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# SIGN LANGUAGE
# TO
# TEXT AND SPEECH CONVERSION

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# ➜ ABSTRACT:

Today in India many people are suffering from disabilities, there are people who cannot hear and speak.Sign language is the language used by mute people and it is a communication skill that uses gestures instead of sound to convey meaning simultaneously combining hand shapes, orientations and movement of the hands, arms or body and facial expressions to express fluidly a speaker's thoughts. Signs are used to communicate words and sentences to the audience.These days, the implanted framework has turned into a critical pattern in all applications.

Our gesture vocalizer will add on to the comfort and make the life of people a bit easier. Mute people can use the gloves to perform hand gestures and it will be converted into speech so that normal people can understand their expression.

# → EXISTING SYSTEM :

Gesture based communication by deaf and dumb people is hard to understand by normal persons. In existing system we have to relay on a computer to translate the hand sign gestures into text output which basically works with the help of MATLAB, it only gives text output in the computer screen. Which makes it very difficult to use and it cannot be used in everywhere its not versatile.

By use of MATLAB, hand gestures are converted into words and that will display on computer. The hearing and Speech impaired people need a computer or tab to display, also by this existing system the visually challenged person cannot be communicated with hear and speech impaired person. It also furnishes correspondence between individuals with discourse hindrance and ordinary individuals.

★ Disadvantage:
- It is not portable
- Very difficult to use
- Takes more time to translate the signs into speech

# → PROPOSED SYSTEM :

In our proposed system we convert the hand signs language into text and speech output with the help of flex sensors, It converts finger gestures into analogue voltages, which are fed to the microcontroller. And the output is sent via Bluetooth module HC-05 and feds into Android application which uses google text to speech algorithm and converts text into speech

★ Advantage :

- With the proposed system it makes it easy to use and easy to operate by everyone
- Portable design works on 9V small Radio battery
- Smaller in size because we are using small microcontroller
- Deaf people can easily communicate with normal people

★ Disadvantage :

- The glove has multiple wires attached to it.
- When handled in a rash way,the flex sensors could break.
- The computer and mobile phone are essential for it to function.
- At times,the exact position of the flex sensor may be misread which leads to generation of a message that wasn't expected as output
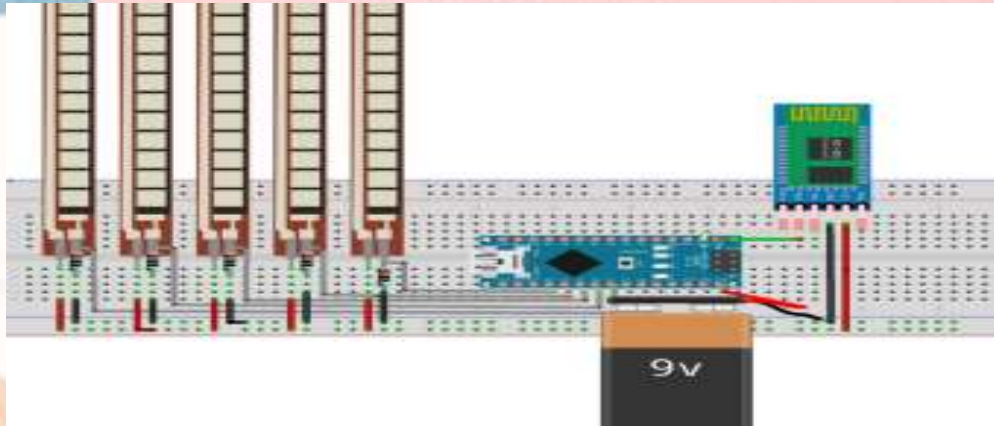
➔ **HARDWARE:**

   **Arduino UNO,Flex sensor,Accelerometer,Bluetooth module,9v radio battery,Gloves,jumper wires,arduino cable.**

➔ **SOFTWARE:**

   **Arduino IDE,Android studio,Google text to speech,Windows 8 or later,8 GB RAM,1.5 GB Disk space,Android application.**

➔ **CIRCUIT DIAGRAM:**

# → FLEX SENSOR:

A flex sensor is a kind of sensor which is used to measure the amount of defection otherwise bending. The designing of this sensor can be done by using materials like plastic and carbon. The carbon surface is arranged on a plastic strip as this strip is turned aside then the sensor's resistance will be changed.Thus, it is also named a bend sensor. As its varying resistance can be directly proportional to the quantity of turn thus it can also be employed like a goniometer.

