SMART GLOVE SIGN LANGUAGE CONVERTER

Submitted in partial fulfillment of the requirements

For the subject of

Data Mining

by

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Certificate

This is to certify that the project entitled **smart glove sign language converter** is a bonafifide work of

Rahul Iyengar (18) , Prathamesh Inamdar (16) , Ganesh Kumble (30) submitted to the Department of Information Technology in partial fulfifillment of the requirement for the the subject of Mini Project.

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BE Project Report Approval for TE

Project report entitled "SMART GLOVES AND SIGN LANGUGAE CONVERTOR" by Rahul iyengar, Prathamesh Inamdar & Ganesh Kumble is approved for the partial fulfillment of the requirement for the subject of BE final year project.

Examiners

1. .....

2.....

Date:

Place:

DECLARATION

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included; we have adequately cited references to the original sources. We also declare that we have adhered to all principals of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. We understand that any violation of the above will be cause for disciplinary action by the institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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ABSTRACT

In Abstract—Human beings interact with each other to convey their Ideas, thoughts, and experiences to the people around them. But this is not the case for deaf-mute people. Sign language paves the. Way for deaf-mute people to communicate. Through sign language, Communication is possible for a deaf-mute person without the means of acoustic sounds.

The aim behind this work is to develop a system for recognizing the sign language, which provides communication between people with speech impairment and normal people, thereby reducing the communication gap between them.

Compared to other gestures (arm, face, head and body), hand gesture plays an important role, as it expresses the user's views in less time. In the current work flex sensor-based gesture recognition.
Module is developed to recognize English alphabets and few words and a Text-to-Speech synthesizer based on HMM is built to convert the corresponding text.

ACKNOWLEDGEMENT

It is an opportunity of immense pleasure for us to present the Mini project report on" SMART GLOVES AND SIGN LANGUGAE CONVERTOR." expressing our heart left gratitude to all those who have generously offered their valuable suggestions towards the completion of this report.

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Chapter 1

INTRODUCTION

1.1 Introduction

Deaf-mute people need to communicate with normal people for their daily routine. The deaf-mute people throughout the world use sign language to communicate with other people.
However, it is possible only for those who have undergone special training to understand the language.
Sign language uses hand gestures and other means of non-verbal behaviors to convey their intended meaning.
It involves combining hand shapes, orientation and hand movements, arms or body movement, and facial expressions simultaneously, to fluidly express speaker's thoughts.
The idea is to create a sign language to speech conversion system, using which the information gestured by a deaf-mute person can be effectively conveyed to a normal person. The main aim of this work is to design and implement a system to translate finger spelling (sign) to speech.

1.2 Motivation

Our main aim of making this system is to help disable/Handicap people. These system can be used in future as motion gesture device also . It us user friendly system and it can be easily adapted by people of any age . This project has potential to replace touch screen system in future. intended meaning.It involves combining hand shapes, orientation and hand movements, arms or body movement, and facial expressions simultaneously, to fluidly express speaker's thoughts.

1.3 Objectives

The project came into existence for one sole purpose, to help the deaf community to easily communicate and interact with thier nearby surrounding. The aim is to convert basic symbols that represent the 26 English alphabet as mentioned under ASL (American Sign Language) script and display them on a smart phone screen. The following points are the tasks done in this project :

1. Construct a glove that recognizes hand gestures with help of flex sensors.

2. According to hand gestures the glove will recognize the gesture and will display the corresponding output

3. Built an android app in which the output will be displayed and will be shout out loud via device speaker.

1.4 Purpose, Scope, and Applicability

The sole purpose of this project is to help disable community by making then capable to understand the alphabets using sign language and hand gestures.

1.4.1 Purpose

Purpose of this project is to help the blind and deaf people and to make them capable to understand alphabets and to learn them by using hand gestures and sign language .

The project was inspired with the idea of controlling robotic arm with the help of hand movements. Most of the working is same but implementing the remaining part is rather a complex task. Accelerometer is used to measure the tilt in the palm. Five bend sensors are placed on a glove, four for the fingers and one for the thumb.

1.4.2 Scope

This tool can be:

1) Further integrated with various services and help to generate employment for the deaf and dumb people.

