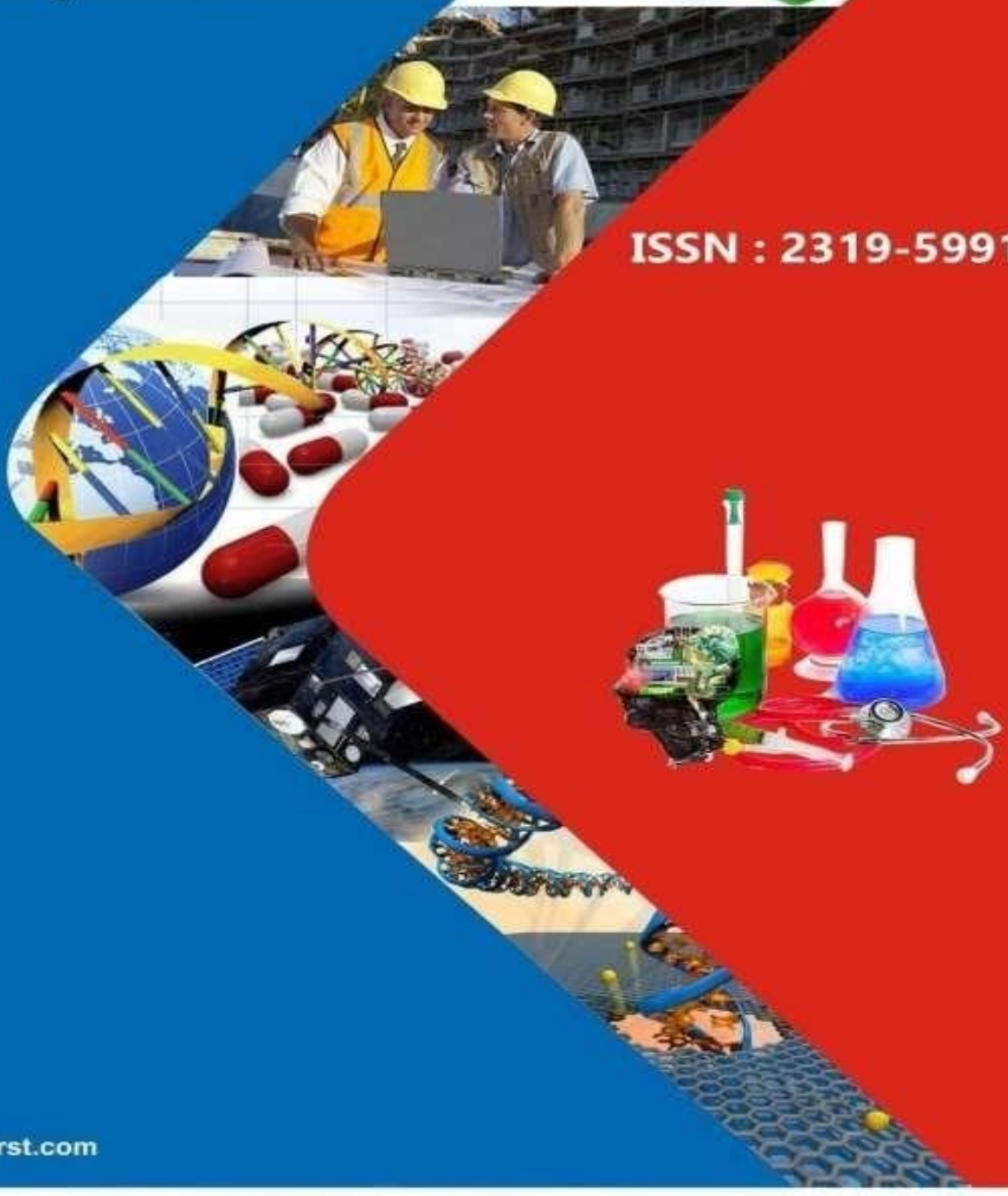
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IMPLEMENTATION OF IOT BASED SMART ASSISTANCE GLOVES FOR DISABLED PEOPLE

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ABSTRACT

The transformative potential of the Internet of Things (IOT) extends to the lives of approximately one billion individuals worldwide living with disabilities, representing around 15% of the global population. This article highlights the importance of addressing challenges related to disability inclusivity and support, recognizing their significant impact on individuals and the global community.

