

A Project Report on
Speech to Sign Language

Submitted in partial fulfillment of the requirements

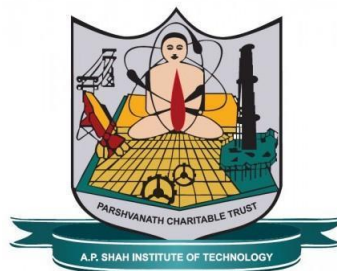
in

Computer Engineering

by

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Under the Guidance of
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Approval Sheet

This Project Report entitled “*Speech to sign language translation*” Submitted by “*Mihir Joshi*” (17102055), “*Shambhavi Kulkarni*” (17102072), and “*Mansi Maurya*” (17102040) is approved for the partial fulfillment of the requirement in *Computer Engineering* from *University of Mumbai*.

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CERTIFICATE

This is to certify that the project entitled “**Speech to Sign Language Translation**” submitted by “**Mihir Joshi**” (17102055), “**Shambhavi Kulkarni**” (17102072), “**Mansi Maurya**” (17102040) for the partial fulfillment of the requirement for award of a degree **Bachelor of Engineering in Computer Engineering** to the University of Mumbai, is a bonafide work carried out during the academic year 2020-2021.

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Declaration

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, we have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Date:29 May, 2021

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1. Project conception and initiation

1.1 Abstract

Sign Language communication is the only viable and effective method of communication for deaf people or people with hearing loss. Without it, they cannot communicate and express themselves to others in the world. There is a need for developing useful tools using technology to help and enable people with disabilities to be given every opportunity a normal person gets in real-world scenarios to progress in their life. We hope to provide such tool for improving their lives. Counterintuitively, this tool can also be used to educate people about Sign Language and help them communicate with people with disabilities. By giving Speech input, the tool will display the corresponding Sign Language gestures, thus enabling translation. This project hopes to close the gap between these groups of people and unite them.

1.2 Objectives

Our objective is to offer a speech to Indian sign language translator as another choice of augmenting communication between the Deaf and hearing communities. We seek to implement a mobile application for Android as well as IOS that a user could use as a way to communicate with Deaf community. This application would detect user's voice and convert them into sentences which would further be used as an input for the application which will then convert them into either manual or non - manual signs.

1.3 Literature review

1. 2018 Eleventh International Conference on Contemporary Computing (IC3): Automated Sign Language Interpreter Humans are developing innovative ideas every year to aid themselves and those who are impacted by any impairment, while technology advances at a breakneck pace. We want to make it easier for deaf individuals to communicate, so we've created a sign interpreter that automatically turns sign language into audio output. Sign language is the only means of communication for the deaf. Physically handicapped people use sign language to communicate their thoughts to others. It is because common people struggle to understand the special sign language, communication becomes tough. Because sign language comprises of a variety of hand movements and gestures, attaining the proper accuracy at a reasonable cost has become a monumental effort. This difficulty can be solved by using instrumented gloves with audio output. For sign interpretation, the gloves are equipped with several sensors. As a result, the proposed solution addresses the issue and assists the deaf in communicating with the rest of the world at a minimal cost.
2. Vision-based sign language translation device, 2013 International Conference on Information Communication and Embedded Systems (ICICES): This paper describes a mobile VISION-BASED SIGN LANGUAGE TRANSLATION DEVICE that allows hearing and/or speech impaired people to communicate with hearing persons by automatically translating Indian sign language into speech in English. It might be used as a translator for those who don't understand sign language, reducing the need for an intermediary and allowing communication to take place in their natural language. The suggested system is a mobile phone-based interactive application program created with the LABVIEW software. The inbuilt camera of the mobile phone is used to capture sign language gesture photos; vision analysis operations are done in the operating system, and speech is delivered through the inbuilt audio device, reducing hardware needs and costs. Because of parallel processing, there is little lag time between the sign language and the translation. This enables near-instant identification of finger and hand movements, as well as translation. This can recognize one-handed alphabet (A-Z) and number sign representations. The outcomes are shown to be highly consistent, reproducible, and precise and accurate.

