



SPEECH TO HAND SIGN TRANSLATOR USING NLTK & BLENDER

¹Mrs. Preethi C, ²Dhakshesh V, ³Lingaraja P, ⁴Perumal K, ⁵Gokul M

¹Asst. Prof, ²Student, ³Student, ⁴Student, ⁵Student

¹Dept of Artificial Intelligence and Data Science,

Sri Sairam Engineering College, Chennai, Tamil Nadu, India.

Abstract : An overview of a web application that translates spoken words into hand signs using the Natural Language Toolkit (NLTK) and Blender, a 3D modeling and animation program, is provided in the abstract. By offering in-the-moment translation services, the web application promises to make spoken and sign language communication easier. The accurate and effective translation of spoken language into text is made possible by the use of NLTK for speech recognition, text processing, and language modeling. A 3D model of a hand sign is animated in Blender using the translated text to reflect the matching sign language gestures. To provide a user-friendly and aesthetically pleasing interface for smooth communication between hearing and non-hearing people, the web software makes use of the strength of NLTK's language processing skills and Blender's animation features. The online software provides an efficient and accessible platform for bridging the gap between spoken and sign languages, increasing inclusivity, and improving communication for diverse populations thanks to this creative integration of NLTK and Blender.

Keywords : NLTK, Blender, Sign Communication, Indian Sign Language, Animation.

I. INTRODUCTION

An inventive method to close the communication gap between spoken language and sign language is the speech-to-hand sign translation online software. It enables real-time translation of spoken English into sign language motions by combining the capabilities of the Natural English Toolkit (NLTK) and Blender, a well-known 3D modeling and animation program. By offering a seamless and inclusive platform for language exchange, this web application intends to promote efficient communication between hearing and non-hearing people.

For precise recognition and transcription of spoken language into text, the web application makes use of NLTK's cutting-edge natural language processing capabilities. Using powerful language modeling methods and speech recognition algorithms, NLTK guarantees the consistency and precision of the translation process. The basis for transforming spoken language input into a textual representation is laid up in this stage.

Blender is used to bring the translation to life. Blender enables the development and animation of genuine hand sign gestures that correlate to the translated text thanks to its robust 3D modeling and animation features. The web application makes advantage of Blender's capabilities to create visually appealing and realistic representations of sign language, facilitating communication for both sign language users and non-users.

The speech-to-hand sign translator online tool offers a thorough and user-friendly solution for allowing efficient communication between people who utilize various ways of language expression by merging NLTK with Blender. This innovation has the power to lower barriers, advance inclusivity, and build a more connected and open society.



Fig1. Hand Signs

II. OBJECTIVE

The speech-to-hand sign translator web app's goal is to offer a simple, effective platform for translating between spoken and sign languages without any errors. The Natural Language Toolkit (NLTK) and Blender integration in the web app intends to accomplish the following goals:

- 1) **Accurate Speech Recognition:** To faithfully translate spoken language input into text, use NLTK's sophisticated speech recognition capabilities. The goal is to provide accurate and dependable translation of spoken language into textual representation for subsequent processing.

- 2) **Effective Text Translation:** To translate text from spoken language to sign language, use NLTK's language processing capabilities. Utilizing NLTK's language modeling and translation capabilities, the goal is to produce accurate and linguistically relevant translations that will improve the comprehension and clarity of sign language motions.
- 3) **Realistic Hand Sign Animation:** Use Blender's 3D modeling and animation tools to produce realistic and eye-catching renderings of sign language motions. The goal is to animate 3D hand sign representations that match the translated text, giving users a realistic and immersive sign language experience.
- 4) **User-Friendly Interface:** Create a user-friendly online application interface that enables simple spoken language input, visual translations into sign language, and simple navigation. The goal is to provide a user-friendly platform that supports users with all levels of technological proficiency and offers a fluid communication environment.
- 5) **Promote Inclusivity:** By facilitating successful communication between hearing and non-hearing people, the ultimate goal is to promote inclusivity. The goal of the web app is to promote understanding, empathy, and equitable participation in conversations and information exchanges by removing language barriers and promoting meaningful connections.

