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Gesture Controlled Wearable Glove for Partially Paralyzed and Disabled People

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ABSTRACT:

In recent years, there has been a surge in the development of assistive technologies aimed at enhancing the quality of life for individuals with physical disabilities. One such innovation is the Gesture-Controlled Wearable Glove, designed specifically to empower those with partial paralysis or disabilities affecting their upper limbs. This abstract elucidates the design, functionality, and potential impact of such a device. The Gesture-Controlled Wearable Glove operates on the principle of capturing hand movements through embedded sensors and translating them into actionable commands. The glove is equipped with a combination of sensors, including accelerometers, gyroscopes, and flex sensors, strategically placed to detect various hand gestures and movements accurately. Upon detecting a gesture, the glove wirelessly communicates with a compatible interface, such as a smartphone or computer, to interpret the gesture and execute predefined actions. This interface can be customized to suit the user's specific needs, ranging from controlling electronic devices to navigating virtual environments and accessing communication tools. Key features of the Gesture-Controlled Wearable Glove include its lightweight and ergonomic design, ensuring comfort and ease of use for prolonged wear. Furthermore, the glove is equipped with rechargeable batteries, offering extended usage without the hassle of frequent recharging. The potential impact of this technology is profound, as it provides individuals with partial paralysis or disabilities affecting their hands with newfound independence and autonomy. By enabling intuitive control over a myriad of devices and applications, the Gesture-Controlled Wearable Glove promotes inclusivity and facilitates seamless integration into daily activities, ranging from communication and entertainment to education and employment.In conclusion, the Gesture-Controlled Wearable Glove represents a significant advancement in assistive technology, offering a versatile and user-friendly solution for individuals with upper limb impairments. As technology continues to evolve, such innovations hold promise in fostering greater accessibility and empowerment for people of all abilities

1.INTRODUCTION

Various existing health monitoring systems are present which makes it easy for the doctors to monitor the patient vitals, but there aren't many systems that are used for the communication of the paralyzed patients, the proposed system helps to overcome these difficulties. Though there are a few approaches that assists the paralyzed patients to get used to their life with paralysis, but the problem is that these types of devices are quite large and are extremely expensive and also these are mostly available only at the hospital premises and aren't used at home or other places based on their convenience.A patient affected by paralysis loses their ability to communicate, so they cannot express their basic needs. The inability to communicate is due to damage caused in vocal cords and nervous system. The proposed system helps paralyzed patient to communicate and express their basic needs using simple hand gestures which does not require much of the muscle movement.Each finger represents messages which is displayed along with beep sound when a patient bends the finger or a combination of fingers. Our proposed system is to help the paralyzed patient to convey the basic requirements and emergency messages by just moving the finger to display the required message.

2.LITERATURE SURVEY:

"Shrote, S.B., Deshpande, M.," in 2014 they have used a non-vision-based approach with the help of flex sensors, pressure sensors. In this a real time image is captured by the preprocessor. After this, feature extraction is done by using Otsu's algorithm with the help of an SVM machine. The corresponding text from the sign language is converted. MATLAB is used to convert the text into voice.

"Kasar, M.S., AnvitaDeshmukh," in2016 a flex sensor is fitted to the gloves. The instructions are fed into the Arduino AT mega. Whenever the finger makes the gesture, the predefined instructions are displayed in LCD and also an audio output.

"Gowtham, B., Saravanan ", in 2019 five flex sensors are used. Along with the flex sensors, tactile sensors and the measurement of the orientation of the hand is done by the accelerometer. The sensor takes in analog inputs and the output is in the form of digital output. ARM processor is used for storing the predefined data. The sound is stored in SPI memory and by using the speaker the output is generated. The output is also given in LCD display.

Mun Eshwar, A., Ratnam", in 2020 The proposed system is focused for facially paralyzed persons. It uses only one flex sensor and predefined input is given and the output is displayed in LCD through NodeMCU ESP8266.