**How to Use Flex Sensors :**
Flex sensor is basically a variable resistor whose terminal resistance increases when the sensor is bent. So this sensor resistance increases depends on surface linearity. So it is usually used to sense the changes in linearity.
• Pin P1: This pin is generally connected to the positive terminal of the power source.
• Pin P2: This pin is generally connected to the GND(ground) pin of the power Source.
Here,

Vo=Vcc(Rx/(R1+Rx)).

where Rx - Flex sensor resistance
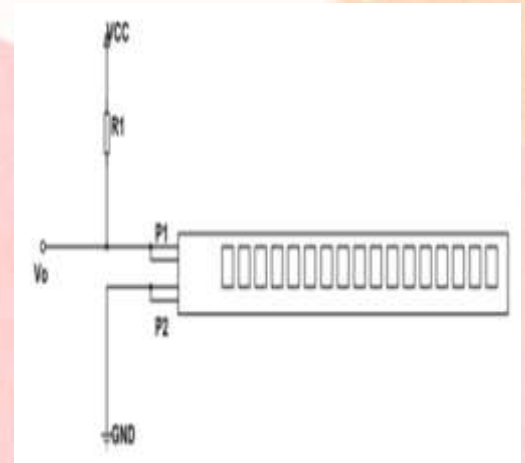
## ➔ BLUETOOTH MODULE :

It is used for many applications like wireless headset, game controllers,wireless mouse, wireless keyboard and many more consumer applications.It has range up to <100m which depends upon transmitter and receiver,atmosphere, geographic & urban conditions. It uses frequency-hopping spread spectrum (FHSS) radio technology to send data over air.It uses serial communication to communicate with devices.I
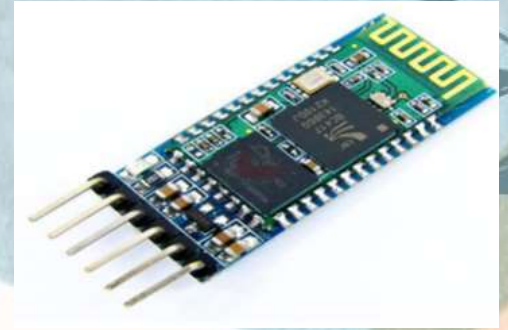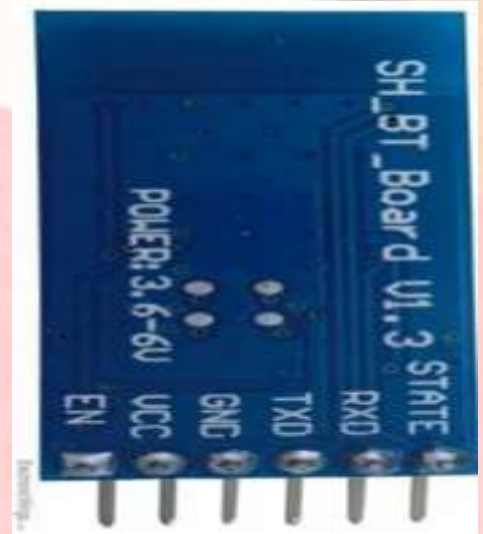
**How to Use Blueooth Module:**
It has 6 pins,

- Key/EN
- VCC
- GND
- TXD
- RXD
- State

HC-05 has a red LED which indicates connection status, whether the Bluetooth is connected or not. Before connecting to the HC-05 module this red LED blinks continuously in a periodic manner. When it gets connected to any other Bluetooth device, its blinking slows down to two seconds

## ➜ Bluetooth communication between Devices:

To communicate with a smartphone with HC-05 Bluetooth module, the smartphone requires Bluetooth terminal application for transmitting and receiving data. You can find Bluetooth terminal applications for android and windows in respective app. store.

