2019),Triboelectric nanogenerator based self-powered sensor for artificial intelligence.
- Sora Park, Justine Humphry(April 2019),Exclusion by design: intersections of social, digital and data exclusion.
- Xiaoyi Zhang, Harish Kulkarni, Meredith Ringel Morris(May 2017),Smartphone-Based Gaze Gesture Communication for People with Motor Disabilities.
- Monique A. S. Lexis, Gert Jan Gelderblom, Rianne M. L. Janssens,Luc P. de Witte(September 2015),Robots and ICT to support play in children with severe physical disabilities: a systematic review.
- Eying Wu, Peng Zhang, Tun Lu, Hansu Gu, Ning Gu(May 2017),Behavior prediction using an improved Hidden Markov Model to support people with disabilities in smart homes.
- Sumit Soman, B.K. Murthy(February 2015),Using Brain Computer Interface for Synthesised Speech Communication for the Physically Disabled.
- Nancy C Brady, Susan Bruce, Amy Goldman, Karen Erickson, Beth Mineo, Bill T Ogletree, Diane Paul, Mary Ann Romski, Rose Sevcik, Ellin Siegel, Judith Schoonover, Marti Snell, Lorraine Sylvester, Krista Wilkinson(March 2016),Communication Services and Supports for Individuals With Severe Disabilities: Guidance for Assessment and Intervention.
- Sharmila A, Saini A, Choudhary S, Yuvaraja T, Rahul S.G.(November 2019),Solar Powered Multi-Controlled Smart Wheelchair for Disabled: Development and Features.
- Ing-JrDing, Rui-Zhi Lin, Zong-Yi Lin(February 2018),Service robot system with integration of wearable Myo armband for specialised hand gesture human–computer interfaces for people with disabilities with mobility problems.
- Stefan Johansson, Jan Gulliksen, Catharina Gustavsso(March 2020),Disability

digital divide: the use of the internet, smartphones, computers and tablets among people with disabilities in Sweden**.**

2.3 Problem Statement Definition

- Communication plays a significant role in making the world a better place. Communication creates bonding and relations among the people, whether persona, social, or political views. Most people communicate efficiently without any issues, but many cannot due to disability. They cannot hear or speak, which makes Earth a problematic place to live for them. Even simple basic tasks become difficult for them. Disability is an emotive human condition. It limits the individual to a certain level of performance. Being deaf and dumb pushes the subject to oblivion, highly introverted. In a world of inequality, this society needs empowerment. Harnessing technology to improve their welfare is necessary. In a tech era, no one should be limited due to his or her inability. The application of technology should create a platform or a world of equality despite the natural state of humans. On the other hand, technology is the most innovative thing on Earth because every time the clock ticks, researchers, software engineers, programmers, and information technology specialists are always coming up with bright ideas to provide convenience to everyone. This paper shows how artificial intelligence is being used to help people who are unable to do what most people do in their everyday lives. Aligned with communication, D-talk is a system that allows people who are unable to talk and hear to be fully understood and for them to learn their language easier and also for the people that would interact and communicate with them. This system provides detailed hand gestures that show the interpretation at the bottom so that everyone can understand them. This research allows the readers to learn the system and what it can do to people who are struggling with what they are not capable of and will provide the technical terms on how the system works.

- Sign language recognition, especially sentence recognition, is of great

significance for lowering the communication barrier between the hearing/speech impaired and the non-signers. The general glove solutions, which are employed to detect motions of our dexterous hands, only achieve recognizing discrete single gestures (i.e., numbers, letters, or words) instead of sentences, far from satisfying the meet of the signers' daily communication. Here, we propose an artificial intelligence enabled sign language recognition and communication system comprising sensing gloves, deep learning block, and virtual reality interface. Non-segmentation and segmentation assisted deep learning models achieve the recognition of 50 words and 20 sentences. Significantly, the segmentation approach splits entire sentence signals into word units. Then the deep learning model recognizes all word elements and reversely reconstructs and recognizes sentences. Furthermore, new/never-seen sentences created by new-order word elements recombination can be recognized with an average correct rate of 86.67%. Finally, the sign language recognition results are projected into virtual space and translated into text and audio, allowing the remote and bidirectional communication between signers and non-signers.