"Rohith, H.R., Gowtham", he projects focuses on converting the gestures made by the deaf- dumb people into meaningful text/speech. The project is carried out by a MEMS sensor and a microcontroller. The predefined hand gestures made by the disabled people are captured and stored in the database. Whenever a hand gesture is made, the MEMS sensor is accelerated and the signal is sent to the microcontroller. Data is matched by the microcontroller with the database and the output is given out in the form of audio by the speaker

3.COMPONENT DESCRIPTION

3.1 BLOCK DIAGRAM AND FLOW CHART

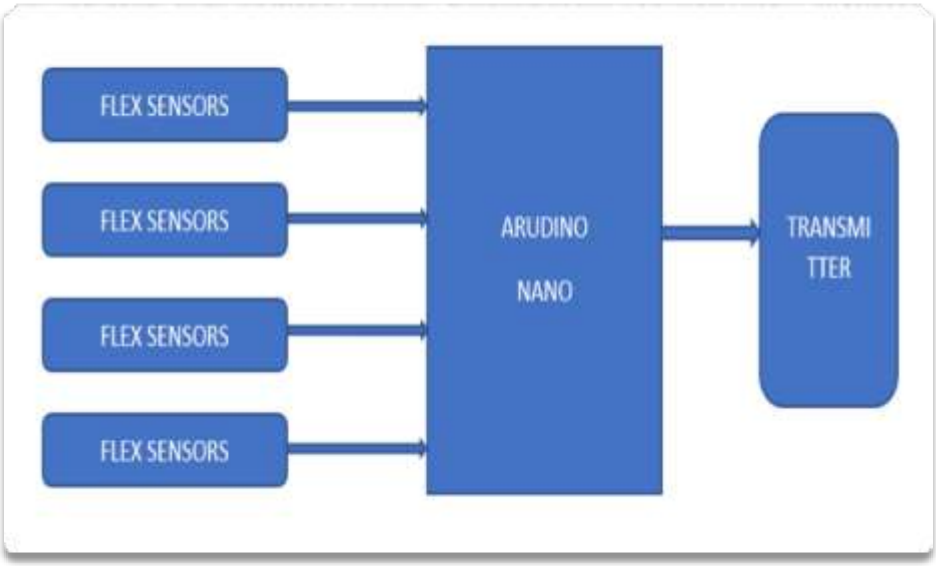


Fig 3.1: - Transmitter Part

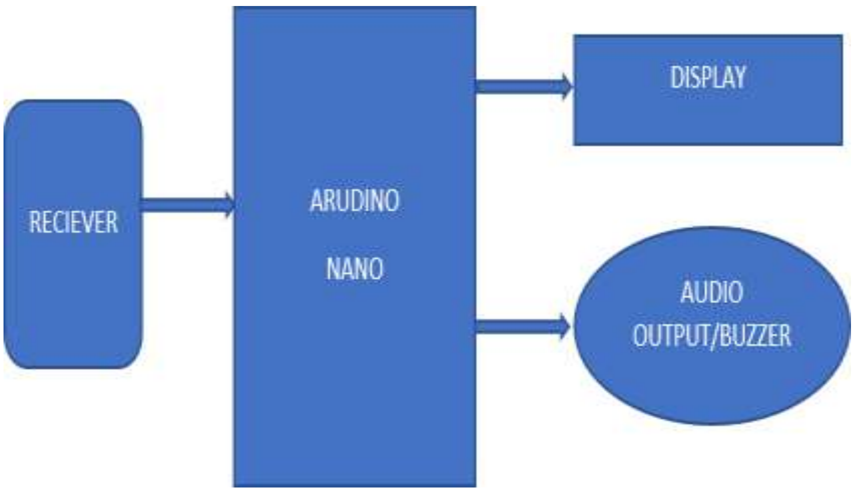
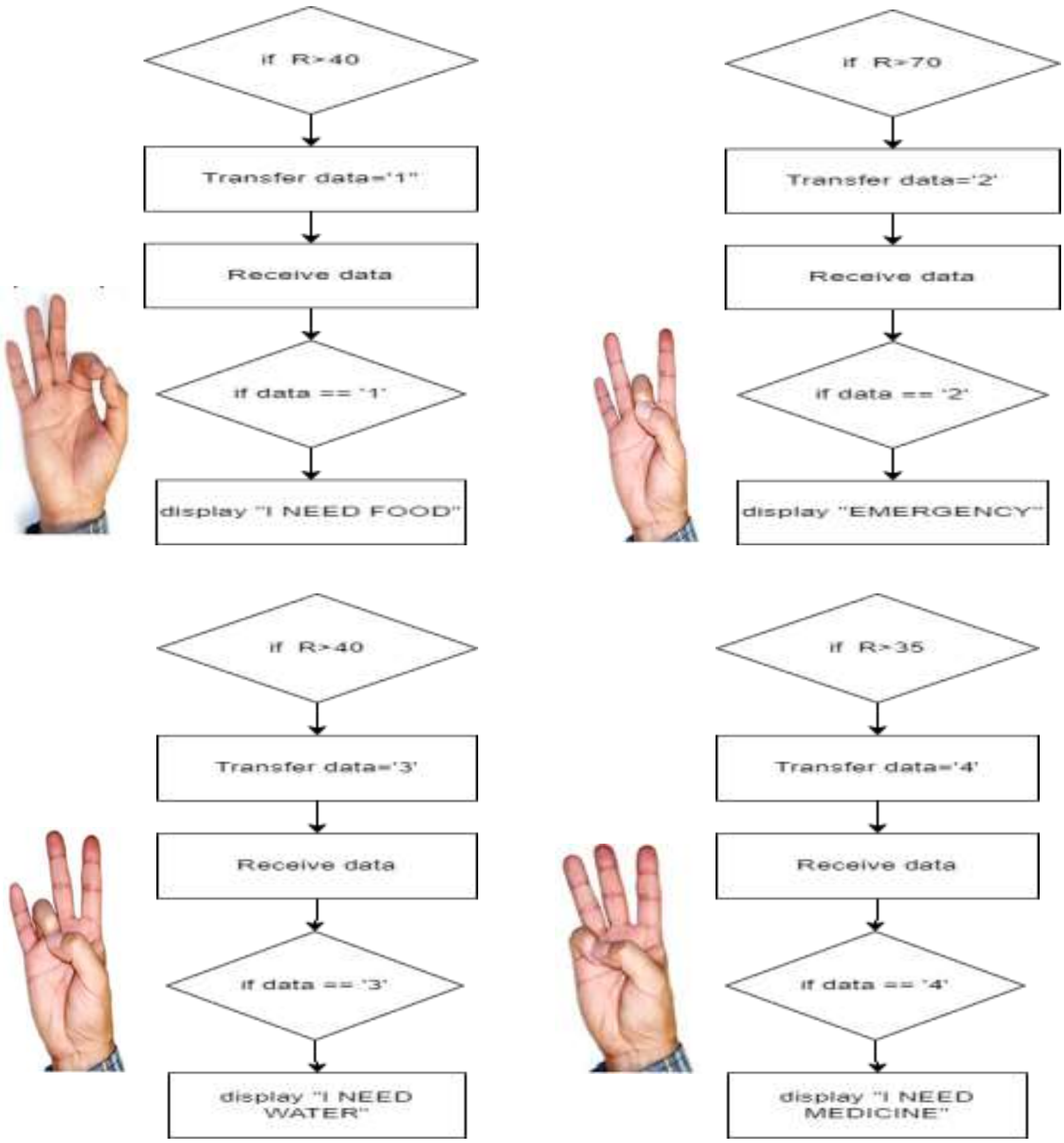


