Charades

Final Year Project Proposal

Session 2016-2020

A project submitted in partial fulfilment of the
COMSATS University Degree
of
BS in Computer Science (CUI)

Department of Computer Science

COMSATS University Islamabad, Lahore Campus

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Project Registration

Project ID (for office use)	
Type (Nature of project)	Research and Development
Area of specialization	Computer Vision and AI

Project Group Members

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Name & Signature of Batch Advisor (If students are eligible for FYP)	

Plagiarism Free Certificate

This is to certify that, I am Ramsha Rasheed S/D/o Muhammad Rasheed, group leader of FYP under registration no CIIT/FA16-BCS-127/LHR at Computer Science Department, COMSATS Institute of Information Technology, Lahore. I declare that my FYP proposal is checked by my supervisor and the similarity index is 16% that is less than 20%, an acceptable limit by HEC. Report is attached herewith as Appendix A.

Date:5-08-2019 Name of Group Leader: Ramsha Rasheed Signature: _____

Name of Supervisor: Dr Usama Ijaz Bajwa Co-Supervisor (if any):_____

Designation: Assistant Professor Designation: _____

Signature: _____ Signature: _____

Approval of FYP Management Committee

Committee Member 1: Name: _____

[ ] Accept [ ] *Defer [ ] *Reject Signature: _____

*Remarks: _____

Committee Member 2: Name: _____

[ ] Accept [ ] *Defer [ ] *Reject Signature: _____

*Remarks: _____

Convener: Name: _____

[ ] Accept [ ] *Defer [ ] *Reject Signature: _____

*Remarks: _____

Project Abstract

As stated by World Health Organization(WHO), it is estimated that over 466 million people around the globe that are suffering from hearing loss that is disabling. [1]. In those 466 million people some are completely deaf that basically have little or no functional sense of hearing at all and the other are called “hard of hearing” who have mild-to-moderate hearing loss. Deaf people practice sign language to communicate whereas the hard of hearing can use sign language and spoken language with aid too. Deaf communicate in sign language as their first language. Abled people perhaps have little or no knowledge of sign language at all. Deaf people have difficulty in correspondence on a daily basis. A sign language interpreter may be used. But a sign language interpreter is expensive to have accessible all the time, and it becomes inconvenient too. A solution to this problem is needed, that is economical and easy to use. Hence, our final year project proposes a solution to this problem that is easy to use and have too. The solution wished-for being an android application works both ways. First as a listener i.e. it detects the signs performed by the deaf person using Smart phone/tablets camera or a device such as Kinect and translate them to native spoken language in form of text on an android tablet/Smart Phones screen. Secondly as a speaker i.e. it takes the text in natively spoken language typed by the abled person through the keyboard and converts it into a series of signs which are implemented on a 3D avatar on the screen of the Smart phone/ tablet.

Introduction

Deaf people all around the world are facing issues in daily life due to this communication gap. Due to slight disability, many people are being deprived of experiencing their life to its maximum. This disability has isolated the deaf community around the globe. It’s their right to enjoy every aspect of life like other abled people.

Our project is the answer to overcome this communication barrier. This project is voice for deaf. The application will be made using Android Studio. The project has three modules:

In the first module, the application does conversion from sign language to native text language. Smartphone camera /Kinect will be used to detect the deaf persons action. The actions are actually the sign language. A dataset of sign language from Kaggle will be used to learn about each sign interpretation. The detected signs will be interpreted and converted to text version of native language.

The second module basically consist of handling datasets. Storing, processing, modifying datasets into databases is done in this part. This module is very important as both the other module depends for recognition and conversion.

In the third module, the input is in form of text typed using phone’s keyboard. The text is converted into corresponding sign language. This conversion will then to be animated by an Avatar on the tablet/Smart phone screen.

The proposed system will provide a direct communication link for deaf and other people. It will make the communication in sign language easier even for a person who does not know the sign language. The idea is to make the application portable and easy to use so more

people feel comfortable in using it. People would not need any extensive training to use the application.

Motivation and Scope

Sign language act as a visual language for the deaf-mute community as their first language. Unlike acoustically sent sound patterns, signing uses body language and manual communication to fluidly convey the thoughts of a person. It is accomplished by concurrently combining hand shapes, orientation and movement of the hands, arms or body, and facial expressions. It can be often used by the disabled and normal individuals for communicating with each other. Having access to sign language is extremely vital for deaf community .As it promotes their emotional ,linguistic and social growth.