III. EXISTING SYSTEM

Often used by those who are deaf or hard of hearing, hand sign communication, often known as sign language, is distinctive and visual. It involves communicating ideas, conveying information, and having conversations via the use of body language, facial emotions, and hand gestures. There are many advantages to communicating with hand signs, but there are also some drawbacks.

The limited accessibility of hand signs for people who are not conversant in sign language is one of their key drawbacks. People who do not understand or use sign language may find it difficult to comprehend and participate in conversations because sign language is a unique language with its grammar and vocabulary. Both deaf and hearing people may experience feelings of exclusion and frustration as a result of this communication barrier.



Fig.2 Hand Sign Communication

The absence of a globally recognized system of sign language is still another drawback. Even though sign languages share some signs and gestures, there can be considerable differences in vocabulary, grammar, and cultural quirks. When communicating with people from different backgrounds, can make cross-cultural communication challenging, and may take extra effort to adapt to various sign language systems.

Effective communication might be difficult when sign language interpreters are not readily available. Deaf people may have trouble receiving crucial information in real-time in contexts like schools or workplaces without an interpreter. This restriction may lead to lost chances, decreased engagement, and a feeling of loneliness.

Additionally, using hand signs to communicate may not always be feasible in some circumstances, such as in noisy settings or when people's hands or arms are restricted in movement. To enable effective contact in such circumstances, alternative communication techniques or assistive technologies may be required.

Attempts are being made to solve the problems related to hand-sign communication despite these drawbacks. The communication gap between sign language users and non-sign language users is being closed by technological advancements like text-to-sign language or speech-to-text translation technologies. Additionally, greater knowledge of sign language and education about it might help create a more inclusive society and lessen the drawbacks of hand-sign communication.

As a result, even though hand sign language is a useful and expressive form of communication for the deaf and hard of hearing, it is crucial to acknowledge and address the potential drawbacks. We may endeavor to create a more welcoming atmosphere for those who use hand signs for communication by supporting education, accessibility, and technology developments.

IV. PROPOSED SYSTEM

The suggested remedy entails creating a web application that translates spoken words into hand signs, utilizing Blender and the Natural Language Toolkit (NLTK) to enable effective communication between sign language and spoken word users. A comprehensive and user-friendly framework for seamless translation will be created through the integration of NLTK and Blender, which will enable precise speech recognition, text translation, and realistic hand sign animation.

The online application will make use of NLTK's powerful language processing and speech recognition algorithms to precisely translate spoken language input into text. The speech recognition component's accuracy and reliability will be enhanced by NLTK's language modeling approaches, resulting in the most accurate translation of the text.

Following the transcription of the spoken language, Blender will be used to create 3D models of hand signs and animate them to simulate the matching sign language gestures. The production of realistic and aesthetically pleasing hand sign animations using Blender's robust 3D modeling and animation tools would improve communication for both sign language users and non-sign language users.

The web application will include an easy-to-use user interface that allows users to enter the spoken language, read translated text, and see animated hand signs. Additionally, it will offer customization options to accommodate unique preferences and geographical peculiarities in sign language, such as the ability to choose particular sign language variants or modify animation speed.

