

ISLAMIC UNIVERSITY OF TECHNOLOGY



SignAll

SWE 4506: Design Project Lab I

Team 14

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Project Overview

SignAll is a web application designed to enhance communication between individuals with hearing disabilities and those who do not know American Sign Language (ASL). It translates ASL gestures into text and speech in real-time using a webcam, making communication more accessible. Additionally, it includes features like an ASL dictionary, practice quizzes, and an admin panel for updating sign gestures, creating a comprehensive solution for sign language translation.

Motivation Behind The Idea

The motivation behind this project is to bridge the communication gap for individuals who rely on sign language due to speech disabilities. By leveraging machine learning, this system enables users to input sign language gestures via a camera and receive real-time text output, promoting accessibility. The integrated dictionary aids in learning sign language, while the quiz feature reinforces knowledge, creating a comprehensive tool for both learning and communication. This project aims to empower non-verbal individuals, fostering inclusivity and improving their interaction with the wider community.

Key Features

Real-time ASL Translation

- The system can use the webcam to capture hand gestures.
- The system can translate captured gestures into text in real time.
- The system can provide speech output of the translated text.

ASL Dictionary

- Users will be able to search for specific signs in the dictionary.
- Each entry in the dictionary will include a video or image of the ASL gesture.

Practice Quizzes

- Users will be able to take quizzes to practice recognizing ASL gestures.
- The system can provide immediate feedback on quiz performance.

Admin Panel

- Admins will be able to add, update, and delete sign language data.
- Admin actions will be authenticated and restricted.

Tools and Technologies

Frontend

We will build the user interface using **Next.js**, ensuring responsiveness and a clean design with **Tailwind CSS**.

Backend

The backend will be developed using **FastAPI**, a modern web framework that allows us to build and serve the application efficiently.

Machine Learning

We will be using **MediaPipe** for gesture detection and **TensorFlow** for training the machine learning model. The model itself would be based on **MobileNetV2**, optimized for recognizing ASL gestures.

Integration

The trained model will be integrated with the **FastAPI** backend, enabling real-time processing and communication with the frontend. The frontend captures video input via the webcam, which will then be processed by the model to output translated text.

Timeline

Week 1-2 : Requirements gathering

Week 3-5 : Client side user interface development

Week 6-7 : Server side functionalities development

Week 8-10 : Detection model development with MediaPipe TensorFlow

Week 11-12 : Model integration using FastAPI server

Week 13-14 : Training the model on more words