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# DEVELPOMENT OF A HAND GESTURE SYSTEM FOR PEOPLE WITH SPEECH DISABILITIES

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ABSTRACT: It is quite challenging for mute persons to communicate with non-mute people. The communication becomes quite challenging because average individuals are not trained in hand sign language. It can be exceedingly challenging for a mute person to communicate with individualsnearby in an emergency or at other times when they're travelling or around unfamiliar people. The technology makes use of a mobile interface and a motion-capable hand motion reading system. Battery-operated circuitry is used to power this system. The data processing and systemmanagement are done on an Arduino uno and gyrometer. The device assists mute persons in communicating simple messages and has roughly 13 stored messages, including "need help," "where is the toilet/washroom," and so forth. The technology reads a person's hand motion and helps to communicate with normal people.

# I. INTRODUCTION:

Innovation has always been drawn to products and tools that help people with disabilities live regular normal, convenient lives. recent technological developments, A new generation of wearable micro-devices has been made possible by advancements in areas like low-power electronics, wireless technology with Bluetooth modulators, and the ability to build both the analogue frontend and digital processing backends as integrated circuits which support the mute people lives easier with these gloves. The suggested approach, it can be exceedingly challenging to communicate with individuals nearby in an emergency or at other times when a silent person is travelling or among unfamiliar people. Here, we suggest a smart speaking system that enables

mute persons to communicate with hearing people by making gestures and hand motions. The system, which enables silent persons to communicate simple messages help," "where "need the like is toilet/washroom," and so forth, comprises of approximately 13 stored messages. Mute persons find it incredibly challenging to communicate with non-mute people. The difficulty of communication arises from the lack of training in hand sign language among the general public. Sensor input values are continuously processed by the Arduino processor. Now it looks for messages that match the set in the database. In this paper, we Represent structure of our project with a glove and highlight the sensors that we used in this project to enhance the idea of our project in a low-cost hand glove to communicate.

# A. Technical background:

The first data glove was the Sayre Glove, built in 1977 by the Electronic Visualization Laboratory at the University of Illinois in Chicago. The Nintendo Power Glove, which first became commercially accessible in 1987, became one of the initial data gloves. For use with the Nintendo Entertainment System, this was created as a gaming glove. It included buttons on the rear, a basic tracker, and finger bend sensors. Hobbyists also built their own data gloves using the sensors in the Power Glove and the data glove from Indian institution of technology

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Madras in 2013 has made a sensor-based glove with gesture recognize mechanism.

# **B. Proposed Solution:**

The primary object of the project is to build a glove in low cost with a minimal sensors application which replicates to direct the person who uses the glove through gyro meter, this glove is attached with 13 stored messages, where the glove is wrapped with the aluminum foil which helps to bend the fingers and when the fingers attached to each other the command shows up in the LCD screen. The gestured words are uttered leveraging an Android stack-based sound synthesizer.



### Fig 1. Flow Chart

This project consists of gesture recognition through a glove where it has 4 basic implementations the aluminum foil is connected to Arduino uno this aluminum foil consists with binary digits and that is converted to a text and displayed on to the LCD, The Arduino uno gives analog output, The gyro meter which sense the angular velocity and it also gives the directions through the glove. there is also a Bluetooth modulator which is connected to Arduino uno which modules the signals and gives the text. This project reflects a low-cost availability to mute people

# II. IMPLEMENTATION

# A. Hardware implementation

We have designed and implemented a glove that consist of a single sensor which is cost efficient that is gyro meter which sense angular velocity and it also directs the person using glove. A blue tooth modulator connected to the Arduino transmits data wirelessly to a mobile phone applying Bluetooth. The phone then receives data and processes it to identify which symbol the hand is resembling. Once an entire word is obtained, the phone's text to speech technology turns it to voice. There is a description on every hardware component used in the project in the below



# Fig 2. Block Diagram

 Sensor: There is one and only sensor which is gyro meter this a device that has a potential to measure and preserve an object's orientation and angular speed. Compared to accelerometers, these are more modern. While accelerometers can only monitor linear motion, they can measure the tilt and lateral orientation of the item. it accelerates the directions to the person who operates the glove.



