CHAPTER 1

THE PROBLEM AND ITS BACKGROUND

1.1 INTRODUCTION

Communication is part of people's lives; people cannot communicate without language, whether non-verbal or verbal. As Filipinos, the native language Tagalog or other regional languages such as Bisaya, Kapampangan, Ilocano, etc. are used to express what people are able to tell. Not just Tagalog, but also English, is a crucial language in order to communicate especially for those traveling or working in other countries. But in some cases, most people forget how to communicate with those disabled persons having trouble speaking and hearing. Those people with hearing problems can read lips but how can they read lips if the community is in a pandemic where wearing face masks and face shields are mandatory?

Aside from PWDs (people with disabilities), as physically-abled individuals, most people are engaged in the thought that "to believe is to speak and listen". People believe that being able to speak verbally and voice out opinions is the basis to be understood. With that statement, it is obvious that the community is being unfair when it comes to communication. They are not interested in listening when people do not know how to speak. So, communication is very essential, especially to people who cannot express themselves in speaking.

Filipino Sign Language Application is described as the easy, useful method and tool for better communication between physically-abled people and those with disabilities specified as the people with speech and or hearing impairments. This app is programmed for building one's ability when socializing, where better communication skills are necessary.

Aside from having an enhanced communication skill, the FSLA will be beneficial when it comes to introducing oneself to a new culture of another community. Through this, to meet new people and friends can acquire. FSLA will give the brain a good exercise and be good in spelling out letters. In short, FSLA is a very useful tool that will enable sign language to be used all the time.

The Filipino sign language application is a windows application and an interactive learning tool used to learn a new language specified as the “sign language” from the title itself that all people with hearing and speech impairments use in their daily lives to communicate. FSLA is an easy access tool especially for beginners that are willing to try and add up knowledge about new languages for a more diverse community. Having knowledge in a new language or the focus language (sign language) will reach and have the connection to extend to the deaf community and prepare every individual for handling the language and communication barriers. In addition, this interactive learning tool will focus on the native language most Filipinos are engaged in, the “Tagalog”. Developers will use the Philippine Alphabet that has almost similar letters included in the English alphabet.

There are existing applications where sign language is used, though their focus is to help those people with impairments due to lack of ability to speak or to hear. This System that the developers will propose would focus on how this tool could be more useful when it comes to learning a language. not just a language , but specified as the Filipino sign language.

People believe that it’s not just being physically normal that binds humans, but communication is a big factor for a better community. A windows application and an interactive learning tool that leads to end language barrier between people and those who need special attention especially when it comes to communication.

1.2 STATEMENT OF THE PROBLEM

By conducting this study, researchers aim to answer the following question?

1. What purposes does “Filipino sign language application” serve?
2. How can “Filipino sign language application” become useful for users who are physically normal?
3. What could be the impact and importance of learning (Filipino)sign language ?

1.3 OBJECTIVE OF THE STUDY

This study aims to achieve the following:

1. To give better understanding and detailed explanation of the application being presented.
2. To be a useful tool for gaining and building skills through communication for users.
3. To understand the essence of communication for both physically normal and not.
4. To give knowledge why it is important to try a new language.

1.4 SCOPE AND LIMITATIONS.

The Application to be programmed will use real time detection and requires web camera and monitor. Filipino Sign Language Application stores different hand signs and gestures to its database. User will use a webcam to detect the gestures or signs which the user is trying to do. From the database of the said windows application, the most precise gestures that the camera detected would provide letters or text that the database have. FSLA provides the letters or text that resembles and corresponds the gestures being signed.

FSLA has a limited range and it is only for one individual at a time. By trying to show many hands, the database will be confused and only show corresponding result to the clearest image that the webcam detected. Meaning if 2 or more users try to use the windows app at once, probably users will not get the result they expect.

As stated above , FSLA runs through hand gesture meaning that hands are required to operate the said windows application.