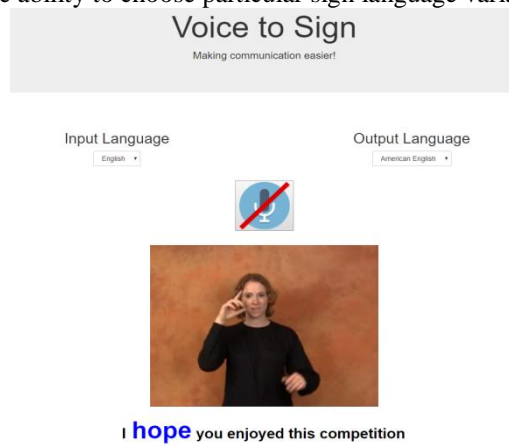


Fig 3 Proposed System

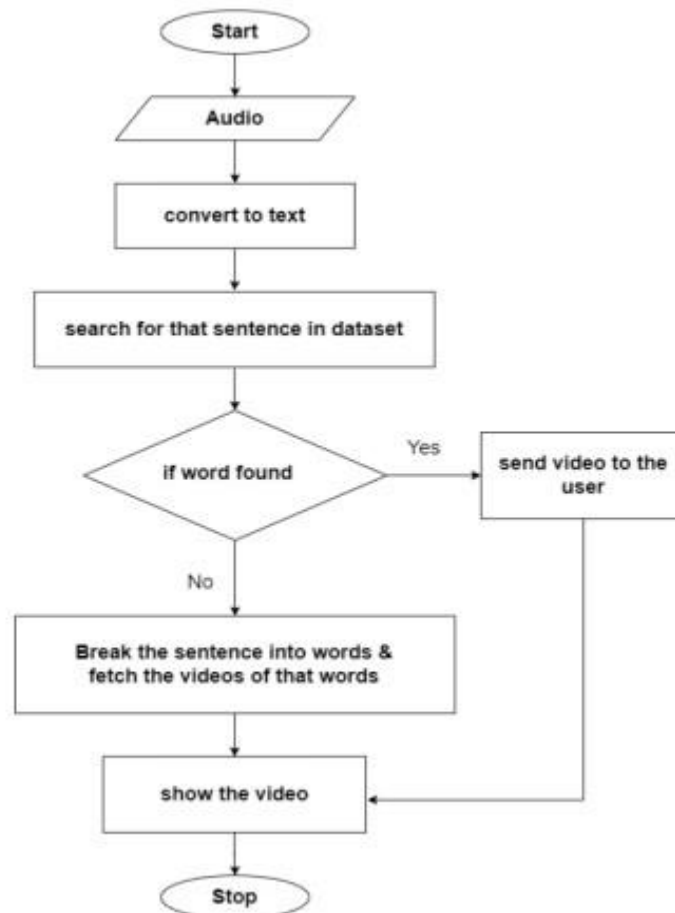


Fig 4 Flow Diagram

By offering an inclusive and accessible platform for effective communication, the suggested solution seeks to close the gap in understanding between users of spoken language and sign language. It makes use of Blender's animation tools and NLTK's language processing capabilities to build a thorough and precise speech-to-hand sign translation system.

We can improve communication, encourage inclusivity, and advance understanding between people who express themselves in various ways through the creation of this online app. The suggested approach might enable sign language users, close the communication gap, and build a more cohesive and inclusive society.

V. LITERATURE SURVEY

People's ability to communicate is important and is recognized as a life skill. We present our project article, which primarily focuses on assisting patients with pain or silent speech, keeping in mind this significant part of life and the environment. The results of our research increase communication with the deaf and the mute. The true meaning of each sign language is expressed via sign patterns that are visually communicated. The dictionary defines sign language as the fusion of hand gestures and/or arm and body motions. It is a result of how the hands and faces are used in combination. Our software project is capable of deciphering sign language signals. It is possible to communicate with hearing aids using these symbols. The program recommended in this article enables regular individuals to communicate effectively with others who are difficult to understand. By utilizing a microphone and a camera in this instance, we are putting the Indian Sign Language (ISL) approach into practice. The ISL translation system can translate spoken words into Indian sign language. The ISL translation framework employs a microphone to collect still images or looping video clips, which are then translated by the software. [1]

People who are speech- and hearing-impaired struggle to communicate with others. These people struggle to communicate because 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 paper, we present a real-time system that recognizes voice input using Pyaudio, SPHINX, and Google speech recognition API and converts it to text. The text is then output in sign language and displayed on the machine's screen as a series of still images or motioned videos with the aid of various Python libraries. [2]

People who are deaf or mute encounter many communication challenges when interacting with others in society. They might feel less confident and alone in the world as a result. When a deaf person wants to communicate with a hearing person, they use sign language. To translate the text into American Sign Language, numerous methods are used. Indian Sign Language is widely used by deaf people in India, but little research has been done on it. This study tries to translate six regional Indian languages—Telugu, Hindi, Malayalam, Marathi, Kannada, and Tamil—into Indian sign language. The suggested model converts speech to a series of equivalent motions, which are displayed as the output. Text translation and sign language mapping are involved together with speech recognition utilizing Wavelet-based MFCC and GMM. [3]

VI. SYSTEM REQUIREMENTS

HARDWARE SPECIFICATIONS:

1. A 50 gigabyte or so disc space.
2. An Intel Core i3 or Intel Atom processor.
3. Although it is not required, a GPU (1GB) is advised for training and to speed up inference.
4. RAM (4GB)
5. An intercom
6. The keyboard

SOFTWARE SPECIFICATIONS

1. Linux and Windows are both supported.
2. Python ≥ 3.6
3. Internet browsers like Chrome
4. Access to the Internet

VII. SYSTEM DESIGN

DATA FLOW DIAGRAM

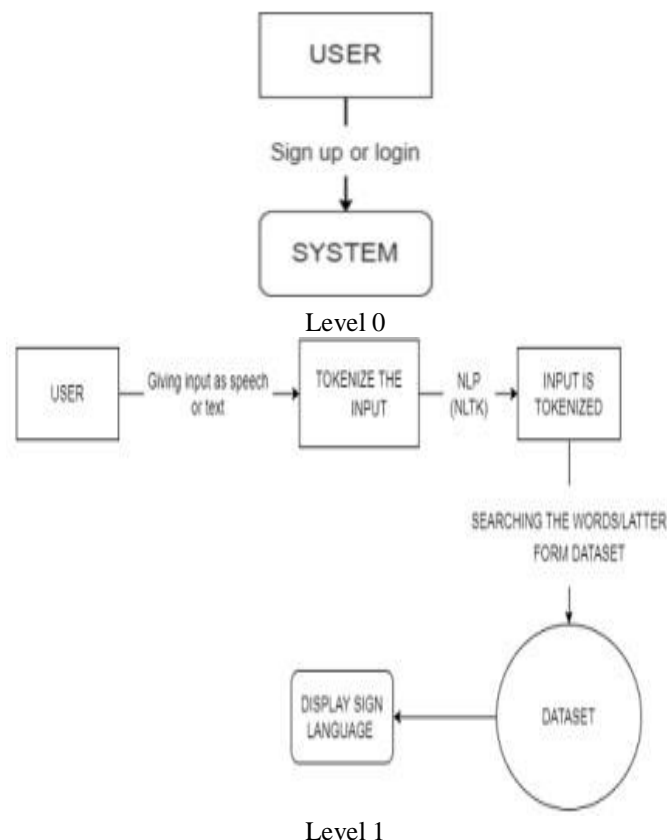


Fig 5 DFD Diagram

UML DIAGRAM

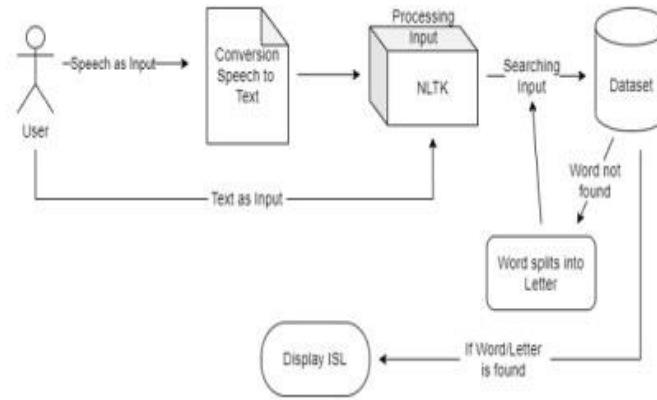


Fig 6 UML Diagram

VIII. CONCLUSION

The voice-to-hand sign translator online program, which makes use of NLTK and Blender, provides a potent and cutting-edge approach to bridging the gap between spoken language and sign language. The online software offers a user-friendly, precise, and visually appealing platform for seamless translation by utilizing NLTK's speech recognition and language processing skills as well as Blender's 3D modeling and animation features.

Users can input spoken language and receive correct transcriptions in text form thanks to the integration of NLTK, which guarantees accurate and reliable speech recognition. The NLTK's language processing skills help to increase communication quality and translation accuracy.