Deaf people are normally deprived of normal conversation with other people because they need a transcriber available all the time or some visual communication. Since having a transcriber always at hand is not possible, so this project helps remove the reliance on the interpreter.

With the help of this project a mobile application will be created. This proposed mobile application will increase the reach to more people. With the help of this application ,a two-way communication system is established. The use of application is limited within the people belonging to same region of the sign language.

Related Work:

1. Augmented reality app that converts sign to speech and vice versa:

New York University students created a working prototype using machine learning and augmented reality that translated sign language into spoken words and vice versa. The sign language used is America sign language and the app has a narrow scope of just making an appointment at a clinic presently. This application is limited in the number of signs it can detect and translate. [2]

This project was just a pilot project and never was available to public. The sign language used for this project is dialect specific and is American sign language which makes the project region specific too. And as the project uses very limited vocabulary of sign language. Thus , project domain is restricted too.

2. Wearable device converts sign language to English language:

The researchers working at Texas A&M University manufactured a wearable device that translates sign language to English language. The device does this by sensing hand movement of the user. The device recognizes 40 ASL signs. There are two sensors which are used to detect the hand movement and are worn by user on their right wrist. The data received from sensors is sent to a laptop through Bluetooth. On the laptop an algorithm runs that interprets the sign sensed and displays the corresponding English word. [3]

This device just gives a one way translation from sign language to text but does not provide a way for the other half of the communication. This also requires hardware that a person cannot wear all the time. If one of the sensor is not working the whole device will provide false interpretation. The hardware will be expensive to replace.

3. KinTrans:

KinTrans uses a camera that traces the movement of a person's hands and body as they are signing the words. A deaf person will approach a bank teller and sign to the KinTrans camera that they would like help, for example. This device can then interpret those signs into English or Arabic corresponding words for the teller to read. The interpretation works both ways.A machine learning algorithm is used by KinTrans that converts each sign as its made, and then another algorithm converts them into a sentence that is grammatically correct. The lack of data on sign language has made the training of data difficult. [4] [5]

The device is limited to English and Arabic users and as sign language like spoken language has many dialects so its use is really limited too.

4. SignAll:

SignAll's system consists of four cameras. One of them records in 3D and capture data from a signer's face as well as their hands and body. The SignAll technology translates ASL into written English, and then displays it as a chat dialogue. This system comprises of two monitors: one is used by the Deaf person , and other one is used by the hearing person. The deaf person has to wear a colourful glove. The colour on the gloves help the technology to differentiate the fingers. The hearing person uses voice that is picked by a speech recognition system. [6] [5]

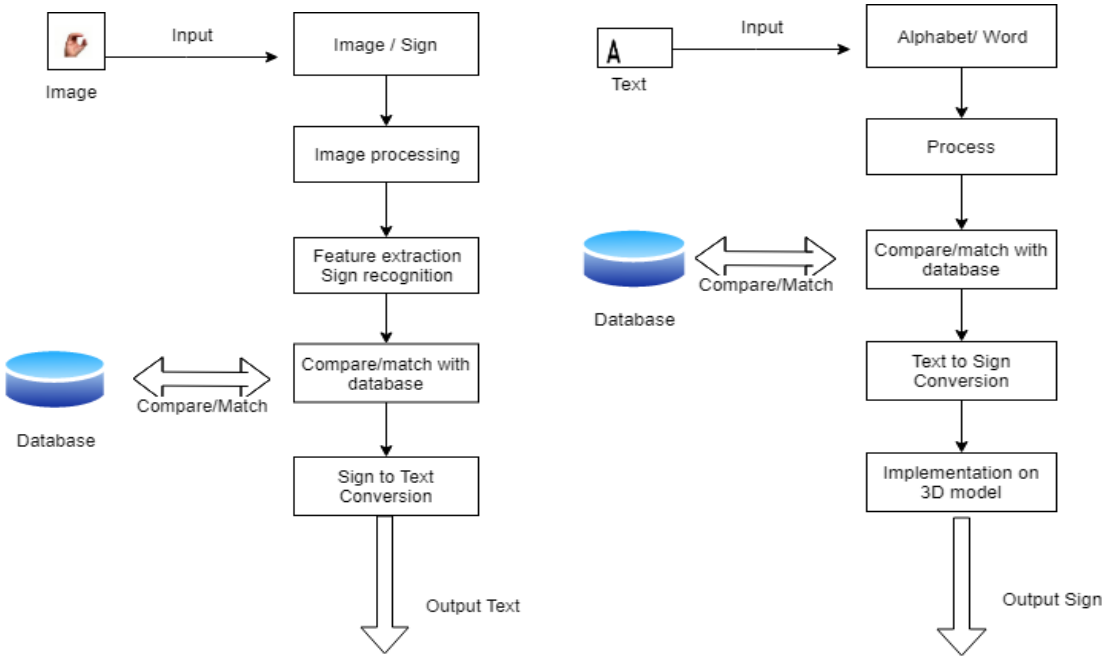
It requires a booth installation for the setup of this technology. The deaf user has to use clear ASL, avoiding regional signs. The users have to avoid colourful clothing , excessive clothing, oversized jewellery (bracelets) etc.