- There has been a surge in artificial intelligence (AI) technologies co-opted by or designed for people with visual disabilities. Researchers and engineers have pushed technical boundaries in areas such as computer vision, natural language processing, location inference, and wearable computing. But what do people with visual disabilities imagine as their own technological future? To explore this question, we developed and carried out tactile ideation workshops with participants in the UK and India. Our participants generated a large and diverse set of ideas, most focusing on ways to meet needs related to social interaction. In some cases, this was a matter of recognizing people. In other cases, they wanted to be able to participate in social situations without foregrounding their disability..

- In society today, people experiencing disability can face discrimination. As artificial intelligence solutions take on increasingly important roles in decision-making and interaction, they have the potential to impact fair treatment of people with disabilities in society both positively and negatively. We describe some of the opportunities and risks across four emerging AI application areas: employment, education, public safety, and healthcare, identified in a workshop with

participants experiencing a range of disabilities. In many existing situations, non-AI solutions are already discriminatory.

- Children with Learning Disabilities (LDs) show some emotional difficulties and behavioural problems in the classroom compared with their peers without LDs. Emotions constitute an important part of the learning process. Recent evidence suggests that the use of Information and Communication Technology (ICT) in special education permits to remove barriers in learning for the target children. Besides, it offers a learning environment for a diversity of emotional experiences. In this present study, we explored the benefits of ICT use to identify the ways in which emotions are involved during the learning process in Virtual Learning Environments (VLE).
- Social participation of people with disabilities has increased with state-supported projects recently. However, even in neuromuscular diseases such as Motor Neurone Disease (MND), Full Sliding Status (TSD), even the communication skills of individuals are interrupted. Brain-Computer Interfaces (BBA), which have a few decades of history and an increasing number of studies with exponential momentum, are being developed to enable individuals with such disorders to communicate with their environment. Spelling systems are BBA systems that detect the letters that the person focuses on the matrix of letters and numbers on a screen and convert them into text through the application.
- We consider how fair treatment in society for people with disabilities might be impacted by the rise in the use of artificial intelligence, and especially machine learning methods. We argue that fairness for people with disabilities is different to fairness for other protected attributes such as age, gender or race. One major difference is the extreme diversity of ways disabilities manifest, and people adapt. Secondly, disability information is highly sensitive and not always shared, precisely because of the potential for discrimination. Given these differences, we explore definitions of fairness and how well they work in the disability space. Finally, we suggest ways of approaching fairness for people with disabilities in AI applications
- People with motor and neurological impairments have little control over parts of their bodies, so they have great difficulty in walking. The development of

solutions based on assistive technology dedicated to people with severe motor disabilities can provide accessibility and mobility, the intelligent wheelchair is an example of this type of technology. However, its use without proper training can be dangerous, a wheelchair simulator game can be a good tool for training people with severe disabilities. The EEG signals can be used as a source of information that allows communication between the brain and an intelligent wheelchair. This research aimed to develop a computer model to categorise electroencephalogram signals and control a virtual wheelchair using motor imagery of the left and right wrists, both wrists and both feet. Signs of electroencephalogram were acquired through the eegmmidb database - EEG Motor Movement/Imagery Dataset, captured by the BCI2000 system, and electroencephalogram signal samples from 10 individuals were used to validate the model. The techniques used are promising, making possible its use in three-dimensional simulation environments for intelligent wheelchairs controlled by a brain-computer interface.

- Globally, health systems face multiple challenges: rising burden of illness, multimorbidity and disability driven by ageing and epidemiological transition, greater demand for health services, higher societal expectations and increasing health expenditures. A further challenge relates to inefficiency, with poor productivity. These health system challenges exist against a background of fiscal conservatism, with misplaced economic austerity policies that are constraining investment in health systems. Fundamental transformation of health systems is critical to overcome these challenges and to achieve universal health coverage (UHC) by 2030. Machine learning, the most tangible manifestation of artificial intelligence (AI) – and the newest growth area in digital technology – holds the promise of achieving more with less, and could be the catalyst for such a transformation. But the nature and extent of this promise has not been systematically assessed. To date, the impact of digital technology on health systems has been equivocal. Is AI the ingredient for such a transformation, or will it face the same fate as earlier attempts at introducing digital technology? In this paper, we explore potential applications of AI in health systems and the ways in which AI could transform health systems to achieve UHC by improving efficiency, effectiveness, equity and responsiveness of public health and health care

services.

