Talk
A communication Tool

A project submitted in partial fulfilment of the

Requirement for the award of the degree of

Bachelor of Technology

In

Information Technology

Submitted by:

Vaibhav Bhaskar

(11912060)

Govind Kumar

(11912057)

Supervised by:

Dr. Mukesh Mann

Assistant Professor

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY SONEPAT

HARYANA, INDIA

Acknowledgement

The satisfaction that accompanies that the successful completion of any task would be incomplete without the mention of people whose ceaseless cooperation made it possible, whose constant guidance and encouragement crown all efforts with success. I would like to thank Prof **(Dr) Mukesh Mann**, Assistant Professor, and IIIT Sonepat for giving me the opportunity to undertake this project. Ito complete the project. Also I would like to thank my batchmates who guided me, helped me and gave ideas and motivation at each step.

Self Declaration

I hereby declare that work contained in the thesis titled "**TALK-COMMUNICATION TOOL FOR SPECIALLY ABLED**" is original. I have followed the standards of project ethics to the best of my abilities. I have acknowledged all sources of information which I have used in the project.

Name: **Vaibhav Bhaskar.** Roll No. **11912060**

Name: **Govind Kumar.** Roll No. **11912057**

Department of Information Technology,

Indian Institute of Information Technology,

Sonepat-131201, Haryana, India.

Certificate

This is to certify that **Mr. GOVIND KUMAR and Mr. VAIBHAV BHASKAR** has worked on the project entitled "**TALK-COMMUNICATION TOOL FOR SPECIALLY ABLED**" under my supervision and guidance.

The contents of the project, being submitted to the **Department of Information Technology**, **IIIT, Sonepat** for the award of the degree of **B, Tech** in **Information Technology**, are original and have been carried out by the candidate himself. This project has not been submitted in full or part for the award of any other degree or diploma to this or any other university.

Dr. Mukesh Mann
Supervisor
Department of Computer Science and Engineering,
Indian Institute of Information Technology,
Sonepat-131201, Haryana, India

Abstract

Name: **GOVIND KUMAR (11912057), VAIBHAV BHASKAR (11912060)**

Degree for which submitted **B. Tech (IT),**

Department of Information Technology, **IIIT, Sonepat.**

Project Title: **TALK-COMMUNICATION TOOL FOR SPECIALLY ABLED.**

Name of the thesis supervisor: **Dr. Mukesh Mann**

Month and year of the report submission: **March 2021.**

Sign language is a visual language used by deaf and dump people as their mother tongue. Unlike acoustically conveyed sound patterns, sign language uses body language and manual communication to fluidly convey the thoughts of a person. It can be used by a person who has difficulties in speaking or by a person who can hear but can not speak and also, by normal people to communicate with hearing disabled people. As far as deaf person is concerned, having access to a sign language is very important for their social, emotional and linguistic growth.

Our project aims to bridge the gap between these Deaf people and normal people with the advent of new technologies of web applications, Machine Learning and Natural Language Processing. The main purpose of this project is to build an interface which accepts Audio/Voice as input and converts them to corresponding Sign Language for Deaf people. It is achieved by simultaneously combining hand shapes, orientation and movement of the hands, arms or body. The interface works in two phases, first converting Audio to Text using speech to text API (python modules or Google API) and secondly, represent the text using Parse Trees and applying the semantics of Natural Language Processing (NLTK specifically) for the lexical analysis of Sign Language Grammar.

List of Figures

List of Abbreviations

SL	Sign Language
ISL	Indian Sign Language
BSL	British Sign Language
ASL	American Sign Language
HamNoSys	Hamburg Notation System
GIF	Graphics Interchange Format
NLP	Natural Language Processing
ML	Machine Learning
AI	Artificial Intelligence

Index

	TABLE OF CONTENTS		
CHAPTER 1	**INTRODUCTION**		**9-11**
	1.1	Introduction…….....	9
	1.2	Indian Sign Language Grammar……	10
	1.3	Problem outline……	10
	1.4	Project Development Methodology…….	11
	1.5	Objectives……..……	11
	1.6	Scope of Project work…….	12
	1.7	Summary…….…….	13

Introduction

A sign language (SL) is a natural visual-spatial language that uses the three-dimensional space to articulate linguistic utterances instead of sound to convey meaning, simultaneously combining hand-shapes, orientation and movement of the hands, arms, upper body and facial expressions to express the linguistic message. The language came into existence because of the deaf, dumb and hard of hearing people in India. All around the world there are different communities of deaf and dumb people and thus the language of these communities will be different. Just like there are many spoken languages in the world like English, French, and Urdu etc.