Fig 3.2: - Receiver Part

FLOW CHART:


if R>40
Transfer data='1"
Receive data
if data == '1'
display "I NEED FOOD"
if R>70
Transfer data='2'
Receive data
if data == '2'
display "EMERGENCY"
if R>40
Transfer data='3'
Receive data
if data == '3'
display "I NEED WATER"
if R>35
Transfer data='4'
Receive data
if data == '4'
display "I NEED MEDICINE"

CIRCUIT DIAGRAM:

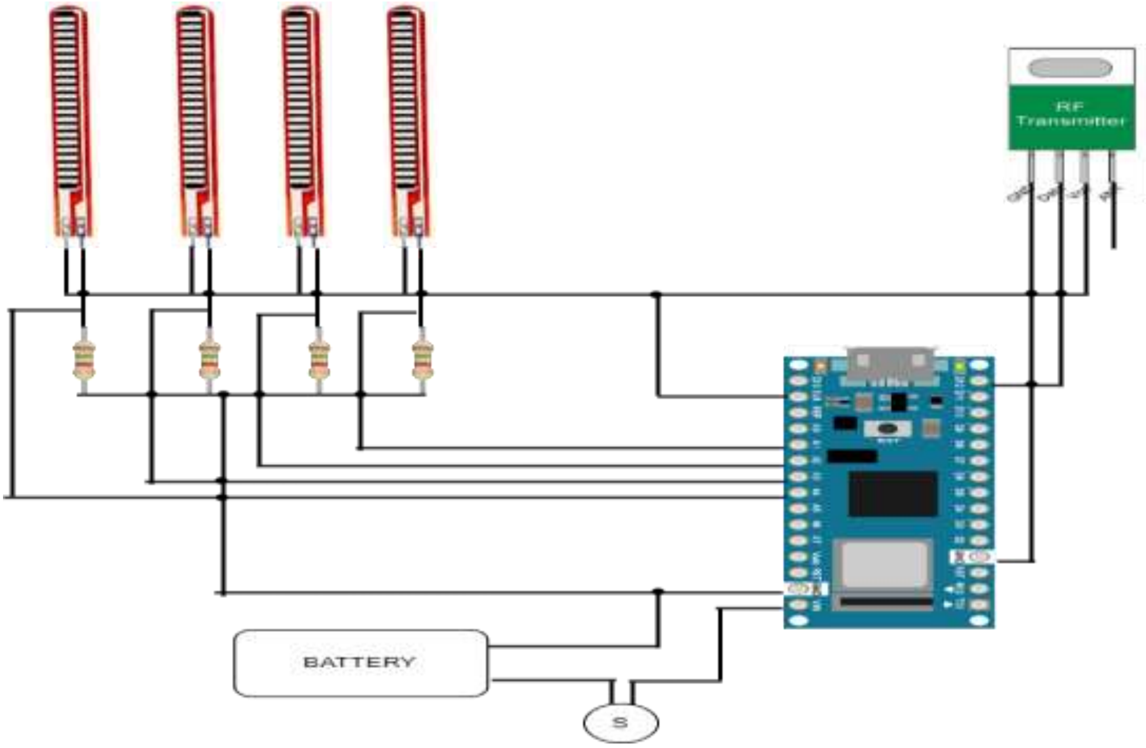


Fig 3.3: - Transmitter Schematic Diagram

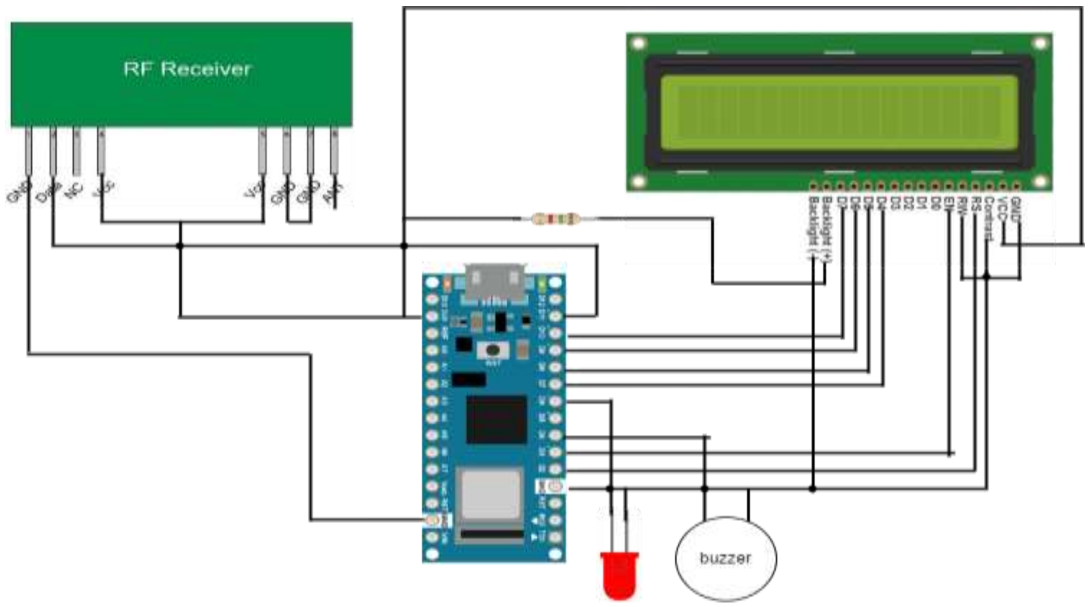


Fig 3.4: - Receiver Schematic Diagram

3.2 FLEX SENSOR:

A flex sensor or bend sensor is a sensor that measures the amount of deflection or bending. Usually, the sensor is stuck to the surface, and resistance of sensor element is varied by bending the surface. Since the resistance is directly proportional to the amount of bend it is used as goniometer, and often called flexible potentiometer.

Fig 3.5: - Flex Sensor

