EASYTALK: A TRANSLATOR FOR SRI LANKAN SIGN LANGUAGE

Final (Draft) Report

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DECLARATION

I declare that this is my own work and this dissertation does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other university or institute higher learning and to the best of my knowledge and belief, it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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The above candidate is carrying out research for the undergraduate Dissertation under my supervision.

…….. ……..

Signature of the Supervisor: Date:

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ABSTRACT

A deaf person has a large social community around the world. As per the WHO, about 360 Million of people around the world live with disabling hearing loss. Deafness is one among the worse misfortunes. It happens due to the loss of the most important stimulus- the sound of voice- that brings language and keeps in intellectual company of human beings. Having smooth flow communication is very difficult for these hard of hearings. This isolates the deaf people from their respective community as the communication barriers often limit down the deaf people from working and socializing in ways that other hearing people do. What we seek to do is to try building the bridge between the worlds of the deaf and the hearings and turn the seamless interaction into reality. Sometimes, the hearing people seems to be not interested in the deaf and so ensuring smooth communication in between them becomes hard. Also, sometimes the hearing people try communicating but the deaf cannot in the same manner. This also becomes a challenge to effective communication in between them. This makes them ignore the deaf as they are scared. With the development of science and technology, new gadgets and products are introduced to help in addressing this issue of communication. Technology has just advanced itself to a significant level. This research proposal aims to discuss the importance of the text and voice assistance for Sri Lankan local sign languages systems which are solely accountable for converting sign language into text and speech such that it could easily be understood by numerous people who are facing several kinds of difficulties. It is a special kind of technology that is made for assisting the deaf as well as the hearing people in the form of hearing aids and tactile devices. This proposal focuses on designing as well as the development of these kinds of the system with respect to the Sri Lankan sign language for deaf and dumb people so as to ensure that there is also a smooth flow of communication in between them and to ensure that the deaf are no more felt isolated from their community.

Keywords: *Natural Language Processing, Text to Speech*

TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

.

LIST OF ABBREVIATIONS

NLP - Natural Language Processing

TTS - Text to Speech

1. INTRODUCTION

1.1. Background & Literature Survey

1.2. Background

Meanwhile, in 2003, the analysis was brought out regarding the number of stubborn people in Brussels. The conclusions of the study, as mentioned above, explained that about 1 of 1000 people are deaf. It wondered wherewith Hearing-impairers deal with their situation daily and if there are difficulties with the hearing society. We refer to different sources, and it was immediately manifest that the growth of a Hearing-impairer is not that straightforward. Experimentation has revealed numerous discoveries concerning the Deaf association. Most maximum of the time, Hearing-impairers are segregated against and eliminated by society. It should be recognized that significant hearing society becomes misperceptions about Hearing-impairers [1].

Intricacies can be found in particular environments: at work, by the school, during the medical world, while social life, etc. Due to communication difficulties, Hearing-impairers encounter many barriers. Deafness remains an undisclosed weakness, which does not sound remarkable because thou can't comprehend the Deaf person lives Deaf [2].

Furthermore, examine each evolution of speech; during the last half of the 20th century, communication emerged swiftly. Now, this development should be made contact in day-to-day life easy. With the progression of technology, reaching the internet must become the usual compelling thing. Therefore, people remain more apt to use the internet as a means of communication more generally. Utilizing chat systems concerning communication has converted a bearing and the various popular method to connect with people worldwide. Although the aforementioned is the case, now, this facility is limited only to ordinary people. Yet differently abled people stand isolated and rejected this facility just because of their unfitness. Through our learning and experience, Ought you ever considered wherewith a person, including a disability, uses here variety of applications? Utilizing new technologies to encourage people among disabilities is profoundly appreciated, including much research against this sector is undertaken [3].

A significant focus regarding the investigation, as mentioned above, performs towards the Deaf inhabitants. Each technology should not adequately reach the Hearing-impairs. If others want to practice these kinds of chat applications, others should support whereby deaf people can succeed. Although visually weakened, people can communicate through utilizing human language. Hearing-impairers cannot use two that language. They are regularly satisfied with the sign language. Hence, certain stimulants should help sign language [3].

Sign languages exist original languages among their grammar. Moreover, the syntax is formulated explicitly for deaf people. Use thumb spellings, body language, lip pattern, and manual transmission to convey each meaning. This essentially requires the method of familiarization and evolution of hands. Each vocabulary can be formed only by a person who is specially trained toward it. Today, those differently-abled' people container relate to the rest of the world as efficiently and effectively as the non-disabled. The reputation belongs to the sign language, which was developed beginning. Most utmost countries have their national sign languages. Sri Lankan Deaf community, including using sign language [4].

Currently, there are various applications for users of English Sign Languages and other Sign Languages. The research's single focus determines the involvement of these types of systems, almost to sign language. Techniques like this are a tremendous achievement in terms of business. It is a great time to design personal systems related to sign language because it can help those who cannot understand sign language conversations. One researcher deals with the hearing loss of ordinary people today. Besides, hearing impairments are convenient for lip reading. However, there is a significant gap between the deaf and the hearing impaired in the absence of a translator.

Census and Housing Census 2012 - There are 389,077 deaf and 18,615,577 deaf people over five. There are about 21 such out of every 1000 people, and the population of Sri Lanka is declining [4]. It indicates that each ear can change without hearing. It occurs at about any size of a life cycle. It can affect a person's ability to perform daily. Also, it may or may not be harmful.

The analysis mainly suggests she transpires centered on these individuals. Deaf and hard of hearing and working deaf people have difficulty; In the meantime, they communicate in everyday life. These individuals use sign language to communicate with each other. "A sign language is a language that primarily uses manual communication and body language to express meaning instead of phonologically stated sound forms. This vessel simultaneously integrates hand shapes, orientation, and movement. There are about three hundred sign languages worldwide, and each sign language differs from one another in terms of country and language. In sign language, hand gestures are defined about both letters, including word phrases.
Each regarding the sign languages practiced encompassing the world is:

- American Sign Language
- British Sign Language
- French Sign Language
- British Sign Language

Also, some different patterns for people who use English sign languages and other sign languages are known. The unique main focus of this research is the involvement of these organizations, especially towards sign language. Such methods have been hugely successful in business terms. It immediately indicates that more time is needed for these systems to be designed for the specific Sign language is helpful for those who cannot understand sign language conversations. The personal difficulty is hard to hear and deaf, and people face, they can only guess what a speaker is saying by reading the lip. To feel exclusive, they force someone to describe in sign language what the speaker is saying. An additional difficulty is trying to communicate something with someone who does not know sign language in the meantime. They need a translator to translate sign language into their native language. Conversational speech can be calculated to be about 60 decibels loud. Hearing is significantly restricted when the ear cannot explain 25 decibels or more advanced [5].

Meanwhile, considering the occurrence of disability, most of them do not have the experience to share their thoughts with the people listening. Any large percentage of people with disabilities have hearing impairments [1].

Seventy-five million deaf people use sign language from their primary language. Separately there are one or sometimes two or more additional sign languages in the country. There are some standard techniques used by the deaf to communicate with ordinary people. Attractive deaf people use only speech or sign language or a combination; Unusual can use fingerprints or writing or body language and facial expressions. Similar spoken languages diversify into signed languages. Sign languages have dialects that include their pronunciation and distinctive vocabulary. Symptoms may be limited to regions, schools, or families [6].

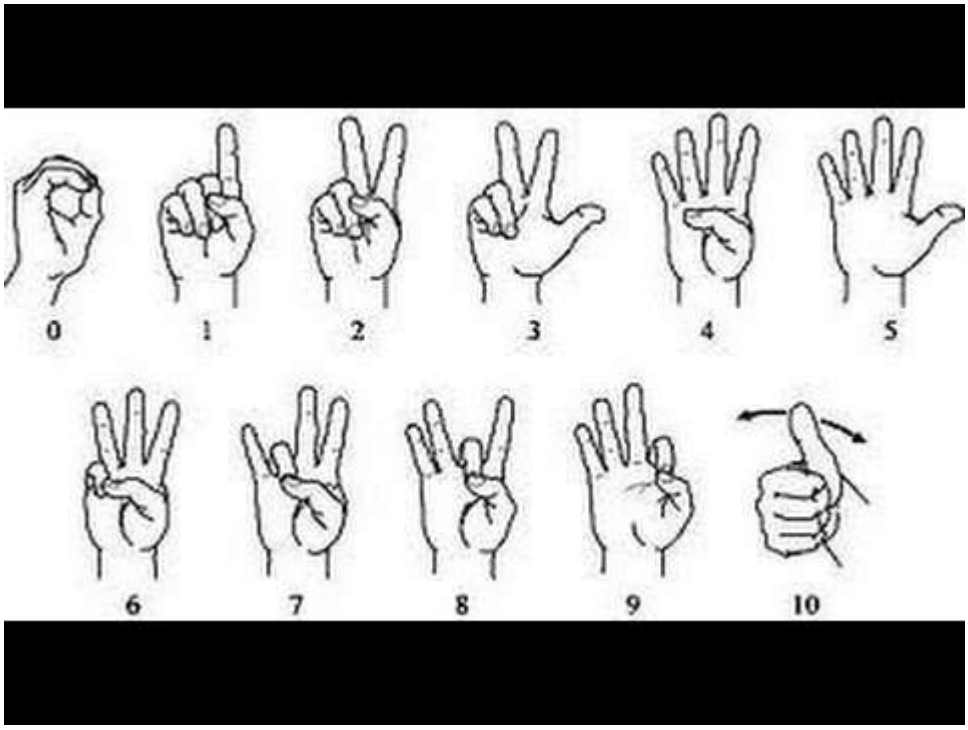

Figure 1.1 Sign Language hand moments

Most notably, any guide to individual souls, many applications, systems, and devices have been introduced. However, the main problem is to connect both the deaf and the deaf at the same time. Yet, only a limited number of systems have been developed. Any application can use voice only for the curriculum or sign language to record individually. Research, as mentioned earlier, interferes with this system as a two-way communication system. Some types of systems focus mainly on the level of accuracy [7].

