IoT Based Smart Glove For Disabled Person

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Abstract

The project represents the entire design of a smart glove for disabled people to smoothen their social life. Main idea of this project is monitoring the health conditions and also to control the wheel chair with finger gestures.The Glove is attached with gyroscope sensors.Our prototype is very significant because many disabled persons need access to wheelchairs so that they can operate independently.

Index Terms—*gyroscope, hand gestures, health monitoring, smart glove.*

I. INTRODUCTION

This IoT-based smart glove helps individuals who have impairments that limit their ability to walk. The wheelchair is one of the most commonly used assistive devices for enhancing personal mobility The primary goal of this project is to translate finger gestures into commands for controlling wheelchair.The project is implemented us- ing Arduino,gyroscope sensors,biomedical application and gloves.Arduino convert the measured movement value in x-y directions to the commands and facilitate the communication between modules is done by wireless serial port module due to its secured data transmission.Gyroscope sensors are attached to the glove,which can measure the resistance value,while bending them. Hand gestures are detected and based on the matching instructions,corresponding actions are performed. In the event of an emergency, GSM will transmit alarm mes- sages.Additionally, our project aims to monitor the biomedi- cal conditions of the individual.The biomedical part contain different types of detectors.SPO2 can detect the oxygen level in the blood,MAX30100 which is a pulse oximeter detects the pulse rate and a temperature sensor.

II. LITERATURE REVIEW

A. Smart gloves for hand gesture recognition: Sign language to speech conversion system.”

According to Abhijith Bhaskaran K, Anoop G Nair, Deepak Ram K, Krishnan Ananthanarayanan, H R Nandi Vardhan -. Indian Census in 2011, about 26 million persons suffer from some form of disability, accounting for of the entire popu- lation.The most prevalent types of disabilities are movement impairment , hearing impairment , and speech impairment. Sign language is used by people with speech impairments to communicate with the rest of society. The traditional approach to gesture recognition is to utilise a camera-based system to track hand gestures. The signs exhibited are collected by a camera, analysed, and features extracted in order to detect the letter given. Separating such unwelcome gestures is time- consuming and not a practical solution.The sign language used differs by region. The present prototype focuses on Indian Sign Language (ISL).

B. ”The smart house for older persons and persons with physical disabilities:”

Dimitar H. Stefanov, Senior Member of the IEEE, Ze- ungnam Bien, Senior Member of the IEEE, and Won-Chul Bang, Member of the IEEE Smart dwellings for persons with special needs should be built to meet a variety of needs, with control algorithms based on a small number of commands appropriate to the user’s movements. The level of technology placed in the intelligent house for physically disabled persons should vary depending on the person’s physical ability, 9 daily habits, and desired safety circumstances.The machines in the home should be capable of correctly reacting to the user's exact orders as well as the user's intentions with a high level of "fuzziness," treating and executing them appropriately. to facilitate monitoring of treatments and health factors.

C. "Smart Assistant for Deaf and Dumb Using Flexible Re- sistive Sensor:"

S.Kumuda and Preethi K Mane claim To begin, a research was conducted on various types of commercially available Braille input and output devices. They created a system that translates sign language and displays it on an LCD screen using Flex sensors and an ARM microcontroller. However, this approach has the disadvantage of being complex and difficult to troubleshoot. Another intelligent assistant based on an image capture model is being developed. A camera captures the signs exhibited, which are then analysed and features extracted in order to determine the letter seen. Nonetheless, this model necessitates a clean background. The feature cannot be extracted if there is any disruption in the background. The entire study is discussed in the context of IoT.Various sensors are utilised to detect hand and finger movement. The ADXL337 accelerometer detects the orientation of the hand whenever a motion is made.

D. "Patient Assistance using Flex Sensor"

Kollu Jaya Lakshmi, Akshada Muneshwar, A Venkata Rat- nam, and Prakash Kodali all agree. There are currently sev- eral approaches accessible, including head movement, tongue movement, eye movement, and so on. Several of these tech- niques are also used to control wheelchairs and other devices.