Despite inadequate support services, the IOT emerges as a beacon of hope, offering innovative solutions to empower people with disabilities. By integrating smart devices and technologies, the IOT can disrupt the cycle of dependence on families, thereby fostering economic activity and social inclusion. Introducing a proposed IOT framework elucidates its pivotal role in enhancing the quality of life for individuals with disabilities and facilitating their active engagement in societal and economic spheres.

The article explores diverse application scenarios to underscore how the IOT can meet the unique needs of this demographic. Furthermore, it addresses critical challenges that must be acknowledged and overcome to implement IOT-based solutions in this context successfully. This study offers a comprehensive overview of IOT solutions tailored to mitigate the challenges encountered by individuals grappling with visual impairments.

Communication between normal people and people with vocal and hearing troubles is a difficult task. The sign language used by these people is not understandable by the common people, so it creates a communication barrier. People who are paralyzed also require assistance regularly. For such people we have proposed Implementation of IOT based Smart assistance gloves for disabled people.

The gloves we designed is very simple yet effective when compared to the existing system. With the help of mobile app and push buttons, the finger gesture is detected and the corresponding instructions are displayed in the android app with audio output. The proposed system is implemented by Arduino UNO and NODE MCU, where the communication between these two modules is done by wireless

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serial port module due to its secured data transmission. An alert message will be sent through the notification during emergency situation.

Keywords: NODE MCU, IOT, mobile app, switches, server, hand gloves, Buzzer, etc.

I. INTRODUCTION

1.1 INTRODUCTION

Microcontroller are widely used in Embedded Systems products. An Embedded product uses the microprocessor (or microcontroller) to do one task & one task only. A printer is an example of Embedded system since the processor inside it perform one task only namely getting the data and printing it. Although microcontroller is preferred choice for many Embedded systems, there are times that a microcontroller is inadequate for the task. For this reason, in recent years many manufactures of general-purpose microprocessors such as INTEL, Motorola, AMD & Cyrix have targeted their microprocessors for the high end of Embedded market. One of the most critical needs of the embedded system is to decrease power consumptions and space. This can be achieved by integrating more functions into the CPU chips. All the embedded processors have low power consumptions in additions to some forms of I/O, ROM all on a single chip. In higher performance Embedded system, the trend is to integrate more & more function on the CPU chip & let the designer decide which feature he/she wants to use.

1.2 EMBEDDED SYSTEM

Physically, embedded systems range from portable devices such as digital watches and MP3 players to large stationary installations like traffic lights, factory controllers, or the systems controlling nuclear power plants. Complexity varies from low, with a single microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure

In general, "embedded system" is not an exactly defined term, as many systems have some element of programmability. For example, Handheld computers share some elements with embedded systems such as the operating systems and microprocessors which power them but are not truly embedded systems, because they allow different applications to be loaded and peripherals to be connected. Embedded systems span all aspects of modern life and there are many examples of their use. Telecommunications systems employ numerous embedded systems from telephone switches for the network to mobile phones at the end-user. Computer networking uses dedicated routers and network bridges to route data.

EXAMPLES OF EMBEDDED SYSTEM:

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Automated teller. machines (ATMS). Integrated system in aircraft and missile. Cellular telephones and telephonic switches. Computer network equipment, including routers timeservers and firewalls. Computer printers, Copiers. Disk drives (floppy disk drive and hard disk drive). Engine controllers and antilock brake controllers for automobiles. Home automation products like thermostat, air conditioners sprinkles and security monitoring system. House hold appliances including microwave ovens, washing machines, TV sets DVD layers/recorders. Medical equipment. Measurement equipment such as digital storage oscilloscopes, logic analysers and spectrum analysers. Multimedia appliances: internet radio receivers, TV set top boxes.Small hand-held computer with P1M5 and other applications. Programmable logic controllers (PLC's) for industrial automation and monitoring. Stationary video game controllers.

1.3 CHARACTERISTICS:

Embedded systems are designed to do some specific tasks, rather than be a general-purpose computer for multiple tasks. Some also have real-time performance constraints that must be met, for reasons such as safety and usability; others may have low or no performance requirements, allowing the system hardware to be simplified to reduce costs. Embedded systems are not always standalone devices. Many embedded systems consist of small, computerized parts within a larger device that serves a more general purpose. For example, the Gibson Robot Guitar features an embedded system for tuning the strings, but the overall purpose of the Robot Guitar is, of course, to play music. Similarly, an embedded system in an automobile provides a specific function as a subsystem of the car itself.