E.g., Send data from the Smartphone terminal to HC-05 Bluetooth module and see this data on PC serial terminal and vice versa.
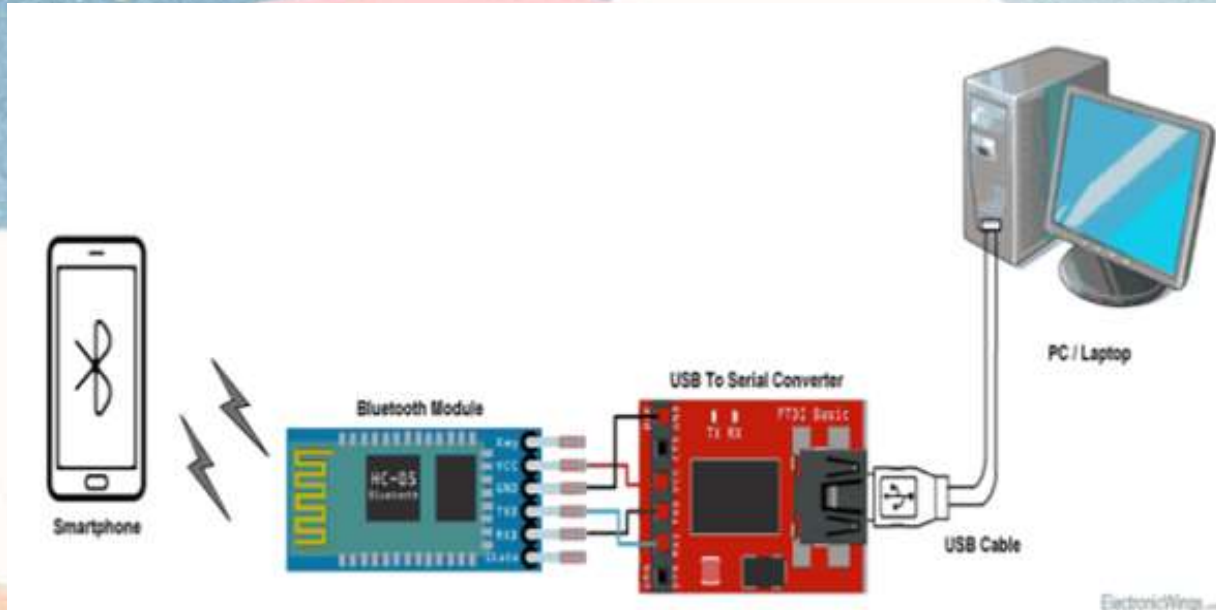
# ➔ ACCELEROMETER :

An accelerometer is a device that measures the vibration, or acceleration of motion of a structure. The force caused by vibration or a change in motion (acceleration) causes the mass to "squeeze" the piezoelectric material which produces an electrical charge that is proportional to the force exerted upon it. Since the charge is proportional to the force, and the mass is a constant, then the charge is also proportional to the acceleration. These sensors are used in a variety of ways from space stations to handheld devices, and there's a good chance you already own a device with an accelerometer in it. For example, almost all smartphones today house an accelerometer.

