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Smart Gloves IoT Device

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ABSTRACT

The "Smart Glove IoT Project " is a comprehensive and assistive solution designed to empower things to be used more smartly, enabling people to perform various functions using a wearable smart glove. This project utilizes flex sensors embedded in the glove, with each finger associated with a unique function. The glove is equipped with an Internet of Things (IoT) module, allowing users to control devices or interfaces by flexing specific fingers. The associated functions are displayed on an LCD screen, providing a customizable and intuitive interface for users with limited mobility.

Keywords: Micro controller, Flex sensor, IoT module, LCD display, power source

1. INTRODUCTION

An IOT Based Smart Gloves is a technology that helps disabled people operate their wheelchairs without the help of a third party. In the proposed technique, the user can move their wheelchair in different directions like forward, backward, left, and right using hand gestures. A smart glove IoT project is all about creating a glove that's equipped with sensors and connected to the Internet. It's a fascinating fusion of wearable technology and the Internet of Things (IoT).

The Internet of Things (IoT) could be a popular technology that's defined as a group or cluster of physical objects that are embedded with various styles of sensors, software, capability, and processing, further as other technologies that are used for the information exchange over the net and in various areas of communication networks.

Existing System:

Current assistive technologies for individuals may have limitations in providing personalized and versatile control options. Traditional methods often involve interfaces that may not be easily adaptable to individual needs, limiting the user's ability to control devices or perform specific functions independently.

Proposed System:

The proposed Smart Glove integrates flex sensors on each finger, converting finger movements into control signals. An IoT module enables wireless communication to convey these signals to external devices or interfaces. Each finger is programmed with a unique function, offering a range of customizable actions. The associated functions are displayed on an LCD screen in real-time, providing visual feedback to the user. This project aims to enhance the independence and quality of life for individuals.

Key Features:

1. Flex Sensors:

- A flex sensor is a sensor that measures the amount of bending or deflection of a surface.
- Flex sensors are often used as goniometers, flexible potentiometers, or human machine interface devices.
- Embedded on each finger to detect and measure finger movements.

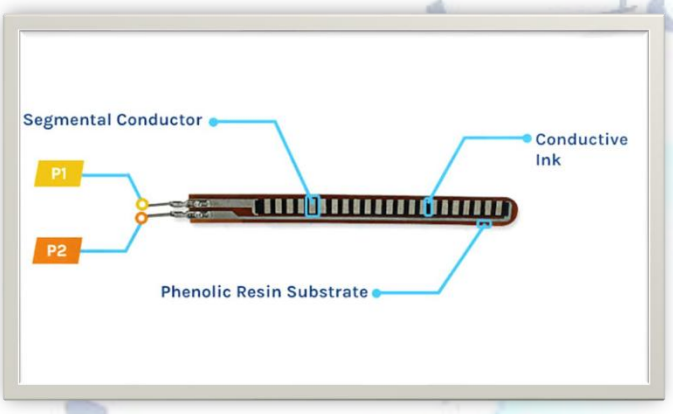


Fig. **Flex sensor**

2. IoT Connectivity:

- IoT connectivity is the term used to describe how IoT devices, such as sensors, trackers, gateways, and routers, connect to the internet and communicate with each other.
- IoT connectivity enables the devices to send and receive data, which can be used for various purposes, such as monitoring, automation, optimization, and decision making.
- Wireless communication module for transmitting control signals to external devices.

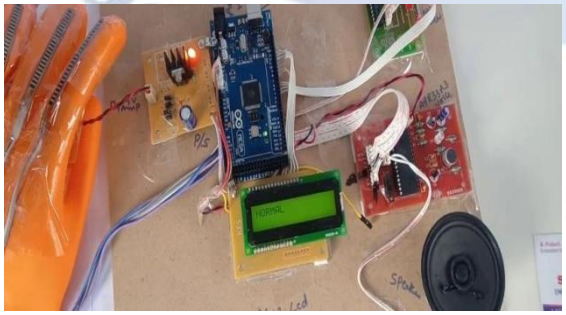


Fig. **IoT connectivity**

3. Individual Finger Functions:

- Individual finger functions are the specific roles and abilities of each finger in performing various tasks.
- Different fingers have different levels of strength, dexterity, sensitivity, and coordination, which affect their functions.
- Each finger is assigned a unique function or command, offering versatility in control.

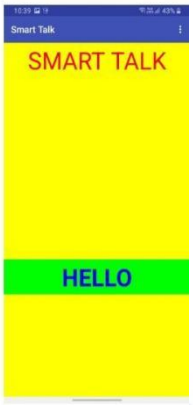


Fig. **Finger functions**

LCD Display:

An LCD is a device that uses liquid crystals to modulate light.

The basic principle of an LCD is that the electric voltage changes the alignment of the liquid crystals, which affects how much light can pass through them.

