# Text to Sign Language Using Android Application

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***Abstract*— Sign Language is the native language of the Deaf Community and as such is a very important tool for any person while having conversation or helping them. This paper sets to define and bridge the gap of understanding Sign Language by developing an Android Application which takes Text as an input and displays the consequent sign language.**

***Keywords—Android Studio, Java, Kaggle, Interface, Deaf Community, ASL Dataset***

## I. INTRODUCTION

For long Speech as been used as an aid for continuation of Human Development. It is of utmost importance to convey someone of one's personal agenda or opinion. But, there are some unfortunate sections of the population, the society of the deaf and dumb people who have to rely on other means of communication to convey their opinion. As such, Sign language was developed in Connecticut in 1817 which greatly improved the lives of the deaf and dumb people.[2] It uses hand gestures to convert a particular word or a sentence into it's relevant sign language so as to be understood by everyone. Though the present form sign language was developed much later, the earliest form was discovered to be way before in the 5th century BC in some of the writings by Socratis and over the years it has evolved to it's current form. One of the biggest challenges people face while learning sign language is since there are so many spoken dialects of even a single language, it becomes increasingly difficult to convert each and every portion of it to sign as it requires learning of both the kinds in order to correctly specify it. It requires years of training and cannot be mastered easily apart from the basic levels. This paper sought to make it easier by developing and interface which translates the text language to its sign counterpart and does not need the knowledge of knowing sign language.

## II. RELAVANT WORK

### A. *Wecapable.com*

This site offers the same functionalities as this paper albeit it's not been developed yet for Android users. It is based on the American Sign Language (ASL).The interface is pretty simple with just a single tab to convert into sign language. They have also displayed ASL on the webpage for reference to know which sign means what.

### B. *Funtranslations.com*

This site gives us an option of even saving the converted images. This webpage is also developed based on the American Sign Language. This translator works based on custom fonts served from the internet (@font-face). When you copy and paste unless you have the font installed locally on your system, it won't look the same. You can use the image for sharing which will look the same regardless.

## III. DESIGN FRAMEWORK AND THEORY

Android Studio was used as the environment to create a Java Programming Language based on the project. This application works on the Operating System JellyBean and above. ASL is incorporated even here and serves as base for conversion.

### A. *American Sign Language*

The exact origins of ASL are unknown but it is said it was made around 200 years ago by the mixing of the local languages and the French Sign language. It is completely distinct from English and has its own set of rules and ways to follow like raising of eyebrow, widening of eyes etc. It incorporates the use of hand and face to convey meaning. It serves as the primary of language for many North Americans who are deaf and dumb. Approximately 250000-500000 people in USA and Canada use this language. Across Europe, it has slight variations that mean different signs for same words. All in all, ASL is pretty much used everywhere in the world, thus, used in this project. The five ways that ASL can benefit anyone are [1]:

1. It improves spelling skills in the children. It provides the children with another tool in which way they can remember the spelling of any word.

2. It overall improves classroom behavior. Research suggests teachers find it easier to manage class with students are armed with words like toilet and excuse me, so that it does not affect the flow of class.
3. It is said that, ASL vastly improves Motor skills in children since it incorporates the use of hand gestures and mouth to convey meaning.
4. It overall increases the communication skills in everyone.
5. Helps in creating a better vocabulary in children as it increases the efforts taken by them to spell any word.

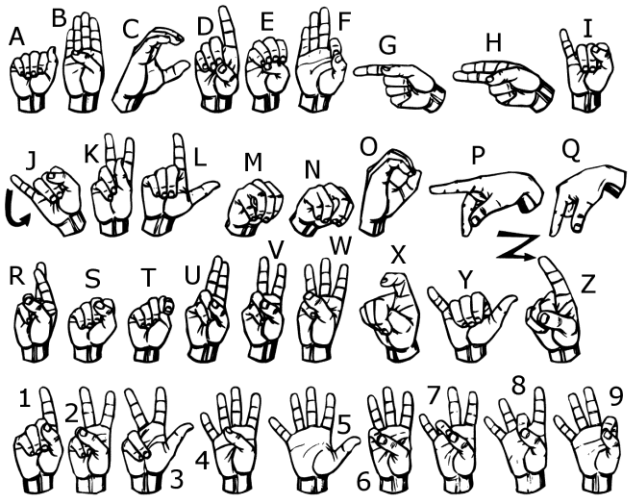


Fig1: American Sign Language

### *B. Android Studio*

It was developed by Google and JetBrains which serves as the official IDE for Android Development. It was announced on 8th may,2013 and although Java was used initially as the official language, Kotlin replaced it in 2019 but, Java and C++ is still supported. It helps designing apps across very android devices and operating systems. Once a program is constructed, the programmer has the accessibility to see how the app behaves and can change then and there so that the app can perform as per specifications. That means the time taken for making any codes changes for a fresh run is lesser and it is not needed to make a new APK every time.[3]The biggest challenge of any Android Programming was making the code faster, Android Studio has bridged that ap by making it faster to analysis and make it more accurate. The user can see in real time how the app performs and has a user-friendly GUI. It's become even easier just to drag and drop APK's. There is no need to have multiple builds now. Android gives the opportunity to test a single build across devices.