For our project,we have used MPU6050 Interfacing With Arduino UNO. MPU6050 sensor module is an integrated 6-axis Motion tracking device.It has a 3-axis Gyroscope, 3-axis Accelerometer, Digital Motion Processor and a Temperature sensor, all in a single IC.
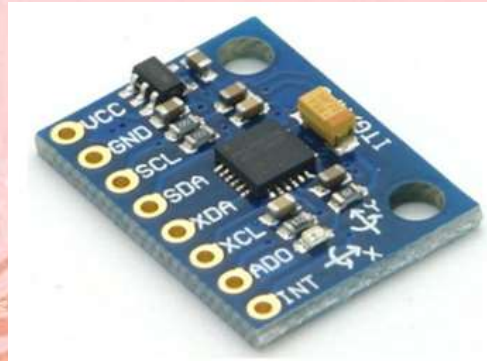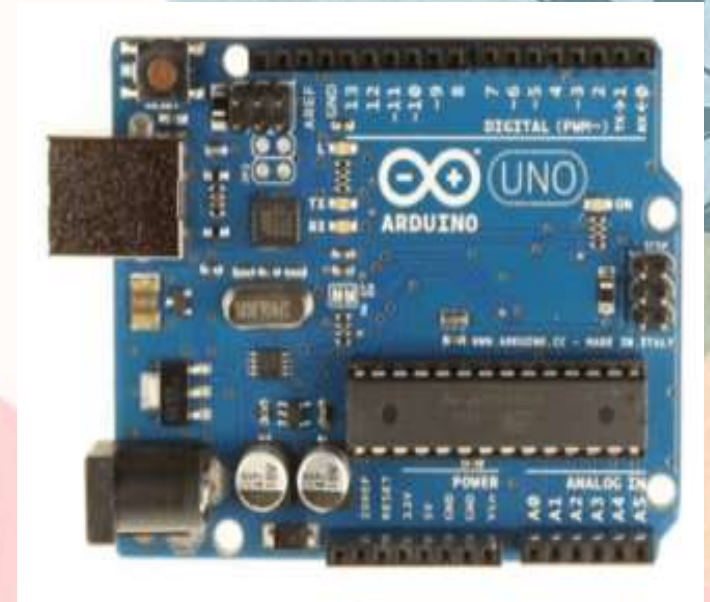
### ➔ POWER SUPPLY :

The nine-volt battery, or 9-volt battery, is a common size of battery that was introduced for the early transistor radios. It has a rectangular prism shape with rounded edges and a polarized snap connector at the top. This type is commonly used in walkie-talkies, clocks and smoke detectors. The nine-volt battery format is commonly available in primary carbon-zinc and alkaline chemistry, in primary lithium iron disulphide,and in rechargeable form in nickel-cadmium, nickel-metal hydride and lithium-ion. Mercury-oxide batteries of this format, once common, have not been manufactured in many years due to their mercury content. Designations for this format include NEDA 1604 and IEC 6F22 (for zinc-carbon) or MN1604 6LR61 (for alkaline). The size,regardless of chemistry, is commonly designated PP3—a designation originally reserved solely for carbon-zinc, or in some countries, E or E-block.

# ➜ ARDUINO UNO :

The Arduino UNO is a standard board of Arduino. It is considered as the powerful board used in various projects.Arduino UNO is based on an ATmega328P microcontrollerIt is easy to use compared to other boards.The board consists of digital and analog Input/Output pins (I/O), shields, and other circuits.The Arduino UNO includes 6 analog pin inputs, 14 digital pins, a USB connector, a power jack, and an ICSP (In-Circuit Serial Programming) header. It is programmed based on IDE, which stands for Integrated Development Environment. It can run on both online and offline platforms.The IDE is common to all available boards of Arduino.



The Arduino Uno board can be powered via a USB connection or with an external power supply.External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the GND and Vin pin headers of the POWER connector. The board can operate on an external supply from 6 to 20 volts.

**➔ ARDUINO IDE :**

The Arduino Integrated Development Environment - or Arduino Software (IDE) contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them.Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension .ino.When wiring is done,now we have to do some settings in the IDE.