5. Live time closed captioning system:

The system is made of three components: a compact microphone that is clipped onto clothing of the user, a smartphone-sized Raspberry Pi/Adafruit-powered microcomputer that is in the pocket of the user, and a Google Glass-like for display. The mic is attuned so that it can pick up human dialogue, even in environments with considerable background noise. The audio received is processed by the computer, which translates it to text and wirelessly transmits that data to the display. The display that is clipped to an existing pair of third-party glasses. That display in turn shows the user the text, that is placed in front of their view of the speaker. There's reportedly very little lag between the words being spoken and being displayed. [7]

A lot of gadgets are required for this to work. Their working for a layman to understand can be difficult and it can be hard to carry everywhere. It would not work if any of the gadgets become defective. Replacing gadgets can be expensive. This system works one way i.e. it's a way that enables a deaf person to hear. The deaf person requires to have intermediate level of written English knowledge.

System Architecture



Goals and Objectives

Objectives of this Final year Project is to be the voice for the deaf community who face many challenges in communicating on daily basis. The objectives of the application are:

- Using Kinect/Smart phone to detect the signs performed by the deaf person.
- Translating those signs into text in native language of the abled person on the display of Smart phone.
- Then abled person typing an answer to the former query on Smart phone's keyboard.
- That texted answer translated into sign language .
- That series of sign being mapped on the avatar.

Keeping in mind that every human being in all normal cases have same hand shapes consisting of 4 fingers and a thumb . This final year project aims at creating a real time system that recognizes the meaningful shapes made by using hands.

Individual Tasks

Being this project a group job. Most of the tasks require all the members involvement as they are inter related to each other.

Aisha

- Research for existing solutions

- Sign – to – Text project research
- Dataset research
- System architecture designing
- Image detection/recognition
- Training module
- Testing
- Documentation of the module

Ramsha Rasheed

- Research for existing solutions
- Text – to – Sign project research
- Dataset research
- System architecture designing
- Training module
- Training 3D model
- Testing
- Documentation of the module

Bilal Ahmed

- Research for existing solutions
- Dataset research
- System architecture designing
- API connectivity
- Testing
- Final Documentation

Software Process Model

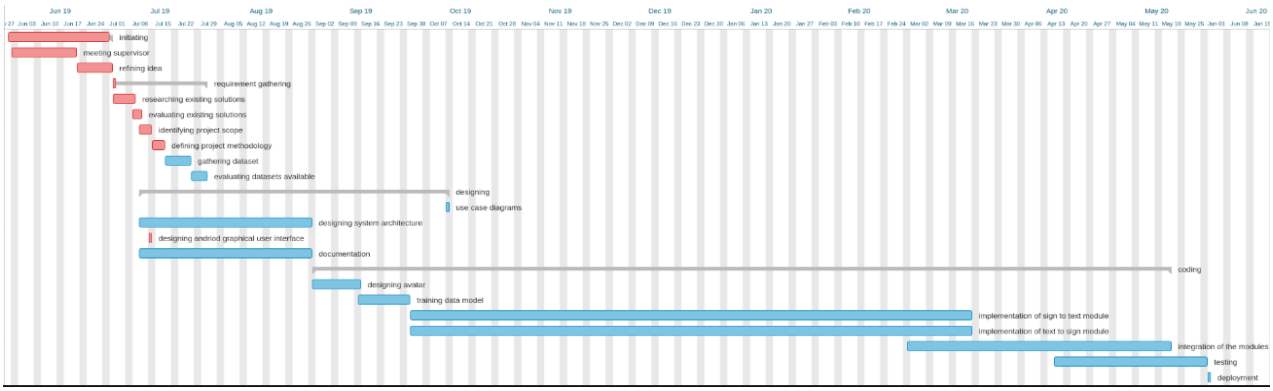
Software process model also known as software development life cycle. It is a process of stages the software goes through while its development. The basic stages are initiation, planning, designing, building, coding, testing and deployment. A model fundamentally includes a specific set of tasks with a workflow and definite milestones and outcome of each task. The result is the desired product.

