VISVESVARAYA TECHNOLOGICAL UNIVERSITY

BELAGAVI – 590 018, KARNATAKA

Shri Bhagwan Mahaveer Jain Educational & Cultural Trust ®

JAIN COLLEGE OF ENGINEERING, BELAGAVI

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

PRE-FINAL YEAR
(2021 – 2022)

MINI-PROJECT REPORT

on

"SMART GLOVES FOR DEAF AND DUMB "

PROJECT GUIDE

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CERTIFICATE

This is to certify that the **Mini-Project Work** entitled **"SMART GLOVES FOR DEAF AND DUMB"** carried out by **Ms.Spoorti V (2JI19EC132), Ms.Soundary H (2JI19EC129), Mr.Venkatesh B (2JI20EC439) and Ms.Shrilaxmi S (2JI20EC427)** are bonafide students of **Department of Electronics and Communication Engineering, Jain College of Engineering, Belagavi,** in partial fulfilment for the award of **Bachelor of Engineering** of the **Visvesvaraya Technological University, Belagavi** during the academic year **2021-2022**. It is certified that all corrections/suggestions indicated for project assessment have been incorporated in the report. The project report has been approved as it satisfies the academic requirements in respect of project work prescribed for the Bachelor of Engineering degree.

Prof.Ashwini Araballi	**Dr. Krupa R Rasane**	**Dr. J. Shivakumar**
Project Guide	HOD, Dept. of E&CE	Principal & Director
Dept. of E&CE, JCE BGM	JCE, Belagavi	JCE, Belagavi

Name of Examiners Signature with Date

1._____ _____

2._____ _____

DECLARATION

We **Ms.Spoorti V (2JI19EC132), Ms.Soundarya H (2JI19EC129), Mr.Venkatesh B(2JI20EC439) and Ms.Shrilaxmi** S **(2JI20EC427)** students of **6th semester B.E. Electronics & Communication Engineering, Jain College of Engineering, Belagavi** hereby declare that the dissertation entitled **"SMART GLOVES FOR DEAF AND DUMB"** has been carried out in a batch and submitted in the partial fulfilment of the requirement for the award of Bachelor's Degree in Electronics & Communication Engineering under Visvesvaraya Technological University, Belagavi during the academic year **2021– 22.**

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Place : Belagavi

Date :

VISION OF INSTITUTE

"To be a university as a resource of solution to diverse challenges of society by nurturing innovation,research and entrepreneurship through value based education."

MISSION OF INSTITUTE

- To provide work culture that facilitates effective teaching-learning process and lifelong learning skills.
- To promote innovation,collaboration and leadership through best practices.
- To foster industry-institute interaction resulting in entrepreneurship skills and employment opportunities.

VISION OF DEPARTMENT

"To impart quality technical education for developing globally competent, ethically sound Electronics and Communication Engineers and innovators."

MISSION OF DEPARTMENT

1. To provide conducive environment through structured student centric, teaching learning process.
2. To nurture needs of society by infusing scientific temper in students and to grow as a centre of excellence with efficient industry-institute interaction.
3. To inculcate self learning skills, entrepreneurial ability and professional ethics.

Program Educational Objectives (PEO's)

Graduates will be able to

- Contemplate real-time social problems and deliver efficient solutions.
- Lead and succeed in professional careers.
- Contribute through research and entrepreneurship.

Program Specific Outcomes (PSO's)

Graduates in the UG program in Electronics and communication engineering will be able to

- Design, verify and develop analog and digital systems by using state of art technology to contribute to the societal needs.

- Apply the knowledge in various domains of IoT, real time systems, communication systems, VLSI and embedded systems, image and signal processing using hardware and software tools.

