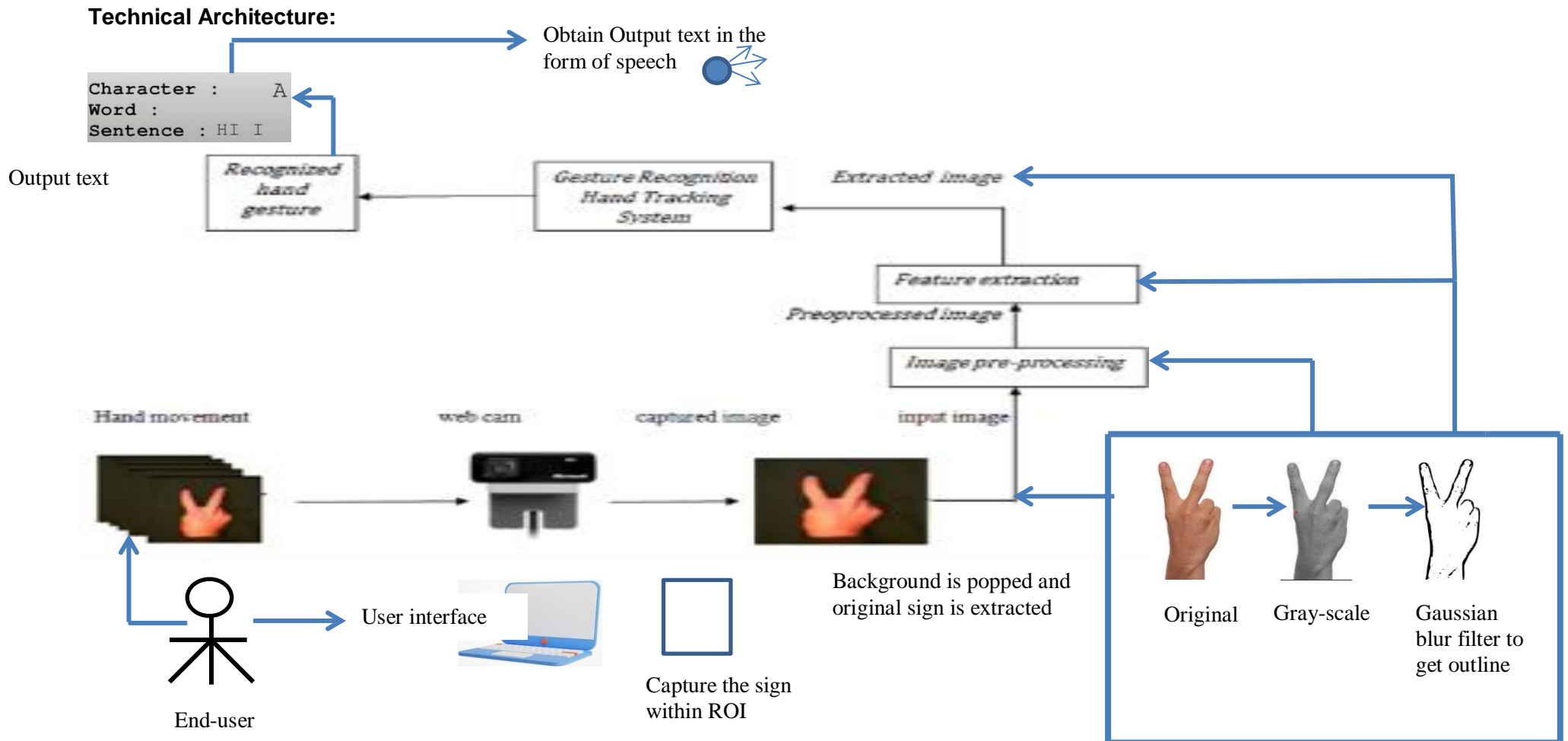


## Project Design Phase-II Technology Stack (Architecture & Stack)

Date	12 October 2022
Team ID	PNT2022TMID37893
Project Name	Project – <b>Real -Time Communication System Powered By AI For Specially Abled</b>
Maximum Marks	4 Marks



**Table-1 : Components & Technologies:**

S.No	Component	Description	Technology
1.	User Interface	How user interacts with application i.e. <b>Desktop usage and clicking the concerned app.</b>	HTML, CSS, JavaScript and Angular JS
2.	Application Logic-1	<ul style="list-style-type: none"><li>• Camera <b>detects the sign shown by the user.</b></li><li>• Captures <b>the sign within ROI.</b></li></ul>	<b>Adaboost face detector</b> is used to differentiate between faces and hand as both involves similar skin-colour.
3.	Application Logic-2	<ul style="list-style-type: none"><li>• <b>Background is popped and original sign is extracted.</b></li></ul>	By default, Original image captured is converted into Gray-scale image.
4.	Application Logic-3	<ul style="list-style-type: none"><li>• Extract the <b>edges of the gray-scale image.</b></li></ul>	<b>Apply Gaussian-blur filter and threshold to the frame taken with Open CV</b> to get the processed image after feature-extraction.
5.	Application Logic-4	<ul style="list-style-type: none"><li>• Convert the <b>output text into speech</b></li></ul>	<b>The Final text obtained is converted to speech using the speech assistant implemented</b> , which in turn produce sound from speaker.
6.	Database	<ul style="list-style-type: none"><li>• <b>Binary Large Object(BLOB)</b> is the data type used to store the images in the dataset.</li><li>• <code>/etc/mysql/my.cnf</code> is the default configuration / directories for MYSQL that is used.</li></ul>	<b>MySQL database</b> is used.
7.	File Storage	<ul style="list-style-type: none"><li>• <b>Create a BLOB column for the image files, whether they be JPEG, PNG, PSD</b> or whatever, and then load the images into the table/column, created for them.</li></ul>	<b>Local File system</b> is used for storing the images.
8.	Machine Learning Model	<b>Allows the user to feed a computer algorithm an immense amount of data and have the computer analyze and make data-driven recommendations</b> and decisions based on only the input data	<b>Supervised and Unsupervised learning model</b> etc.

**Table-2: Application Characteristics:**

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	<ul style="list-style-type: none"> <li>• <b>Palm detector</b> operates on full images and outputs an oriented bounding box.</li> <li>• <b>Hand landmark</b> takes the cropped image defined by the palm detector and returns 3D hand key points.</li> <li>• <b>Gesture recognizer</b> then classifies the previously computed key point configuration into a discrete set of gestures</li> </ul>	<b>Media Pipe Framework is used.</b> Within this framework, the pipeline is built as a directed graph of modular components.
2.	Scalable Architecture	<ul style="list-style-type: none"> <li>• It's a Three –Tier Architecture comprises the following technology, Convolutional neural network can be scaled in three dimensions: <i>depth, width, resolution</i>.</li> <li>• <b>Depth</b> of the network corresponds to the number of layers in a network.</li> <li>• <b>Width</b> is associated with the number of neurons in a layer.</li> <li>• <b>Resolution</b> is the image resolution that is being passed to CNN.</li> </ul> <p><b>Increasing the depth</b>, by stacking more convolutional layers, allows the network to learn <b>more complex features</b>.</p>	<b>Convolution Neural Networks is used.</b>
3.	Availability	<p>Hand gestures are <b>the natural way of interactions when one person is communicating with one another</b> and therefore hand movements can be treated as a non verbal form of communication.</p> <p>Hand gesture recognition is a process of understanding and classifying meaningful movements by the human hands</p>	<b>CNN, Media Pipe, Gaussian blur filter, Machine learning models along with Speech assistant</b> is used.