The software written for embedded systems is often called firmware, and is usually stored in read- only memory or Flash memory chips rather than a disk drive. It often runs with limited computer hardware resources: small or no keyboard, screen, and little memory.

1.4 MICROPROCESSOR (MP):

A microprocessor is a general-purpose digital computer central processing unit (CPU). Although popularly known as a "computer on a chip" is in no sense a complete digital computer. The block diagram of a microprocessor CPU is shown, which contains an arithmetic and logical unit (ALU), a program counter (PC), a stack pointer (SP), some working registers, a clock timing circuit, and interrupt circuits.

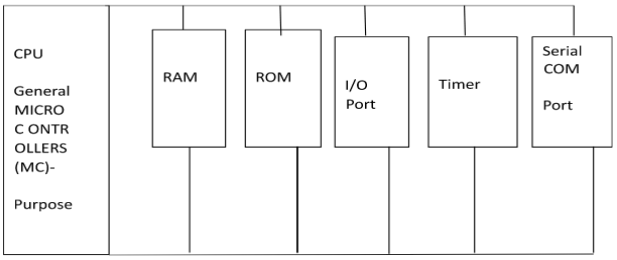


Fig 1.1 Block diagram of microprocessor

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1.5 MICROCONTROLLER (MC):

Figure shows the block diagram of a typical microcontroller. The design incorporates all of the features found in micro-processor CPU: ALU, PC, SP, and registers. It also added the other features needed to make a complete computer: ROM, RAM, parallel I/O, serial I/O, counters, and clock circuit.

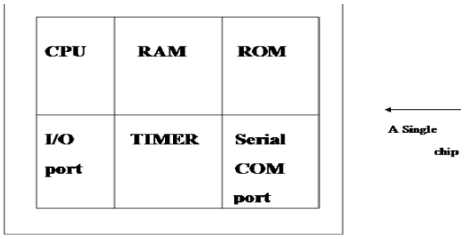


Fig 1.2 Microcontroller

1.6 COMPARISION BETWEEN MICROPROCESSOR AND MICROCONTROLLER

The microprocessor must have many additional parts to be operational as a computer whereas microcontroller requires no additional external digital parts. The prime use of microprocessor is to read data, perform extensive calculations on that data and store them in the mass storage device or display it. The prime functions of microcontroller is to read data, perform limited calculations on it, control its environment based on these data. Thus the microprocessor is said to be general-purpose digital computers whereas the microcontroller are intend to be special purpose digital controller. Microprocessor need many opcodes for moving data from the external memory to the CPU, microcontroller may require just one or two, also microprocessor may have one or two types of bit handling instructions whereas microcontrollers have many.

II. LITERATURE SURVEY

2.1 INTRODUCTION

In India the recent survey shows that there are millions of people who have speaking and hearing disabilities. The scale goes up to 2.4 million people. Disable people struggle to communicate with other in their day-to-day life and also, it's hard for them to express their emotions. People with disabilities generally use sign language to communicate with each other but this sign language is difficult for normal people to understand. Not only normal people, but people with disabilities find it hard to learn these sign languages. It is also difficult for them to socialize and they will not be able to voice out their opinions. This is the same case with paralyzed people. They will not be able to move or communicate. So, the gloves we have designed allow the person with disabilities to communicate what he/she wants without anyone’s help. Though there are many existing approaches to this project. We have designed this disabled assistance glove for faster and smarter response. There are two types of gesture recognition, namely data glove based and vision based. Vision based recognition is not accurate as it has noise

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disturbance and is difficult to process data. Data glove based is said to have faster response than vision based. We have proposed a data glove-based approach because the result obtained is accurate, feasible, and also portable. Based on the movement which is done by the fingers, the flex sensors detect the bend made by the finger and the output is varied in terms of resistance. Due to its flexibility and large range of resistance, many commands can be fed into it. We have used Node MCU for more storage and faster response. The raspberry pi 3b includes inbuilt Wi-Fi module, Bluetooth and USB boot which is used to connect with the android app. The Node MCU and the raspberry pi are transfer signals between them with the help of a wireless serial port module.