PROGRAM OUTCOME'S (PO'S)

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance**: Demonstrate knowledge and understanding of the **engineering and management principles and apply these to one's own work, as a member and** leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Outcomes (CO's)

Course Outcome	Course Outcome Statement	Bloom's Level
18ECMP68.01	Design and develop an electronic system using modern tools by following professional ethics to exhibit the academic skills acquired.	L3,L4
18ECMP68.02	Develop employer valued skills such as teamwork, communication skills and technical write-up.	L3
18ECMP68.03	Understand the design factors to be considered that impact society, safety and environment.	L2,L3

Bloom's Cognitive Levels

L1: Remembering; L2: Understanding; L3: Applying; L4: Analyzing; L5: Evaluating; L6: Creating

STRENGTH OF CO MAPPING TO PO/PSOS WITH JUSTIFICATION:

1. Slight (Low) 2. Moderate (Medium) 3. Substantial (High)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1	3	-	-	2	-	-	-	2	3	2
CO2	-	-	-	-	-	-	-	-	3	3	2	-	-	-
CO3	-	-	-	-	-	2	2	-	-	-	-	-	-	-

CO – PO - PSO	Justification
CO1 → PO1 (3) CO1 → PO2 (3) CO1 → PO3 (3) CO1 → PO4 (1) CO1 → PO5 (3) CO1 → PO8 (2) CO1 → P12 (2) CO1 → PSO1(3) CO1 → PSO2(2)	- Students apply the electronics and communication engineering skills and design products to solve complex engineering problems. - Students gain the knowledge of modern tools and skill usage. - Students can use research-based knowledge and methods including design of experiments, analysis and interpretation to provide valid conclusions. - Students can work ethically and professionally in the industry. - Students can be employable in the core as well as multi-disciplinary organizations.
CO2 → PO9 (3) CO2 → P10 (3) CO2 → P11 (2)	- Students can effectively act as an individual, and as a member or leader and work in a team. - Students can comprehend and write effective reports and make documentation with effective presentation. - Learn to management and financial skills required for the execution of project.
CO3 → PO6 (3) CO3 → PO7 (3)	- Students can able to understand the impact of professional engineering solutions in societal and environmental contexts. - Students can be able to apply reasoning of contextual knowledge to assess societal, health and safety issues.

ACKNOWLEDGEMENT

Although a single sentence hardly suffices, we would like to thank almighty God for blessing us with his grace and taking our endeavour to a successful culmination.

We express our gratitude to our guide **Prof. Ashwini Araballi, Assistant Professor, Dept. of E&CE, JCE, Belagavi,** for his valuable guidance and continual encouragement and assistance throughout the project work**.** We greatly appreciate the freedom and collegial respect. We are grateful to him for discussions about the technical matters and suggestions concerned to our topic.

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We extend our sense of gratitude to **Dr. Krupa R Rasane, Professor & Head, Dept. of E&CE, JCE, Belagavi,** for extending support and cooperation which helped us in completion of the project work.

We would like to express our sincere thanks to **Dr. J. Shivakumar, Principal, JCE Belagavi,** for extending support and cooperation which helped us in the completion of the project work.

We would like to extend our gratitude to all staff of **Department of Electronics and Communication Engineering** for the help and support rendered to us.

We would like to extend our gratitude to all our family members and friends especially for their advice and moral support.

ABSTRACT

In this paper we represent smart glove for deaf and dumb. About 9 billion people in the world are deaf and dumb. The communication between a deaf and dumb people to normal visual people. This creates a very little room for them with communication being a fundamental aspect of human life. The blind people can talk freely by means of normal language whereas the deaf and dumb have their own manual-visual language known as sign language. Sign language is a non-verbal form of intercourse which is found amongst deaf communities in world. The languages do not have a common origin and hence difficult to interpret.

The project aim to facilitate people by means of a glove based communication interpreter system. The implementation of glove for deaf and dumb people that will provide to conveys their messages in sign language which is converted into audio and also displayed. The glove internally equipped with five flex sensors. For each specific gesture, the flex sensor produces a proportional change in resistance. The processing of these hand gestures is in Arduino uno board which is an advance version of the microcontroller and software. It compares the input signal with predefined voltage levels stored in memory. According to that required sound is produced with the help of Android application.