The pin configuration of the flex sensor is shown below. It is a two-terminal device, and the terminals are like p1 & p2. This sensor doesn't contain any polarized terminal such as diode otherwise capacitor, which means there is no positive & negative terminal. The required voltage of this sensor to activate the sensor ranges from 3.3V -5V DC which can be gained from any type of interfacing.

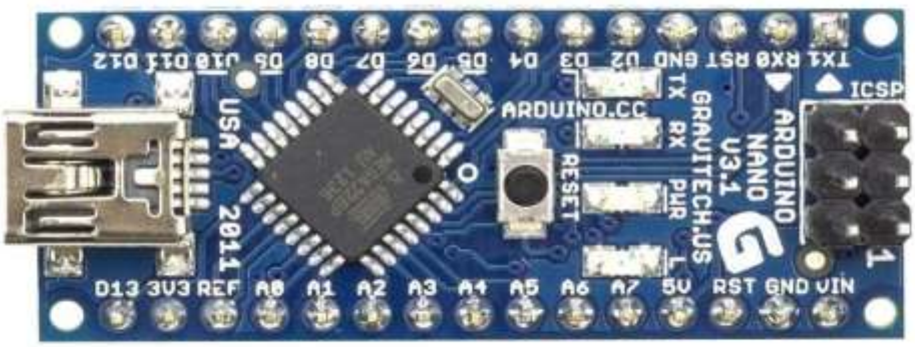
Pin P1: This pin is generally connected to the +ve terminal of the power source. Pin P2: This pin is generally connected to GND pin of the power source.

This sensor is used wherever you need to test the exterior of a device otherwise thing is planned or not. A flex-sensor could be used to check a door or window is opened or not. This sensor can be arranged at the edge of the door and once the door opens then this sensor also gets flexed. When the sensor bends than its parameters automatically change which can be designed to give an alert.