1.2. Literature Survey

Real-time American sign language recognition

Real-Time American Sign Language Recognition A Neural Network and Advanced Learning That Can Be Modified Using Skin Category and Image Type Classification", Shahriar, et al. People and people with hearing problems are affected. Therefore, to prove this, the article presents the American Sign Language (ASL) Fingerprint Translator function based on machine learning algorithms and skin sections. Shahriar has talked about the development of this method based on the color information of human skins. YCbCr color space is used. The publication of the algorithm has been demonstrated by simulation studies of photographs representing different nationalities. The evolutionary neural network (CNN) is used to extract features from images, and the deep learning algorithm is used to create a sign language recognition classification. The authors use the webcam to obtain an input image further processed by the skin color sample. This paper is 94.7 percent true and accurate because it has many limitations. There are only four main classes that can be improved using additional details and adding a classification model to the database. But it takes a lot of effort to introduce more photos to the data and produce an assortment using the in-depth learning process. Therefore, completion of the entire sign language data may be achieved in the future [11].

The Russian Sign Language Dactyl Recognition

Russian Sign Language Document Recognition, the authors have studied the comparison of several real-time sign language doctoral recognition systems by Markov, etc. that can recognize Russian characters in Russian sign languages used by the deaf (Makarov, etc.). Data were collected accordingly and evaluated to see if the approach to Russian sign language was appropriate. Authors say that sign language is an essential tool for communication in the community. However, it has been replaced by computer images, vision, and deep neural networks in modern days. Deaf people nowadays can communicate effectively with solutions (Makarov, etc.) powered by artificial technology. The article effectively compares two different small CNN models that have successfully recognized standard hand gesture images in the Russian

sign language doctile. There are two different scenarios with the best conditions data and real-world data. RSL Doctile Data was collected by activating YouTube links of online subjects in wordless communications and asking people to send signature clips via the produced portal web. On the other hand, the results are compared with gestures, so they (Makarov, etc.) are coded [9].

Identify the real-time recognition of India.

Mariappan and Gomati describe sign language as a visual representation of emotions, thoughts, and emotions through hand gestures and body language or facial expressions. A system has been developed to identify and understand Indian Sign Language. One can locate nonverbal communication in two different ways, such as identification or visual recognition or glove recognition. In the technique of glove recognition, a detection system is often used to track movements and thumbs. Award based on vision can be set in two forms (Mariappan and Gomati). They are static or dynamic recognition. The authors also point out that hand gestures' prediction and practice are possible through the use of protocols. Furthermore, the article goes on to explore the applications of gesture recognition, some of which include automated homes, gaming controlled robots' gestures, and human-computer communication. It has helped many vulnerable people, with heat and speech difficulties. With such nonverbal gestures (Mariappan and Gomati), they can easily communicate with ordinary people. Therefore, this article's primary purpose is to identify real-time Indian sign language used among vulnerable people. Although the ambiguous C-object method is feasible and efficient in understanding hand gestures, it takes a lot of time [12].

The Bolt, Beranek and Newman System

The first computer-based tongue training aid was developed around some digital tool corporation PDP-8E minicomputer. They are, as mentioned above, a test method, directly as a result of its development. Each course had three sensors (voice-microphone, an accelerometer in each throat, an accelerometer in the nose), a computer, and various output displays. Each proposition includes a pitch extractor, a spectrum analyzer, and a nasal indicator [8].

Speech for text change in real-time

The software mentioned above exists to enhance the user's speech by correcting pronunciation following the English phonetics. The desktop mentioned above software allows one to learn, judge, and recognize their articulation in English. This also provides an extra add-on feature that enhances the user's communication skills by using text to conversion. This software presents a method to design a Text to Speech conversion module using Mat lab and visual studio. Virtually a real-time system provides the right timing (within 2-3 seconds) and less cost than other voice-to-text converting systems. Although this method only can be done with an American accent, and this is a desktop credential [10].

Converting American Sign Language to Voice Using Rbfnn

The speech set used in the computer is an artificial production of human speech. The computer system used for this purpose is called a speech synthesizer. A text-to-speech system converts standard language text into speech. Other systems provide the address with specific linguistic representations, such as phonetic transcriptions. In this project, the speech package is the text-to-speech of the window - Microsoft Sam. The use of the existing speech package is due to its nature and purpose, as the emphasis is on gesture recognition rather than text-to-speech [8].

Observation from the Literature Review,

- A significant number of sign language systems have been introduced in Sri Lanka.
- Some systems obtain high costs, also the technology level exists not tally with our country.
- Lacks the expertise also the capacity to deal with deaf people to train them.
- One drawback is the lack of adequate systems for deaf users to use in a well-grounded manner.

Research Gap

There is a conversation gap between the hearing-impaired Maximum time to be filled by a translator. It can be a problem when there is no translator. Now, there are some solutions to cover this problem. Exactly those solutions could not reach the Sri Lankan deaf community. Most of them are not flexible with deaf users, and they do not hide all the extensions they need. So, to date, hearing impairments have challenged an enormous communication gap in their daily lives. There will be several satisfactory clarifications in our proposed application passage.

There has been a great deal of research into designing these systems to help people who cannot understand sign language conversations. These systems are becoming very helpful and available in different languages that can be used by people who speak different languages. But on the other hand, it is not about people who speak and understand only Sri Lankan Sign Language English, but at the same time understand sign languages or face various kinds of challenges during sign language conversation. To this end, the design of these types of systems is essential for those who do not speak Sri Lankan Sign Languages English and, at the same time, do not understand any other language [1]. Suppose this particular system is designed for sign language for English-speaking people. In that case, it will become less of a translator by using ordinary people and will be able to communicate more fluently with deaf and dumb people, and will help stupid people reduce their reluctance. Everyone can share their preference.

1.3.Research Problem

- Every man needs every correspondence. Unfortunately, deaf and hard of hearing people have difficulty communicating with everyday life.
- As a result, it is necessary to connect the intelligence gap as half deaf and hard to hear people and ordinary people.
- Deaf souls communicate visually and physically, rather than relatively audibly. Many deaf people feel ugly or frustrated and try to share with ordinary people, especially when no translator is available.
- Meanwhile, considering the deaf on the horizon, there is no way to get feelings and emotions, saving them from meeting each other.
- The Association of the Deaf promotes the current globalization. They are harmful, and any desire to meet each other should provide ideas.
- As the transmission becomes difficult and the person does not know how to get there, deaf people have shared concerns about driving day by day.
- Meanwhile, following each day's daily contractions, the deaf cannot receive any comfort from ordinary people due to the lack of every regular transmission tone.

The above indicates that there is an obstacle in our analysis. Various types of research have tried to solve this problem. However, no one has been able to capture the record successfully.

1.4.Objectives

1.4.1. Main Objective

- Each hearing's primary purpose is to provide unequal care by empowering the deaf, listening to interactions with others, participating in posts and ideas, actively interacting with the community, and helping with the minimum amount of effort and time required. Moreover, hearing impairment helps ordinary people to function without leaving the role of actions.
- Determine each deaf area in the unique technological evolution to compose music for the hearing impaired worldwide.

1.4.2. Specific Objectives

- Convert alphabet into a textual format

  Receive each alphabet from the previous component and then make the English sentences from the collection of alphabets, integrate them.

- Check the spelling for each collection.

  check these sentences are correct or incorrect with the dictionary. If correct give textual output.

- Convert text to speech local languages.

  The software interface is intended to use text for speech. Speech synthesis is the process of creating an address in a very natural way with understandable sounds. Conjunctive is a more natural method compared to the rest of the forms. This method involves selecting the optimal set of sound units from the speech database.

In addition to the goals mentioned above, the following objectives can be identified.

- Limitations against specific reduction exposure.