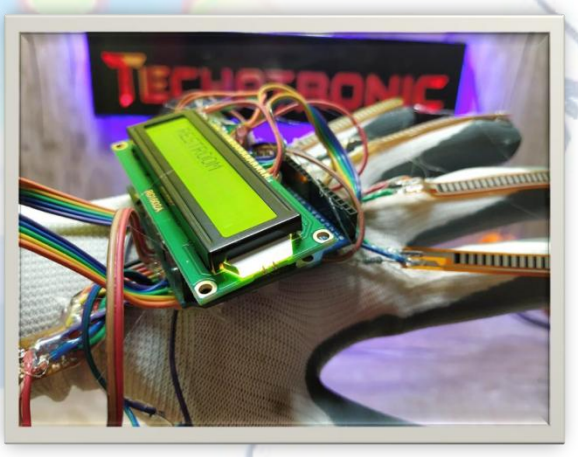


Fig. **LCD Display**

It is commonly used to display alphanumeric information on various electronic devices. •Shows real-time feedback on the assigned functions for each finger.

Customizable Programming:

Allows users or caregivers to program and customize the functions associated with each finger.

- Customizable programming is a term that refers to the ability to create or modify software applications according to one's preferences and needs

Fig. **Customizable programming**

- Customizable programming can also involve using platforms or services that enable users to design, develop, or deploy custom apps without coding or minimal coding.

5. Real-time Interaction:

- Provides immediate feedback on the LCD screen as users flex their fingers.
- Real-time interaction for IoT is the term used to describe how IoT devices and applications can communicate and exchange data with each other and with users in real-time.

Real-time interaction enables faster and more efficient data processing, decision making, and feedback.

- Real-time interaction can also enhance the user experience, personalization, and responsiveness of IoT applications.

6. Wearable Design:

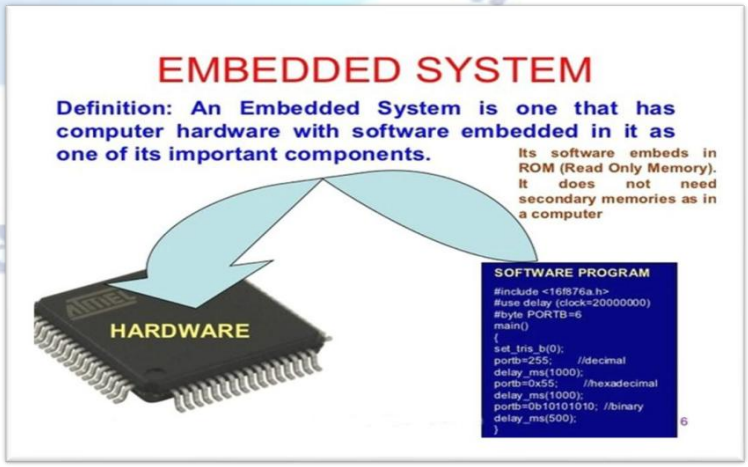
- The glove is designed to be comfortable and wearable for extended periods.
- A wearable design for a smart glove is a design that incorporates sensors, electronics, and wireless communication into a glove that can perform various functions.
- It can perform various functions such as gesture recognition, motion tracking, health monitoring, or human-machine interaction.

Fig. **Wearable design**

Software Tools:

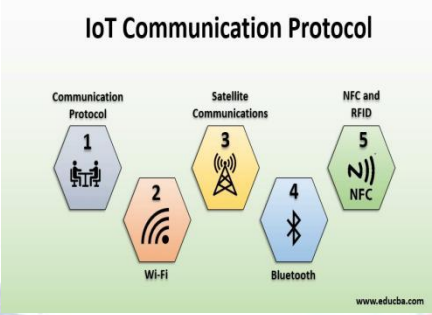
1. Embedded Systems Programming (e.g., C/C++):

- Develop the code for the microcontroller to interpret flex sensor data and control the IoT module.
- Embedded systems programming involves designing software for systems that have limited resources, including memory, processing power, and energy. Therefore, developers must optimize software for these systems to ensure that they are efficient and reliable.



2. IoT Communication Protocol (e.g., MQTT, HTTP):

- Establishes communication between the smart glove and external devices.
- Communications protocols used in IoT deployments include Lightweight M2M (Machine-to-Machine) which is a device management protocol designed for sensor networks and the device volumes associated with M2M environments.
- IoT protocols and standards are broadly classified into two separate categories. These are: IoT data protocols (Presentation / Application layers) Network protocols for IoT (Datalink / Physical layers)



Hardware Tools:

1. **Microcontroller (e.g., Arduino or ESP8266/ESP32):**
- Processes flex sensor data and controls the IoT module.
2. **Flex Sensors:**
- Converts finger movements into electrical signals.
3. **IoT Module (e.g., Wi-Fi or Bluetooth):**
- Enables wireless communication between the glove and external devices.
4. **LCD Display:**
- Shows real-time feedback and assigned functions.
5. **Power Source:**
- Battery or rechargeable power source for continuous operation.

CONCLUSION

The IOT-based being a finger gestured controller would prove to be a boon to the old aged people as it needs no human intervention nor any remote to control it and makes it easy for the old aged people to get their basic requirements. They do not have to move anywhere or call out for help. Instead, they can sit in one place and control the bit with their hands which would approach them according to the instructions of the finger gestures and would serve the elderly people with food water medicines, etc. As they cannot communicate or speak properly because of their old age, this smart glove would make life better for them. Even the illiterate the deaf and dumb people can use them. On the other hand, smart gloves are also being used for women's safety which would also act as a rescue system for women and bring them out of danger. This smart glove, making use of IOT technology would be a very autonomous one that helps the aged people to meet their basic requirements and also for girls in times of emergencies or dangerous situations. This project would be one of the greatest contributions in the world with the best service.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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