• Go to Tools
 • Board & select Arduino UNO.
• Select the right PORT
 • And Upload any code.
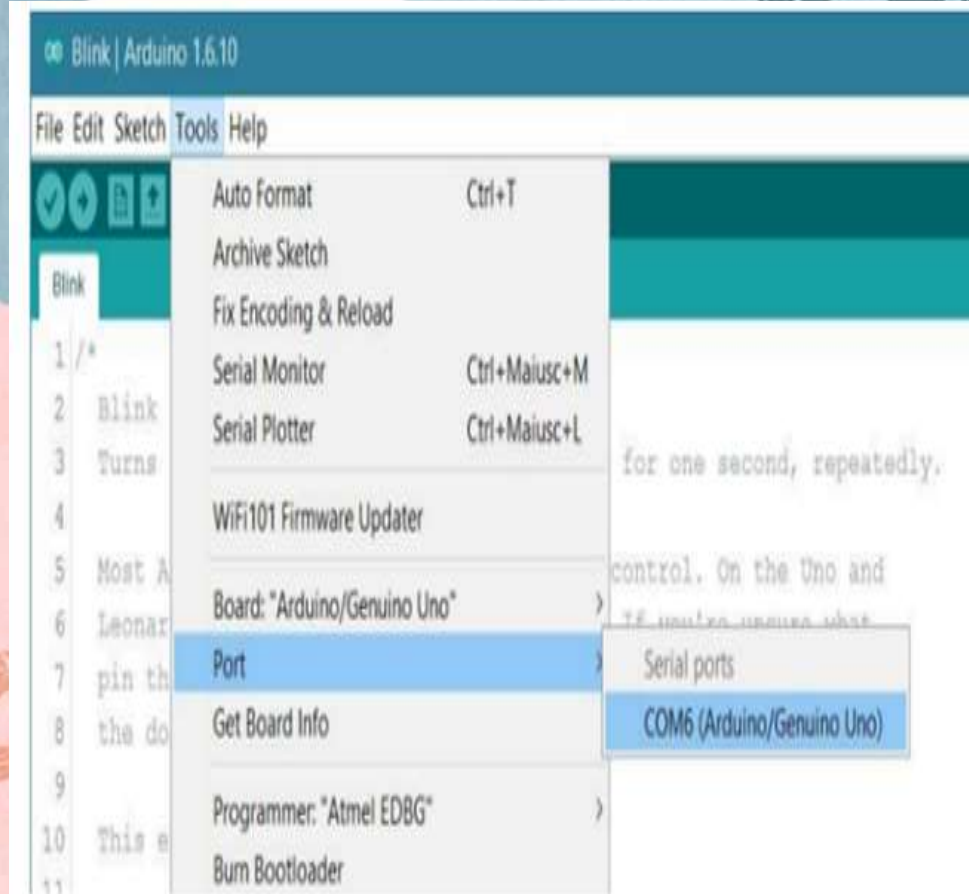
➔ **ANDROID APPLICATION :**

Text-to-speech (TTS) is a type of assistive technology that reads digital text aloud. It's sometimes called "read aloud" technology.With a click of a button or the touch of a finger, TTS can take words on a computer or other digital device and convert them into audio.The voice in TTS is computer-generated, and reading speed can usually be sped up or slowed down.