- Ambient intelligence (AmI) is intrinsically and thoroughly connected with artificial intelligence (AI). Some even say that it is, in essence, AI in the environment. AI, on the other hand, owes its success to the phenomenal development of the information and communication technologies (ICTs), based on principles such as Moore's law. In this paper we give an overview of the progress in AI and AmI interconnected with ICT through information-society laws, superintelligence, and several related disciplines, such as multi-agent systems and the Semantic Web, ambient assisted living and e-healthcare, AmI for assisting medical diagnosis, ambient intelligence for e-learning and ambient intelligence for smart cities. Besides a short history and a description of the current state, the frontiers and the future of AmI and AI are also considered in the paper.
- Triboelectric nanogenerator based sensors have excellent material compatibility, low cost, and flexibility, which is a unique candidate technology for artificial intelligence. Triboelectric nanogenerators effectively provide critical infrastructure for a new generation of sensing systems that collect information by large amounts of self-powered sensors. This review mainly discusses capability and prospect of triboelectric nanogenerators being applied to intelligent sports, security, touch control, and document management systems. The above fields have paid increasing attention in artificial intelligence technologies, such as machine learning, big data processing and cloud computing, demanding huge amounts of sensors and complicated sensor networks.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

Think and Feel	Frustrated by not being able to share things	Wanting others to understand us	Needing a fair communication medium

Hear	Talk or hear with no mouth or ears	Comfortable communication	Lead a normal life like everyone
Say and Do	Finding equipments	Exercising sign language	I want some device reliably
See	Something to help us	Cross communication tool	Equipment to overcome disabilities
Pain	Lack of tech knowledge	Obstacles in making product available	Not convenient
Gain	Can communicate	Can experience	Can accomplish

3.2 Ideation & Brainstorming

Ideation is often closely related to the practice of brainstorming, a specific technique that is utilised to generate new ideas. A principal difference between ideation and brainstorming is that ideation is commonly more thought of as being an individual pursuit, while brainstorming is almost always a group activity.

Ideas :

Thangamari S	AI for Accessibility program uses the potential of Artifcial Intelligence to develop solutions to many physical and cognitive challenges	Making design widely accessible also ends up being good for those without a disability	Assistive or enabling technology includes devices, tools, hardware, or software, which enable, partially,etc
Priya S	By the action of a person it can detect the meaning	The development of speech-to-text and text-to-speech	Social robots, which are made to interact with humans, can

		technology provides even more interactive	help teach social and educational skills.
Shree sorna V	speak directly to the person rather than the person with them.	let the person know you are having difculty; try asking yes or no questions.	ask the person what will help with communication—the re are different ways to communicate.
Tamizhanbu M	Audio description content for those who are blind or visually impaired	For those with visual impairments, graphic components such as typefaces	Virtual assistants such as Siri and Google Assistant allow consumers to fully utilise their cellphones

3.3 Proposed Solution

s.no	Parameter	Description
1	Problem Statement (Problem to be solved)	Communication between deaf & dumb and normal people is found difficult enough. Because deaf/dumb communicate only through sign language which they know like the back of their hand. But normal people do not have much knowledge in sign language.
2	Idea / Solution description	A conversation engine for deaf and dumb.
3	Novelty / Uniqueness	The engine uses CNN of AI to analyse the images of the person who is using sign language and convert them into voice/text.

4	Social Impact / Customer Satisfaction	Deaf & Dumb finds it easy to communicate freely and the change it made in their life comparing to their past.
5	Business Model (Revenue Model)	There is no country in the world without deaf & dumb. So it is easy to get revenue from it just with word of mouth.
6	Scalability of the Solution	It also added a feature to add new signs and their corresponding meanings and made it available to all other users using the 'Update' feature.