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CHAPTER 1

INTRODUCTION

MOTIVATION

General, deaf people have difficulty in communicating with others who don't understand sign language. Even those who do speak aloud typically have a "deaf voice" of which they are self-conscious and that can make them reticent. Therefore, we proposed a new technique artificial speaking mouth for deaf and dumb people. It will be helpful to them for conveying their thoughts to others. Some people are easily able to get the information from their motions, but the remaining is not able to understand their way of conveying messages.To overcome this complexity, the artificial mouth is introduced for deaf and dumb people.

PROBLEM STATEMENT

In the last few years, there has been exponential increase in the population of hearing impaired and speech disable people due to oral disease, birth defects or accident. One of the main reason why deaf and dumb people are being ignored is communication and give less priority as compare to normal person. There is also lack of awareness regarded to diversity among the disabled people. Also there are very less jobs available for disable person.

OBJECTIVE OF PROJECT

- The main aim of the our proposed project is ti develop a cost effective system which can give voice to voiceless person with displayed message. It means that using Smart Glove by the deaf and dumb people enables them to communicate with others which also helps to bridge the gap between person with disability and normal person.
- Problems faced by disabled people regarding employment can be overcome by this method. So in the proposed work an intelligent Arduino based system using flex sensors will be developed.
- Also this is our objective of making of this project to help people and serve humanity.

LITERATURE SURVEY

Deaf people have used sign languages throughout the history. One of the earliest written records of a sign language is from fifth century BC, in Plato's Cratylus. In 1620, Juan Pablo Bonet published “Reduction of letters and art for teaching mute people to speak” which is considered as the first modern treatise of sign language Phonetics. In order to overcome the gap of communication between dumb and normal person we have come up with this novel idea. Some papers present Sign Language Interpreter a recognition system for the vocally disabled. In the recent years, there has been tremendous research on the hand sign recognition. The technology of gesture recognition is divided into two categories- Vision-based and Glove-based, in comparison with these two, vision based system faces many problem it is not convenient for user to use whereas glove based is convenient and simple method. One more study proposes that the system must be capable of recognizing the gestures continuously without any manual indication. The system must recognize the gestures accurately between 80 to 90 percent. There is a need of designing of wireless transceiver system for Microcontroller and Sensors Based Speech Converter. There is a need of monitoring health of speech impaired and paralyzed patients too so heartbeat sensor is mounted in a hand gloves which is convenient and reliable to use, which measure pulse rate. The intension of the sign language translation system is to translate the normal sign language into speech and to make easy contact with the dumb and it is made portable. Proposed system avoids PC intervention for processing and all operations are controlled by microcontroller. Another study states that nowadays Embedded System emerging as an important trend in all applications. More recently developed embedded applications are changing our lifestyle in a smart way.

DESIGN APPROACH

Firmware Design & Development

- Requirement gathering
- Software Design Document
- Firmware design and development
- Coding

Testing

- Hardware module testing
- Unit & Integration testing of the software
- System Testing

