INTRODUCTION

We are living in the era of technological advancements but still the disabled are dependent mainly on primitive methods of external help. The DTS systems emphasize on using open source technology and smartphones for helping specially-abled individuals with modern but economical methods.

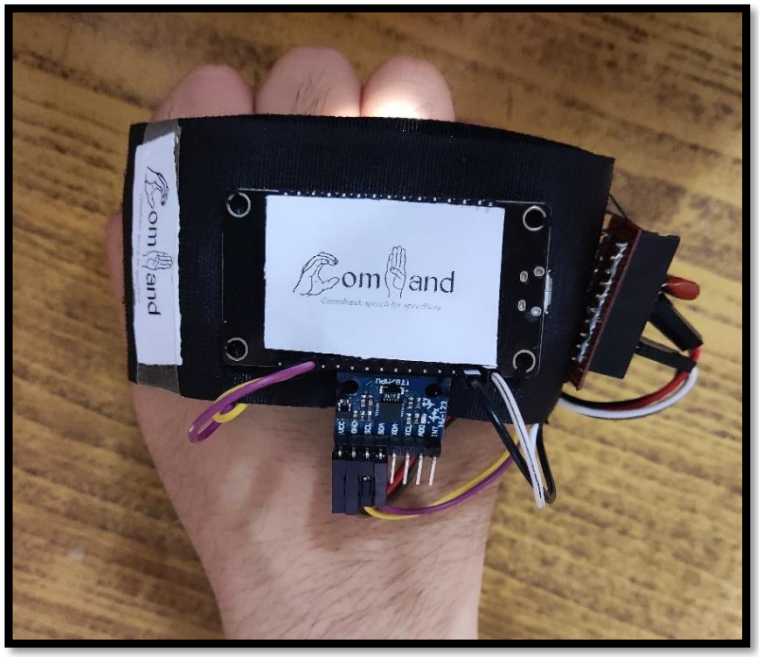
The DTS consists of three different units :

I. **Commglove** – A sign language alternative for people with speech impairements.
II. **ThirdEye –** A SONAR based system for aiding the blind.
III. **Curantis –** An assistive system for communication between caretaker and disabled.

All parts of the system are based on Arduino microcontrollers and its interaction to a smartphone application.

COMMBAND

CommBand is a gesture recognition device employing the use of an accelerometer to provide people with speech impairments and the inability to use sign language, a means to communicate. The target user base consists of people suffering from , speech impairments or diseases like cerebral palsy, Parkinson's Disease, etc

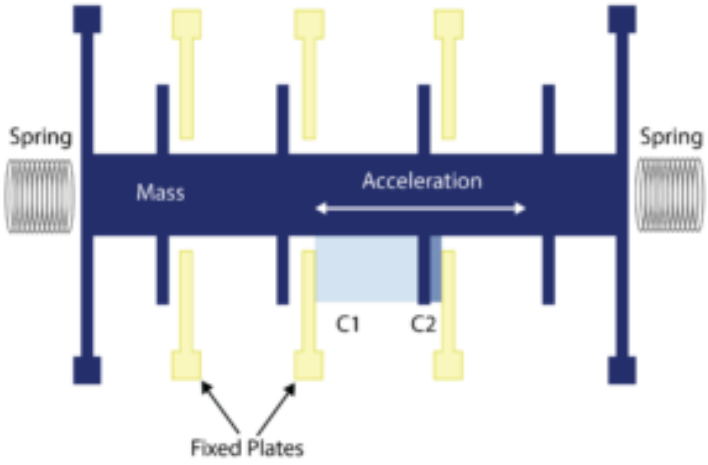


COMPONENTS USED

1. Arduino UNO
2. HC-05 Bluetooth Module
3. MPU6050 Accelerometer

WORKING PRINCIPLE

A MPU6050 accelerometer is a micro-machined structure built on top of a silicon wafer. This structure is suspended by polysilicon springs. It allows the structure to deflect when accelerated along the X, Y, and/or Z axes. As a result of deflection, the capacitance between fixed plates and plates attached to the suspended structure changes. This change in capacitance is proportional to the acceleration along that axis. The sensor processes this change in capacitance and converts it into an analog output voltage.



By computing the acceleration values on the 3D coordinate system we derive the following equations

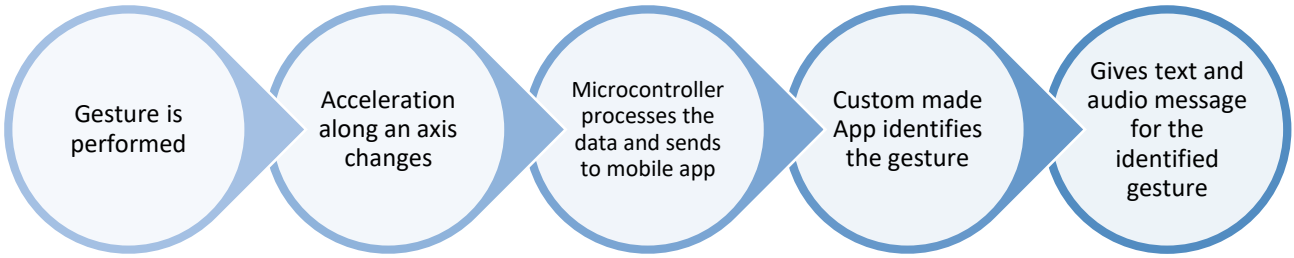
$$roll = \arctan(\frac{a_y}{a_x})$$

$$pitch = -\arctan\left(\frac{a_x}{\sqrt{a_y^2 + a_z^2}}\right)$$

Pitch measures the angular deviation from vertical axis and roll measures the angular deviation from horizontal axis.

GESTURE RECOGINITION

By measuring the change in angles we have made 4 easy to perform gestures,



Whenever a gesture is performed the microcontroller, processes the change in roll and pitch values and identifies the gesture, the gesture value is sent to the mobile app which in turn gives us an

audio output of the message corresponding to the respective gesture.

MERITS

- Cheaper than other technologies (expected cost of production < 900 rs)
- Open source and thus can be upgraded or customized by anyone to use in any situation.
- Lightweight and easily wearable

FUTURE SCOPE

The primary focus of future development is based on:

1. Proper analysis of data to increase number of gestures.
2. Use of machine learning to include a larger number of gestures (even the whole alphabet series).
3. Using more precise systems to reduce the delay between gesture and audio output.