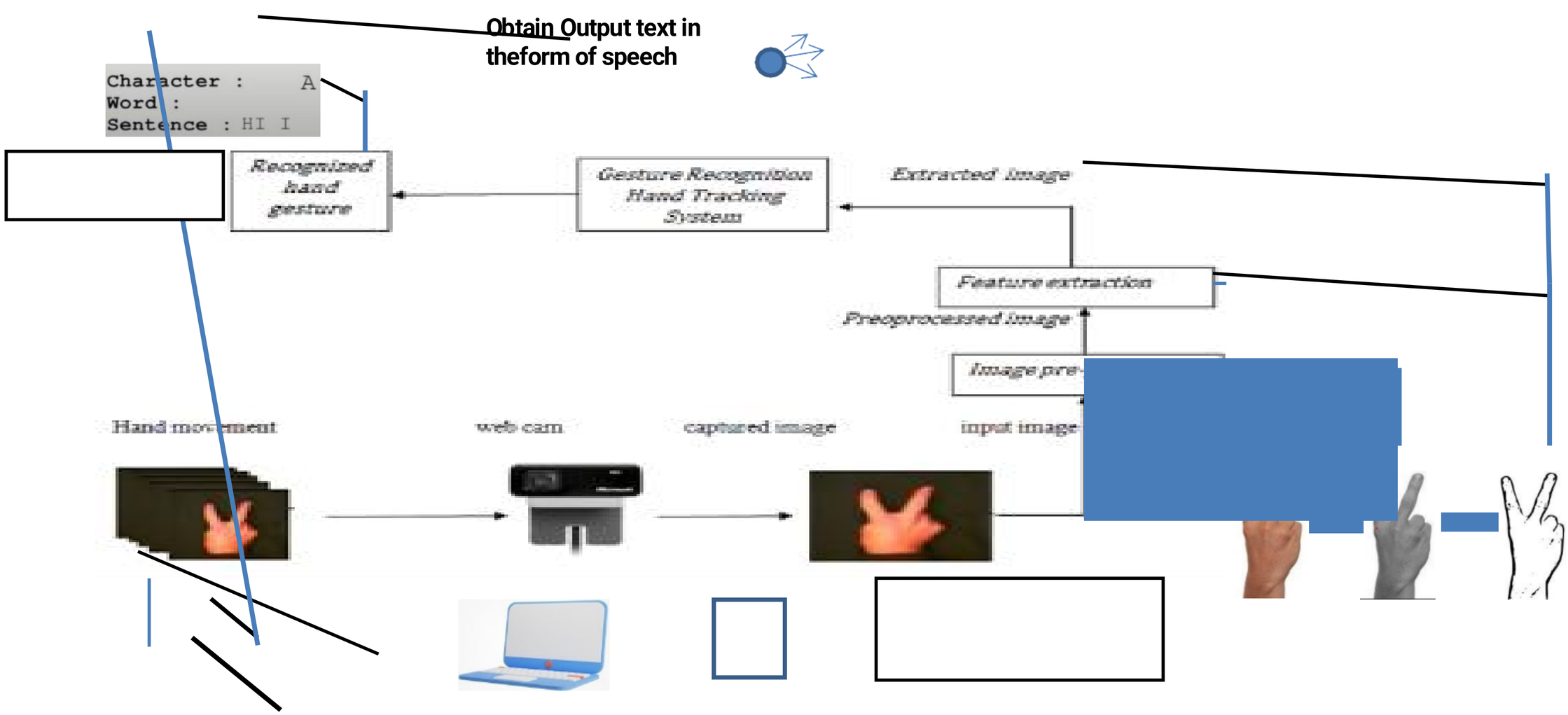
Project Design Phase-II

Technology Stack (Architecture & Stack)

Date	01 November 2022
Team ID	PNT2022TMID46015
Project Name	Project – **Real -Time Communication SystemPowered By AI For Specially Abled**
Maximum Marks	4 Marks

Technical Architecture:


Obtain Output text in theform of speech
Character : A
Word :
Sentence : HI I
Recognized hand gesture
Gesture Recognition Hand Tracking System
Extracted Image
Feature extraction
Preprocessed Image
Image pre-
Hand movement
web cam
captured image
input image

Output text

End-user

User interface

Capture the signwithin ROI

Background is poppedand original sign is extracted

Original

Gaussian blur filter toget

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	How user interacts with application i.e**. Desktop usageand clicking the concerned app.**	HTML, CSS, JavaScript andAngular JS
2.	Application Logic-1	Camera **detects the sign shown by the user**. Captures **the sign within ROI.**	**Adaboost face detector is used** to differentiatebetween faces and hand as both involves similar skin-colour.
3.	Application Logic-2	**Background is popped and original sign is extracted**.	By default, Original image captured is convertedinto Gray-scale image.
4.	Application Logic-3	Extract the **edges of the gray-scale image**.	**Apply Gaussian-blur filter and threshold to the frame taken with Open CV** to get the processedimage after feature-extraction.
5.	Application Logic-4	Convert the **output text into speech**	**The Final text obtained is converted to speechusing the speech assistant implemented ,** which in turn produce sound from speaker.
6.	Database	**Binary Large Object(BLOB)** is the data type used to store theimages in the dataset. /etc/mysql/my.cnf is the default configuration / directories forMYSQL that is used.	**MySQL database** is used.
7.	File Storage	**Create a BLOB column for the image files, whether they beJPEG, PNG, PSD** or whatever, and then load the images into the table/column, created for them.	**Local File system** is used for storing theimages.
8.	Machine Learning Model	**Allows the user to feed a computer algorithm an immense amount ofdata and have the computer analyze and make data-driven recommendations** and decisions based on only the input data	**Supervised and Unsupervised learning modeletc**.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	**Palm detector** operates on full images and outputs anoriented bounding box. **Hand landmark** takes the cropped image defined by the palmdetector and returns 3D hand key points. **Gesture recognizer** then classifies the previously computed key point configuration into a discrete set of gestures	**Media Pipe Framework is used**. Within this framework, the pipeline is built as a directedgraph of modular components.
2.	Scalable Architecture	It's a Three –Tier Architecture comprises the followingtechnology, Convolutional neural network can be scaled in three dimensions: *depth,width, resolution*. **Depth** of the network corresponds to the number of layers in anetwork. **Width** is associated with the number of neurons in a layer. **Resolution** is the image resolution that is being passed to CNN. **Increasing the depth**, by stacking more convolutional layers, allows the network to learn **more complex features**.	**Convolution Neural Networks is used.**
3.	Availability	Hand gestures are **the natural way of interactions when one person is communicating with one another** and therefore handmovements can be treated as a non verbal form of communication. Hand gesture recognition is a process of understanding and classifying meaningful movements by the human hands	**CNN, Media Pipe, Gaussian blur filter, Machine learning models along with Speechassistant** is used.