Incremental process model is iterative in nature. It divides the requirements into multiple standalone modules of the software development cycle. Every iteration passes through the requirement gathering, designing, coding and testing phase. At the end of each iteration a partial system is built and every following release of the system has some added functions to the earliest release until a desired final product is produced.

We are using incremental process model because of our proposed project's nature. Our project is mainly divided into two modules. Both modules require revisions to them until we receive our final project as this project works on sign language. As in the incremental

process model, the plan is just made for the next increment; so the modification would be easier to implement as per need of the users.

Gantt Chart



Charades	Sub Tasks	Assignee	Est. Hours	Start Date	Due Date	Task Prog.
initiating		Unassigned	-	31/May	30/Jun	0%
1 meeting supervisor		Unassigned	-	01/Jun	20/Jun	0%
2 refining idea		Unassigned	-	21/Jun	01/Jul	0%
requirement gathering		Unassigned	-	02/Jul	02/Jul	0%
4 researching existing solutions		Unassigned	-	02/Jul	08/Jul	0%
5 evaluating existing solutions		Unassigned	-	08/Jul	10/Jul	0%
6 identifying project scope		Unassigned	-	10/Jul	13/Jul	0%
7 defining project methodology		Unassigned	-	14/Jul	17/Jul	0%
8 gathering dataset		Unassigned	-	18/Jul	25/Jul	0%
9 evaluating datasets available		Unassigned	-	26/Jul	30/Jul	0%
designing		Unassigned	-	10/Jul	12/Oct	0%
11 use case diagrams		Unassigned	-	12/Oct	12/Oct	0%
12 designing system architecture		Unassigned	-	10/Jul	31/Aug	0%
13 designing andriod graphical user interface		Unassigned	-	13/Jul	13/Jul	0%
14 documentation		Unassigned	-	10/Jul	31/Aug	0%
coding		Unassigned	-	01/Sep	20/May	0%
16 designing avatar		Unassigned	-	01/Sep	15/Sep	0%
17 training data model		Unassigned	-	15/Sep	30/Sep	0%
18 implementation of sign to text module		Unassigned	-	01/Oct	20/Mar	0%
19 implementation of text to sign module		Unassigned	-	01/Oct	20/Mar	0%
20 integration of the modules		Unassigned	-	01/Mar	20/May	0%
21 testing		Unassigned	-	15/Apr	31/May	0%
22 deployment		Unassigned	-	01/Jun	01/Jun	0%

Future Work

The system can be extended to incorporate the knowledge of facial expressions and body language too so that there is a complete understanding of the context and tone of the input speech.

The system can be extended to incorporate multiple sign languages and native languages so the solution can become universal. This can also help in deaf person to person communication of different regions also easier.

Tools and Technologies

- Microsoft Kinect
- Tablet / Smartphone device
- Android Studio
- Software development kit (SDK)

Bibliography

[1] "World health organization," 15 march 2018. [Online]. Available: https://www.who.int/news-room/facts-in-pictures/detail/deafness. [Accessed 19 July 2019].

[2] K. Rogers, “vice,” 27 March 2018. [Online]. Available: https://www.vice.com/en_us/article/zmgnd9/app-to-translate-sign-language. [Accessed 19 July 2019].

[3] E. Matcher, 6 October 2015. [Online]. Available: https://www.smithsonianmag.com/innovation/wearable-device-translates-sign-language-english-180956827/. [Accessed 19 July 2019].

[4] “KinTrans,” [Online]. Available: https://www.kintrans.com/. [Accessed 19 July 2019].

[5] M. Reynolds, “newscientist,” 2 June 2017. [Online]. Available: https://www.newscientist.com/article/2133451-automatic-sign-language-translators-turn-signing-into-text/. [Accessed 19 July 2019].

[6] “SignAll,” [Online]. Available: https://www.signall.us/. [Accessed 19 July 2019].

[7] B. Coxworth, “New Atlas,” 28 October 2015. [Online]. Available: https://newatlas.com/live-time-closed-captioning-system/40078/. [Accessed 19 July 2019].

Appendix A

Turnitin Originality Report

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From Paper (Research Papers)

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