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

Date	03 October 2022
Team ID	PNT2022TMID593092
Project Name	Project – Lip Reading using Deep Learning
Maximum Marks	4 Marks

Technical Architecture:

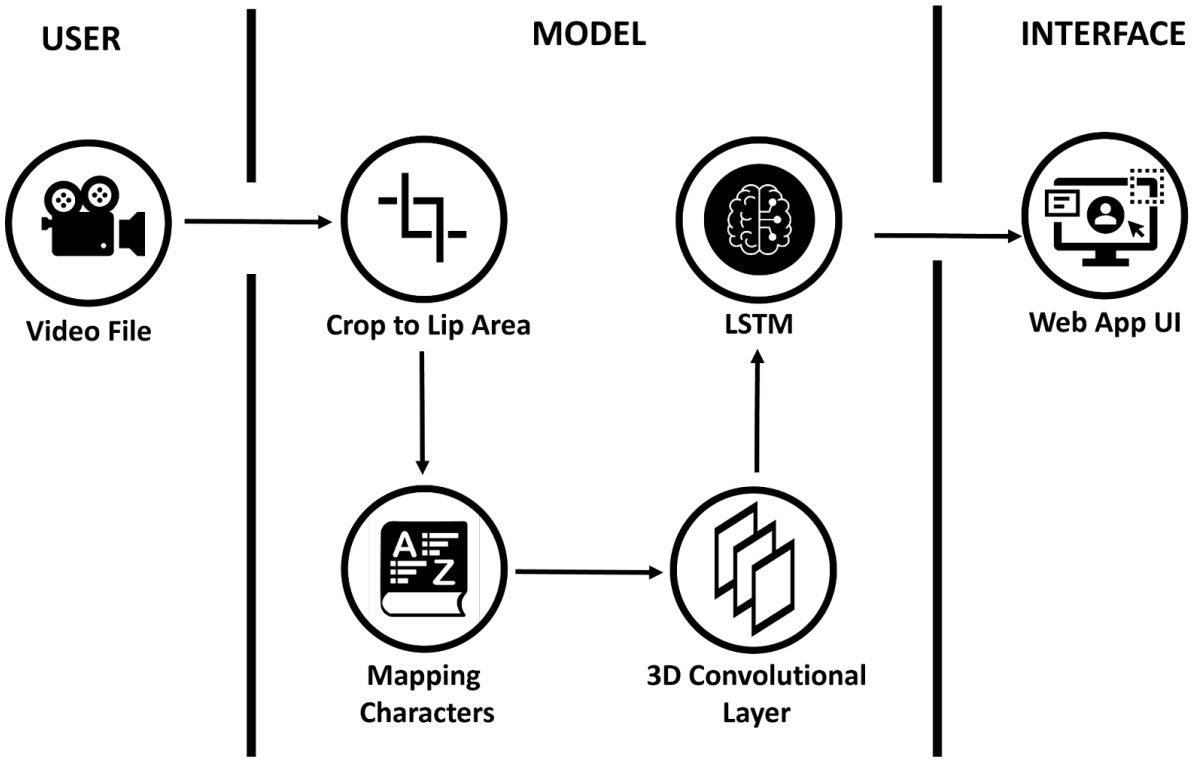

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	Web UI	Streamlit
2.	Language	Coding Language used	Python
3.	Dependencies	Libraries and dependencies	opencv-python, matplotlib, imageio, gdown, tensorflow
4.	Data Handling, processing and pipeline	Video and alignments functions, vocabulary setup and mapping functions and create data pipeline for training	gdown, cv2, tensorflow, numpy, TensorFlow (StringLookup, Matplotlib, Dataset, list_files, shuffle, mappable_function, padded_batch, prefetch)
5.	Deep Neural Network	Design neural network architecture	TensorFlow (Sequential, Conv3D, LSTM, Dense, Dropout, Bidirectional, MaxPool3D, Activation, Reshape, SpatialDropout3D, BatchNormalization, TimeDistributed, Flatten, Adam)
6.	Machine Learning Model	Purpose of Machine Learning Model	Lip Reading Model

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	List the open-source frameworks used	LipNet utilizes TensorFlow, an open-source machine learning framework.
2.	Security Implementations	List all the security / access controls implemented	SHA-256 encryption for secure hashing, IAM controls for access management, and adherence to OWASP standards for web application security.
3.	Scalable Architecture	Justify the scalability of architecture	LipNet employs a scalable architecture, utilizing a microservices approach. The use

			of Bidirectional LSTMs in the deep neural network design supports scalability in handling varying input sizes.
4.	Availability	Justify the availability of application	LipNet integrates Learning Rate Scheduling during training to optimize model convergence, enhancing model availability. Additionally, the use of Model Checkpoints ensures that the model weights are saved, facilitating model recovery and reducing downtime.
5.	Performance	Measures taken to optimize system performance	LipNet incorporates optimization measures such as BatchNormalization and Dropout layers in the deep neural network to improve training performance. The usage of TensorFlow's GPU capabilities further enhances performance by leveraging parallel processing.