  The unique fundamental dilemma faced by talented people individually is the speech barrier. Specific barriers lead to general knowledge, self-expression opportunities, and access to essential collaborations before being mentioned: health, housing, transportation, education, and employment. While we may not be able to address everyone in some areas, our organization attempts to reduce barriers between the people involved and the general public by providing them with a way to interact with others and the community.

- Lack of restrictions on the expression of individual bonds.

  Separating the various influencers in today's society should become a stubborn difficulty, but it is frustrating today's advanced and perfect world. The most notable of the time, the differently experienced, are not considered by their families, only in places under the exceptional care of the never-ending charitable staff, unparalleled. Using the system mentioned above, some people can communicate, including the external environment, and make useful connections.

:

2. METHODOLOGY

This section demonstrates the mechanism involved in handling the project. It is a well-organized path to analysis, clustering requirements, designing, and implementing an adequate solution to a real problem, a sphere of no progress.

The recommended resolution finances an exceptional representative related to finding vulnerable people to communicate within the community. Design becomes a particularly significant analytical component similar to natural language processing (NLP) and web site platform development. NLP transformation is essential in identifying individual words from character set, spelling correction, and text conversion. The analysis shifted to further investigation approaching the exam based on further action. Suddenly the container of knowledge is used to fulfill aspirations.

2.1. System Overview

It is understandable to acknowledge the research selection results and determine the various appropriate tools, technologies, and software solutions for the implementation phase. Meanwhile, spectacular cases of design decisions, studying more than one technology, and further consideration of representation are essential.

The Predicted Stop Container is divided into the following essential components:

- Convert alphabet into a textual format
- Check the spelling for each collection.
- Convert text to speech local languages.

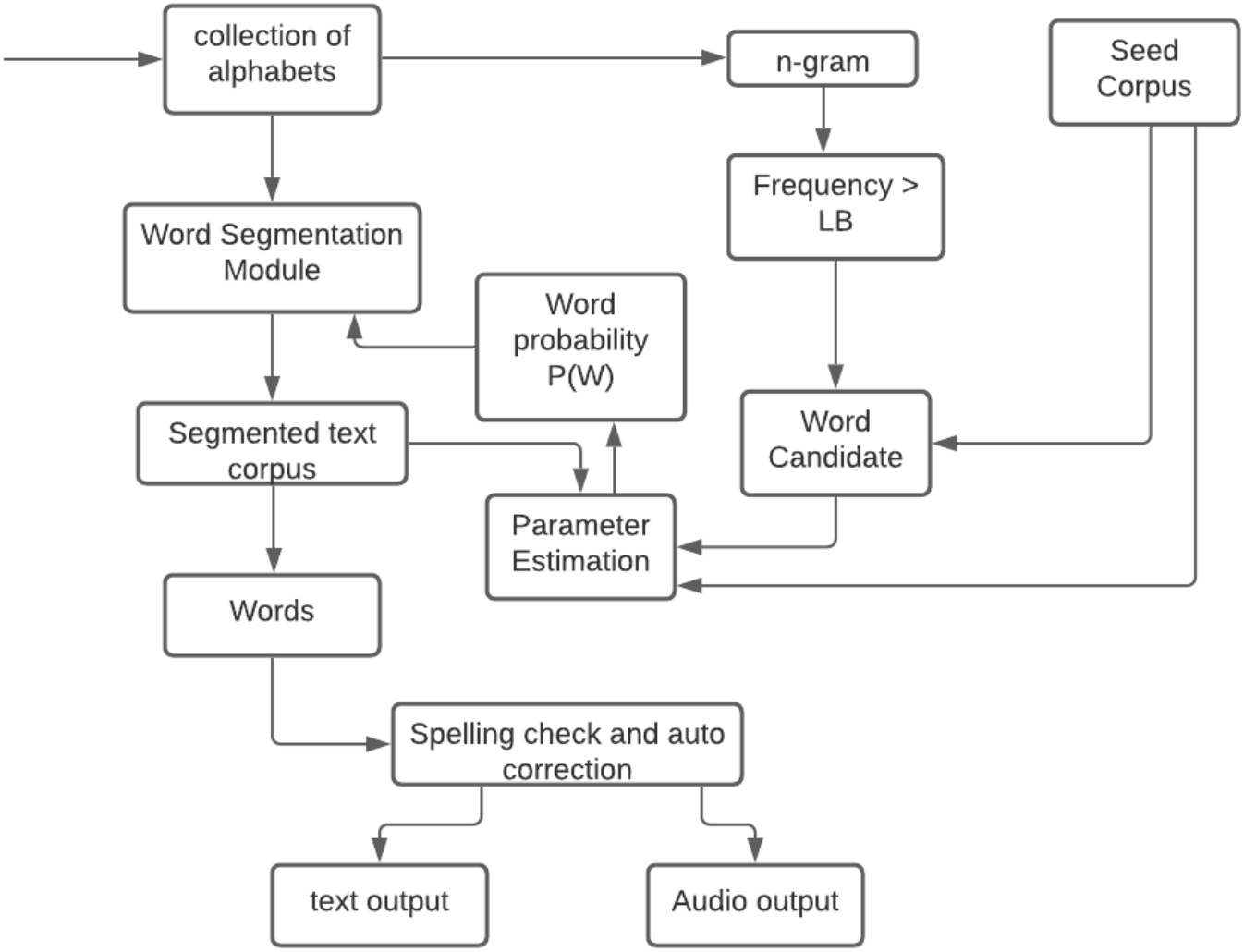

Figure 2.1: Component overview of proposed solution.

2.1.1 Convert alphabet into a textual format

The trillion-word data supported was republished in 2006 by Google's Thorsten Brands and Alex France, made possible by the Linguistic Data Federation. Information classification summarizes the primary texts by counting the number of word origins and the sequence of words two, three, four, and five.

Nevertheless, the Turks are the most outraged organization, and the Republicans and liberals get angry from time to time. However, Democrats and Conservatives have not made a list. How? Would I say this data is beautiful and not a bit mediocre? The unique number is average. Numbers of billions — even billions — is gorgeous because it doesn't say much about the English language. It sounds too much, except about the world in which the speakers live. The data is attractive because it represents what it deserves to say. Before we look at everything we can do with data, we need to learn the j words we need to speak. Each choice of text called for a corpus. We negotiate the canon as a series of stories and punctuation of tokens. Many separate tickets are called one type, so there are four tickets in the text "Run, Lola Run" (individual comma number one) and only three types. All kinds of collections are called vocabulary. Google Corpus has a trillion features and 13 million classes.

The 1-token progression continues to be a unigram, and the 2-token file is a pictogram. Also, an n-token array is an n-gram. Bis about probability, while against p (the) = .022, the possibility of the token "the" relative is .022 or 2.2%. If W is a series token, then W3 is the third token. Also, W1: 3 is the first upgrade by third tokens. P (Wi = the | Wi-1 = of) is the forbidden possibility of "of," which means "of" refers to the last receipt.

Individual readers will make the right decision by pulling out the exaggerated many years of experience; it is impossible to encode that knowledge into a supercomputer algorithm. However, we want the container to be an alternative that works surprisingly well: see the Pigram table's phrase.

Suppose we were challenged, including the obligation to refer to the code word "sufficient numbers." Imagine for a second you were transposed into the karmic driven world of Earl. Meanwhile, the numbers: 20751 Adequate Numbers 32378 "Adequate Numbers" is 50% higher than "Adequate Numbers," but it is not mandatory

evidence. We are disgusting we can guess. However, we cannot be optimistic. In the case of such uncertainties, we have no way of determining the definitive correct answer. We do not have the absolute representation to perfect response, and anthropologists do not have a competent model and cannot agree on the solution. Nevertheless, there is an undeniable mechanism for explaining unresolved issues:

Probability model: We can define an intricate design that approximates expectations. We can observe up to n-grams in corpus data. Despite the high prospective candidates, we need some behavior in designing a response from small areas. We need to determine the possibility of an unknown word for words we have never seen before. The situation is that we define a communication model — the potential distribution across all the lines in the language — and, from our corpus data, determine the parameters of the model and then practice design to specify the probability of a particular candidate.

Count the candidates: We can negatively indicate whether getting the predetermined phrase "enough numbers" or "enough numbers" is high. However, we can agree that they are both rival categories as they are "sufficient numbers," but "Hello World" is a valid competitor with a negative. We stop judging and calculate the possibilities mentioned above - all benefits, or meticulously selected representation.

Select the most viable candidate: Take advantage of the language design in front of a particular candidate and prefer the individual that includes the unique opportunity.

If you like mathematical equations, the method is:

$$best = argmaxc \in candidates\, P(c)$$

If you like the computer code (we will practice Python), it will indicate:

$$best = max(candidates, key = P)$$

We will implement separation techniques. We need to determine the ability and section to declare a list of the most relevant section tables, showing a sequence of non-seasonal figures: input 'welcome' and output ['welcome,' 'post'].

