Project Design Phase-II

Technology Stack (Architecture & Stack)

Date	02 November 2022
Team ID	PNT2022TMID39159
Project Name	Project – **Real -Time Communication System Powered By AI For Specially Abled**
Maximum Marks	4 Marks

Technical Architecture:

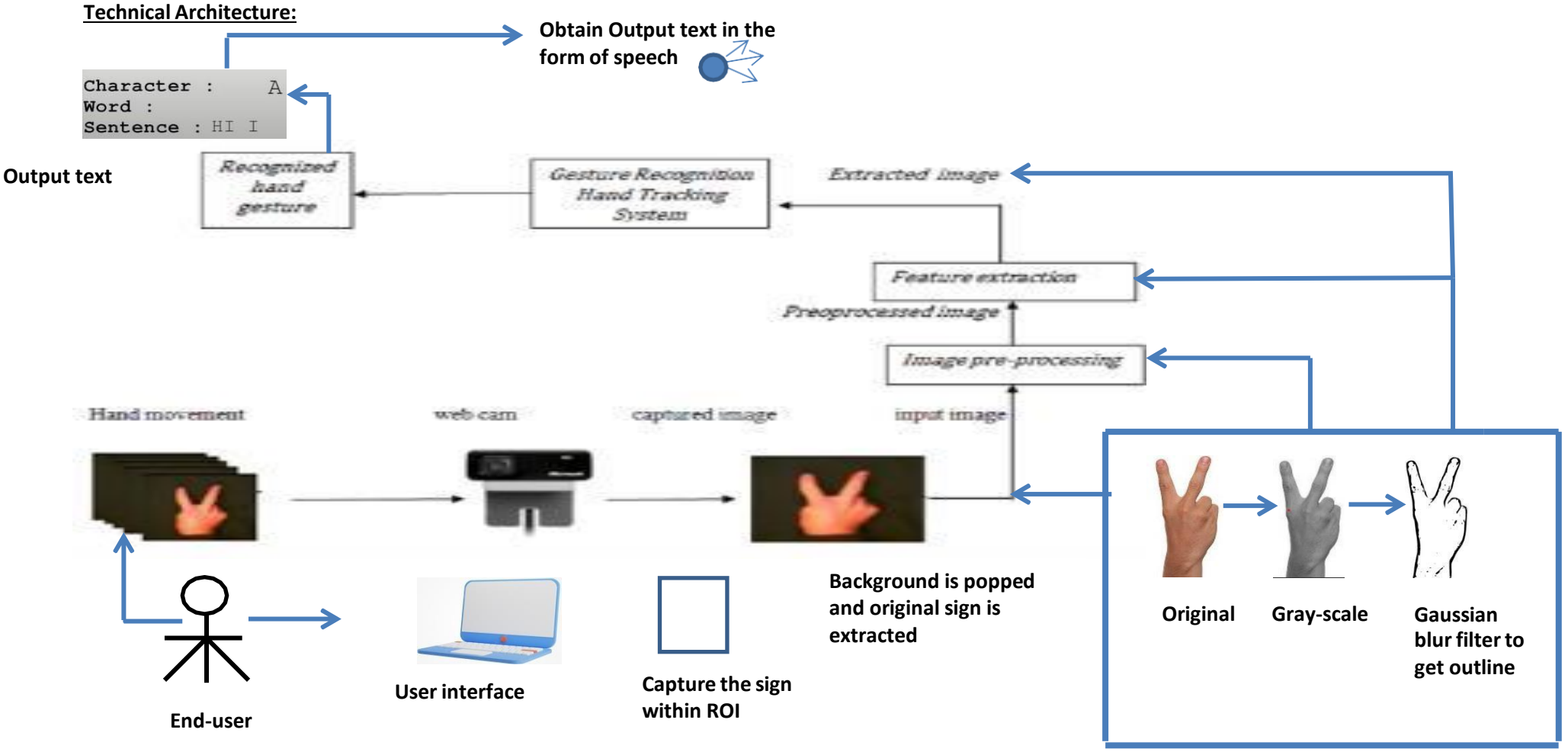

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	How user interacts with application i.e**. Desktop usage and clicking the concerned app.**	HTML, CSS, JavaScript and Angular JS
2.	Application Logic-1	• Camera **detects the sign shown by the user**. • Captures **the sign within ROI.**	**Adaboost face detector is used** to differentiate between 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 converted into 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 processed image after feature-extraction.
5.	Application Logic-4	• Convert the **output text into speech**	**The Final text obtained is converted to speech using the speech assistant implemented ,** which in turn produce sound from speaker.
6.	Database	• **Binary Large Object(BLOB)** is the data type used to store the images in the dataset. • /etc/mysql/my.cnf is the default configuration / directories for MYSQL that is used.	**MySQL database** is used.
7.	File Storage	• **Create a BLOB column for the image files, whether they be JPEG, PNG, PSD** or whatever, and then load the images into the table/column, created for them.	**Local File system** is used for storing the images.
8.	Machine Learning Model	**Allows the user to feed a computer algorithm an immense amount of data and have the computer analyze and make data-driven recommendations** and decisions based on only the input data	**Supervised and Unsupervised learning model etc**.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	• **Palm detector** operates on full images and outputs an oriented bounding box. • **Hand landmark** takes the cropped image defined by the palm detector 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 directed graph of modular components.
2.	Scalable Architecture	• It's a Three –Tier Architecture comprises the following technology, Convolutional neural network can be scaled in three dimensions: *depth, width, resolution*. • **Depth** of the network corresponds to the number of layers in a network. • **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 hand movements 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 Speech assistant** is used.