3.4 Problem Solution Fit

s.no.		
1	CUSTOMER SEGMENT	Who is your customer? Deaf & Dumb people (Specially Abled)
2	JOBS-TO-BE-DONE / PROBLEMS	Which jobs-to-be-done (or problems) do you address for your customers? There is a need to develop a system to convert sign language to speech and vice-versa There should be a conversation engine to communicate
3	TRIGGERS	What triggers customers to act? Seeing people isolated Inability to convey their thoughts during emergencies Frustration upon missing opportunities Wish to lead a normal life
4	EMOTIONS	do customers when face Before-Socially secluded, After-Equality, Confident,

		Relieved
5	AVAILABLE SOLUTIONS	Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons what do these solutions have? Learning sign language Interpretation using Hardware components like smart gloves and finger caps Assistive Technologies & Applications
6	BEHAVIOUR	What does your customer do to address the problem and get the job done? BE Text Usage to convey information Use of understandable signs Lip reading
7	PROBLEM ROOT CAUSE	What is the real reason that this problem exists? What is the backstory behind the need to do this job? Everyone does not sign language Inability to communicate normally and effectively Improper interpretation
8	CHANNELS of BEHAVIOUR	What kind of actions do customers take online? What kind of actions do customers take offline? Dependency on a person for communication assistance.

4. REQUIREMENT ANALYSIS

4.1 Functional requirement

This paper presents an understanding of complex hand movements. A framework based on Hidden Markov Models (HMMs) [11] is provided for modeling and recognition of complex gesture trajectories. A detection algorithm is used to detect the hand of the user, and a contour-based hand tracker is developed, which combines condensation and partitioned sampling. The proposed approach can attain automated online identification of hand movements and can effectively reject atypical

movements. The experimental results indicate that the proposed algorithm can produce better results for recognition than the conventional method of hand recognition [12]. The hand gesture recognition system consists of three major parts: palm detection, hand tracking, and trajectory recognition. Figure 5 provides an overview of the hand gesture recognition process. The hand tracking function is enabled when the device senses an open hand in front of the camera; when the user finishes the gesture, the hand gesture classification based on HMM is disabled.

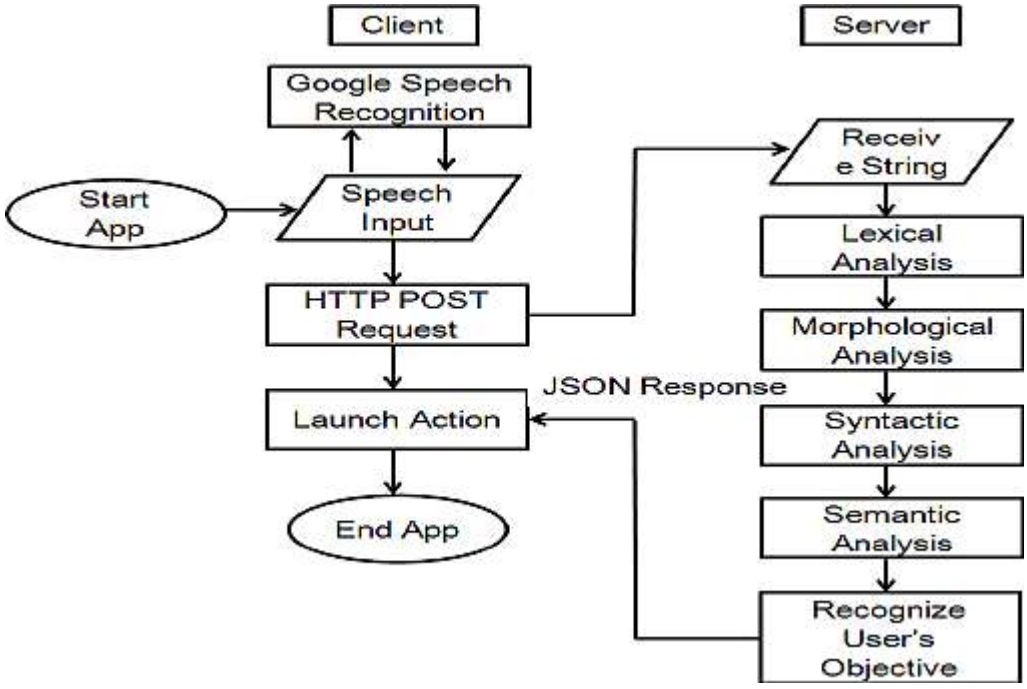
4.2 Non-Functional Requirements

The training phase was based on storing the images in the database. The database contained images of hands, both men and women. The training was based on identifying all possible signs that can be made using one hand. For this purpose, 30 different images with different levels of lights and duration were captured and stored in the database. These images were used as training images that will help in making the right decision for the tasks. The database contained over 1000 images of unique hands and signs.