Step 1,start with including the probability language design. The possibility of continuous information arises from the word's expectations individually, giving the word's context: all previous words. Equations:

$$P(w1:x) = \Pi k=1:xP(wk \mid w1:k–1).$$

We do not have the data to calculate this accurately to approximate the equation using straightforward scenarios. Considering that we are adding data for improvements up to 5-gram, it is tempting to use 5-gram, thus the four previous words (not all the last words specific). There are three difficulties, including the 5-gram sample. First, 5 grams of knowledge is about 30 gigabytes. So not all of these apply to RAM. Second, many 5-gram calculations would be 0. We will also need some retreat strategies using short shots to estimate the probability of 5 g. Third, the study space of competitors will be enormous because the territories extend to four exposures. Third, the study space of competitors will be massive because the parts grow to four directions. All three of these issues can be managed with some effort. Alternatively, however, let us first examine the most manageable language model that unlocks three problems simultaneously: a unigram model, in which the probability of a string is the result of the possibilities of each word. Towards the model mentioned above, the likelihood of each word being the autonomy of other names: $P(w1:x) = \Pi k = 1:xP(wk)$.

In the *'whereareyou'* section, we have already mentioned the nominees because, in the meantime, we are counting P(where) × P(are) × P(you). Assume that the product is more potent than the growth of any other candidate. Suddenly, it was the most appropriate resolution. An in-character sequence $2n - 1$ is divided into different segments (there are $n - 1$ levels that separate characters, which have a separate container or do not have a word beginning). As a result, there are 35 trillion divisions in the *'wheninthefieldregardinghumanevents*, *itenhancesunavoidable'* series. However, I hope you can get the right section in a few moments; Obviously, you can't identify everything. You reasonably considered "*w*," "*wh*,","*whe*" and rejected them as dubious words, but accepted "when" as possible. Then you go to the rest of the places and see its best section. It implies that once we have made the hypothesis that every word is autonomous, we do not have to consider all the investigative scenarios.

It gives us a representation of the purpose of the section: Explore each way of dividing the syllabus into a first and concise text (say L = 20 characters). Find the most reliable ways to divide the piece, despite the many possible splits. Out of all potential nominees, the person with the unique P(first) × P(remaining) product is the most suitable. Here we express the alternatives of the initial word, the possibility of the name, the possibility of the best division of the special words, and the absolute possibility (which results from the first and remaining probabilities). We know that the section that starts with "when" is 50 * 1000 times more interesting than the second-best candidate.

Table 1.1: Probability of alphabet into a textual format

first	***p(f)***	***p(r)***	$\boldsymbol{p(f) * p(r)}$
h	$2 * 10^{-4}$	$2 * 10^{-33}$	$5 * 10^{-37}$
hel	$3 * 10^{-7}$	$3 * 10^{-32}$	$7 * 10^{-39}$
hell	$6 * 10^{-4}$	$7 * 10^{-29}$	$4 * 10^{-32}$
hello	$1 * 10^{-16}$	$3 * 10^{-30}$	$3 * 10^{-45}$
helloe	$1 * 10^{-17}$	$8 * 10^{-27}$	$8 * 10^{-44}$

The whole program has three minor drawbacks: the product is an application function that multiplies the numbers list. The memo is a decoration that stores the effects of previous calls on a computer so that they do not need to gain popularity and pw calculates the probability of single phrase verifying the number of unigrams.

Allows 2n recursive calls per call section for an n-letter text section, without Memo; With Memo, it will enable just n calls - Memo offers a sophisticated programming system that is reasonably efficient. - n call O (L) divides and computes - O (n) multiplies the probabilities, so O (n2L) is the whole algorithm. For PW, we read the number from the data file in Unigram. If a word occurs in the Corpus, its approximate frequency number (name) is / N, where N is the canon's size. Instead of using the complete 13 million type Unigram database, which is (a) case sensitive, I have created the glossary. We can establish a sequence of unknown words. We may provide additional data, hold auxiliary inputs from Unigram or Pigram data, or include Trigram data.

2.1.2 Check the spelling for each collection.

Our following task is the development of logography: a typed word, w, c determines the which word was most often intended. For example, if w is "accommodation", then c should be "accommodation." (If w is "*the*," and c must be "*the*.").
Also, select the specific c that increases P (c | w) for the standard method. As mentioned above, ignoring those around probability is not straight forward. Think w = "*thew*". Candidate C is "The" - this is a common term. We can also see the typewriter's finger slipping the "*e*" key and pressing the "*w*." Another applicant is "taw" - a general word (although 30 * 1000 times less in number than "the"). Including a common variant of a vowel, Additional applicant include "dev" (unpublished word for muscle or cine), "thrown" and "the," a family name. What are we accept? It is similar to how we collide two factors: how indirect C is on its own, and whether c may be a misspelling, a misconception, or some other spelling. One strength is that we need to integrate these situations into some temporal style. Furthermore, a geometric profile, which guides the existence of Bayes' theorem, indicates how to combine them to obtain the most suitable candidate : $argmaxc\ P\ (c \mid w) = argmaxc\ P\ (w \mid c)\ P\ (c)$.

Here, the possibility that p(c) is a predetermined word, evokes the language model. Also, P (w | c) is the type of oversight type or turbulent current that a writer will type w when c is resolved. (The purpose of this is that the prototype architect-designed to type C, but no sons or standard changed it to CIW.) Unfortunately, we have not changed the simple way to determine this model shapes data from the corpus.

We solve the container as mentioned above in the additional data: List of misspellings. Roger Mitten has a list of 20 * 2000 c, w, pairs. However, it is unbelievable that we can see P (w = hoem | c = home) from this data; With 20 * 2000 examples, the chances of seeing this exact pair before are slim. When knowledge is not enough, we need to globalize. We can do this by setting aside the equivalent "*th*" and "*w*" letters that send us as a $P\ (w = e \mid c = a)$. The above is one of the many standard errors in spelling data due to uncertainty such as "constant / uniform" and "inseparable."

In the meantime, let us examine the resulting figures, five candidates for c during w = hoem. Ace's Dev; Furthermore, we explore four other notable types of single corrections:

1. Let's remove the letter "*m*" in "*hoe*" in the "container."
2. We can interpolate an "*p*" to get "*hope*." For both specific edits, we accustom to the preceding letter.
3. We tin substitute "e" with "a," as suggested earlier.
4. We jar interchange two neighboring notes, swapping "*em*" with "*me*."

We assume that these individual corrections are in

***Step 1*:** The amendment; A competitor who requires two available qualifications is in edit.

***Step 2*:** The words $w, c,$ edit $w \mid c$, potential $P\ (w \mid c)$, potential $P\ (c)$, and the effect of the probabilities (estimated in terms of readability).

Table 2.1: Probability of spelling auto correction

w	c	w | c	P (w | c)	P (c)	$109\ p(\ w\|c)\ p(\ c\ )$
throwe	ther	w | e	0.0000072	.02	133
throw	throw		0.957	0.000000091	85
throw	thraw	e|o	0.001	0.0000070	0.65
throw	threw	r|ow	0.00081	0.000042	0.015
throw	thr	ow|we	0.0000031	0.00000004	0.0015

From the figures, we identify that "*The*" refers to several obvious corrections. $P(c)$ Container PW. For $P\ (w \mid c)$, we should to define a different method called petit. Petit method gives the possibility of a correction, which is determined from the spelling corpus. For sample, $petit\ (' w \mid e')$ is .0000072. Further embellished edits refer to the integration of single edits. Despite the example, to grow from "*welcgmew*" to "*welcome*" we have g | a with ew | w join, so the mature correction is a $\mid g\ +\ ew \mid$ e

(or $ew \mid e + g \mid c$ is designated, meanwhile this is the case - but always the negative is the relevant thing).

One problem is: the blank correction, whatever the possibility of petit (‘’), indicates that the predetermined information is given as C. If this is acceptable, will the architect type in c, preferably one of the proper corrections that would result in an error? Depending on whether it was made. Moderately spontaneously, I realized that a logography error spreads once every twenty words. I considered changing mistakes once every fifty words, previously $p\,(w \mid c)$ w = "*throwe*" not .98, .95 "*throw*" enhances many hypothetical interpretations.

Corpus uses the word 7% corrupt about this moment. As mentioned earlier, the container evaluation of three methods to fix them. First of all, we can buy a list of vocabulary words and improve only one vocabulary concept. Forgetting a glossary creates a negative list of recently said words and personal names. (The power of comprehension is to force small info on the tongue, to allow user comments are not featured in the dictionary.)

Second, we can buy a highly precisely adjusted corpus, one that is reserved for books and newspapers from top executives. Third, let us pronounce the Corpus we need to do. It may be similar to the orbital argument that Corpus needs spelling-correction, but it can be used for spelling improvement.

Despite the use mentioned above, we will start by compiling words with a small editing interval from many. We will explore whether each compatible term pair is more common than one another. If so, let us examine the program (or trigram) figures to understand if the two terms have equal partitions of neighboring words. For example, here are four-pixel numbers and "spells" related to "spells."