2) Geared up with the controller to provide home automation on finger tips.

3) Paired up with fitness sensor to monitor health of the individual.

1.4.3 Applicability

There are various field in which this concept can be applied :

1. This project can be used to helf blind and deaf community to understand alphabets and various characters .

2. This concept can be used in robotics for arm moments or other parts moment .

3. It can be use in home automation to control various parts of home such as lights , fan ,ac , tv etc.

4. It can be used for narration purpose in library or other places such as schools or university.

1.5 Organisation of Report

The materials presented at the workshop is organized into five chapters.

After this introductory chapter chapter 2 describes the literature survey in which we are going to discuss about the following literature that is related to our project .

Chapter 3 summarizes the survey of technology that is been observed by various literature papers and case studies .

Chapter 4 provides an account on project proposal which will include topics such as
1. problem definition .
2. requirements specification.
3. software and hardware requirements
4. .preliminary product description .
5. project plan .

Chapter 5 presents the conclusions of our project .

Chapter 2

LIRERATURE SURVEY

With the advent of wearable technology, it is now possible to implement numerous and extremely creative ideas to serve humanity in unprecedented ways. Thus inspired, we have developed a smart system which would be able to serve as best friend to

the hearing and speech impaired person. The primary goal of this paper is to design and implement a low cost wired interactive glove, interfaced with a Computer with higher degree of accuracy for gesture recognition .

In literature, the usage of data gloves has been found to be cumbersome and restrictive in the gestures which are possible in real applications . The use of light weight sensors and reduced number of bend sensors help in alleviating this problem while maintaining a high degree of recognition accuracy.

The main reason behind using flex Sensors is that the bend sensors have a limited sensing capability. They are unable to sense further bending beyond a certain threshold.

As mentioned in the abstract the glove is aimed at benefiting people with hearing and speech impairment. It can enable such differently abled persons to communicate normally with other people without a sense of inferiority or embarrassment.

With further modifications to the decoding procedure it can even enable a differently abled person to give a speech in a conference, thereby helping the truly talented minds, lacking the powers of speech and hearing, in expressing their ideas. Such a method has been tried and reported in literature

Flex sensors are sensors that change resistance when bent. This change in resistance can either be increasing or decreasing depending on the type of flex sensors used. This concept shows that if flex sensors are placed at the joints of fingers, they can be used to determine if fingers are bent or not. Given five fingers with two states each, one for bent and one for relaxed, finger gestures could easily be given a numeric code which be used as command signals for device control and virtual simulation.

With this concept, flex sensors along with a digital accelerometer, which can be used to detect the hand tilting movements, can be placed in a glove allowing hand movements to be captured and be used as commands for device control and virtual simulation. Thus, it was aimed to create a low-cost wireless glove controller through the use of flex sensors and a digital accelerometer which allows the user to define specific finger gestures to be used to control robotic devices and generate 3d visual environment.

Chapter 3

SURVEY OF TECHNOLOGIES

Abstract—A low-cost wireless glove controller that detects finger gestures was developed using makeshift flex sensors and a digital accelerometer. The performance of the makeshift flex sensors was compared to that of commercially available ones. A system using Arduino, Bluetooth, and Processing was developed to allow the user to specify desired finger gestures for controlling a variety of robotic devices and generate virtual characters for alphabets .

The implementation of this thesis was divided into five parts: (1) the creation of the glove controller; (2) the process of how finger gestures are to be interpreted; (3) the programming of the Arduino micro-controller for processing flex-sensor and digitalaccelerometer data; (4) the development of a program for the user-definition of gestures and device control; and (5) the creation of a 3D environment for virtual simulation of hand movements and device control.

A. Glove controller .

The glove controller was created using flex sensors and a digital accelerometer connected to a micro-controller and a Bluetooth shield for wireless implementation. Two kinds of glove controller was created, one using commercial flex sensors and one using makeshift flex sensors.

In order to reduce the cost for the creation of the glove controller, ommercial flex sensors were recreated using low-cost materials

B. Finger Binary System .

The concept of the Finger Binary System was used for the detection of finger gestures. Since there are two states of the fingers, flexed and relaxed, each state was given a bit value, 0 for relaxed and 1 for flexed. Thus, with the thumb being the most significant bit and the digital accelerometer being the least significant bit, the Binary Coded Decimal (BCD) equivalent can be used to refer to each gesture.