CHAPTER 2

HARDWARE DESIGN

2.1 BLOCK DIAGRAM

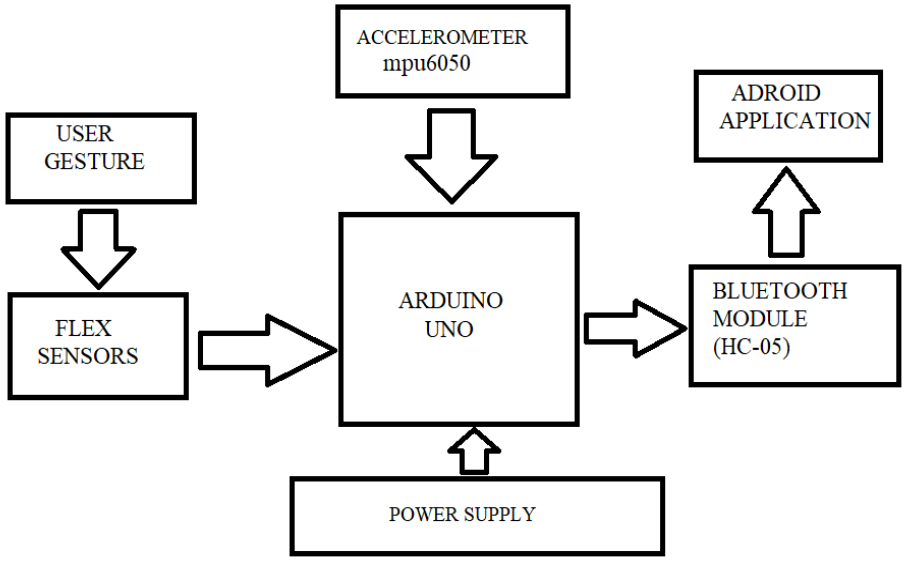


Figure 1. Block Diagram

2.2 Explaination of each block with proper names and their features as follows

2.2.1 FLEX SENSOR

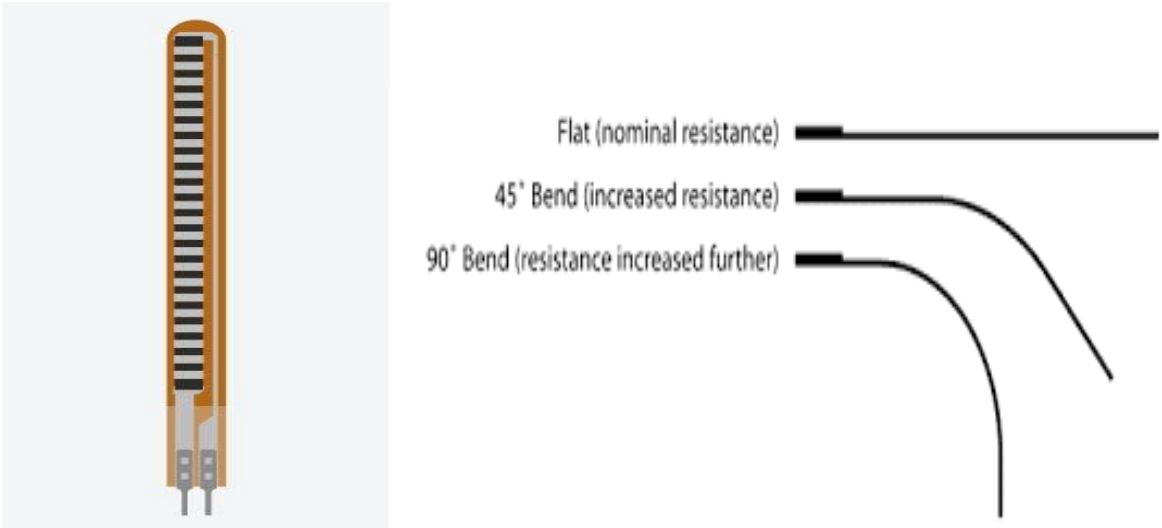


Figure 2 : Flex Sensor and its variation of resistance

2.2.1.1 FLEX SENSOR DETAIL

We used 4 flex sensors in our project. Flex sensor detect the bending of fingers. It just like a variable resistor whose resistance changes with respect to the amount of the finger bending. Flex sensor is an analog sensor and its value increases whenever flex sensor bends. We place the flex sensor on the each finger of the glove to detect the bending of the finger. Inside the flex sensor carbon resistive elements within a thin thin flexible substrate.

FEATURES

- Flex sensor can vary the resistance with the amount of finger bending.
- It is capable of varying values between normal conditions of 30K ohm upto maximum of 160K ohm.
- Flex sensors usually available in two sizes. One is 2.2 inch and another is 4.5 inch.

Table 1. Flex Sensor Pin Discription

Pin Number	Description
P1	Connected to Vcc / 5V
P2	Connected to ground

2.2.2 ARDUINO UNO

The “Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform.

Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB

cable or power it with an AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip.