Similarly there are different sign languages and different expressions used by hearing disabled people worldwide. The Sign Language used in USA is American Sign Language (ASL); British Sign Language (BSL) is used in Britain; and Indian Sign Language (ISL) is used in India for expressing thoughts and communicating with each other. The interactive systems are already developed for many sign language e.g. for ASL and BSL etc.

In India, approximately 5.07 million people who suffer from hearing disability. Among them, more than 30% people are below 20 years of age and about 50% are between 20 years and 60 years of age. These people are generally unable to speak properly because of which they use sign language to communicate with others. As sign languages do not have well defined structure or grammar, therefore there is no or very less acceptability of these signs outside the small world of these differently abled people. In research on American Sign Language proved that sign language is a full-fledged language with its own grammar, its own syntax, and other linguistic attributes. To prove the same for other sign languages, there are some efforts including Indian Sign Language. Particularly, research on ISL started in 1978 and it has been found that ISL is a complete natural language with its own grammar and syntax.

Communication for the hearing impaired people in common places like railway stations, bus stands, banks, hospitals etc., is very difficult because a hearing person may not understand the sign language used by the deaf person to communicate. Also, a hearing person cannot convey any message to deaf person as he/she may not know the sign language. To make the communication between deaf and non-deaf community, the language translation is must.

According to 2011 census, in India

- 6.3% of the population is suffering from significant hearing loss.
- Out of these people, 76-89% of the Indian Deaf have no knowledge of language, either signed or spoken/written.

Reason behind the low literacy rate can be either of the following

- Lack of Sign Language Interpreters
- Unavailability of SL tools.

Talk will be an 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-gloss which may then be converted into the Hamburg Notation System (HamNoSys). The HamNoSys representation will provide signing instructions to the sign synthesis module, to generate an animated representation of ISL to the user. Dependency trees is used to represent ISL syntax.

Indian Sign Language Grammar

Like other languages, Indian Sign Language has its own grammar. It is not dependent on the spoken language – English or Hindi. The sign language is not same as the manual representation of spoken English or spoken Hindi. It has certain unique and distinct features like:

- All the sign representation for numbers are done with appropriate hand gesture for every number.Eg. the sign for 45 will be the representation of four followed by sign representation of 5.

- The signs for family relationships are preceded by signs for ‘male/man’ and ‘female/woman’. The interrogative sentences having words like WHAT, WHERE etc. are represented by placing these questions at the end of sentences.

- The ISL consists of various non-manual gestures including mouth pattern, mouth gestures, facial expressions, body postures, head position and eye gaze. ISL has essentially a Subject-Object-Verb word order (unlike English which is Subject-VerbObject).

Problem Outline

Low literacy rate among the people suffering from hearing ability. Reason behind the low literacy rate can be either of the reasons like lack of ISL interpreters, unavailability of ISL tools.
Due to their inability, communication for the deaf community in common places like railway, bank, and hospitals is difficult. To help them communicate better with the rest of the world, a system is needed which will enable the conversion of text to Indian Sign Language and vice versa. These systems will increase the quality of living of this community. Sign languages have not been studied as extensively as spoken languages, and there is still much left to be learned about them.is the concept of people, individually or as a group, appearing at a location for a previously scheduled event

Project Development Methodology

There will be mainly four modules that will be developed:

1. Audio to Text Converter:

   The module will use Google Cloud Speech for audio to text. The input can be given, The output is given as English text string. The module will be developed in python script.

2. Input Parser:

   The input paragraph will be tokenised into sentences. Using machine learning and Natural Language Processing tools, each sentence will be tokenised into words.

3. ISL Generator:

   In this system, source language will be transformed into some intermediate abstract text, some linguistic rules are then applied to that text to transfer it into target language.

4. Graphics Generator:

   Input to this module will be the ISL text string. In this module, Graphics generator will map each token of text to a database. For every word present in database there will be a corresponding file present

Objectives

- Providing Information access and services to deaf people in Indian Sign Language.
- Developing a scalable project which can be extended to capture whole vocabulary of Indian sign language through manual and non-manual signs.
- It will be developed as a desktop or mobile application to enable specially abled people to communicate easily and effectively with others.
- This application takes in live speech or audio recording as input, converts it into text and displays the relevant Indian Sign Language images or GIFs

Scope of Project Work

- The system can be extended to incorporate the knowledge of facial expressions and body language too so that there is a complete understanding of the context and tone of input speech.
- In real-time, capturing a hand gesture and movement, implement an application which recognises ISL and show the output on the screen in real time. This would help the person with disability to communicate easily.
- A mobile and web based version of the application will increase the reach to more people.
- Integrating with a hand gesture recognition system using computer vision so that a two way communication system can be established.
- Help in Educating People about the Indian Sign Language.