As the said application is real time based, it shows text from the gestures caught in the web camera with fast inference in a base level of accuracy .

For the user's side, the application provides basic guide on how to sign by clicking the provided button named as "GUIDE". Alphabets with its hand gestures are indicated in the application for a convenient and easy use of the application. In addition, buttons like "ADD" , "SAVE", "START" and "EXIT" are provided on the interface so that users can add up signs they wanted , save and to begin using the FSLA. The button "exit" is understood as to quit the usage of the said windows application "FILIPINO SIGN LANGUAGE APP" (FSLA).

1.4 SIGNIFICANCE OF THE STUDY

The researchers considered the following significance of the conducted study:

BEGINNING INTERPRETERS – For an interpreter hoping to be a professional one, this application will help non-expert interpreters to practice their talent and knowledge when it comes to signing and communicating to persons with lack of abilities to speak and hear.

PHYSICALLY-ABLED PEOPLE - For physically-abled people and without any knowledge

about sign languages, this application can give them basic ideas on how sign language works.

SPECIAL EDUCATION (SPED) TEACHERS – SPED teachers are those who teach children with special needs including those with hearing and speaking impairment. As part of this application research, it will help SPED teachers to have easy ways of teaching on their part, especially those beginner teachers.

FUTURE RESEARCHERS - this study will serve as a guide to them who would choose and who will conduct research similar to this presented study.

STUDENTS – Being a student is to be responsible to learn new things like building and broadening knowledge in different aspects. Part of this is knowing basic information about sign language like how to sign letter to understand and give importance to PWDs. Today's youth may not understand other's rights when expressing their own opinions. Others make fun of a person's disability without knowing their side.

1.6 DEFINITION OF TERMS

WINDOWS APPLICATION – an application similar to mobile application but only can installed in computers(Windows OS).

WEBCAM - an accessory of a computer used to capture images.

DATABASE – an organized collection of structured information or data typically stored in a computer system.

P.W.D – refers to the people including in the topic Filipino sign language specifically those without the ability to hear and lack of vocals when communicating.

SIGN LANGUAGE – a non-verbal kind of language that uses gestures of hands together with facial expressions for better understanding.

FILIPINO SIGN LANGUAGE – non- verbal kind of sign language but has the dialect which is the main focus.

REAL-TIME DETECTION – task of doing gesture dectection in real-time with fast inference while maintaining a base level of accuracy.

RANGE – certain length/distance to detect a gesture and for able to provide corresponding text.

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter aims to give information, better understanding and to broaden readers' knowledge relevant to the topic that the researchers are able to present. Moreover, this can be a tool for the next batch who will do research relating to the topic being discussed.

2.1 LOCAL

The article “Text to English and Text to Filipino Sign Language Translator: An Android-based Mobile Application with Text Analysis Using Knuth-Morris-Pratt Naive Algorithm” (Masbate, 2020) aims to build an android-based mobile application translator framework that can translate text. The inability of a person to hear sounds makes it difficult to communicate with others. Via multiple hand movements, facial expressions, body movement and sign language enable the deaf community to communicate what they want to say. Not all, however, are conversant in sign language.

In the article titled **“**Simbo Wika: A Mobile and Web Application to Learn Filipino Sign Language for Deaf Students in Elementary Schools” (Empe, 2020), it is stated that the Philippines' population is rising, and the number of deaf people is increasing as well. Many people with hearing impairments speak English as their primary language, Sign Language of the United States. Communication between hearing and deaf people is difficult, particularly given the deaf people's lack of technology and language skills. This leads the researchers of this article to develop an application to help the deaf students in elementary schools to learn Filipino Sign Language. The said mobile application includes examples to help students practice FSL and evaluate their success. Teachers may also use the web application to keep track of their students' progress.

