Project Design Phase-II

TechnologyStack(Architecture&Stack)

Date	12October2022
TeamID	PNT2022TMID37233
ProjectName	Project–**Real-TimeCommunicationSystem Powered By AI For Specially Abled**
MaximumMarks	4Marks

TechnicalArchitecture:

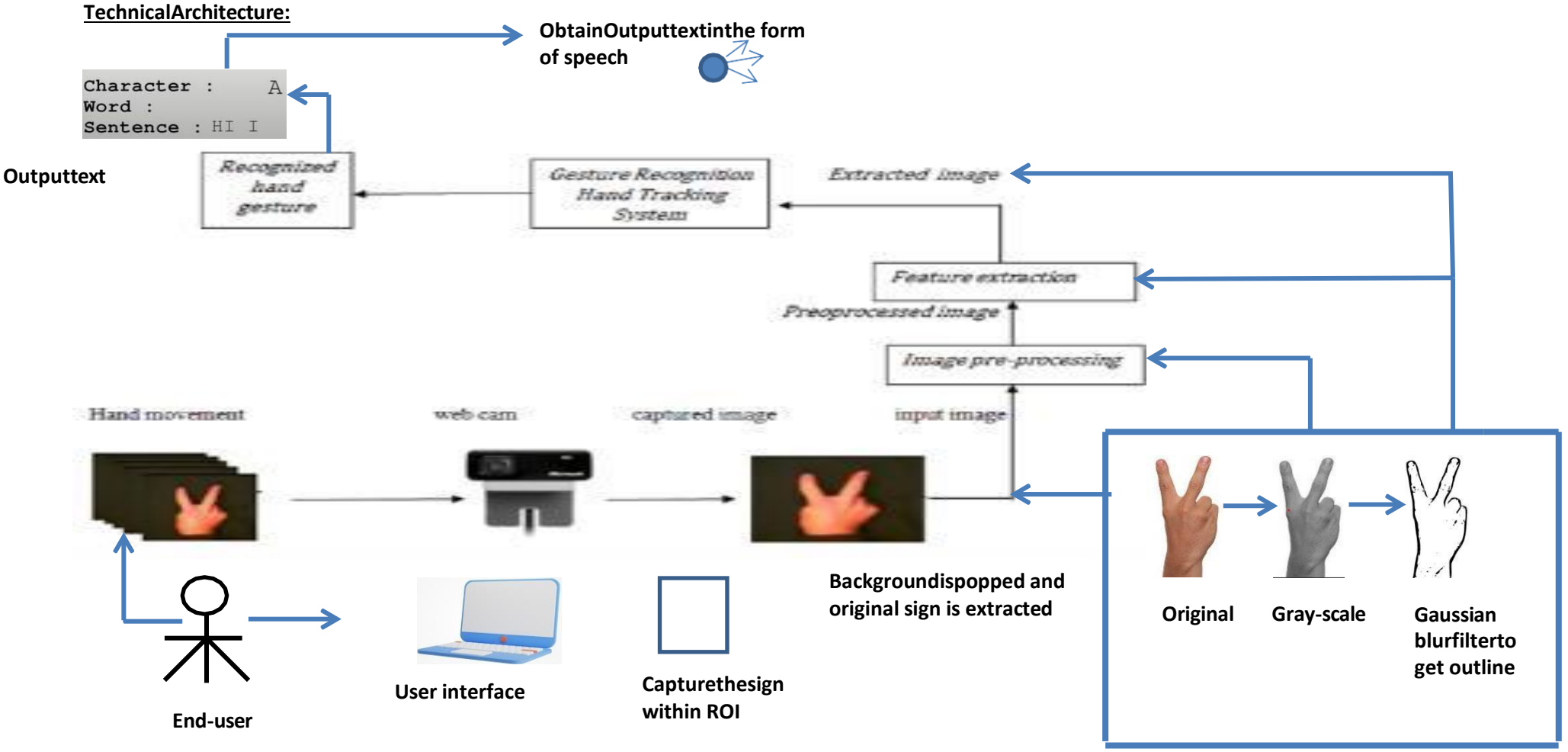

Table-1:Components&Technologies:

S.No	Component	Description	Technology
1.	UserInterface	Howuserinteractswithapplicationi.e**.Desktopusage and clicking the concerned app.**	HTML,CSS,JavaScriptand Angular JS
2.	ApplicationLogic-1	• Camera**detectsthesignshownbytheuser**. • Captures**thesignwithinROI.**	**Adaboostfacedetectorisused**todifferentiate between faces and hand as both involves similar skin-colour.
3.	ApplicationLogic-2	• **Backgroundispoppedandoriginalsignisextracted**.	Bydefault,Originalimagecapturedisconverted into Gray-scale image.
4.	ApplicationLogic-3	• Extractthe**edgesofthegray-scaleimage**.	**Apply Gaussian-blurfilterand threshold to the frametakenwithOpenCV**togettheprocessed image after feature-extraction.
5.	ApplicationLogic-4	• Convertthe**outputtextintospeech**	**TheFinaltextobtainedisconvertedtospeech using the speech assistant implemented ,** whichinturnproducesoundfromspeaker.
6.	Database	• **BinaryLargeObject(BLOB)**isthedatatypeusedtostorethe images in the dataset. • /etc/mysql/my.cnfisthedefaultconfiguration/directoriesforMYSQL that is used.	**MySQLdatabase** isused.
7.	FileStorage	• **CreateaBLOBcolumnfortheimagefiles,whethertheybe JPEG,PNG,PSD**orwhatever,andthen loadtheimages into thetable/column,createdforthem.	**LocalFilesystem**isusedforstoringthe images.
8.	MachineLearningModel	**Allowstheusertofeed acomputeralgorithmanimmenseamountof data and have the computer analyze and make data-driven recommendations** and decisions based on only the input data	**SupervisedandUnsupervisedlearningmodel etc**.

Table-2:ApplicationCharacteristics:

S.No	Characteristics	Description	Technology
1.	Open-SourceFrameworks	• **Palmdetector**operatesonfullimagesandoutputsan oriented bounding box. • **Handlandmark**takesthecroppedimagedefinedbythepalm detector and returns 3D hand key points. • **Gesturerecognizer**thenclassifiesthepreviouslycomputed keypointconfigurationintoadiscretesetofgestures	**Media Pipe Framework is used**. Within this framework,thepipelineisbuiltasadirected graph of modular components.
2.	ScalableArchitecture	• It'saThree–TierArchitecturecomprisesthefollowing technology, Convolutionalneuralnetworkcanbescaledinthreedimensions:*depth, width,resolution*. • **Depth**ofthenetworkcorrespondstothenumberoflayersina network. • **Width**isassociatedwiththenumberofneuronsinalayer. • **Resolution**istheimageresolutionthatisbeingpassedtoCNN. **Increasingthedepth**,bystackingmoreconvolutionallayers, allows the network to learn **more complex features**.	**ConvolutionNeuralNetworksisused.**
3.	Availability	Hand gestures are **the natural way of interactions when one personiscommunicatingwithoneanother**andthereforehand 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 humanhands	**CNN,MediaPipe,Gaussianblurfilter, Machinelearningmodelsalongwith Speech assistant** is used.