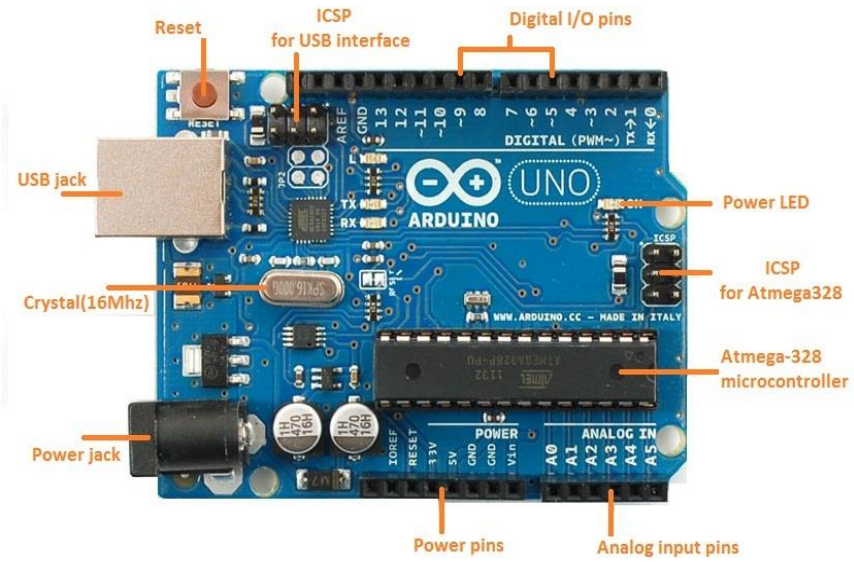


Figure 3: Arduino Uno

2.2.2.1 ATMEGA328P MICROCONTROLLER

The Atmel Pico Power ATmega328/P is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega328/P achieves throughputs close to 1MIPS per MHz. This empowers system designed to optimize the device for power consumption versus processing speed.

2.2.3 ACCELEROMETER (mpu6050)

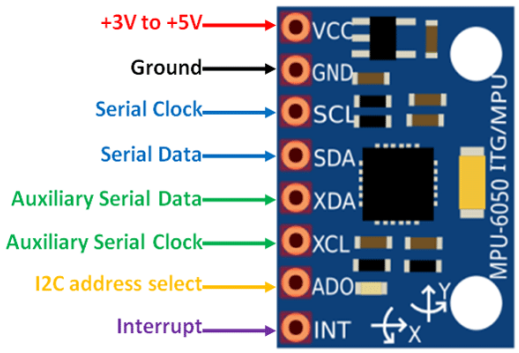


Figure 4: Accelerometer

2.2.3.1 Accelerometer Detail

Mpu6050 has a 3-axis gyroscope, 3-axis accelerometer and a digital motion processor integrated on a single chip. mpu6050 uses the I2C protocol for communication and transfer of data. This module give values of the change in the motion by the hand which is the x-axis, y-axis and z-axis.

Features

- mpu6050 has built-in 16 bit ADC which provides great accuracy
- It also has an in-built temperature sensor.

2.2.4 Bluetooth Module(HC-05)

Wireless communication is designed to replace cable connections. HC-05 uses serial communication to communicate with electronics. It is usually used to connect small devices like mobile phones using short range wireless connection to exchange information. HC-05 module can be operated within 4-6V power supply. Most importantly it can be operated in Master-Slave mode which means it will either send or receive data to external sources.