Mendy Grace Garcia, Christian Ian San Luis and Mary Jane C. Samonte Mapa presented “E-tutor for Filipino Sign Language" at the 2016 International Conference on Computer Science and Education. According to this article, Sign Language Mobile learning is a communication method of delivering educational materials via devices such as smartphones and tablets. The research focuses on the development of an application (app) that aims to provide deaf users with an interactive experience. The key tutorial lesson in the app is Filipino Sign Language (FSL), the Philippines' natural sign language. In addition, three modules make up the e-learning system: dictionary, diagrams, and evaluation. The modules cover fifty important FSLA signs for deaf and non-deaf users and will display an instructional demonstration using a human-model video illustration and a written and visual memory aid. The app's mission is to familiarize its users with the most frequently seen signage in the environment.

In the work by Cueto (2020) “Translating an Aesop’s Fable to Filipino Sign Language through 3D Animation”, the aim of the research is to use 3D animation to translate an Aesop's fable into Filipino Sign Language, resulting in a video performance. On screen, a 3D animated avatar performs FSL sign translations (primarily focusing on hand gestures such as hand shape, palm orientation, position and movement), alongside their English text equivalents and related images. It is crucial to consider the animation's appearance, speed, naturalness and accuracy in order to make it more successful as a learning tool. The typical action units were also mentioned in the paper for easier creation of sign animations.

In the School of Information Technology, Mapua University, Makati, Philippines, the article “Filipino Sign Language Recognition for Beginners using Kinect” (Elijah, 2018) covers Filipino

Sign Language and uses Kinect V2. The advocates of the thesis contrasted the findings of two separate approaches. The first method uses Cartesian coordinates to map the position of the joints of interest, while the second method uses spherical coordinates with normalization to track the location of the joints. Simple Filipino words provided by sign language experts in an open palm form are included in the framework of the report. Fingers and facial expressions are not taken into account, so these discrepancies may be exploited in future study. Therefore, the analysis proposed approach had a maximum accuracy of 95.00 percent, recall of 95.00 percent, and precision of 95.89 percent.

2.2 FOREIGN

The article titled “Recognition of Sign Language using Image Processing” in the International Journal of Business Intelligence and Data Mining in January (2018), proposed the system that aims to recognize the American Sign Language and convert it to text. The said system has input images of the hands depicting the necessary alphabet. Furthermore, the histogram or the representation of the data of the input image is then computed and checked for similarity with the histograms of pre-saved images by using the Bhattacharyya Distance Metric. In fact, OpenCV is the type of histogram used for processing the image of the proposed system. Therefore, the image whose histogram is the most similar with the histogram of the input image is then checked for its associated alphabet and the alphabet is printed out.

According to the World Health Organization, over 5% of the world’s population have hearing and speaking disabilities. Hence, the primary language of communication for people

who are deaf and mute is sign language. This can be a hindrance in day-to-day communications for them. Conversion of sign language to text can be a possible solution to this obstacle.

Thus, Implementation of the system in the said article will be a small step in overcoming the social barrier of communication between the deaf-mute people and the people who do not understand sign language.

On the other hand, a conference paper titled “Real Time translator for Sign Language” from the International Conference on Frontiers of Information Technology (Memon, 2017) is introduced. The paper claims that sign language is a medium of conversation for physically disabled people. Indeed, people communicate via different actions of hands where different gestures mean something. This conference paper focuses on removing the barrier of communication between normal and physically disabled people. In addition, it aims to translate the sign language in real time by mobile camera so that it can act as a medium of conversation.

A journal article titled “Developing a Prototype to Translate Text and Speech to Pakistan Sign Language with Bilingual Subtitles: A Framework” from the Journal of Educational Technology systems of Pakistan (Ali, 2018). The purpose of the study is to provide a literature review of the work done on sign language (SL) around the world and in Pakistan and to develop a translation tool of speech and text to Pakistan Sign Language (PSL) with bilingual subtitles. Besides, information and communication technology and tools development for teaching and learning purposes improve the learning process and facilitate both teachers and students. On the contrary, unimpaired people in Pakistan face a lot of problems with deaf people due to lack of sign language understanding, learning resources and interpreters thus teachers struggle communicating with deaf students in the classroom. The study provides a literature

review to highlight the existing technological work done around the world and in Pakistan and also provides an architectural framework of the PSL translation tool which is developed by the researchers to facilitate the people who face difficulty to communicate with deaf people. The author concluded that dead people will have more opportunities to communicate effectively with other members of the society at every level.

