GESTURE CONTROLLED ROBOT HAND USING GYROSCOPIC SENSOR

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Abstract - *Gesture controlled robot hand is a wireless robot hand that works based on the gesture given by the operator to pick and place an object from one place to another by using the gesture of our hand. The gesture of the hand is read by using gyroscopic sensor. With the help of Bluetooth module, Arduino UNO and servomotor the hand is being operated to pick and place the object.*

Key Words: **Gesture, Gyroscopic Sensor, Bluetooth module, Arduino UNO.**

1. INTRODUCTION

Robotics makes work easier for men to do the job easily and also helps in developing the world. Gesture controlled robot hand uses hand gesture recognition to develop human and computer interaction so that the person need not required to depend on the traditional method to work at every field and need not want to depend on others to do the job. The five finger hand combined with its wrist and forearm has fourteen degree of freedom to do the job. With the help of the robotic hand it not only makes the job easier but also helps to produce objects with greater accuracy. It also helps in carrying the object comfortably like using our own hands.

2. METHODOLOGY

Nowadays many projects using automations use Arduino board since it's an open source platform. Here we use Arduino board for receiving the signals from sensor and sends it to the servomotor and controls it as per the gesture given by the sensor. Here the Arduino board is given with a set of commands on how the motor needs to be controlled for the given gesture. If the gesture shown to the sensor matches the command it controls the motor according to the command given to the respective gesture. This will be helpful for workers using a joystick for lifting and moving things instead they can use their gesture to control the movement easily.

3. BLOCK DIAGRAM

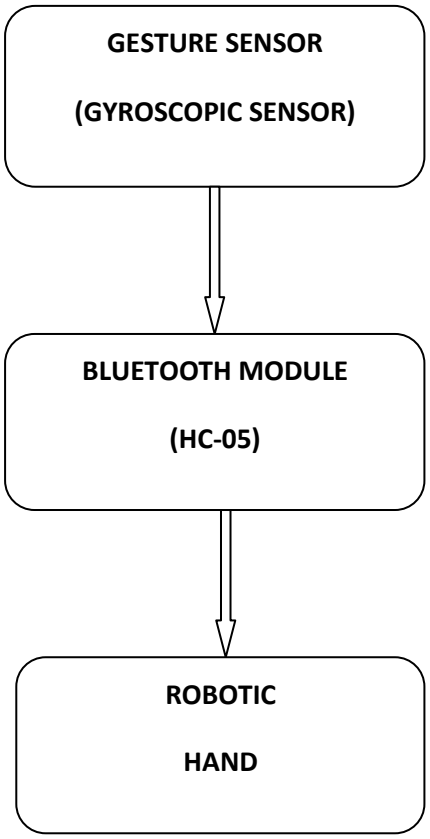

Fig-1 Block diagram

The block diagram shows as follows,

- The command is being sent by the user to the hand through the sensor.
- The command is received by the Bluetooth module (HC-05) which is connected to the Arduino module.
- The Arduino module acts according to the command received and controls the robotic hand.

4. WORKING

In this project we have used gyroscopic sensor to sense the movement of the hand. It can be attached to the hand or we can use the Smartphone having inbuilt gyroscopic sensor. On the other hand the robotic hand consists of five fingers each of them connected to the individual servomotor. Five fingers

are controlled by using five servomotors. The gesture like closing of the fingers and the opening of fingers is sent to the ATMega16 microcontroller and the resultant data will be sent to one of the port via serial communication. The microcontroller will generate appropriate PWM signal to control the servomotor.

The readings of each gesture are measured in form of voltage, while the movement of each gesture will be given respect to angle. Thus to relate voltage with respect to angle we plot graph of each gesture and then we get a linear graph.

5. VARIOUS HAND GESTURE

Various hand gestures to make the robot hand to perform various functions are as follows,

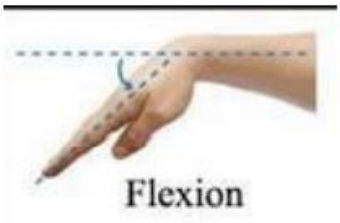

Fig-2 Close gesture

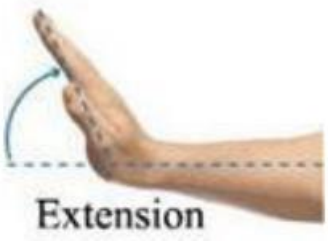

Fig-3 Open gesture

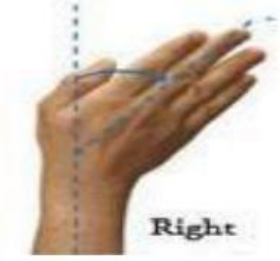

Fig-4 Rotate right gesture

Fig-5 Rotate left gesture

There are total of five conditions for this gesture controlled robot hand.

MOVEMENT OF HAND	INPUT TO ARDUINO FROM GESTURE				
Side	**D3**	**D2**	**D1**	**D0**	**Direction**
Stable	0	0	0	0	Stop
Tilt right	0	0	0	1	Rotate right
Tilt left	0	0	1	0	Rotate left
Tilt back	1	0	0	0	Open
Tilt front	0	1	0	0	Close

APPLICATION

- Through the use of gesture recognition, remote control of various hands with a wave of a hand is possible.
- Gesture controlling is very helpful for handicapped and physically disabled people to achieve certain task like driving a vehicle and lifting a product etc.
- With the help of this project a person can lift a chemical compound or a hot material comfortably like lifting it with bare hands.
- Gesture can be used in gaming to make the game players more interactive.

Adv. OF GESTURE RECOGNITION

- Easy to access.
- Easy to develop.
- Touch less.
- Easy to maintain.

Disadv. OF GESTURE RECOGNITION

- Costly solution.
- Need high resolution camera.

- Highly sensitive to noise in image processing (lens aberration).

6. CONCLUSION

The objective of this project was developing the hardware and software of robotic hand. Our project presents a wireless animatronics hand which is implemented by using latest wireless technology. It can be used on hazardous area for human hands and for physically challenged person to achieve their own needs.

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