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# Audio /Text to Sign Language

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*Abstract:* People who are speech- and hearing-impaired struggle to communicate with others. These people struggle to communicate since not everyone is conversant in sign language. The purpose of this work is to develop a system that aids those with speech and hearing impairments and converts a voice into Indian sign language (ISL). People may find it difficult to learn sign language, thus this research offers a method based on speech recognition and picture processing. The development of sign languages has made communication simple, especially for the deaf and hard of hearing.

In this work we propose a real real-time that recognizes the voice input through Pyaudio, NLP, and Google speech recognition API and converts it into text, followed by sign language output of text which is displayed on the screen of the machine in the form of series of images or motioned video by the help of various python libraries.

Keywords: Speech recognition, ISL, image processing.

***Index Terms*** - Speech recognition, ISL, image processing.

## I. INTRODUCTION

Sign language (SL) is a natural visual-spatial language that combines facial emotions, hand forms, arm orientation, and movement with the movement of the upper body and upper body parts to produce verbal utterances in three dimensions rather than just one. The people in India who are hard of hearing, deaf, and dumb gave rise to the language. There are several groups of deaf and dumb people around the world, and as a result, their languages may vary. There are several spoken languages around the world, including Urdu, French, and English. Similarly, hearing-impaired persons utilize a variety of sign languages and phrases around the world.

In India, 6.3% of the population, or 63 million people, have substantial hearing loss, according to the 2011 census.

Among them, between 76 and 89 percent of the Indian Deaf are illiterate in spoken or written language.

One of the following two factors may be the cause of the low literacy rate:

-Lack of interpreters for sign language

-Absence of the ISL tool.

-ISL research is lacking.

Communication is challenging for deaf people in settings like banks, trains, and hospitals because of their disabilities. It is necessary to develop a system that will translate text into Indian Sign Language and backward to improve their ability to communicate with the outside world. These systems will raise the community's standard of living. Although sign languages have received less research than spoken languages, there is still much to learn about them. is the idea that individuals or groups of people show up at a location to participate in an event that was previously organized.

Audio to sign language translator is a web-based application developed for deaf or hard to hearing people. It translates English audio into Indian Sign Language. The system takes simple English sentences as input and generates ISL.

## II. LITERATURE SURVEY

[1]Youhao Yu discussed all of the steps required in the voice recognition challenge as well as the primary approaches employed for it. Speech recognition's significance and uses in other fields are also discussed. Choosing a voice recognition method is helpful when this system's task involves transforming speech input into text output.

[8] Vaishali Kulkarni and Purva C. Badhe proposed a method for translating Indian sign language to English. It makes use of gesture recognition to translate a gesture into the appropriate text. The design of the model training, data collection, data preparation, and other crucial steps helpful for creating our desired system were provided in this study work.

[3] By creating a system for automated recognition of sign language utilizing KNN classification techniques and Neural networks, Madhuri Sharma, Ranjna Pal, and Ashok Kumar Sahoo developed a system beneficial in communication between signing persons and non-signing people. This method teaches the principles of Indian sign language and aids in understanding the opposite of the desired system.

[11] Taner Arsan and Ouz Ülgen created a method using Java to translate sign language from speech to sign language and vice versa using the Microsoft Kinect Sensor for the Xbox 360. With the aid of the Java conversion application CMU Sphinx, Google Voice Recognition was utilized to recognize the voice and convert it to sign language. The suggested technique helps comprehend sign language and use Google Speech Recognition, which is what we want.

[8] An Android app was proposed by M Mahesh, Arvind Jayaprakash, and M Geetha to translate sign language into regular English and make it easier for dumb and deaf persons to connect with others. This system provides excellent insight into picture processing and input-to-output format conversion. As a potential future scope work for our intended product, which is now a desktop application, a mobile version of this research can be developed

## III. PROPOSED MODEL

The existing system is less interactive than the proposedmodel. We investigate the many strategies and ideas employed in system design. The first job is to utilize voice recognition to identify the audio input coming from the user. Using several Python modules, the detected audio is examined before being transformed into a string and compared to the dataset created. The final picture or GIF is then shown on the computer screen using Indian Sign Language.