Another article called “Gesture Recognition” (Mitra, 2007) at Machine Intelligence Unit, Indian Stat. Inst. Kolkata pertains to recognizing meaningful expressions of motion by a human, involving the hands, arms, face, head and/or body. A survey on gesture recognition is given, with a focus on hand movements and facial expressions. Hidden Markov models, particle filtering and condensation, finite-state machines, optical flow, skin color and connectionist models are among the applications explored in depth. Present research issues and future research opportunities are also discussed.

A “Sign Language Hand Motion Identification Interpreter” at International Journal of Global Technology by Jignesh Sisodiya, Bhushan Malgaonkar, Arunkumar Pal said that Hand gestures are often used by mute people to communicate. The issue is that the listener should understand the context of the gestures. The goal of the project is to achieve reasonable accuracy in detecting and recognizing hand gestures, where the input to the gesture recognition system will be given from the hand using a web camera. It recognizes the pattern and shows it in the form of text, which can then be translated into expression. The input gesture is then searched in the qualified dataset during the detection process. The ASL (American Sign Language) library is used to translate text to speech.

CHAPTER III

RESEARCH METHOD AND PROCEDURE

This chapter includes method and procedures that will be used to pursue and gather data in developing this system. It also includes design, participant and flowchart. In order to accomplish this study, the researcher used different procedures to gather the information needed to develop the system.

3.1 RESEARCH DESIGN

The researchers used flowchart on the development of Filipino sign language application.

The researchers used flowchart to present the flow of process and the step of the algorithm. This illustration representation can give a step-by-step solution to a given problem and describe certain aspects to process and they are usually complementary by other diagrams.

Flowcharts are the diagrams that used to show step by step progression through procedure or system specially using connecting lines and a set of conventional symbols like other types of diagrams. They help visualize what is going on, thereby helping the viewer to understand the process. The use of flowchart is an effective way of representing data. Flowchart also shows what will be the output when the user has come up with a choice.

3.2 RESEARCHER PARTICIPANT

The researcher conducted interviews on different individuals such as students and even ordinary individuals that can be the user of the FSLA. The researcher interviewed a few Teachers on how they are communicating to their students.

3.3 RESEARCH PROCEDURE

The developers and researchers of the FSLA can say that this windows application can be a useful tool in more than a way, beneficial to the community, for fellow individuals and even for the user itself.