This sensor is used wherever you need to measure the Bent, Flex, otherwise, change of an angle for any device otherwise any instrument. The internal resistance of this sensor alters approximately linear with the angle of its flex. Thus, by connecting the sensor to the device, we can have the flex angle within resistances of electrical param

3.3 ARDUINO NANO:

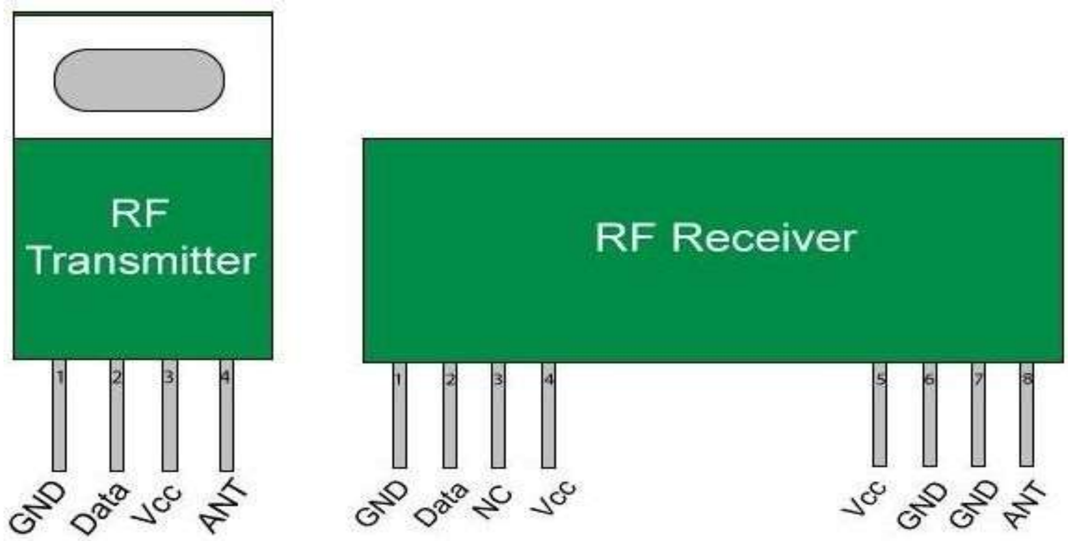
Arduino is common term for a software company, project and user community that designs and manufactures computer open source hard ware, open-source software, and microcontroller- based kits for building digital devices and interactive objects that can sense and control physical devices



3.4RF TRANSMITTER AND RECEIVER:

An RF module (short for radio-frequency module) is a (usually) small electronic device used to transmit and/or receive radio signals between two devices. In an embedded system it is often desirable to communicate with another device wirelessly. This wireless communication may be accomplished through optical communication or through radio-frequency (RF) communication. For many applications, the medium of choice is RF since it does not require line of sight. RF communications incorporate a transmitter and a receiver. They are of various types and ranges. Some can transmit up to 500 feet. RF modules are typically fabricated using RF CMOS technology.

3.5PIN DISCRIPTION:

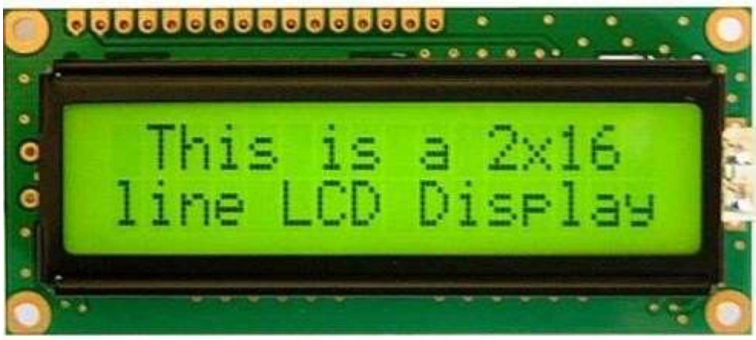


This RF module is a combination of RF Transmitter and RF Receiver. The transmitter/receiver (Tx/Rx) pair operates at a frequency of 433 MHz**.**

The RF transmitter receives serial data and transmits it wirelessly through its RF antenna. The transmission occurs at the rate of 1 Kbps – 10 Kbps. RF receiver receives the transmitted data and it is operating at the same frequency as that of the transmitter.