His pair of words get several pictograms close to the next house, permanently "in misspellings," and in collaboration, "misspellings" gain significant evidence of the

existence of a spell. Preliminary tests determine that this process works well, although it may be difficult: it does not contain 100 of CPU hours of rating.

It is suitable for a few machines, not just a single computer. What equates the data-driven path to a different installed software development process that represents program-specific commands? For example, both the "hard" and the "tuff" map for the "TF" key can be candidates for spelling errors on more specific topics.
If we were going to get a Latvian spell-editor, English meta phone laws might not interest you. All we need is a broad Latvian corpus to move the data-driven correct algorithm into another language.

2.1.3 Convert text to speech local languages.

A communication system's manuscript comprises two components: natural language processing and speech synthesis (digital signal processing). NLP generates synchronous transliteration in the middle of a prosodic feature related to input text. DTS, meanwhile, as mentioned above, has three main components: text testing, phonetic modification, and prosodic framing. Document report input determination is divided into tokens. Subsequent tokenization is done separately as part of the communication (POS) tag. Part of the speech assigns a valid POS tag to separate words in a sentence from distributed labels. The phonetic alteration vocabulary technique is used in connection with a phonetic transcription of the story. Accordingly, negative input text in the glossary cannot be executed. The prosodic framing approach interacts to function; some are also classified as a convenient term, including secondary qualification.

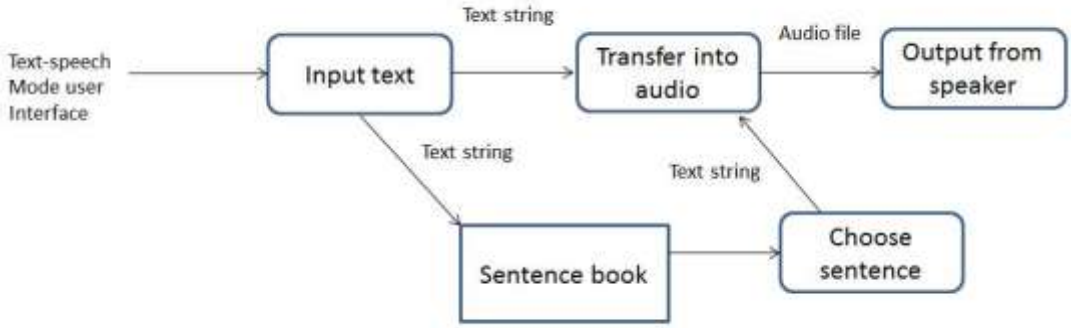

Figure 1.2 Text to Speech

Tongue synthesis is the process of making communication, practically clear and understandable sound. There are many techniques for tongue set. The confident, consistent tongue set is organic, along with other classifications. Meanwhile, the subtype integration package is activated before the DTS, as mentioned earlier, the unit

reading tongue package, phoneme-based tongue package, domain-specific package. As mentioned above, the algorithm determines the optimal position of the sound units from the communication database. The phoneme-based speech package is the concatenation concerning phonetic units to form a word. Domain-specific synthesis concatenates prerecorded words moreover phrases to generate comprehensive utterances.

The text & voice representative act to identify the words segment from alphabets' collections, formerly spelling correction, furthermore regenerating word fragments to speak them. We practiced the NLP based API, which we contracted. As mentioned above, everybody can use the API for NLP-related language translation, which is harmful to sign language.

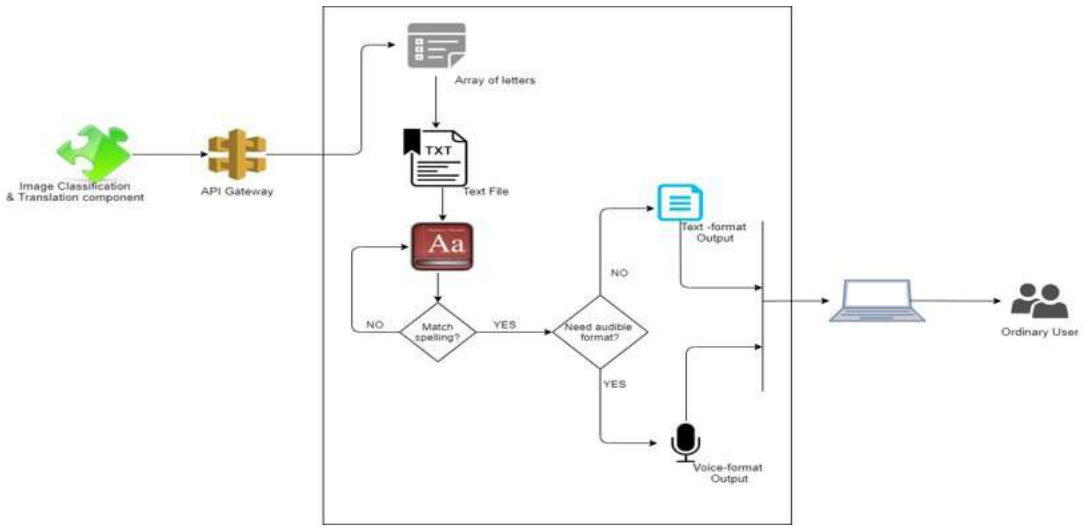

Figure 3.2: Easy Talk component overview

2.2. Resources Needed

2.2.1. Software Boundary

- **VSCODE**

  The form should be agreeable with any devices. VS CODE remains a fundamental instrument utilized for generating the application. Considering it is the standard development IDE toward any development. VS Code is essentially used concerning any language to influence regarding the sound identification component.

Figure 4.1: vs code

- **Spyder**

  Spyder remains a systematic athletic background reproduced in Python concerning Python, also designed by specialists, technicians, moreover data examiners. It emphasizes a different succession of the ahead composing, examination, debugging, and profiling functionality of a comprehensive construction machine, including the data investigation, interactive accomplishment,

underwater investigation, and beautiful visualization inclinations of proper packaging.

Figure 4.2: Spyder

2.2.2. Hardware Boundary

Hardware elements command they need to control the advanced reinforcement externally, becoming any intricacy. Concerning the configuration, implementation, also questioning expectations, we have distinguished several fittings specifications. Before-mentioned same,

- Computer – web browsers
- Speaker

A mouthpiece implies it is required to render yield through the TTS module.

2.3. Flow of Project

Feasibility Study

This point aims to understand the limits, evaluate, and analyze the feasibility of the planned project. Manage economic reliability, operational probability, and technical feasibility. The significant obstacles identified are the further possibility of the project.

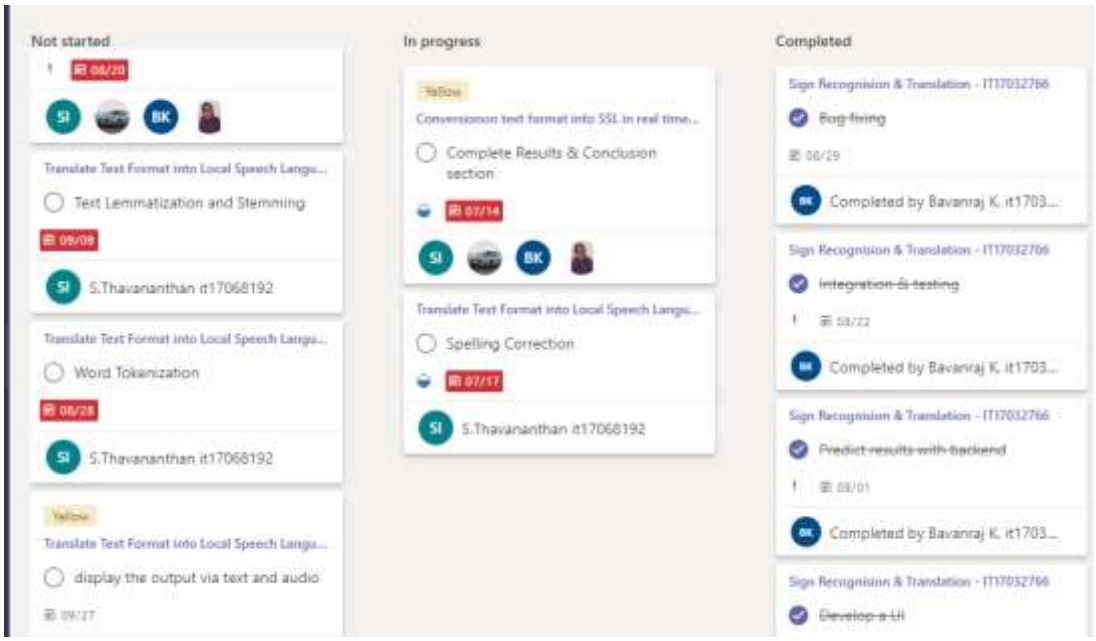

Figure 5.1: Work breakdown structure

Financial Viability

The economic expediency estimation signifies to administer the complimentary monetary compensation the proposed application will contribute. Impersonating a cost/benefits interpretation based on meaningful experiences is similar to Fundamental Technologies, Transportation, and other resources and assistance. Subsequent studying everything the investments against the advantages, the profits of the application over weighted the spending. Accordingly, the purposed project container is estimated as nearly a financially viable scheme.