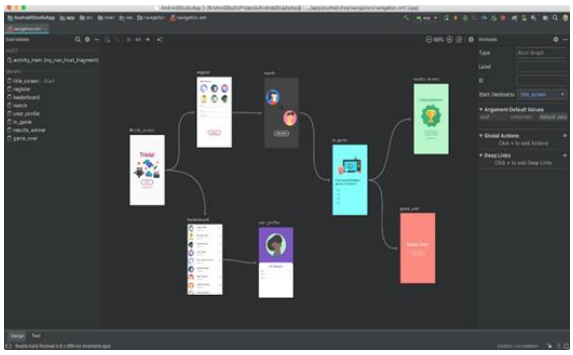

Fig2: Android Studio

### *B. Kaggle*

Kaggle is an online platform where Companies and Organization dump their official datasets of a particular topic so that programmers around the world can access it and develop some kind of predictive or comparison algorithm. There are also regular competitions that are held based on Kaggle Datasets. It is a subsidiary of Goggle LLC and is mainly for a community of Data scientists and Machine Learning researchers. Though Kaggle is free, it takes vast amounts of time in order to first preprocess the data so that one can make some meaning out of it, then has to understand it before deploying the models. It was founded in 2010 by Anthony Goldbloom and has its headquarters in California. It also houses immense computational power through its servers and can give access to vast machine learning algorithms and data analysis packages which come pre-installed with it. Apart from providing huge data set, it also from time to time provides Elearning courses so that budding ML researchers can benefit from it.

## IV. WORKFLOW

This section sought to explain the practicality of the project and the basic design of how it was achieved.[4] For this purpose. Android Operating system Google Pixel 2 was used.

### *A. Android Interface*

Since this is the first version of this project, a basic GUI was developed which housed the database we rely on, i.e., ASL. A square box is given which acts as an input. The user can type in the sentence that he wants to convey in sign language to another person.[5] As of now, the only accepted input is in English language. There is also a mic option with which instead of writing a text, the user can simply speak into the phone. Once the required speech or text is used as an input, one only has to push the Translate button so as to show its equivalent sign language. The interface has deliberately been made simple so as it can be used by person from any walk of life.

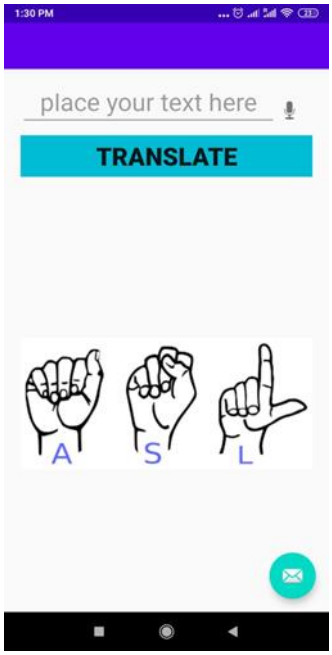


Fig 3: Homepage

*a) Input.*

*b) Speech Detection.*

*c) Based on ASL.*

## *B. Sign Language*

Once the translate button is pushed, the app transforms the sentence into sign language. It uses ASL dataset from Kaggle for this. The sentence is broken down into separate words and each word's corresponding sign is show as a host of tabs.


Fig 4: Input Text

As we can see in Fig 4. 'Good morning' is typed in as the input and the user then clicks on the Translate button.


Fig 5: Translation for first 3 words

Owing to the lack of space on an Android Screen, the app firsts displays the initial 3 words of the text as the sign equivalent, as on can see the words here being translated are G,O,O. Likewise, the user just has to scroll his fingers on the screen to get the next 3 words and so on.

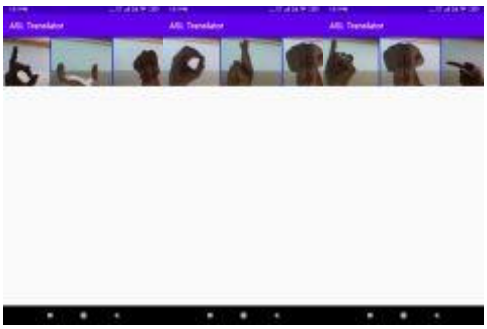

Fig 6: Sign Translation of remaining words.

Fig 6 defines the sign language of remaining words and thus the literal translation of any sentence can be achieved using this app.

The future work is set to understand even how to use the app to translate the sign language into text and how it could be incorporated with this app.

## V. Other Approaches

As of now there have been a lot of different approaches for the same topic, our project sets to define another approach as to how a deaf or dumb person's life could be made easier and solves the problem of portability.[6]

## Acknowledgment

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