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- 2) Arduino Mega 2560 MC: An Arduino uno board termed the Arduino Mega 2560 is based on the ATmega2560. (datasheet). It includes 16 analogue inputs, 4 hardware serial ports, a 16 MHz crystal oscillator, 54 digital input/output pins 14 which can be used as PWM outputs, a USB connector, a power socket, a header for ICSP, and a reset button. This Arduino is connected through a connecting wired in a bread board resistor attached to the bread board along.
- 3) Aluminum Foil: Aluminum foil is used as bend of the fingers to the glove which acts as binary source which converts to textthat is displaced in the LCD. This foil is connected through connecting wires from Arduino uno as a major source.
- 4) Bluetooth Modulator: This are able to send high-quality audio to speakers using a Bluetooth transmitter. A Bluetooth signal is transmitted by the transmitter, connecting it to an eligible device. The transmitter connects to the analog systems or digital output of the object you want to control and communicates a signal there. Additionally, plenty of new mobile phones permit Bluetooth, and we eventually want to sync the device with the mobile.
- 5) LCD: The liquid crystal display (LCD) panel is additionally designed to use an outdated overhead projector to carryinformation from a microcomputer's screen to a larger projection.



Fig 3. Hardware setup

#### **B.** Software implementation

1) Microcontroller Software: In the Arduino uno we use 1.8.19 windows which is used to instruct the glove this data is arranged in the form of packets and stored to retrieve the data. The project is designed based on the combination of C, C++ and JAVA which insist the glove through commands.

In the aluminum foil the data is stored in binary format when the fingers attached to each other then it is further converted into digital input signals then displayed on to the LCD screen. The Bluetooth modulator is used as a medium in the mobile application where it is used as a digital converter and then processed in the application.



Fig 4. Software Implementation III. RESULT

All of the demonstrated modules have been put into conduct. Character recognition is possible due to a learning system that can pick up more new characters. Additionally, the glove can be equipped with sensors like a gyro meter to detect more complicated gestures and aluminum foil to act as a source of bending for the fingers.

The image of hand gesture describes about Moment of the hand every moment of the hand describes the command



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- 1. 0 sign value represents image of flatter hand and the command represents as no command.
- 2. 1 sign value joins thumb and index finger which implies as a command give me water.
- 3. 2 sign value joins index and middle finger which implies as a command one tea please.
- 4. 3 sign value joins middle and bring finger which implies as a command give me food.
- 5. 4 sign value joins ring and little finger which implies as a commander I need rest.
- 6. 5 sign value joins index and middle finger which implies as a command take me way to hospital.
- 7. 6 sign value joins middle and ring finger which implies as a command give me medicine.
- 8. 7 sign value joints middle finger,ring and little fingerprint whichimplies as a command snacks, please.
- 9. 8 Sign value joins index, middle, ring and little finger which implies as a command I am not feeling well.
- 10. 9 sign value joins thumb, index, middle and ring finger which implies as a command take me restroom.
- 10 sign value join all the fingers as a fist which implies as a command VBIT.

**Table 1.** Results of hand gestures with voicemessages

Sign	Image of hand	Voice
value	Gesture	message
0	SAR A	No Command

1	Give me water
2	One tea please
3	Give me food
4	I need rest
5	Tell me way to hospital
6	Give me medicine
7	Snacks please
8	I am not feeling well



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Further extend of the result implies based on the gyro meter which directs the person who uses the glove and gives the commandas a mobile application which is attached with a speaker and the gyro meter consist of angular values based on the direction of the hand. Below there is the representation of the table and the values accordingly.

#### Table 2. Gyro meter angular values

Movement of hand	Input for Arduion from gesture	
side	Angular values	Directions
Tilt right	>=380,<=410	Move right
Tilt left	>=260,<=290	Move left
Tilt back	>=260,<=290	Move backwards
Tilt front	>=380,<=410	Move front

# **IV. CONCLUSION**

A promising and cutting-edge strategy to assist those who have trouble speaking is the development of a hand gesture system. Speech-impaired people can communicate clearly and effectively because to the system's use of machine learningalgorithms to recognize hand motions and transform them into speech. The adoption of hand gesture systems for those who struggle with dialect still faces significant difficulties. The correctness and dependability of the system, which might impact communication quality, is one of the most significant challenges. The project also adapts with a gyro meter and other components which help in communicating the needs of the mute people.

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