5. PROJECT DESIGN

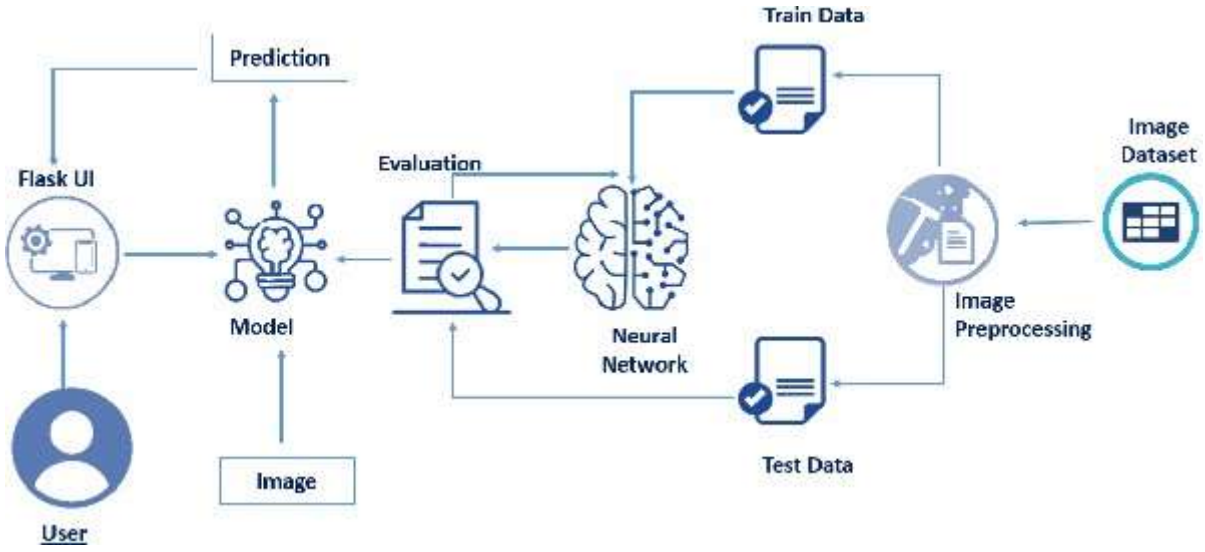
5.1 Data Flow Diagram

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. Example: DFD Level 0 (Industry Standard)



5.2 Solution & Technical Architecture

It is said that in the world there are totally the percentage for the specially disabled are about 15 to 20 % . In which 8.5 % percent of people are deaf, they mostly use sign language as their common tongue.For such people this application is used much widely. by having the sign in front of the camera the program will convert the meaning of the action into speech recognition or into the text format.



5.3 User Stories :

Use the below template to create product backlog and sprint schedule

S.NO	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
1	Data Collection	USN-1	As a user, I can collect the dataset from various resources with different sign languages	10	Low	Chutun kumar

2	Data Pre-processing	USN-2	As a user, I can load the dataset, handling the missing data, scaling and split data into train and test	10	Medium	Pappu kumar
3	Model building	USN-3	As a user, I will get an application with ML model which provides higher accuracy of recognized meaning of the signs	5	High	Suraj Kumar
4	Add CNN layers	USN-4	Creating a model and adding the input, hidden, and output layers to it.	5	High	Prayag Raj
5	Compiling the model	USN-5	With both the training data defined and model defined, it's time to configure the learning process	2	High	Chutun Kumar
6	Train and test the model	USN-6	As a user, let us train our model with our image dataset.	6	Medium	Suraj Kumar
7	Save the model	USN-7	As a user, the model is saved & integrated with an android application or web application in order to predict something.	2	Low	Prayag Raj
8	Building UI Application	USN-8	As a user, I will upload the signs image to the application by clicking a upload button.	5	High	Pappu kumar

						Suraj Kumar
						Prayag Raj
						Chutun Kumar
9		USN-9	As a user, I can know the details of the fundamental usage of the application.	5	Low	Pappu kumar
10		USN-10	As a user, I can see the predicted/ recognized signs in the application.	5	Medium	Suraj Kumar
11	Train the model on IBM	USN-11	As a user, I train the model on IBM and integrate flask.	10	High	Prayag Raj
12	Cloud Deployment	USN-12	As a user ,I can access the web application and make the use of the product from anywhere	10	High	Chutun Kumar

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation:

Estimation is done by the entire team during Sprint Planning Meeting. The objective of the Estimation would be to consider the User Stories for the Sprint by Priority and by the Ability of the team to deliver during the Time Box of the Sprint.