Helping individuals who are battling with hearing loss is our aim. The conversion of sign language from input to text or audio has been done in several sign language initiatives. However, tools for translating audio into sign language have only sometimes been developed. It is advantageous to both hearing people and the hearing impaired. In this project, we provide a state-of-the-art audio-to-sign language translator built on Python. It accepts audio as input, searches the recording using Google API, APIows the text on the screen, and then generates the sign code for the input using an ISL (Indian Sign Language) generator. Then, each word in the sentence is compared to each entry from the dictionary along with any accompanying images or GIFs.

Although it is commonly recognized that facial emotions communicate a significant portion of sign language, this experiment didn't specifically focus on them. This technique may be used in a variety of situations, such as accessing government websites without a video clip for the hearing impaired or filling out online forms without an interpreter around.

**Procedure**

1 for Converting Audio to Text: The Python PyAudio library is used to capture audio input.

-AudiAudio-to-textversion with a microphone

-Dependency parsers are used to determine the relationships between words and analyzed sentence syntax.

2. Using Google Speech API, convert text to sign language.

-Using NLP for Text Preprocessing.

-Machine translation based on dictionaries.

-ISL generator that applies ISL grammatical rules to the supplied sentence.

-With the help of a signing avatar, sign language was created.

Where the website is created using HTML, CSS, and javascript as the front-end.

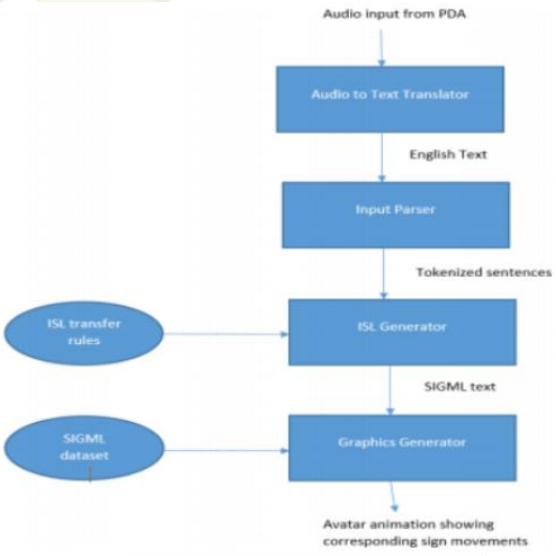


Figure 1:System Architecture

-Filler words, including "is," "are," "was," and "were," among others, scarcely help to context-to-sign language conversion in natural language processing. As a

Resuthe lt, the filler words are eliminated from the speech or phrase by the algorithm.

-Root Words - The words may be used as gerunds, adjectives, or plurals. The suggested technique will eliminate these word forms and identify the word's root. The effective translation of spoken language into sign language will benefit from

these fundamental terms.

Dataset - To map Indian sign language words to text or text identified from voice, the system has a sizable dataset of Indian sign language terms. All Indians who are deaf will thus benefit from it. It helps individuals understand the majority of speech.

### *A. Execution steps*

The following steps can be followed to use the website andchatbot:

1. Go to the tool website
2. If you are already a user, log in to the website; otherwise, go to the register page.
3. To talk, simply click the microphone button. The website will convert your voice to text and display it in the chat box.
4. To display the avatar with Indian sign language, click on the play/pause button.
5. The user receives the required reply.

### *B. Database*

The dataset utilized is crucial for the system's smooth operation in any project requiring machine translation and natural language processing. We used a dataset for Indian Sign Language for our project, which includes visuals for every English character, as well as a GIF collection for some frequently used words and phrases. The dataset of characters used to construct the system is shown below.


### *C. Navigation*

The location navigator provides quick access and directs to the various important pages in the tool.