The proposed technology is intended for people who are facially paralysed. It simply has one flex sensor, a specified input, and the output is shown in an LCD using Node MCU ESP8266. To detect the gesture, conducting line sensors (CSL) are used. This line sensor is connected to an Arduino uno, and the data is digitally sent into the microcontroller. The output of the line sensor varies depending on its position.As a result, the corresponding command is shown as text on the LCD. The blind can communicate freely using conventional English, whereas the deaf and dumb have their own manual- visual language called as sign language.

E. " Assistive Translator for Deaf Dumb People "

Mandar Deshpande, Prashant Deshmukh, and Sanjaykumar Mathapati, according to S. B. Shrote Communication between deaf and hearing persons is more difficult than communication between blind and normal seeing people. With communication being such an important element of human life, this leaves very little room for them. The blind can communicate freely using conventional English, whereas the deaf and dumb have their own manual-visual language called as sign language. They used flex sensors and pressure sensors in a non-vision-based technique. The preprocessor captures a real-time image in this case.. Following that, feature extraction is performed using Otsu's technique and an SVM machine. The matching sign language text is converted.The text is converted into voice using MATLAB.

F. "Data gloves for sign language recognition system"

Priyanka Lokhande, Riya Prajapati, and Sandeep Pansare believe Sign languages have developed wherever communities of deaf-dumb people exist. A sign language is a language that conveys meaning through hand gestures and body movement rather than through acoustically communicated sound patterns. This can include integrating hand shapes, hand orientation and movement, arm or body movement, and face expression to dynamically portray a speaker's thoughts. The microcon- troller's ADC channels are used for digital conversion. Flex sensors are utilised to detect finger gestures, and the output is audio via a speaker and an LCD. On the LabVIEW platform, the complete process is implemented and customised.The proposed technology is intended for people who are facially paralysed. Hand motions are collected in this project and then transformed into the corresponding text and audio formats. The LCD is used for text output and the speaker for audio output. For each activity, a mode is provided. Using a signal processing package, flex sensors are used to detect finger movements and hand gestures.

G. "Deaf-mute communication interpreter"

Conducting line sensors (CSL) are utilised to detect the gesture, according to Rajamohan, A., Hemavathy, R., and Dhanalakshmi. This line sensor is connected to an Arduino uno, and the data is digitally sent into the micro-controller. The output of the line sensor varies depending on its position. As a result, the corresponding command is shown as text on the LCD. The project aims to turn deaf-dumb people's motions into understandable text/speech. A MEMS sensor and a microprocessor power the project. Disabled people's specified hand gestures are recorded and saved in a database. When a hand gesture is made, the MEMS sensor accelerates and sends a signal to the micro-controller.The micro-controller matches data with the database, and the output is provided by the speaker in the form of audio. The system also incorporates a text to voice converter (TTS), which converts the text into the accompanying speech.

H. "Hand gesture recognition in real time using IR sensor"

According to Rohith, H.R., Gowtham, S., and Sharath Chandra, the project focuses on turning deaf-dumb people's motions into meaningful text/speech. A MEMS sensor and a microprocessor power the project. Disabled people's specified hand gestures are recorded and saved in a database. When a hand gesture is made, the MEMS sensor accelerates and transmits the signal to the microcontroller. The microcontroller matches data with the database, and the output is provided by the speaker in the form of audio.The system also incorporates a text to voice converter (TTS), which converts the text into the appropriate speech. The Renesas microcontroller interprets the gestures. Hand motions are collected in this project and then transformed into text and audio formats. The LCD is used to display text output while the speaker is used to output audio. you might find that Table I has been cross referenced as Table IV-B3.

III. PROPOSED WORK

A. SCOPE AND OBJECTIVE

The variety of functions and functionalities that a wheelchair with glove control can offer is referred to as the wheelchair's scope. The goal of creating such a wheelchair is to give people with mobility issues, particularly those with weak or nonexistent hand or arm function, a different way to use a wheelchair for increased freedom and a better quality of life. The wheelchair based on gloves intends to make it easier for people to move around their environment, carry out daily tasks, and take part in social and recreational activities.