Voice quality varies, but some voices sound human.Arduino Bluetooth CH-05, CH-06 can communicate with the app by sending text (new line at the end of each transmission). It will convert the text received to speech.When the bluetooth module which is mounted on the Arduino is connected with the app,the code runs and the respective position of flex sensor generates the corresponding message which is displayed visually and also read aloud.
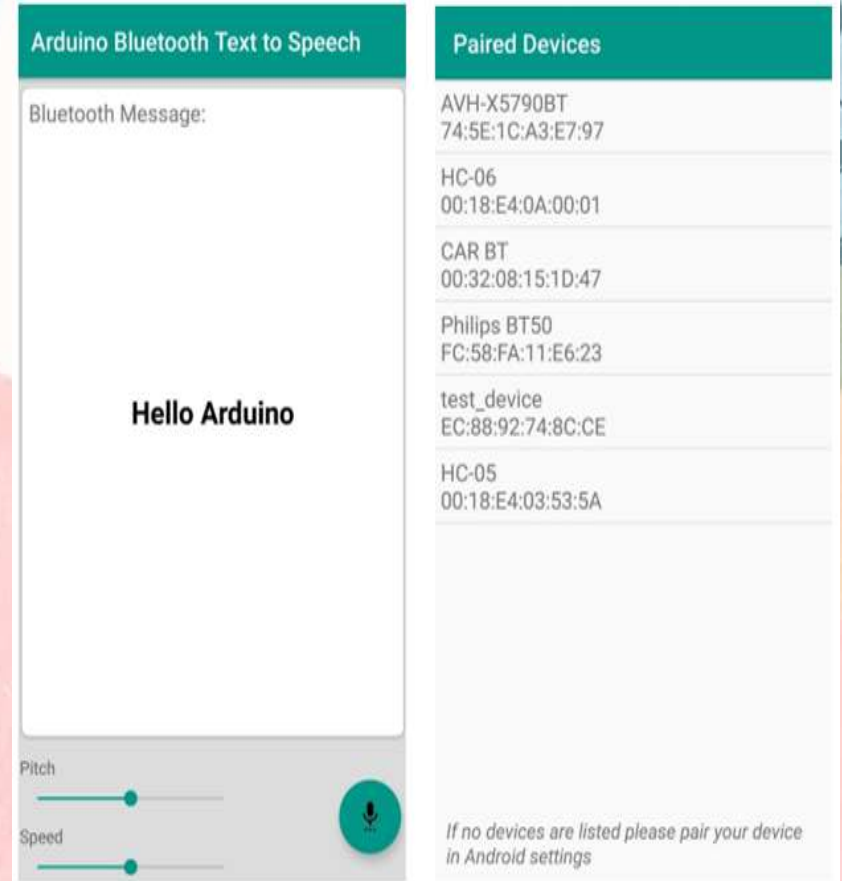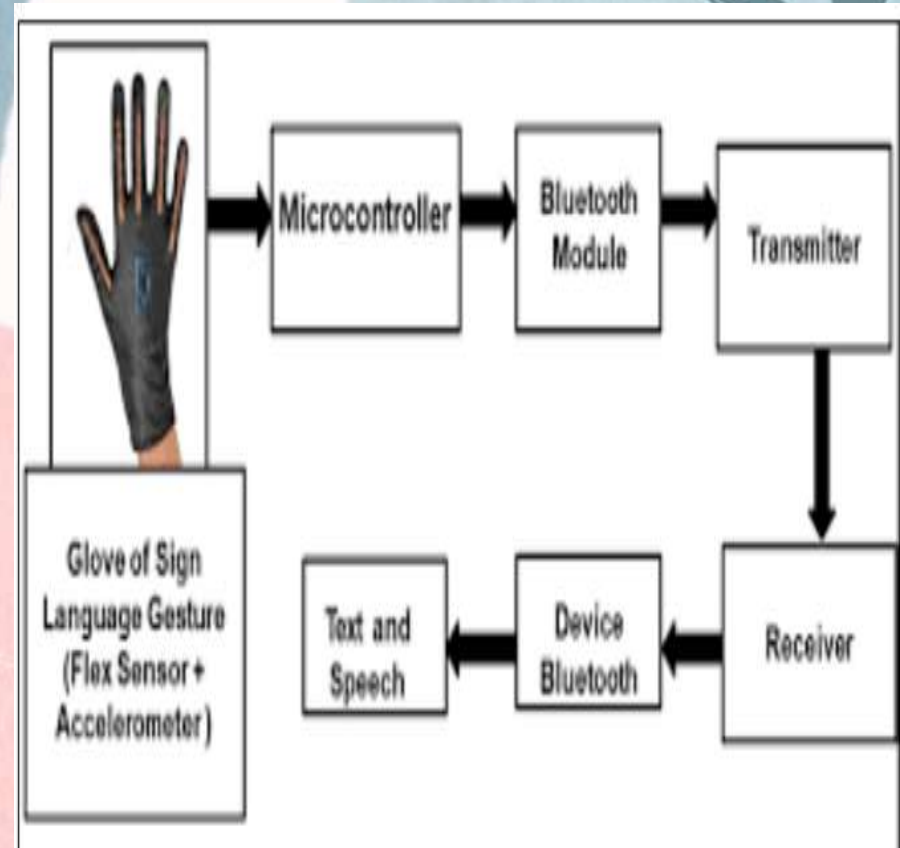
**SYSTEM IMPLEMENTATION :**