3. IEEE Eighth International Conference on Technology for Education (T4E): Stringing Subtitles in Sign Language, 2016 IEEE Eighth International Conference on Technology for Education (T4E): The extension neural network type-1 (ENN-1) method is used in this study to assess air quality using remote sensing data from automotive exhaust. As part of the moving air pollutants, old autos generate exhaust. This research develops an automatic inspection technique based on the ENN1 and uses data from automotive exhausted telemeters to demonstrate how the ENN-1 can embed the salient aspects of parallel computation and learning capability to successfully reduce air pollution and increase the efficiency of remote sensing equipment.

1.4 Problem Definition

- 1 To provide people with knowledge and resources in Indian sign language.
- 2 To create a bridge between deaf and hearing community.
- 3 Create a scalable project that can be expanded to capture the entire ISL vocabulary using both manual and non-manual signs.

1.5 Scope

We created a mobile application for both Android, IOS that takes as voice of the user as input which are later converted into text. If the input matches with common phrases then gifs will be shown as output and if it doesn't match the individual Indian sign language letters will be shown. To create this application we have used Flutter SDK. Flutter is a new application development interface which is multiplatform and highly scalable. It focuses on creating a bridge between deaf and hearing communities. This will help hard to hear people learn and use Indian sign language. It also creates an easy platform for people who are curious and wants to learn Indian Sign language.

1.6 Technology Stack

- Dart

1.7 Benefits for environment and society

1. This is a speech-to-text app with some advanced functionality, including the ability to show gifs when common phrases are used which creates a quick communication.
2. Offers a pleasant amplification and clarification through an easy-to-use interface.
3. Computers, smartphones, and tablets are becoming more common in almost everyone's life these days, and with the right software and services that we developed, they can be useful resources in assisting people with hearing loss to live well.
4. The Android and iOS versions both have the benefit of being fully free to use with unlimited service usage.
5. This app is totally free to use, and unlike most others in this category, it works on a push-to-talk basis, which means it only offers captions when the on-screen mic button is pressed. This could be useful for quick bursts of captioning rather than continuous captioning. Other useful features include the fact that many common phrases (roughly 100) will be given as input which results as gifs.
6. This software can also be beneficial to people who want to learn Indian Sign Language. This app will assist them in understanding them quicker because it has many gifs. Not only will this app assist those who are curious to understand, but it will also assist those who might lose their ability to hear in the near future in learning language and speeding up their learning process.

2. Project Design

2.1 Proposed System

To have an interactive application that will receive audio input and convert it into text form. The text will then be checked if it is a commonly used phrase or a unique sentence. If it's a common phrase, then the respective gif of sign language gesture will be displayed otherwise the text will be split into individual letters and the respective letter's signs will be shown successively.

2.2 Methodology

This application begins by translating spoken words and sentences (input audio signals) into text using speech to text Flutter package. A library that provides access to device-specific speech recognition. The speech to text process is completely on-device and hence it provides no constraints regarding internet availability and privacy issues. This plugin includes a series of classes that make it simple to use the underlying platform's speech recognition capabilities in Flutter. As Flutter supports Android, iOS and the Web, it is truly a multiplatform application.

The tool is built using Flutter SDK. Flutter is a new application development interface which is multiplatform and highly scalable. The deployment of multiplatform codebases is illustrated by Figure 1.1. This speech to Indian sign language app makes communication easier for users. Since Flutter platform is used to build this app, it can be simultaneously developed for both Android and iOS platforms, thus increasing the target user base.