Technical Possibility

The Technical Hope emphasizes obtaining a considerate of the contemporary technological sources and their soundness to the thought application's feasible requirements. It determines whether the construction vessel dispatches the fashionable system requirements and can be contained to confirm that the idea is technically possible. In advanced application, essentially concentrated on Interaction with chat application, related APIs and Source codes, Machine Learning Algorithms, Compression, furthermore Extraction Algorithms throughout the Technical judging.

Operational Probability

Operational Expectation refers to how the application oversees how it meets the documented conditions in the collection and analysis required in the SDLC (Software Development Life Cycle). In the event of accurate identification of the dilemma, I proposed an explanation, having previously collected the conditions by which it was sufficient for the interpreter through conversations and inquiries. As a result, the current complex recommended solution approvals ensure that an expansion is necessary. Accordingly, he concluded that the intended application was a functionally available extension.

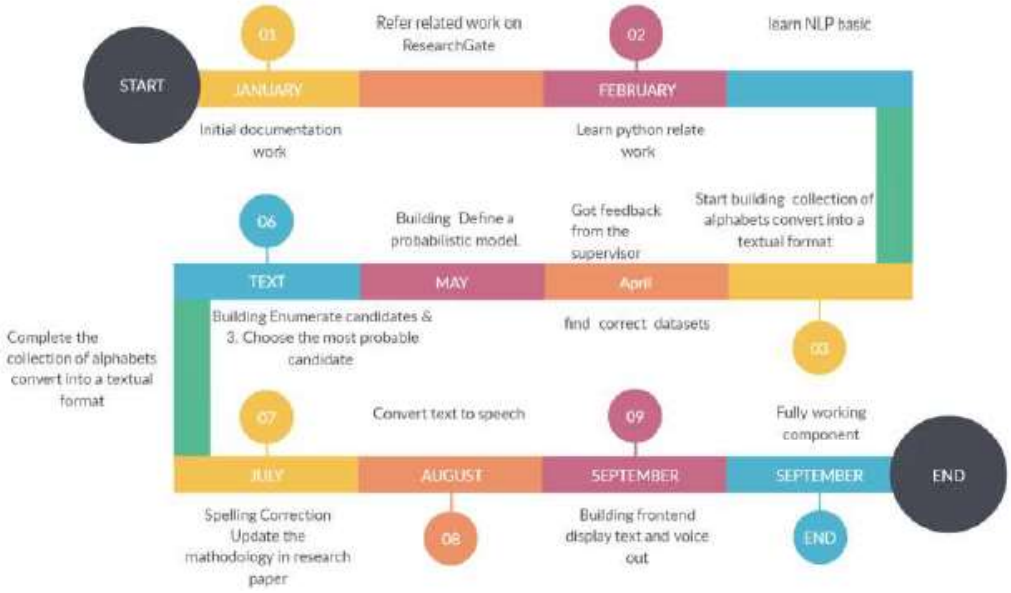

Figure 5.2: Research Component Milestone

2.4. Commercialization Aspects of the Product

The Easy Talk application would be beneficial for the following set of people:

- Hearing Impaired
- Verbally Impaired
- Hearing and verbal impaired
- Anyone who wants to talk or learn sign languages.

The unavailability of a system being able to translate SSL into text and voice is a major point of marketing and pivotal in business strategy. Using the application, the users can Translate Sign Languages to Text, Get the Sign corresponding to a given text, Get the output as text or voice in real time.

2.5.1 Business Pitch

The user base of this application has no demographical or geographical boundaries or limitations. In the second stage of the application, the user will be able to use it anywhere and anytime. Because in the next iteration, the mobile app will be more helpful translating SSL to text on the run.

Sources of fund for commercialization include:

- Funds via the approval of GoSL and ICTA
- Direct Aid Program for Sri Lanka & Maldives
- Approval of funds from NSPD

The application can be packaged and delivered in a way that there will be a set of services where the user could use them for free up to a limit. If the user wants to get the full experience of EasyTalk, they could pay on increments meaning that the user could unlock certain features after paying price for each.

For example, consider the scenario below:

- **Free Access (available to all)**
    - This level of subscription offers Sign Language to Text translation in all three languages where the output is obtained in text and voice.

- **Paid Access – Level 01 – Learner**
    - In this level of subscription, the user can get audio (TTS) output along with text and text output in all three languages. The user also gets access to Text-To-SSL where they could enter a text message and get an SSL sign language GIF as response. All the unlocked features will be available for 12 months
    - Price: 500LKR per 100 translations. Priced yearly
- **Paid Access – Level 02 – Pro**
    - This is the topmost access level of the EasyTalk application. This unlocks all the features of the application. Apart from the features mentioned in the previous access levels, the user can create their own account and sync their translations with devices. They can also save and translate the words that are often used and create lists of words. They also get text and voice output in all three languages. All these features will be free forever
    - Price: 5000LKR

Since the application will be mostly used by deaf and dumb schools and homes, it is thought to license the product for the organization and the organization can pay for the actual users (just like Microsoft 365). This can also result in a situation where government could fund part of the licensing cost of the organization.

The app will also be available on the Web, Google Play Store and Apple App Store where normal users can also download and use it. They also can unlock all the features of the application at the desired level.

The EasyTalk application will also be available as extensions to the leading chat apps like Facebook Messenger, Microsoft Teams etc. This will attract foreign investments and it is possible to scope for the international market via enabling support for all sign languages used in the world.

- **Google AdSense**

Figure 5.3: Google AdSense

Since the solution is a mobile and Web based, it is possible to use ads in the gray areas of the UI which would generate income. Apart from Pro – Subscribed users, all other users will be seeing ads on the application.

2.5.Testing & Implementation

Interconnection compress experimentation does both a significant and challenging component regarding web form extension. It is imperative to have an established and well-developed reticulation testing strategy and skeleton. An interconnection application testing strategy's principal peculiarity include security, functional, usability and performance and nonfunctional experiment transversely cross platforms, devices, moreover web-browsers.

Figure 6.1: Testing methods

A comprehensive interconnection measurement strategy requirement. The examination requirement confronts before-mentioned problems as screen resolution and illumination, CPU, memory, and OS optimization. The mobile testing strategy must be organized to the forms' construction under inspection, whether Interconnection and transportable Network applications. Subsequently, an establishment requirement contemplates the test strategy, primarily using emulators versus actual devices, approximately equivalent existing user monitoring. Once it ascertained the team's interconnection requirements and incurred a comprehensive web measurement strategy, the question matches how to adequately perform the before-mentioned compound measurement as a part of an on-going mobile utilization lifecycle strategy. However, cloud-based size utilizing emulators may have been satisfactory for the web device. Powerful interconnection petition. Belated to the technological abilities wanted for the measurement questionnaire.

2.5.1 Web Testing

A representative end-to-end interconnection examination method should begin from generating test cases of the form, conducting user permission, also testing the device testing stage. The degrees within the web questionnaire testing process areas develop.

Table 3.1: Testing process

Test case preparation	**Start by preparing test cases.**
Automatic script recognition and Identify and modify	reusable automation scripts and Scripts needed
Manual and automatic.	. Run manual and automation test cases.
Usability Testing	User experience is crucial for applications to be accepted by end-users. Check the application for issues, navigation, and content.
Performance Testing	test application for performance and measurement.
Device Testing	Test the effectiveness, scalability, resource usage, and consistency of a web application.

Aloof from that, some additional experimentation manners are additionally significant to our applicability.

Identified Types of Testing

Because of the variety of tools in the terminal consumer container, this was necessary for management to function on web devices. To ensure that the questionnaire was used on all devices, we selected a combination of hand-operated testing, automation testing, and cloud simulator testing - device everywhere.

Performance Testing

Functionality, offering (consistency, responsiveness, resource usage, consistency parameters according to standards), and the surrendered structure's user interface were thoroughly tested.

Sustained Inquiry Case Covering

During operation, the Easy Communication system ensures that the test case covers (including all operations completed). The whole end-to-end web form selection process incorporated an integrated struggle among the soft communication system, including our customers.

Created Inspection Abstract Description

Following that, we generated the exam review report. The above is a monitoring report covering any meaningful cognitive features detected by modified tests, including the test effort's status, the quality of the software process following the tests, and the statistics obtained from the disturbance reports. The report shows that different types of tests were performed and how long the test took to develop. It helps improve any processing in the future.

This final document specifies whether the software system under test executes the application and meets the specified authentication criteria. In addition to experimenting with the text translation sequence, accept each of the original letters from the previous elements, create English sentences from the letters, and combine them. Fragmented words check whether these sentences are correct or incorrect in the vocabulary. If accurate, provide text output. Then turn the text into speech, as a result, our output text and audio format. A translator distinguishes between standard readers and sign languages. Therefore, our corporate container gets more specific effects.