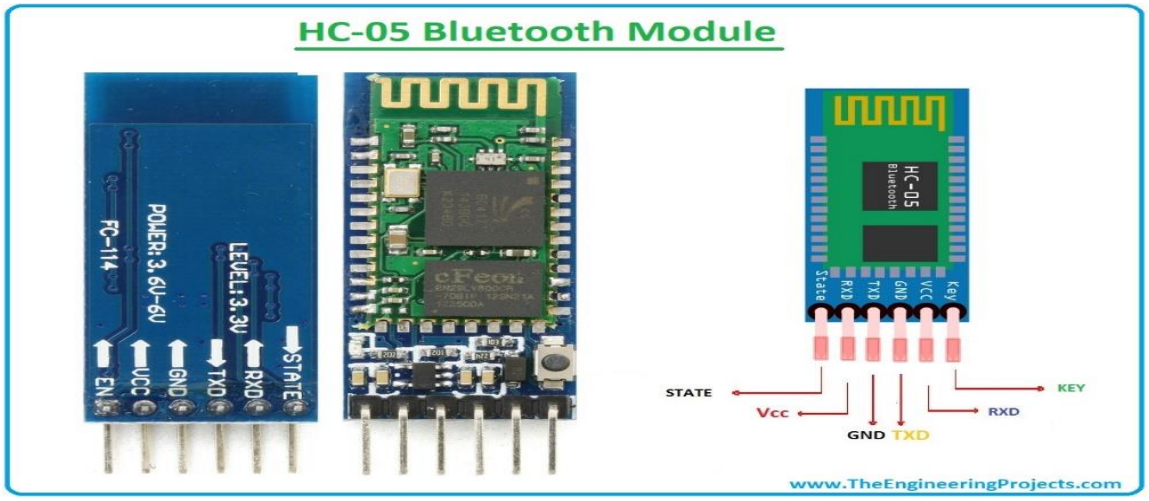


Figure 5: Bluetooth module

CHAPTER 3
SOFTWARE DESIGN

3.1 PROGRAMMING LANGUAGE

- C Programming

3.2 DEVELOPMENT TOOLS

- Arduino IDE Tool

3.3 ARDUINO IDE

Arduino software is needed to program Arduino boards and must be downloaded from the Arduino website and installed on a computer. This software is known as the Arduino IDE (Integrated Development Environment). Drivers must be installed in order to be able to program an Arduino from the Arduino IDE.

3.4 DESIGN

3.4.1 DESIGN METHODOLOGY

The work of this paper start from movement of hand gloves where the flex sensors are attached, and the value of sensor changes when its experiences the bending. The flex sensor is another type of potentiometer are attach to the fingers when we bend the figure the value of the sensor get changes. The changing value of the sensor is depend upon the resistance and applied angle of the bending when we bend the sensor at some particular angle we can see the value of the resistance is increase and accordingly the output get reduced . On the other way we can say that its like a inversely proportional when the resistance of the sensor is increase at that instant the value of output decrease and accordingly we can make paper by getting the advantage of this process.