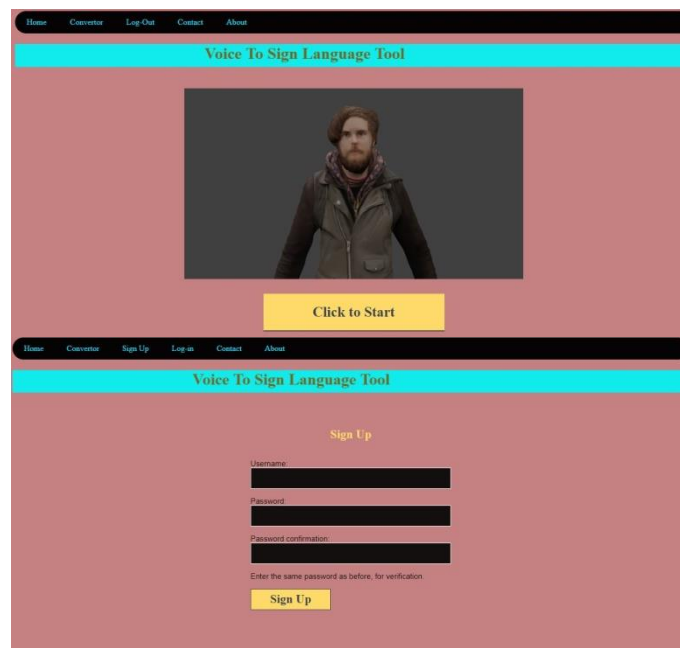
The web software relies heavily on Blender's 3D modeling and animation capabilities to produce aesthetically appealing and realistic hand sign animations that correlate to the translated text. The communication process is improved and non-sign language users and sign language users can better comprehend one another because of this visual representation of sign language motions.

The web application offers a complete solution that handles the particular difficulties of voice-to-hand sign translation by fusing NLTK with Blender. It makes communication easier for those who are deaf or hard of hearing and promotes a more welcoming and accessible environment for all users.

Using NLTK and Blender, the speech-to-hand sign translator online software can completely change how we support communication between various language modalities. It encourages comprehension, inclusivity, and equitable engagement in discourse, eroding barriers and fostering a more connected and peaceful community.

Further research and development in this area can improve the web app's precision, speed, and usefulness as technology develops, making it a crucial tool for those with hearing loss. An important step towards bridging the communication gap and establishing a more inclusive and accessible future for all is the speech-to-hand sign translation online software.

IX. OUTPUT



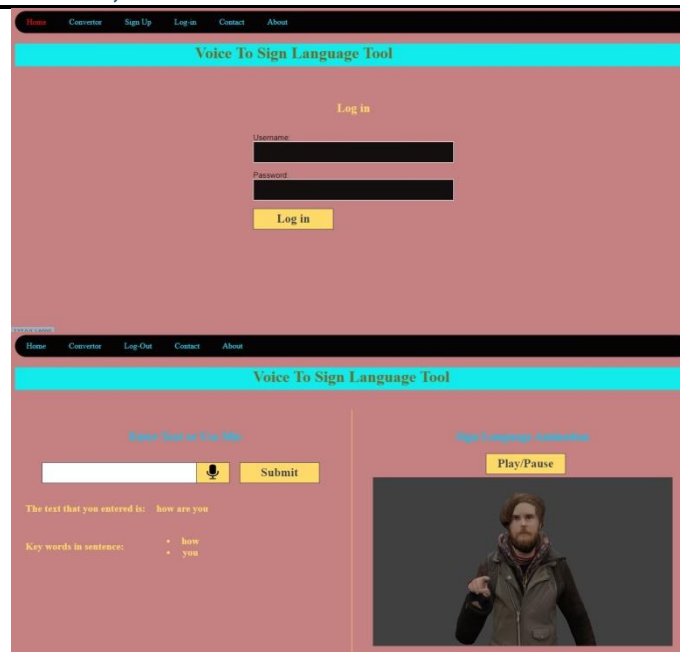


Fig 7 Output

REFERENCES

- [1] In the International Research Journal of Engineering and Technology (IRJET), there is an audio-to-sign language converter.
- [2] In 2022, during the 8th International Conference on Advanced Computing and Communication Systems (ICACCS), speech-to-sign language translation for Indian languages would be available.
- [3] For Indian languages, the Ijrasnet Journal For Research in Applied Science and Engineering Technology provides speech-to-sign language translation.