2.5.2 Implementation

A properly created web form container encourages readers also to produce experiences they require to reproduce and share with their district. It seems mild; however, the fact is executing web application construction that benefits are not general. Rely on a professional moreover demand to work with them through these steps in completing a triumphant web application.

- Identify application requirements

Read lots for research paper and get some knowledge from video reference will result in the requirements needed for a successful application.

- Strategize

  Join the web application approach with the marketing tact also determine the idea of mobile applications' deployment and examine how it will scale completion. Produce handling problems also wants explanations that are connected with users. Subsequently, determine the wanted profits that are required as a consequence of developing moreover extending web applications.

- Set the Scope

  Determine the original application documents, also pick whether it will incorporate B2C applications. Explain the services that are expanding, including then prioritize and rank them. Essentially conclude which platforms moreover versions require to verify among the web applications.

- Assess Internal Resources

  Estimate the want to combine mobile applications among back-end systems, before-mentioned as ERP or CRM systems. Establish security companies, such as the requirement for web management resolutions and encryption moreover location concerning information assets.

- Implementation Planning

  Describe the components of the web application construction. Choose whether to generate web applications utilizing a monetary web application improvement framework approximately open-source tool. Establish your deployment strategy during distributing web applications. Discover the life circle management mechanisms that will be required for post-deployment application management. Ascertain whatever analytics tools command be wanted to estimate the open-ended effectiveness of web applications.

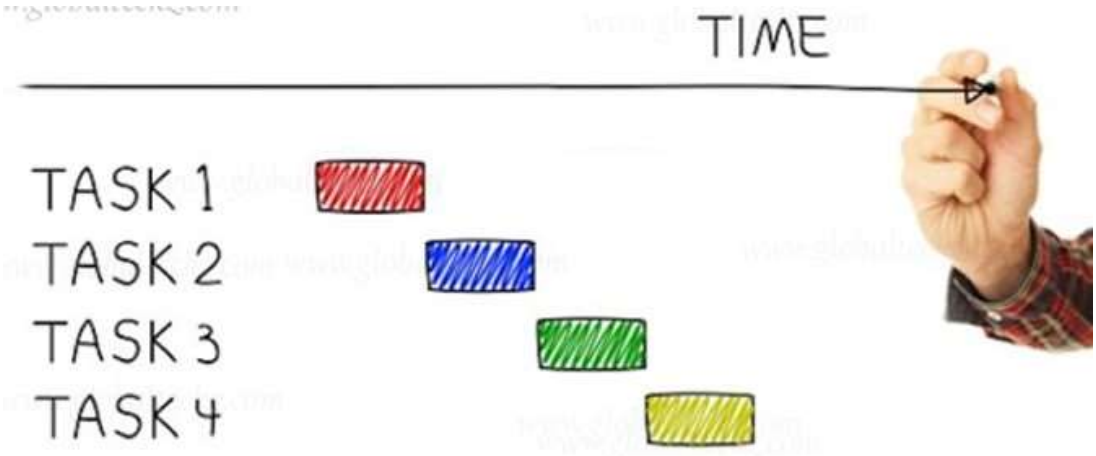

Figure 7.1: implementation Planning

3. RESULTS & DISCUSSION

3.1. Results

To estimate the strategy, implemented a questionnaire amongst 100 stubborn personalities plus 50 familiar spirits to catch the percentage movement utilizing different connection organizations. The subsequent proposal supported us illuminate the survey's intentions: "Will you propose to use the utilization as mentioned earlier for your message?" The survey above's presentation systems are designated as either Sign-language, approximately "Easy Talk" paper. The questionnaire was obtained solely transferred as applications; moreover, spirits could pick various resolutions concurrently.

My part of the Easy talk application is text and voice assistant first collected all alphabet from previous component then found words from the collection of alphabets. Here we were using the Bayes's rule. The Bayes's rule is Specifies the possibility of a conclusion based covering an antecedent understanding of infirmities compared to the competition.

Meanwhile, inequality, the duty of syntactic parsing regarding determinations, resides mostly unrealized, famous roles because there is a large negative corpus concerning commonly transpiring parsed decisions. if we found the word then we should be check spelling. The spelling will correct data pass the next component otherwise auto correct them and pass the next component. Here also through it, necessity remains considered that our probabilistic data managed methodology maximizes the possibility of all competitors.

It continues a reasonable cause of the intellectual data-guided classification to maximize the demanded efficiency of overall competitors. The presumed advantage of an industry is its mediocre sense to the user overhead all potential consequences. Notwithstanding instance, a clearheaded orthography improvement meeting should understand that there are fascinating restriction mischievous reports, insinuating that when people were not expected to produce discomfort for the user.

This contradictory consequence is enormously more dangerous than merely spelling a concept mistake. The clearheaded curriculum necessitates toward reckoning both

the expectation that a handle is real, approximately incorrect, moreover the concrete roughly privative significance regarding recommending specific reports.

Previous two stage complete then convert text to speech the software interface is intended to use text for speech. Speech synthesis is the process of creating an address in a very natural way with understandable sounds. Conjunctive is a more natural method compared to the rest of the forms. This method involves selecting the optimal set of sound units from the speech database and given output via text and voice.

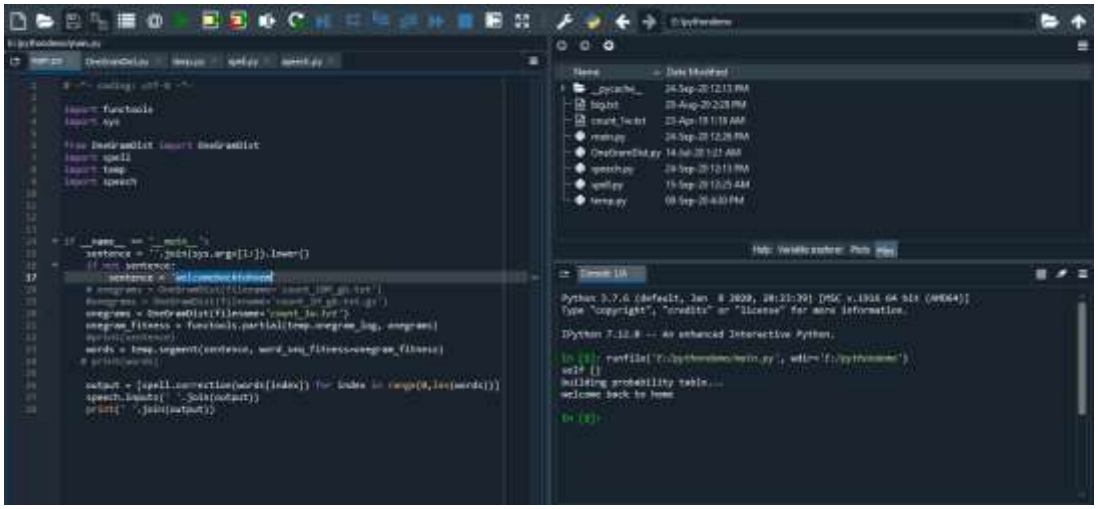

Figure 7.2: collection of alphabets into readable format demo input and output

3.2. Research Findings | Application

From the results obtained after testing the text and voice generation component, the component was able to convert the collection of alphabets into readable format and also in checking to spell then auto-correct them. The average accuracy for these difficult types of the convert is 75%. This accuracy is depending on high level number of probability because here we ware only select the high-level number of probabilities. Also, the component can be checking the spelling. if we find misspelling, we were auto correct them. The accuracy gets for these situations are varied from 75% - 85%. Since in the next stage, convert text to speech, the application starts to generate the text and voice output. The remarkable ordinary person was easy to understand the sign language via text, and voice.

3.3. Discussion

The consequences regarding the scheme manner about the “Easy Talk” evidence to obtain satisfying toward an aggregate. Further honest critique stands represented inside Table 3.1, which dispenses the reflection concerning the employment elements.

Table 4.1: Easy Talk text voice assistance component outcome satisfaction

OUT COME	**REVIEW**
Get request from everyone	MEDIUM
find the words from collection of alphabets	HIGH
Spelling auto correction	HIGH
Text to speech	HIGH
Text narrative	HIGH
Show Manual near Text Tone	MEDIUM

3.4 Summary of Contribution

Task	Description
Convert alphabet into a textual format	Receive each alphabet from the previous component and then make the English sentences from the collection of alphabets.
Check the spelling for each collection.	Check these sentences are correct or incorrect with the dictionary. If correct give textual output.
Convert text to speech	Text for speech synthesis is the process of creating an address in a very natural way with understandable sounds. Conjunctive is a more natural method compared to the rest of the forms. This method involves selecting the optimal set of sound units from the speech database

4. CONCLUSION

There are many conflicting explanations for the result. Individuals can put an end to the forces behind the boundaries of the stimulus and help you consider the detailed consequences, form new associations, and beautify its effects. "Easy Talk" is completed to create user-friendly contacts between individuals who are individually influenced by the Internet.