2.3 Class diagram

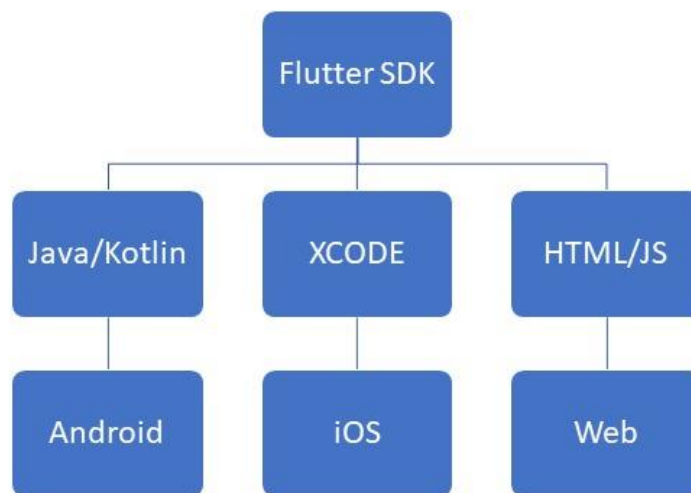


Fig 1.1

The working of the tool is illustrated in the following flow charts.

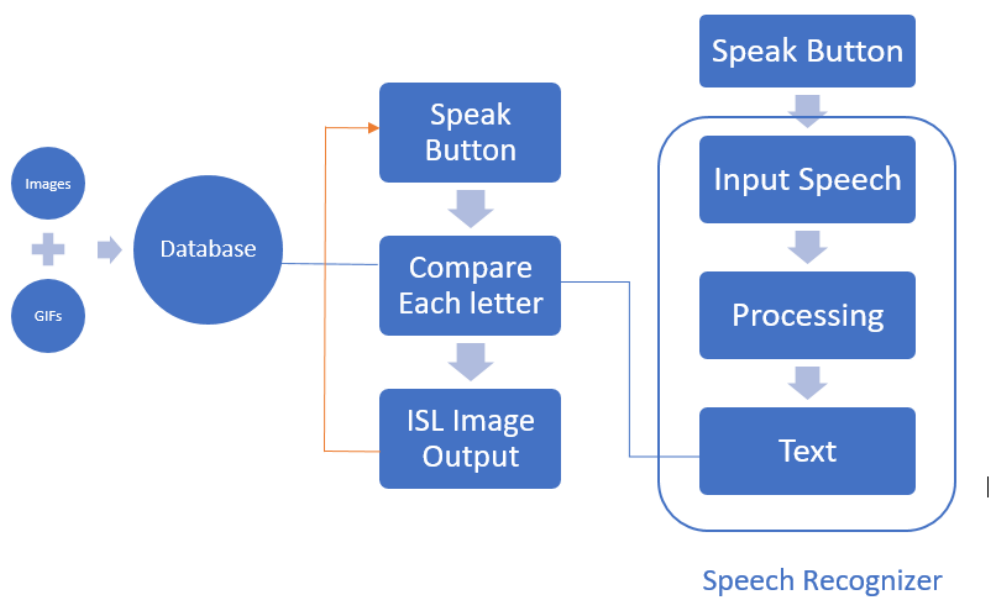


Fig 1.2

3. Proposed system

3.1 Platforms for executions

1. Flutter SDK
2. Using Flutter SDK it can be run on IOS, Android, and Website.

4. Results

4.1 Conclusion

Sign Language translation is an area with huge potential and all work done for improving it will definitely help and empower people with disabilities and our world will become more inclusive. We hope our tool and research will have a positive impact on society and bridge the gap between people in terms of communication and expression of thoughts and ideas and also educate and spread awareness among the general population.

4.2 Future Scope:

1. New languages can be implemented apart from English for Speech to Text translation which would increase the user base and help this tool reach new audiences.
2. Additional GIFs can be added to serve new words and phrases which would aid faster communication and increased efficiency.
3. Live, Real-time translation can be developed which will translate words and sentences on the fly and help in real world back and forth communication.

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