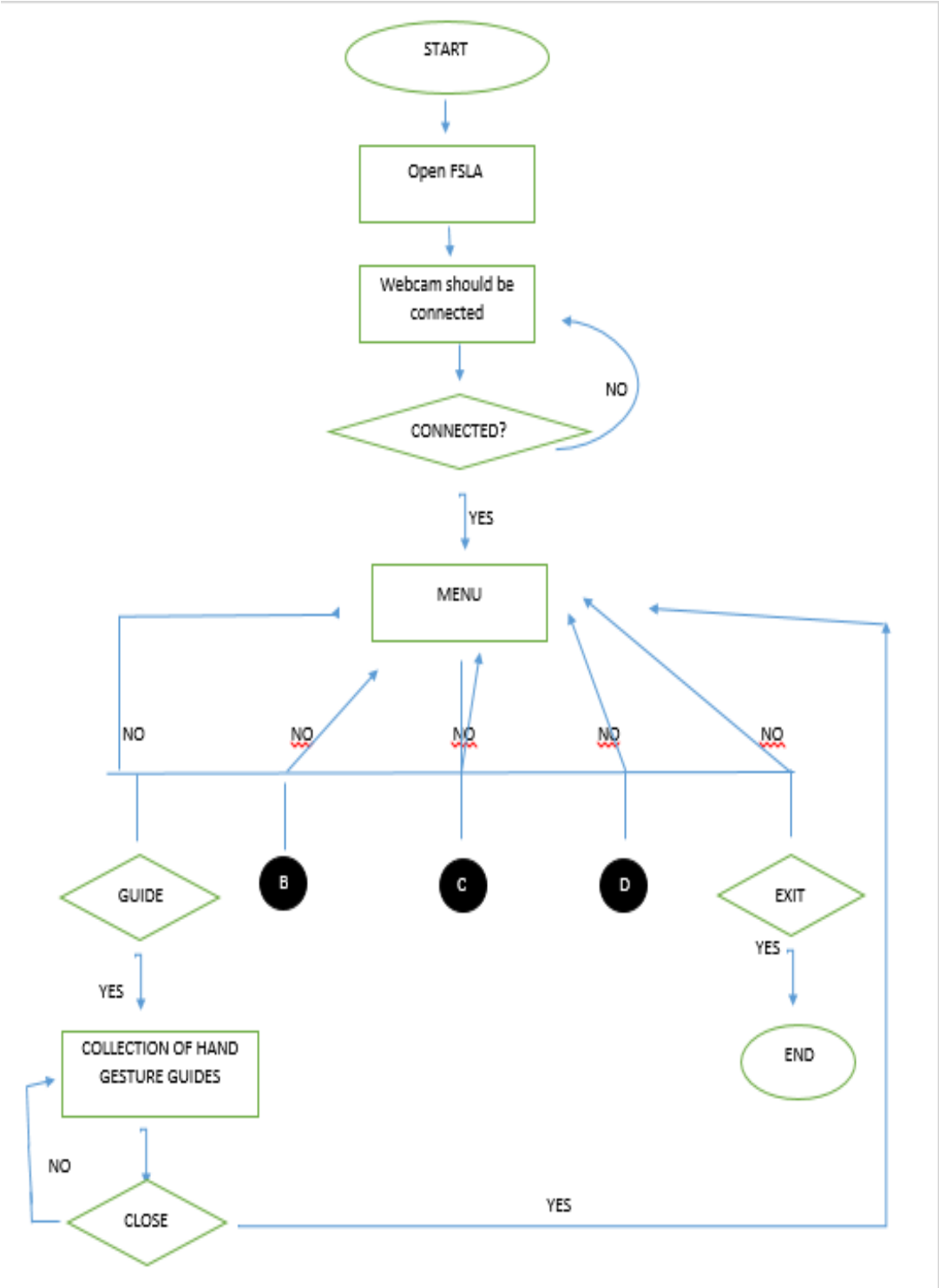
The developers land on the thinking that making this kind of window interactive learning application can help both physically-abled individuals as well as the people with impairments. Through this application, developers may help to raise diversity, fellowship and lessen language boundaries bit by bit for a better community.