3.4.2 MAIN FLOW DIAGRAM

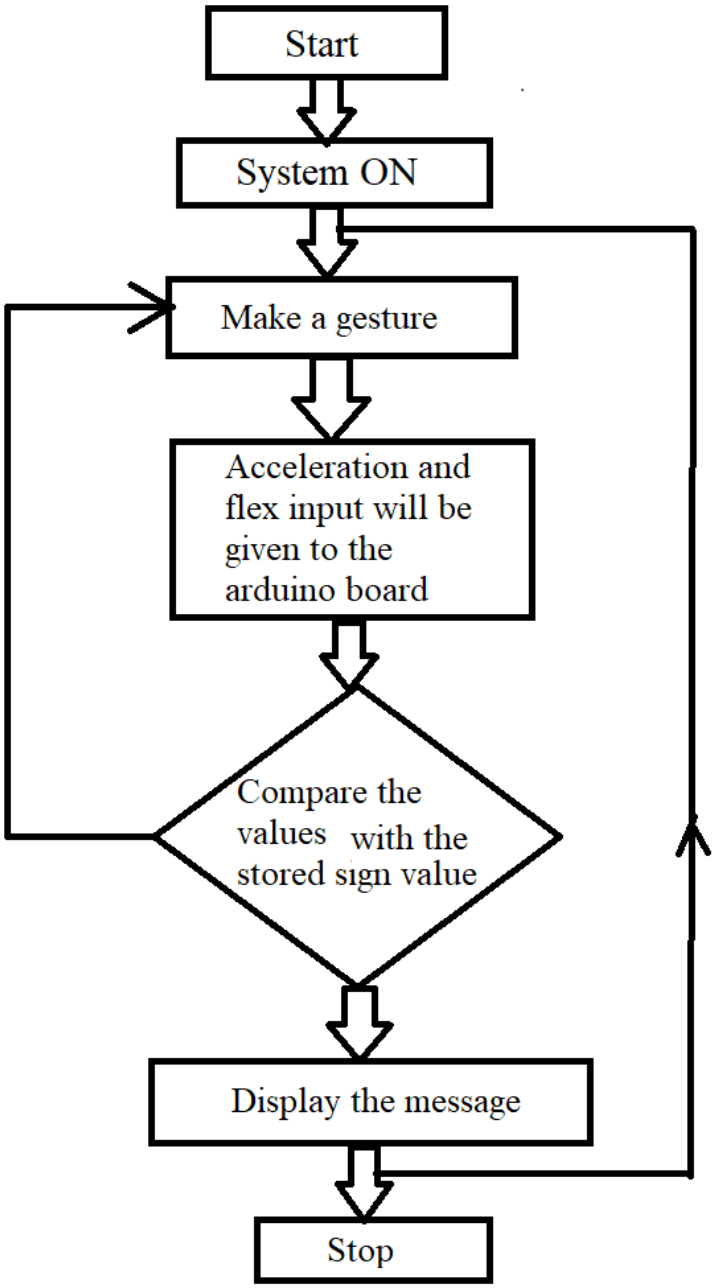


Figure 6: Flow chart

CHAPTER 4

APPLICATIONS

4.1 APPLICATIONS

- General purpose device for better living.
- Gaming control application.
- Advanced version can be used in Home automation.

4.2 ADVANTAGES

- It is light in weight , small in size and easy to operate.
- It is portable device.
- It is flexible for users.
- Facilitates effective real-time communication.

4.3 DISADVANTAGES

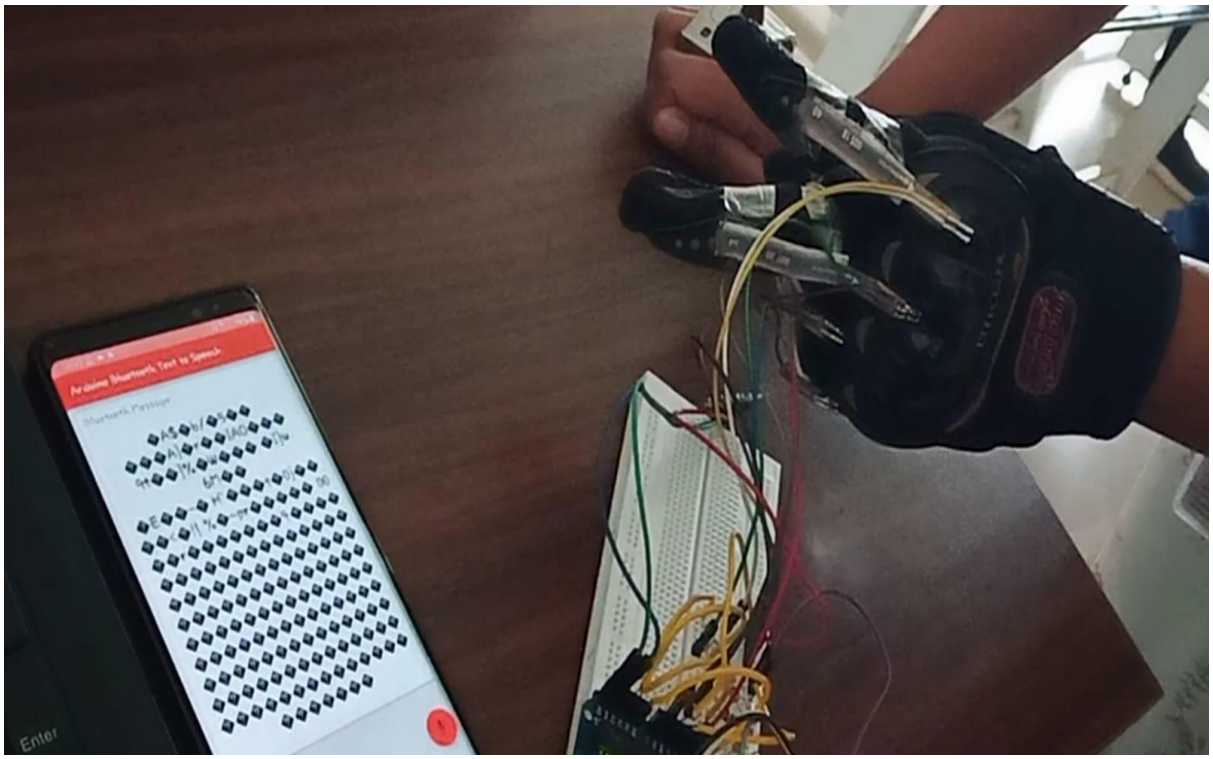
- Facial expressions are not been considered.
- Processing of system may be slow.