2.2 LITERATURE SURVEY

The model consists of the Transmitter and Receiver section. The transmitter section consists of flex sensors, PIC12F683 microcontroller and a RF transmitter, whereas the receiver section consists of PIC18F45K20 microcontroller, AC driver, LCD display, voice module and RF receiver. The flex sensor gestures are converted to commands and displayed in LCD. Voice recorder and Playback unit is used to pre-record the voice to fetch the output in the speaker. This model uses microcontroller The ADC channels of the microcontroller are used for digital conversion. The flex sensors are used to detect the finger gesture and the output is in form of audio through speaker and through LCD. A mode is specified for different. The overall project is done using the LabVIEW software and data acquisition device (DAQ Card). Flex sensors are employed to detect the finger movements and the gestures made by the hand using signal processing kit. In this project the alphabet in the sign language made by the disabled person is captured and it is concatenated into the corresponding word. The overall process is implemented and customized on the LabVIEW platform. 2021 7th International Conference on Advanced Computing & Communication Systems (ICACCS) 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[4]. conducting line sensors (CSL) are used to detect the gesture. This line sensor is connected to Arduino uno and the data is fed into the microcontroller in digital form. The output of the line sensor varies on various positions. So, the corresponding command is displayed in LCD as text. 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 is given through the spoke jet with signal amplification [6]. The whole paper discussed in the area of

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IoT.Different sensors are used to detect the movement of hand and fingers. Whenever a gesture is made, the orientation of the hand is detected by the ADXL337 accelerometer. These gestures are interpreted by the help of the Renesas microcontroller.

III. PROBLEM STATEMENT

Limited Movement and Comfort:

The sensors and electronics needed for the glove can add bulk, restricting hand movement and making the glove uncomfortable to wear for extended periods, potentially impacting daily activities.

Accuracy Issues:

Gesture recognition algorithms may struggle to accurately interpret complex hand movements, especially in real-time, leading to misinterpretations and frustration.

Technology Dependency:

The glove relies on a functional internet connection and device to translate gestures, which can be problematic in areas with poor connectivity or if the device malfunctions.

Environmental Factors:

Sweat and moisture on the hands can interfere with the sensors, impacting the glove's functionality.

Social Integration:

While the glove can aid communication, it may not fully address social aspects of interaction and could potentially create a barrier in certain situation

DISADVANTAGES OF EXISTING SYSTEM

Severity from limitations of stamina to paralysis. Physical disability results in physical difficulties of different levels. The IOT technology provides proactive help to patients with it advanced human machine interaction by internetworking physical devices and embedded sensors which enables these objects for collecting and exchanging data. Physical disability results in physical difficulties of different levels. The IOT technology provides proactive help to patients by internetworking physical devices and embedded sensors. Paralyzed patients are provided with unobtrusive support by the caregivers with the help of an application where a combination of services such as Home Automation, Patient Monitoring and Speech to SMS or Touch to SMS. Providing help to patients when caregivers are on remote location is a major issue which may to inattentiveness to some serious issues. The patient can operate electrical appliances through this application using Touch/Voice commands which reduces dependency. To accomplish his daily routines such as “need water” “need food” etc. which are sent as text messages to the caregivers mobiles as well as played in the speaker. By the patient using voice or touch commands. Caregivers on receiving the message can attend the patient immediately or he can provide a substitute to

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help the patient. Person even nearby can attend the patient as the messages are played on the speaker in the absence of the caregivers. Patient's heartbeat and temperature are monitored, by the application through sensors. Doctors can provide necessary first aid on reaching the threshold of temperature and heartbeat. ARM 7 Processor and SIM 900 modem is used for high speed communication and enabling GPRS communication to control the electrical appliances over mobile. Heartbeat and temperature of the patient are sensed using LDR and LM35 sensors..

IV. PROPOSED SYSTEM

Understanding the IOT enabled systems for disabled is very necessary to provide an automated system. Using the Wide applicability of IOT, an efficient and automated system can be created. In the past years

health monitoring is difficult for doctors and family members to provide quality of services, patient is totally dependent on the caregivers to do small jobs. Healthcare IOT can boost patient engagement, satisfaction by allowing the patients to spend more time to interacting with their doctors. The application has potential to not only keep patients safe and healthy, but to improve patients care as well. Another major issue with the previous methodologies is the inefficiency of giving proper treatment during the right time, unavailability of doctors. Home Automation provides the patient liberty to be independent. Messaging system helps to understand the needs of the patient properly, provides a high level of satisfaction to the patient.