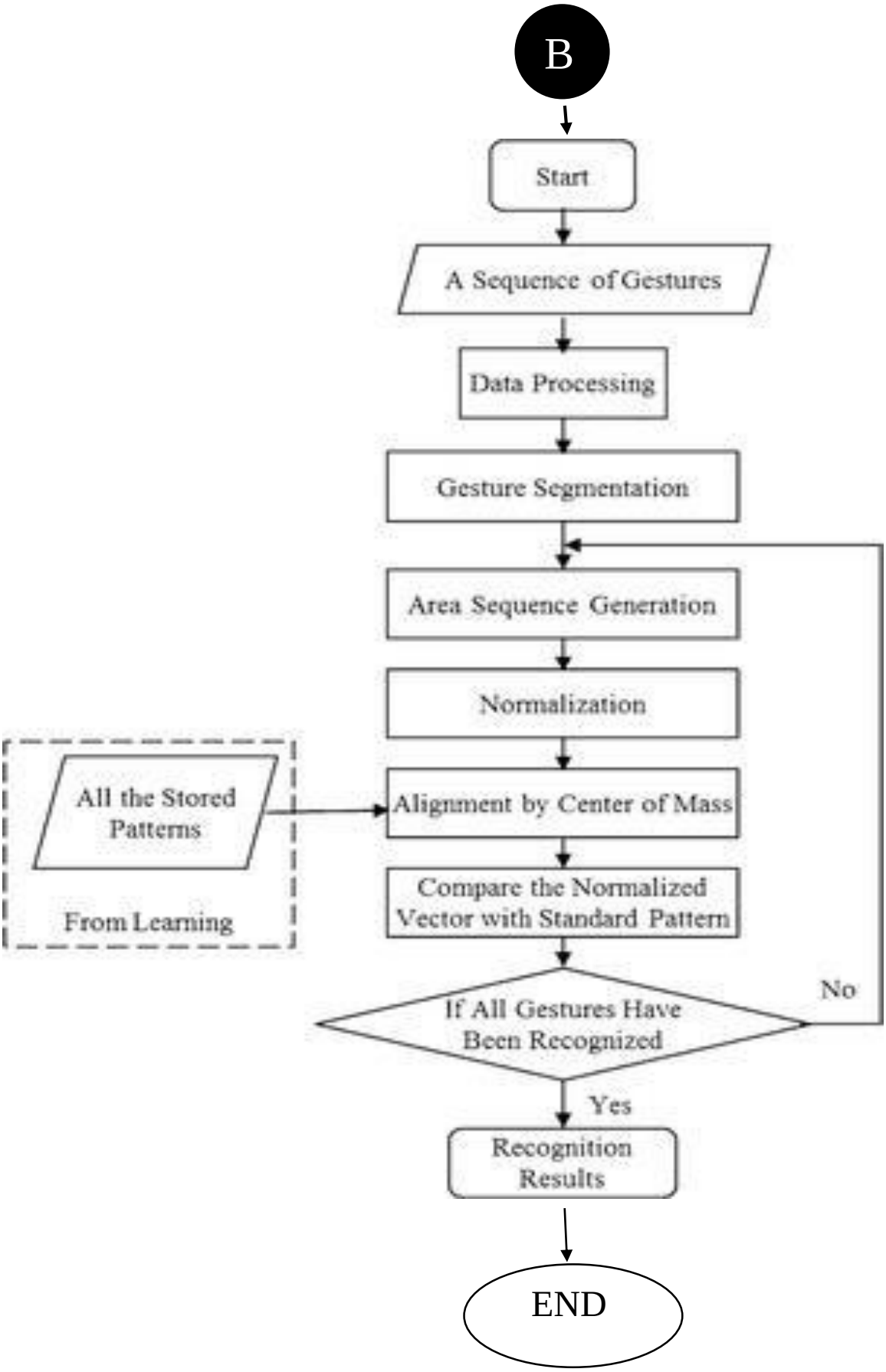
Using this application can be a tool for building one's skill while making people with impairments appreciated.