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members

Sprint-1	Data Collection	USN-1	As a user, I can collect the dataset from various resources with different sign languages	10	Low	Pappu kumar
Sprint-1	Data Pre-processing	USN-2	As a user, I can load the dataset, handling the missing data, scaling and split data into train and test	10	Medium	Suraj Kumar
Sprint-2	Model building	USN-3	As a user, I will get an application with ML model which provides higher accuracy of recognized sign languages	5	High	Prayag Raj
Sprint-2	Add CNN layers	USN-4	Creating a model and adding the input, hidden, and output layers to it.	5	High	Chutun Kumar

Sprint-2	Compiling the model	USN-5	With both the training data defined and model defined, it's time to configure the learning process	2	High	Pappu kumar
Sprint-2	Train and test the model	USN-6	As a user, let us train our model with our image dataset.	6	Medium	Suraj Kumar
Sprint-2	Save the model	USN-7	As a user, the model is saved & integrated with an android application or web application in order to predict something.	2	Low	Prayag Raj
Sprint-3	Building UI Application	USN-8	As a user, I will show up the sign infront of the camera.	5	High	Chutun Kumar
Sprint-3		USN-9	As a user, I can know the details of the fundamental usage of the application.	5	Low	Pappu kumar

Sprint-3		USN-10	As a user, I can see the predicted/ recognized digits in the application.	5	Medium	Pappu kumar
Sprint-4	Train the model on IBM	USN-11	As a user, I train the model on IBM and integrate flask .	10	High	Suraj Kumar
Sprint-4	Cloud Deployment	USN-12	As a user ,I can access the web application and make the use of the product from anywhere	10	High	Prayag Raj

6.3 Reports from JIRA:

7. CODING & SOLUTIONING

7.1 Feature 1 :

```
import numpy as np
  import cv2
  import os
  from keras.models import load_model
  from flask import Flask, render_template,
  Response
  import tensorflow as tf
  from gtts import gTTS
  global graph
```

```
global writer
from skimage.transform import resize

graph = tf.get_default_graph()
writer = None

model = load_model('aslpng1.h5')

vals = ['A', 'B', 'C', 'D', 'E', 'F', 'G', 'H', 'I']

app = Flask(__name__)

print("[INFO] Accessing Video Stream...")
vs = cv2.VideoCapture(0)

pred =  " "

@app.route('/')

def index():
   return render_template('index.html')
```

7.2 Feature 2 :

templates

index.html

```
<!DOCTYPE html>
 <html lang="en">
  <head>
   <style>
    * {
     box-sizing:  border-box;
    }
    body {
```

```
      background-image: url({{ url_for('video') }});
      background-repeat: no-repeat;
      background-size:  cover;
     }
     .content {
      position: fixed;
      bottom: 0;
      background: rgba(0, 0, 0, 0.5);
      color: #f1f1f1;
      width: 100%;
      padding: 20px;
     }
     body {
      margin: 0;
      font-family: Arial;
      font-size: 17px;
     }
    </style>
   </head>
   <body>
    <div class="content">
     <h1>Conversation Engine for Deaf and Dumb</h1>
     <p>A Real-Time Communication System Powered By AI For Specially
Abled</p>
    </div>
    <script>
    </script>
   </body>
</html>
```

Code.py

```
  def detect(frame):
      vals = ['A', 'B', 'C', 'D', 'E', 'F', 'G', 'H', 'I']
      img = resize(frame, (64,64,1))
```