CHAPTER 5

RESULTS

In our design, the detection time for sensor is 2 seconds for anyone who wears the glove.

Each sign of this language based on the movement of hands and bending fingers in specific manner with particular angle respectively.The values generated by the flex sensor and accelerometer are given to Arduino.These sensors produce different values on the basis of position of hands and fingers. Each produces unique value which is already assigned to Arduino, by using least distance technique, the Arduino finds the nearest value among the all we defined gestures.Once it is identified, the signal is send to the Bluetooth module.The Bluetooth module which is connected to the android application that speaks and displayed the messages.



CHAPTER 6

CONCLUSION

6.1 CONCLUSION

The main barrier coming between the interaction of deaf & dumb community and the normal persons is how to communicate each other's sentiments and emotions. It is required for both the parties to have a deep knowledge of sign language. In most of the cases, it is seen that the deaf & dumb community has sign language as their saviour but the normal persons face the difficulty in understanding them. In this paper, we reviewed numerous attempts and initiations taken by different persons to overcome this social issue. Gloves were made using flex sensors, contact switches, accelerometers, image processing and many other logics were implemented but each had some or the other drawback. To take into account whole of the sign language, a huge library of functions is required which is a very tedious job in itself. Researches are still being made to invent new and cost effective ways to create such a device
which converts sign language to speech

6.2 FUTURE SCOPE

There can be a lot of future enhancements associated to this research work, which includes: Designing of wireless transceiver system for "Microcontroller and Sensors Based Gesture Vocalizer".Perfection in monitoring and sensing of the dynamic movements involved in "Microcontroller and Sensors Based Gesture Vocalizer". Virtual reality application e.g., replacing the conventional input devices like joy sticks in Video games with the data glove.
The Robot control system to regulate machine activity at remote sensitive sites. Designing of a whole jacket, which would be capable of vocalizing the gestures. This system is useful for deaf and mute people to communicate with one another and with the normal people. The dumb people use their standard sign language which is not easily understandable by common people and blind people cannot see their gestures.This system converts the sign language into voice which is easily understandable by blind and normal people. The sign language is
translated into some text form, to facilitate the deaf people as well. This text is display on LCD.

CHAPTER 7

REFERENCES

[1]] Divyashree Merthia, Ayush Dadhich, Bhaskae Varma and Dipesh Patidar Porrnima Institute Of Engineering And Technology, JaipuR Rajasthan India "A Speaking Module For Deaf And Dumb". SSRG International Journal of Electronics and Communication Engineering (SSRG-IJECE) - Volume 3 Issue 8 – August,pp.47-89.

[2] Noor Ibraheem and Rafiqul Khan, “Survey on Various Gesture Recognition Technologies and Techniques” International Journal of Computer Applications, Vol.50, 7 July 2012,pp.38-44.

[3] Solanki Krunal, “Microcontroller Based Sign Language Glove” International Journal for Scientific Research & Development (IJSRD),Vol. 1, Issue 4, 2013, pp.831-833.

[4]https://create.arduino.cc/projecthub/prakhargurunani/smart-hand-glove-84e046