## IV. IMPLEMENTATION

This project's primary goal is to provide answers to numerous college-related problems. The implementation makes use of the following applications, modules, or frameworks:

### *a) WebDesign*

The Graphical User Interface (GUI) is a significant segment of any system. With the UI of sign the Language tool, the home page, Converter page, login page, SignUp page, Contact, and Abouand t have been created using the help of HTML, CSS, and Javascript.

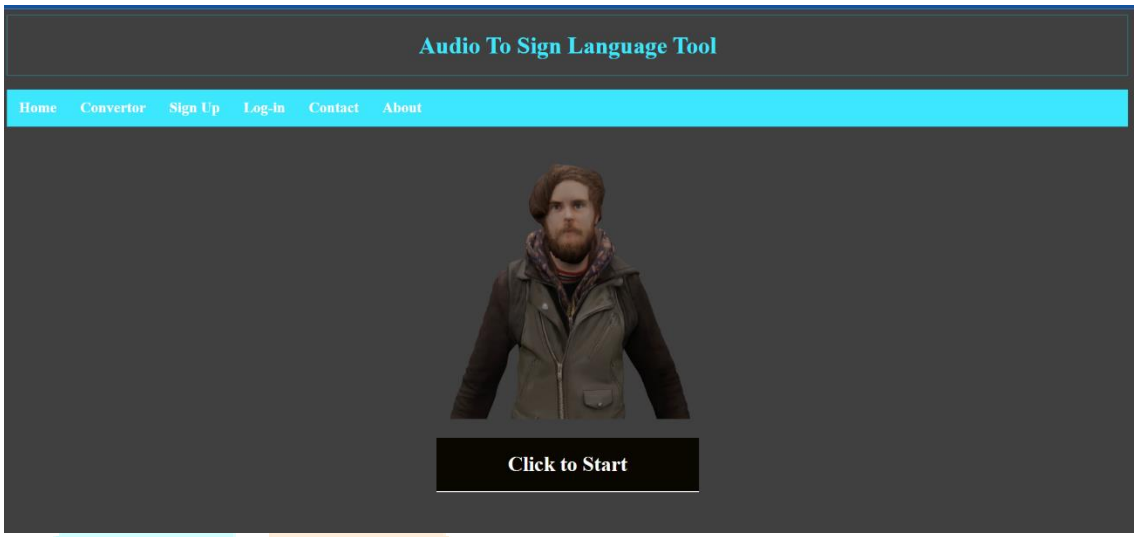


Figure 2: UI of Sign Language Tool

Figure 2 shows the UI of the Sign Language Tool. The front end is developed using HTML, CSS, and JavaScript. The back end is developed using python Django and SqlLite is used as a Database.

### *b) NLTK*

Natural Language Tool Kit (NLTK) is a toolkit designed forPython-based NLP operations. Numerous text-processing packages and test datasets are included in NLTK. Using NLTK, a variety of activities are carried out, including the tokenizing and parsing tree.

In the proposed system following methods of NLTK are applied to the input query that is provided:

- Tokenizing:
  Tokenization converts a sentence into an individualcollection of words. It follows a Structured process.

- Stemming:
  Finds the root word of the given word.

- Bag of Words (BOW):
  It is an algorithm that turns the text into vectors of fixed length. This can be done by keeping track of how frequently a word appears in a document.

### *c) Deep Neural Network*

Deep learning is a branch of machine learning that uses artificial neural networks and a set of processing layers to extract increasingly more complex properties from data.

All the relevant information, FAQ, and general queries are written as intents data, The deep neural network is trainedon the data and the model is saved with the PyTorch library as "data. pth".

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## I. RESULT

The result will be Avatar displayed on the screen created by the user. Avatar displays the sign as per the required input it has taken.