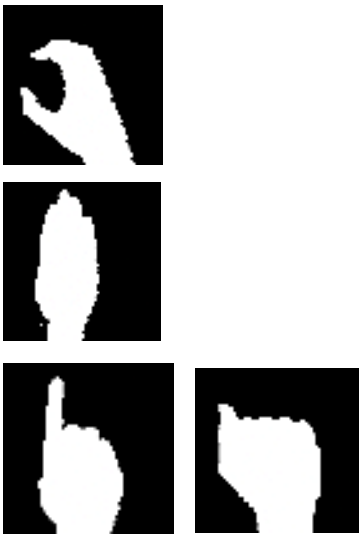
```
    img = np.expand_dims(img,axis=0)
    if(np.max(img) > 1):
      img = img / 255.0
    prediction = model.predict(img)
    pred = vals[np.argmax(prediction)]
    print(pred)
    return pred

@app.route('/video_feed')

def video():
    return Response(gen(), mimetype='multipart/x-mixed-replace;
boundary=frame')

if __name__== '__main__':
    app.run(debug=True)
```

7.3 Database Schema :

Compared to standard algorithms, neural networks can solve somewhat complicated issues at a much easier level about the complexity of algorithms. Neural networks can solve somewhat complicated issues at a much easier level concerning the complexity of algorithms [26, 30]. The neural network builds to mimic human brain neural function but with the mathematical functions [31, 33,38].. It includes three layers, the input layer, many hidden layers, and the output layer [21,39]. The input layer passes data without modification. Hidden layers process the data, and the output layer converts hidden layers to output as a classification. Collecting datasets for training takes time to process [41, 45]. As the number of configuration increases, training samples increase. Most data in the world not uniformly distributed. We need to know what the shapes of the fingers are, where they are located. The software will use a saliency map to guide for locating the object. The location and size will be defined by a bounding box, rectangle shape, which located on corner coordinates.

8. TESTING

8.2 User Acceptance Testing :



9. RESULTS

9.1 Performance Metrics :

As you see if we run this application by showing the appropriate action of the letter infront of the camera it shows the correct answer.

11. CONCLUSION

the real time pllication for the specially disabled using AI has been implemented. the most wqidely used ML algorithms have been trained and tested on the same data in the order azquire the comparison between classifiers.The accuracy of this code is nearly for about 95.3%.

12. FUTURE SCOPE

By this application,the disabled persons can know the sayings of the other disabled persons or the normal persons.So that they can interact with the other people normally.It is a most wnted apllication for the disabled persons The advancement in this field can help us create an environment of safety, awareness and comfort by using these algorithms in day-to-day application and high-level application (i.e., corporate level or Government level). Application-based on artificial intelligence and deep learning is the future of the technological world

because of their absolute accuracy and advantages over many major problems.

13. APPENDIX

Source Code**:**

index.html

```
<!DOCTYPE html>
 <html lang="en">
  <head>
   <style>
    * {
     box-sizing:  border-box;
    }
    body {
     background-image: url({{ url_for('video') }});
     background-repeat: no-repeat;
     background-size:  cover;
    }
    .content {
     position: fixed;
     bottom: 0;
     background: rgba(0, 0, 0, 0.5);
     color: #f1f1f1;
     width: 100%;
     padding: 20px;
    }
    body {
     margin: 0;
     font-family: Arial;
     font-size: 17px;
    }
   </style>
  </head>
  <body>
```

```
    <div class="content">
      <h1>Conversation Engine for Deaf and Dumb</h1>
      <p>A Real-Time Communication System Powered By AI For Specially
Abled</p>
    </div>
    <script>
    </script>
  </body>
</html>
```

Code.py

```
  def detect(frame):
      vals = ['A', 'B', 'C', 'D', 'E', 'F', 'G', 'H', 'I']
      img = resize(frame, (64,64,1))
      img = np.expand_dims(img,axis=0)
      if(np.max(img) > 1):
        img = img / 255.0
      prediction = model.predict(img)
      pred = vals[np.argmax(prediction)]
      print(pred)
      return pred

    @app.route('/video_feed')

    def video():
      return Response(gen(), mimetype='multipart/x-mixed-replace;
    boundary=frame')

    if __name__== '__main__':
      app.run(debug=True)
```

Github Link:

https://github.com/IBM-EPBL/IBM-Project-48282-1660806260

Video Link:
https://drive.google.com/file/d/1ytGM78HTakPduOTw2OQd1QsDWlaGRAmX/view?usp=drivesdk