

AI-Powered Sign Language Translator

1. Project Idea:

Communication barriers between individuals who are deaf or hard of hearing and those who do not understand sign language pose significant challenges in education, healthcare, and daily interactions. This project aims to develop an AI-powered sign language translator that uses computer vision and deep learning to recognize and translate sign language gestures into text or speech in real-time. The goal is to improve accessibility and inclusivity for the deaf and hard-of-hearing community.

2. Relevance to Sustainable Development Goals (SDGs):

This project aligns with SDG 4 (Quality Education) by enhancing learning accessibility for students with hearing impairments. It also supports SDG 10 (Reduced Inequalities) by facilitating communication between deaf individuals and the broader society, promoting equal opportunities for education, employment, and social inclusion.

3. Literature Examples:

1. Zhang et al. (2021) developed a real-time sign language recognition system using convolutional neural networks (CNNs) and long short-term memory (LSTM) networks, achieving high accuracy in recognizing American Sign Language (ASL) gestures.
2. Sharma et al. (2020) proposed a deep learning model that translates sign language into text using a combination of CNNs and recurrent neural networks (RNNs), demonstrating significant improvements over traditional image-processing techniques.

4. Describe Your Data:

The project will utilize publicly available sign language datasets, such as Amharic sign language dataset. The data format includes video sequences and image frames of sign gestures. Preprocessing steps will involve frame extraction, background noise reduction, and data augmentation techniques to improve model generalization.

5. Approach (Machine Learning or Deep Learning):

A deep learning approach will be used due to the complexity of recognizing continuous hand gestures and facial expressions. A combination of CNNs for feature extraction and Transformer-based models for sequence prediction will be implemented to ensure high accuracy and real-time performance.