B. PROPOSED SYSTEM

An IOT Based Smart Gloves is a technology that helps the disabled people to operate their own wheelchair without the help of a third party. In proposed technique, the user can move their wheelchair to different directions like forward,backward,left and right using hand gestures. This project provide easy mobility and reduce physical strain. Android application is are very helpful to track the health status of the disabled person. In this way our project helps to avoid the emergency situations .The Biomedical application consist the health monitoring system like temperature sensor,pulse monitoring and SpO2.SpO2 is the oxygen saturation which check the level of oxygen in blood.MAX30100 sensor that calculate the pulse and oxygen level.End platform developed by linking devices to Arduino IoT cloud database.It take data from database. The user can access the health status of the person.Doctor can view the health status through web dashboard.Scheduler is implemented for Medicine Purpose.
A gyroscope sensor, often referred to as a gyro sensor, is a device that measures angular velocity or rotational motion.Gyroscopes work based on the principle of angular momentum. They contain a spinning rotor that maintains its axis of rotation regardless of external forces. When the device experiences rotational motion, the rotor's axis tries to remain fixed in space, and the resulting movement can be measured. Gyroscopes typically measure angular velocity in units such as degrees per second (°/s) or radians per second (rad/s). This measurement represents the rate of change of an object's orientation over time.LM35 is a temperature sensor integrated circuit,used for temperature sensing and measurement in various electronic systems and applications.Principle of operation of BO Motor works with DC motors operate based on the interaction between a magnetic field and an electric current. They typically consist of a stator (stationary part) with permanent magnets or electromagnets and a rotor.

MODULE 1:HARDWARE IMPLEMENTATION

The Arduino Nano is a small, versatile microcontroller board based on the ATmega328P microcontroller. It is similar to the Arduino Uno but comes in a compact form factor, making it suitable for projects with space constraints. LM35 is a temperature sensor integrated circuit,used for temperature sensing and measurement in various electronic systems and applications.The MAX30100 is a sensor module that integrates a photodetector, an LED light source, and low- noise electronics to measure pulse oximetry and heart-rate signals. It is commonly used in wearable devices, medical applications, and fitness trackers to monitor vital signs.A gyroscope is a device used to measure or maintain orientation and angular velocity. It consists of a spinning rotor that maintains its axis of rotation regardless of any movement or rotation of the gyroscope's mounting. Gyroscopes are widely used in various applications, including navigation systems, aircraft and spacecraft stabilization, robotics, and motion control.The L298 is a popular motor driver integrated circuit (IC) commonly used to control DC motors and stepper motors. It is widely used in robotics and other applications that require motor control.The L298 motor driver can control two DC motors or one stepper motor, providing bidirectional control (forward and reverse) and speed regulation. It operates by using H-bridge configuration, which allows the motors to be controlled in both directions by switching the direction of current flow.The HC-05 is a popular Bluetooth module widely used for wireless communication between devices. It is commonly used in hobbyist projects, Internet of Things (IoT) applications, and robotics. The module allows devices to establish a wireless serial connection over Bluetooth, enabling data transmission and control between devices.