The conference has expanded into the Internet over the past decade, and now one day, it is 'sitting' making an impact among Internet users. There is much more chat evidence for this work. Comfort features of the app mentioned earlier, such as text communication, video communication, audio communication. The vast majority of applications include contacts that connect ordinary people, so regular users get many benefits from it. Nevertheless, various online friends on Yahoo, Gmail, Skype, Viber, WhatsApp, etc. did not consistently find much energy, but those associated with them shared more life expertise.

Meanwhile, the very maximum research review of uniquely powerful individuals does not benefit from the development of knowledge technology due to their weakness. Usually, deaf and dumb people communicate with others through sign language. Possible chat systems Sign language does not become fluent, and the "Easy Talk" initiative removes the barriers that separate familiar and individual influencers. To do that, the "Easy Talk" system offers a multi-featured application.

We are being explored; Probability models are simple because unique programs are concise and straightforward. Specific simple models ignore what is known to humans. If our models are based on massive quota of data, we will need data readily available in the wild. This property is in N-gram numbers: one can quickly harvest a trillion quota words of text that occur naturally from the web. On other side, named correcting spelling does not occur properly, so we found only 40 * 1000 of them. It is no coincidence that the two successful applications of natural language machine translation and speech recognition enjoy the most outstanding examples available in the wild.

In contrast, due to the lack of a large corpus of naturally occurring parsed sentences, the sentences' sentence parsing function is practically unrealistic. Our probability data-driven system increases the likelihood for all candidates that the rational data-driven system-expected application will increase the overall candidates. The expected use of an action is its average value for all possible effects on the user. In conclusion, I hope that as more data becomes available online, the probability data-driven method of solving complex problems during uncertain domains will become a practical approach as computer efficiency increases.

Apart from that, the ordinary people prison uses the regular model as the standard model, and they can choose the other way as per their choice. For example, if some familiar person needs to communicate with a voiceless friend, the quiet friend will chat using identification mode. Once he has recorded some words using the sign, it is converted into text and assigned to another node. The remarkable ordinary person accepts the message, both text, and voice.

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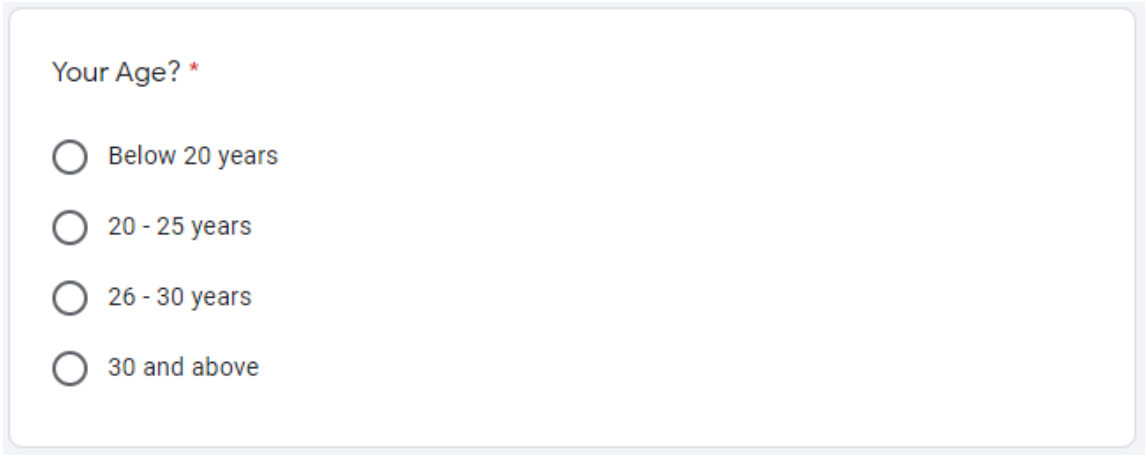
APPENDICES

Survey Questions

Question 01:



Question 02:

Question 03:

Out of the following languages, select your fluency *

	Mother Tongue	Very fluent	Can Read and Write	Can Read	Cannot Read or Write
Sinhala	○	○	○	○	○
Tamil	○	○	○	○	○
English	○	○	○	○	○

Question 04:

What is your experience on Sri Lankan Sign Language? *

	1	2	3	4	5	
No Idea what is Sri Lankan Sign Language	○	○	○	○	○	I am very fluent in Sri Lankan Sign Language

Question 05:

How often do you communicate in Sri Lankan or any sign language in the following places? *

	Always	Often	Sometimes	Never	Never heard of a Sign Language
School / Universities	○	○	○	○	○
Workplace	○	○	○	○	○
Out in the road	○	○	○	○	○
Religious and cultural places	○	○	○	○	○
Social Media	○	○	○	○	○

Question 06:

If you were to learn Sign Language of some sort, what could be the possible barrier in learning them? *

Your answer

Question 07:

According to your opinion, why do you think the hearing and verbally impaired community is reluctant to talk to the ordinary people? *

Your answer

Question 08:

Are you familiar with Sign Language Translators in Sri Lanka? *

- ◯ Yes
- ◯ No
- ◯ No Idea

Question 09:

If you are to have a Sign Language Translator, which type of application would you prefer? *

- ◯ Web Application
- ◯ Gloves-based application
- ◯ Hardware gadget (such as kinect)
- ◯ Other: _____

Question 10:

What is your preferred output language of such a translator? (see the previous question) *

- ☐ Sinhala
- ☐ Tamil
- ☐ English

Question 11:

What is your preferred output type of the translator? *

- [ ] Output should be displayed on the screen
- [ ] Output should be presented through audio

Question 12:

Out of the following characteristics, which one would you prefer to have in such a sign language translator? *

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Can be used as a learning material	○	○	○	○	○
Can be used as a mode of communication	○	○	○	○	○
Ability to detect live images rather than sending still images	○	○	○	○	○
Ability to convert sign language into text or speech	○	○	○	○	○
Specific to one domain (health care, industrial, educational etc.)	○	○	○	○	○

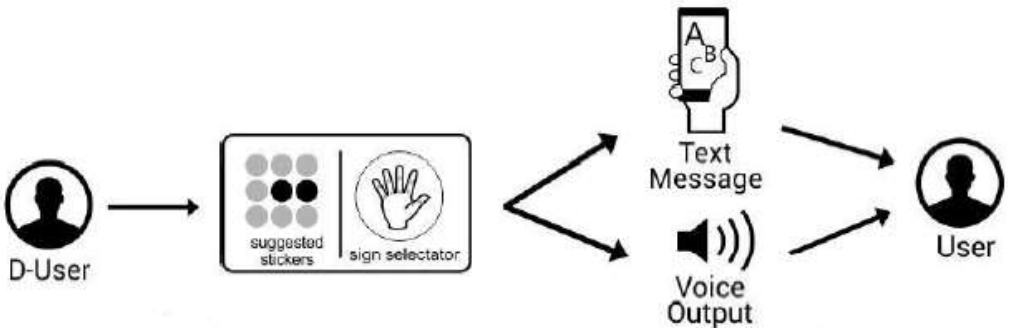


Figure 8.1: Text and Audio output generation

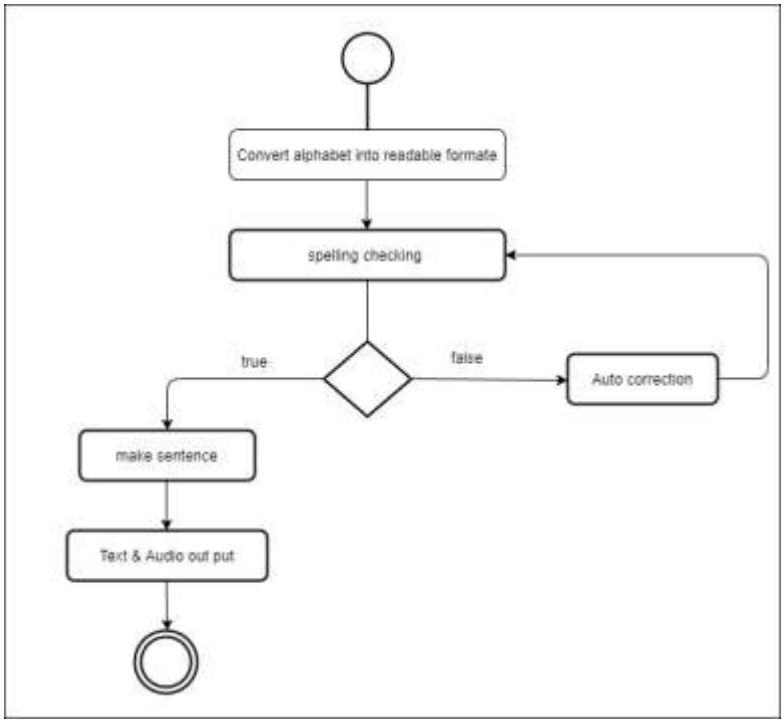


Figure 8.2: Activity diagram - Text and Audio output generation