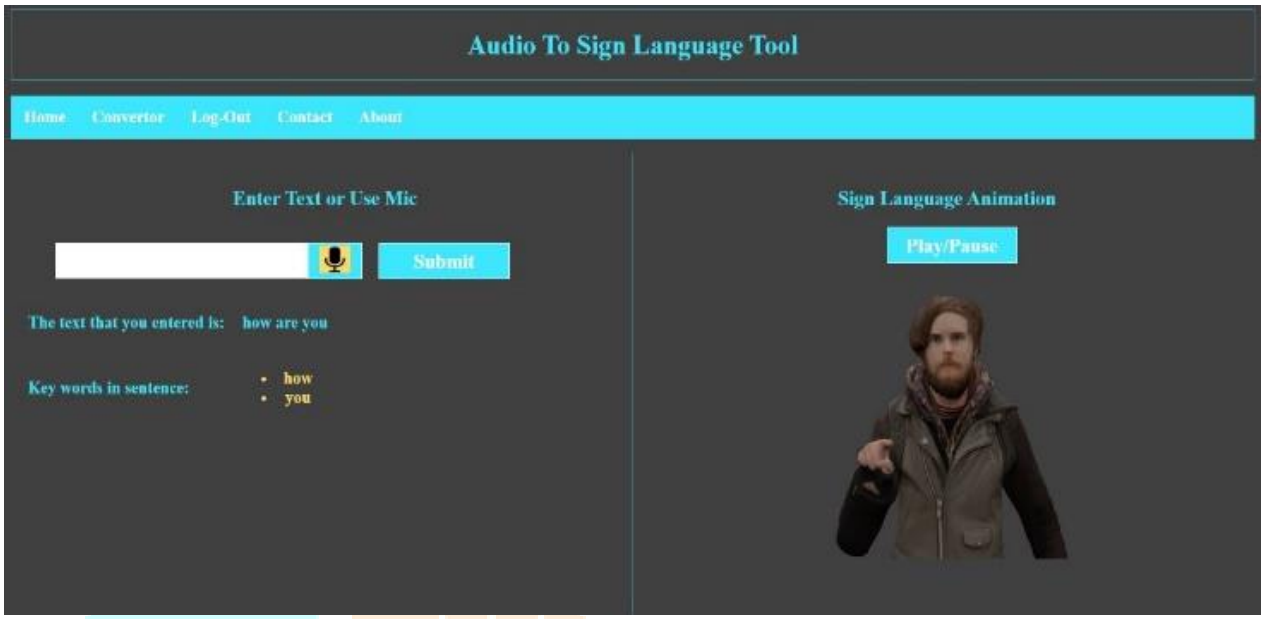


Figure 3: Sign

The output (figure 3) displays the sign of our text or audio given to the system /Tool It fetches the symbol from the dataset provided to it and depends on the length of the word. If the given word is small then it displays character by character and if the word length is medium or large then the predefined single sign stored in the database for that word will be displayed as output. If the word is not there in the database as a sign then the word will be broken into characters and the sign of the characters will be displayed as a token of the whole word.

As part of the deployment of our system, we created an efficient Audio to Sign language converter that can be useful to many people who are deaf or hard of hearing and make communicating with them much simpler. For those who are less wealthy, this desktop application will be incredibly helpful and make their lives easier. When Indian Sign Language is widely used throughout the nation, it will be very beneficial. This technique is usable at schools, airports, colleges, institutions, and any place else.

## IV. RESULTS AND DISCUSSION

*6. TESTING*

| Test Case ID | Test Scenario | | Test Case | Preconditi ons | Test steps | Test Data | Expected Results | Postcond ition s | Actual Results | Status Pass/F ail |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. | Using the website | | Accessing the page | The website is being opened. | Open the tool.<br><br>Enter the details. | Hi | Sign language is produced in a picture format. | Using the sign languag e tool |  | PASS |
| 2. | Using the website | | Accessing the page | Using the website | Open the tool.<br><br>Enter the details | How r you | Sign language is produced in a picture format. | Using the sign languag e tool. |  | PASS |
| 3. | Using the website | | Accessing the page | The website is being opened. | Open the tool.<br><br>Enter the details | walk . | Sign language is produced in a picture format. | Using the sign languag e tool |  | PASS |
| 4. | Using the website | | Accessing the page | The website is being opened. | Open the tool.<br><br>Enter the details | Me sad | Sign language is produced in a picture format. | Using the sign languag e tool |  | PASS |

Table 6.1: RESULTS

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