C. Arduino IDE and Micro-controller .

Through the use of a Micro-controller programmed via Arduino IDE, the data from the flex sensors and the digital accelerometer were read and interpreted. These data were then sent to the user-definition program and the virtual environment.

D. User-Definition and Device Control via

Processing IDE

A user-definition program was created using Processing IDE to allow the user to define his/her desired gestures for device control. The user was given the liberty to define his/her desired gestures for the actions to be performed by a device and/or the elements inside the virtual environment. Once was user was done in defining his/her desired gestures, the program created via Processing IDE will serve as an access point for device control. Through this, the user will now be able to use his defined gestures to control a device.

D. 3D Virtual Environment via Android studio.

We have used android studio to generate a virtual space on which the alphabets will be displayed and can be heard from the smart phone speaker itself . The control signals used for device control was also used inside the virtual environment. These were similarly used to let elements inside the virtual environment perform actions.The glove controller serves as the link for human interaction with the elements inside the virtual environment. This opens a lot of applications such as human motion capture for animations or simulations, and even an alternative means of input for human-software interaction.

Through this thesis, a low-cost glove controller which allows the user to define desired gestures for wireless device control and virtual environment simulation for generating alphabets characters was developed, thus, paving way for various technological advances for alternative device control, medical rehabilitation, bodyoriented gaming, and other applications that calls for wireless control.

Chapter 4

Final Year Project Proposal

4.1 Problem Defifinition

1. Similar type of hand gestures such as “u” and “v” were confused by the sensor. It was a problem to identify the difference between similar looking alphabets.

2. The person who does not have a hand or finger will not be able to use this glove as he/she cannot use the glove to make gestures .

3. If there is any electromagnetic interference or any other heavy wireless network interference then the glove will be struggling to send the data to app.

4. The glove has to be connected to the computer hence there will be a portability issue.

5. Bend sensors are costly hence we are using generic flex sensors to reduce the cost .

4.2 requirements Specification

Those are the hardware and software requirement of our smart glove project to make it work easily and efficiently .

4.3 Software and Hardware Requirements

Software requirment;

1. Arduino IDE version 6.4.1
2. Android studio 2019
3. OS : windows 7 /8/10 64 bit , MAC os .

Hardware requirement :

Components:

1. Arduino uno / nano R3
2. HC-05 Bluetooth module
3. Flex sensor
4. Analog accelerometer : ADX335
5. Speaker

System requirement :

1. 1 GB ram.
2. Harddisk 10 gb
3. 64 bit processor intel / AMD.

4.4 Project Plan

Till now we have completed the basic idea of planning and research of various literature to conclude what our project is going to be and how it is going to work .

In further semesters we are going to construct a glove with flex sensor and micro controller connected to it so that it can be use to generate alphabets using gestures and various sign language standards .

After that we are going to construct an Android app that will be used to display that output of the gestures generated by the smart glove and the app will be operated using a smart phone . the same smart phone will be used as a speaker to hear out loud the alphabets as an audio medium using the same android app.

Chapter 5

CONCLUSIONS

5.1 Conclusion

Through this thesis, a low-cost glove controller which allows the user to define desired gestures for wireless device control and virtual environment simulation was developed, thus, paving way for various technological advances for alternative device control, medical rehabilitation, bodyoriented gaming, and other applications that calls for wireless control.

The primary objective of this work is to enable the speech impaired and the mute to have a seamless communication and independent living in the society. The proposed prototype and accompanying algorithm accomplished the initial objective. The glove is cost effective and is capable of translating sign gestures (conventional Indian Sign Language) into speech-text in real time using android application on the phone. The significant recording of hand movements and feature extraction is done by applying Principle Component Analysis. The glove prototype is independent of the surrounding light or any other kind of interference. As a result, precise and accurate recognition gesture is possible in less time. This paper emphasizes on the translation of sign language with the help of the glove; however, the glove could be used for various other applications such as for the virtual reality interaction, gaming, entertainment, education technology, robotics etc. This is an ongoing work; the of the algorithm and prototype are going on.

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