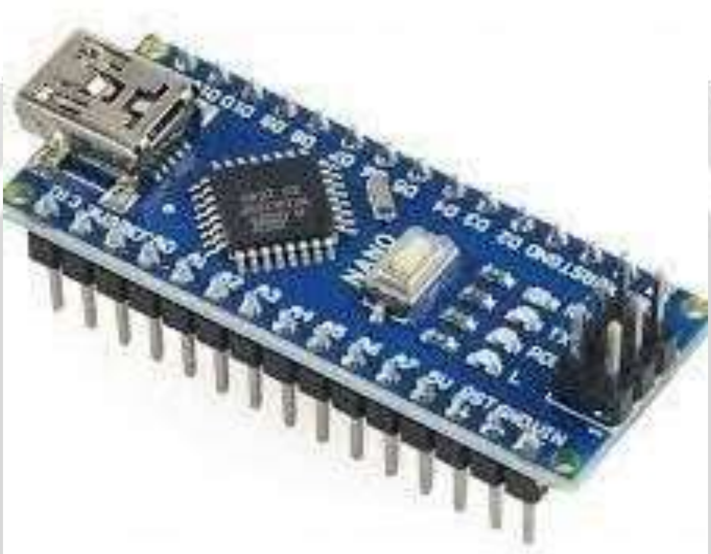

Fig. 1. Arduino Nano

MODULE 2 : USER INTERFACE

The user interface application can be designed as a mobile app or a graphical interface on a mounted display within the wheelchair. The objective of the user interface application is to provide an intuitive and user-friendly interface that allows individuals to control and customize the wheelchair based on their preferences and needs.End Platform developed by linking devices to Arduino IoT cloud database.It takes data from the database.A Scheduler is implemented for medical purpose.Through user interface application the user can access health status.Mobile application is not required beacuse here we uses a web dashboard.The doctor can access patient health status through his pc.

Fig 2: User Interface

MODULE 3 : WEB DASHBOARD

A web dashboard is a user interface that provides a visual representation of data and information in a centralized and easily accessible manner. It is typically accessed through a web browser and allows users to monitor, analyze, and interact with data from various sources in real-time. In the context of a wheelchair based on gloves, a web dashboard can serve as a comprehensive control and monitoring platform for the wheelchair system

IV. CIRCUIT

Designing a specific circuit for a wheelchair based on gloves would require detailed knowledge of the specific requirements, components, and system architecture of the wheelchair system. As an AI text-based model, I can provide a general overview of the components that might be involved in such a circuit design. However, it is essential to consult with a professional electrical engineer or an expert in assistive technology to design a circuit that meets the specific needs and safety standards of the wheelchair based on gloves. Here are some key components that might be included in the circuit: Gesture Recognition Sensors: These sensors detect and capture the hand movements and gestures made by the user wearing the gloves. They can include accelerometers, gyroscopes, or flex sensors to accurately capture the gestures and translate them into control signals

Microcontroller: A microcontroller serves as the brain of the circuit and controls the overall operation of the wheelchair. It receives input signals from the gloves and processes them to generate appropriate commands for the wheelchair's motorsor actuators.

Power Supply: The circuit requires a power supply to providethe necessary voltage and current for its operation. This caninvolve batteries or an external power source, depending onthe design and requirements of the wheelchair system.

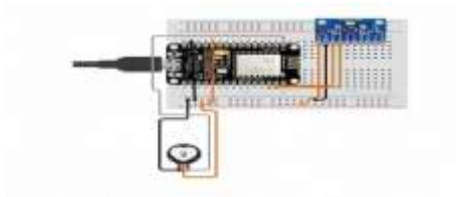

Fig. 1. Circuit Diagram For Biomedical Sensors

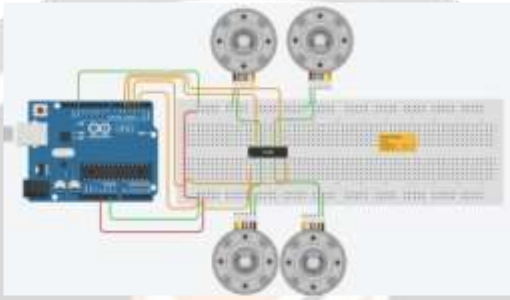

Fig. 1. Circuit Diagram For Wheelchair

V. CONCLUSION

This technology could provide a new approach for around 70 million people with handicapped and have some medical issues. This technology aids in the continuous monitoring of a patient's real-time conditions, which aids in the prevention of emergency situations. Thus, the proposed model has the advan- tage of supporting physically impaired people as well as paral- ysed patients by controlling wheelchair through hand gestures. Data communication is rapid and secure when wireless serial port modules are used. We can control numerous fundamental functions such as controlling the directions of wheelchair by tilting the hand..This study discusses the replacement of the popular joystick stick driven wheel chair with a hand-glove control device for simpler manoeuvring by bending the hand. The system is controlled by the intended users wearing an instrumented glove equipped with gyroscope or bend sensors for regulating the movement and direction of the wheelchair. The process entails a detailed examination and examination of electric-powered and joystick- controlled wheelchairs, as well as the control law utilised to manoeuvre these vehicles. A study of the operation of bend sensors, sometimes known as gyroscope, is also included in the methodology. It is made up of a gyroscope circuit, a wireless transmitter and receiver combination, and microcontrollers

VI. REFERENCES

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