4.1 BLOCK DIAGRAM OF PROPOSED SYSTEM

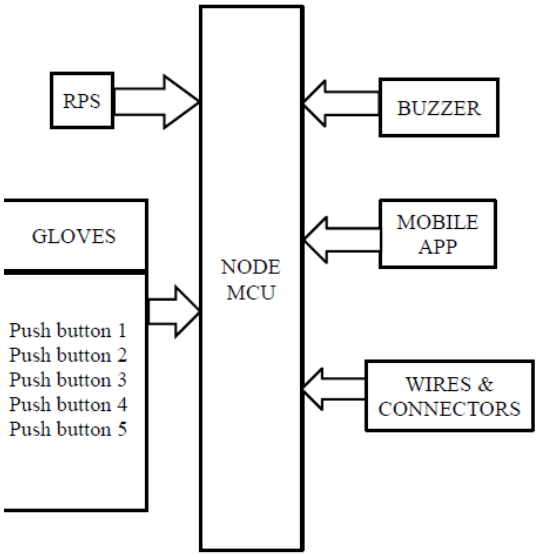


Fig 2.1 :Block Diagram

V. BLOCK DIAGRAM OF PROPOSED SYSTEM

HARDWARE COMPONENTS

Power Supply , Node MCU, Switch, Buzzer

SOFTWARE COMPONENTS

The following software tools used in the proposed system

Arduino IDE, Proteus, Mobile app

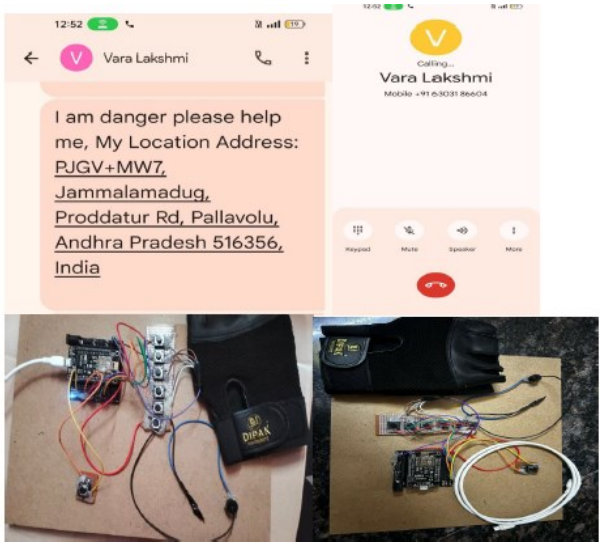
VI. RESULT AND DISCUSSION

6.1 PROTOTYPE (THROUGH KIT)

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Smart Assistance Glove prototype utilizing IOT enables real-time patient monitoring for disabled people ,here is the working principle

Working Principle:

1. User Input via Push Buttons: The glove is equipped with multiple push buttons, likely placed near the fingers When the user presses a button, it sends a signal to the microcontroller.

2. Microcontroller (NodeMCU - ESP8266): The NodeMCU reads the input from the push buttons and processes it. It then decides the appropriate response based on pre-programmed conditions.

3. Output Mechanisms: Buzzer: Provides audio feedback to confirm button presses or notify the user. Communication via WiFi or Bluetooth: The NodeMCU can send signals to a mobile app or another connected device, allowing further control or assistance features.

4. Additional Sensor (Possibly IR or Camera Module):

The small module connected with red, yellow, and black wires may be an IR sensor or a camera module.

If it's an IR sensor, it might detect obstacles or assist in gesture recognition.

5. Power Supply and Connectivity: The system is powered via a USB cable, ensuring a stable power source. The NodeMCU provides the necessary voltage to the components.

VII. CONCLUSION

IOT is a technology which if used carefully, can help in improving the life style of everyone. One step ahead, it can be the greatest help to physically disabled people. Our system tries to focus on improving the facilities for supporting the patient using IOT technology that not only realizes the needs, ut may help in health care services.The motivation behind the system is to enhance the self dependency on themselves which makes them satisfied by improving their capability of doing things. For home automation, by using different gestures we can control various basic functions such as switching home appliances in an effective manner.

VIII. FUTURE SCOPE

As the demand for android applications are increasing day to day, there is lot of scope to increase the number of devices and use wearable devices for Home Automation and healthcare systems. Parameters such as ECG, blood pressure and different techniques for

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SMS can increase the reliability and efficiency of the system. 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

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