3.6 LCD MODULE 2X16:

Fig 3.10: - LCD Display



A liquid-crystal display (LCD) is a flat-panel display or other electronic visual display that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are used in a wide range of applications including computer monitors, televisions, instrument panels, aircraft cockpit displays, and signage. They are common in consumer devices such as DVD players, gaming devices, clocks, watches, calculators, and telephones, and have replaced cathode ray tube (CRT) displays in nearly all applications. They are available in a wider range of screen sizes than CRT and plasma displays, and since they do not use phosphors, they do not suffer image burn-in. LCDs are, however, susceptible to image persistence.

3.7 LED – LIGHT EMITTING DIODE

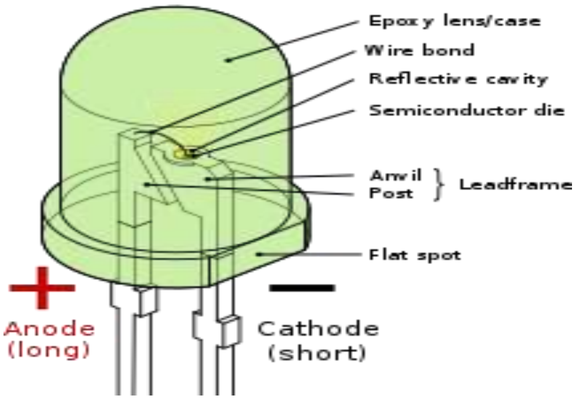
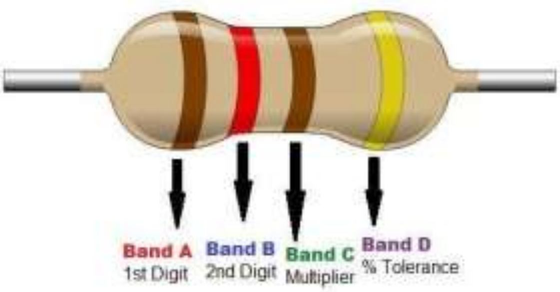


Fig 3.11: - LED

A light-emitting diode (LED) is a two-lead semiconductor light source. It is a p-n junction diode, which emits light when activated. When a suitable voltage is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons. This effect is called electroluminescence, and the colour of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor.

2.8 RESISTOR:



A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. Resistors act to reduce current flow, and, at the same time, act to lower voltage levels within circuits. In electronic circuits, resistors are used to limit current flow, to adjust signal levels, bias active elements, and terminate transmission lines among other uses

4. RESULT AND ANALYSIS

- Our proposed system conveyed the basic requirements and emergency messages of a paralyzed patient by just moving the finger to display the required message for the patient.
- Our proposed system bridges the gap between these patients with others through communication and helps the paralyzed to relieve their stress by revealing their thoughts and helps to keep them as motivated as possible.
- It is also cheap enough to afford without much debt.

GESTURE

OUTPUT

GESTURE

OUTPUT

5. CONCLUSION

Thus, the proposed model has the advantage of assisting the paralyzed patients as well as deaf and dumb by displaying the output commands in display with sound output in buzzer. By using wireless transmission, data transmission is fast and secured. In case of emergency, the RED LED light will blink to react the respective person immediately. Compared to the vision-based techniques, this data-based gloves will reduce noise disturbances and offer less complexity in algorithms. In future, we can enhance this proposed model with a maximum number of commands. Using AI, the data-based system can be further enhanced with speech recognition. For home automation, by using different gestures we can control various basic functions such as switching home appliances in an effective manner.

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