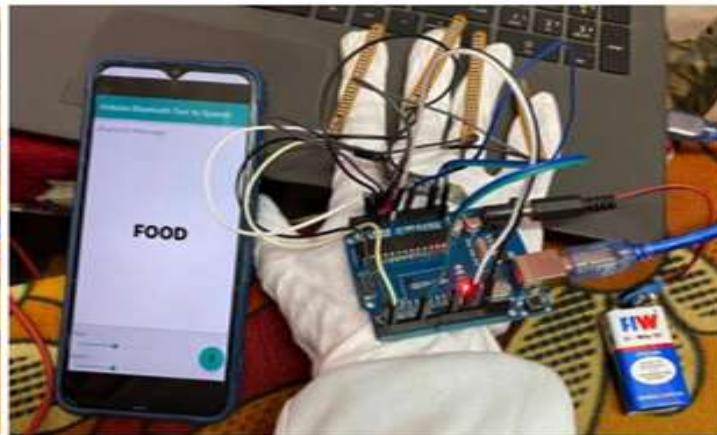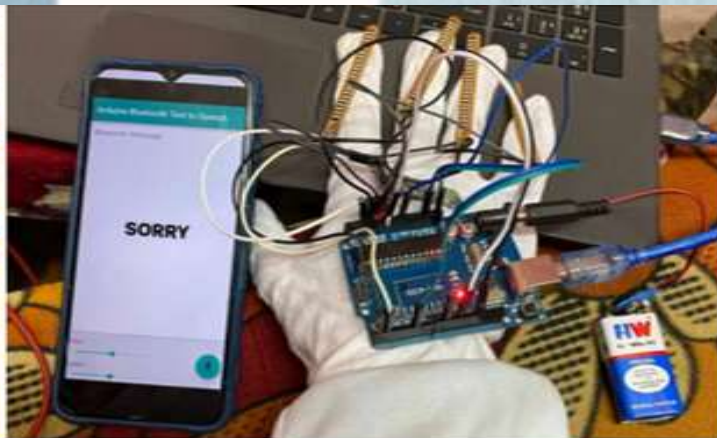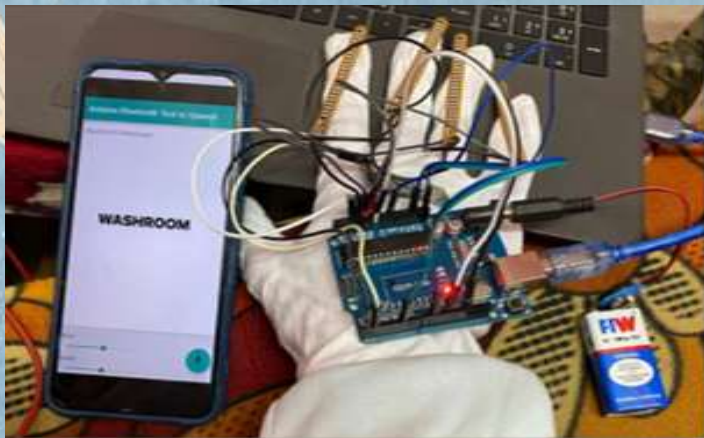**STEP 1:** Hand signs are used as a input source

**STEP 2:** The sign inputs are taken with the help of flex sensors and these flex sensor

**STEP 3:** Takes flex sensor input from the internal analogue-to-digital controller (ADC) and checks whether it exceeds certain threshold limit when the sensor is bent

**STEP 4:** These values are then fed to microcontroller and it converts sign into text sends out to the android mobile phone through Bluetooth

# THANKYOU