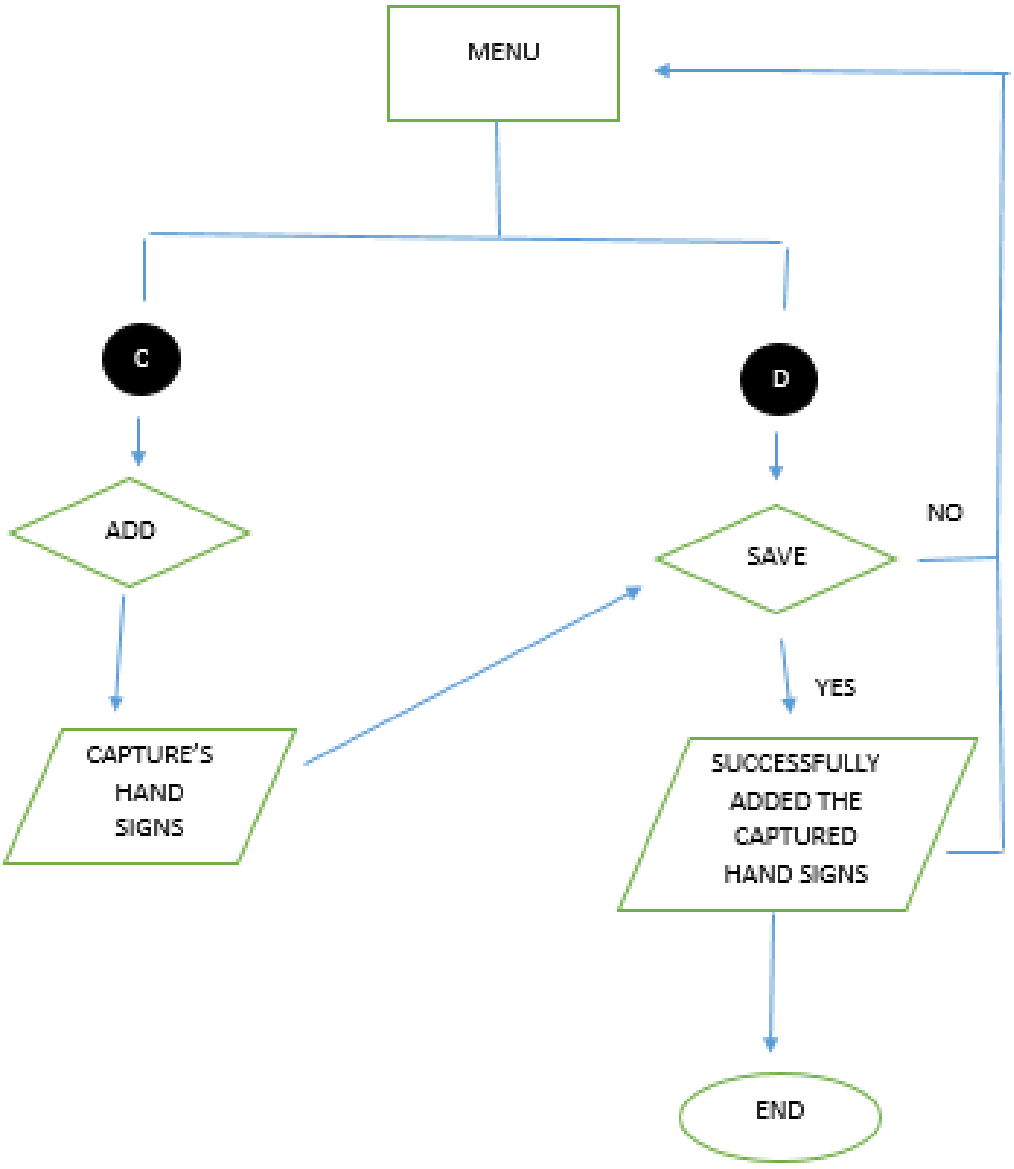
FLOWCHART

Beyond the making of this program the flow of the system where process takes place are drawn through flowcharts.

WINDOWS APPLICATION'S FLOWCHART




B
Start
A Sequence of Gestures
Data Processing
Gesture Segmentation
Area Sequence Generation
Normalization
All the Stored Patterns
From Learning
Alignment by Center of Mass
Compare the Normalized Vector with Standard Pattern
If All Gestures Have Been Recognized
No
Yes
Recognition Results
END


MENU
C
D
ADD
SAVE
NO
YES
CAPTURE'S HAND SIGNS
SUCCESSFULLY ADDED THE CAPTURED HAND SIGNS
END