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SMART WHEEL CHAIR USING IOT

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ABSTRACT

According to one study, there are about 6 million people in the world who are paralyzed and need a wheelchair to move. Wheelchairs had to be moved and supported by in the existing system. However, in normal use, these joystick-controlled wheelchairs are difficult to operate. Especially for paralyzed people, the one-way operation of the hard button and joystick made it difficult to operate the joystick. To overcome these problems, the proposed Smart wheelchair using IOT can be moved with a slight tilt of the hand and is also implemented in voice control and Android applications. This project works perfectly with user-specified voice and gesture commands, and attention is also paid to human stability. This technology is also based on wireless technology, which also saves wiring costs. output from the wheelchair's designed gesture and voice controls and obstacle detection.

Keywords: PIC microcontroller, NODEMCU, Ultrasonic sensor, Gesture sensor, BLDC Motor, Motor Drive, Android Application.

1.INTRODUCTION

This goal has shown an advanced approach for converting physical hand gestures into electrical signals, processing the signals into appropriately sized digital signals, and transmitting them through a transmitter. It provides a useful solution for people who have difficulty moving, who have paralyzed limbs, or who have lost their limbs in an accident. This wheelchair brings a paradigm shift between humans and machines. Where is this Machines work with user commands, person say their man-machine interface. With the growth of technology, there has always been a desire to use it for the benefit of mankind. again and again The world has demonstrated the ability to use technology to bring comfort to people in need. The parallel integration of technology and business is the main goal of this white paper. Also build hand gestures, Wheelchairs that have solid technology but are inexpensive are the main concerns. Today, in this modern age, about 10% of the world, about 650 million people, suffer from disabilities. To make her life a little easier, we decided to build a wheelchair that controls the movement of the hands, which works with her hand gestures.

2. HIGHLIGHTS OF THE WORK

The speed of the DC motor can be changed electrically or mechanically. Android's DC motor controller system is designed to control speed in different directions. Previous research on controlling the speed and direction of DC motors used a PC to control the speed. The software was developed and supplied to the PC, resulting in commands given to the chopper via the computer to control the engine speed. Increasing use of stand-alone microcontrollers for DC motor speed control. In another study, a microcontroller was used to control the speed. The operation of the system can be summarized as a voltage in a rectified drive form and consists of a chopper driven by a modulated signal generated by a microcontroller unit (MCU). Sensors that detect the direction of the DC motor that powers the system can easily control speed and direction. A sensor connected

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to the microcontroller detects the distance. The microcontroller easily reads the information from the sensor and allows you to control the motor properly.

This proposed control method is applied to control the speed and direction of the DC motor wirelessly. To improve the quality of life for people with disabilities. The proposed system allows control. To make her life a little easier, we decided to build a wheelchair that controls the movement of the hands, which works with her hand gestures.

PURPOSE:

- Development of wheelchairs that can be controlled by speech and gestures.
- To relieve the person pushing the wheelchair.
- Improve the balance and posture stability of the elderly.
- Prevention of non-survivable serious

3. EXISTING SYSTEM

most people who rely on electric wheelchairs have a hard time completing basic activities all day long. To help this population, robotics and intelligent system technology have developed intelligent electric wheelchairs. The systems and programs developed must be intelligently designed and easy to use. Wheelchairs are modular devices that make people. Wheelchairs are widely used around the world, especially in hospitals. You can develop an electric wheelchair Using the latest system. One of the advantages of a joystick-controlled wheelchair is the very ease of control by the disabled. The joystick allows you to easily control the orientation of your wheelchair. Properly selected sensors, processing those signals and generating control actions are essential for safety. These actions include skills to avoid obstacles, to pinpoint the actual position, to determine the distance to the surroundings, and to reach a given destination accurately.

Wireless systems are widely used for remote monitoring and remote control in a variety of applications. The steps to design an Android-based wheelchair for the disabled are presented in another study. On the other hand, some important issues related to the control of electronic systems need to be discussed. The ability to make maintenance decisions based on technology, all consumed resources that are part of operational shelf life should be devoted to bioanalysis. Circuits for PWM-based control of MOSFET transistor DC motors can be used in system development and the proposed system needs to be studied. This treatise aims to develop electronic devices to improve the quality of life of people with disabilities. The proposed system controls the wheelchair according to the needs of the user. Car chairs with various advantages have been developed. The advantage of ultrasonic rangefinders is that they are cheap and easy devices for measuring distances. The device calculates the distance with the appropriate accuracy and resolution.

BLOCK DIAGRAM

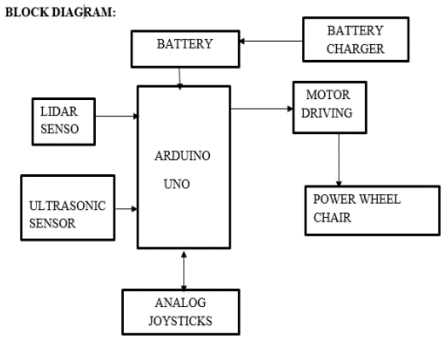

Fig 3.1 Block diagram of Existing System

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EXPLANATION OF EXISITING SYSTEM

LIDAR (light detection and ranging) sensor, two ultrasonic sensors, power wheelchair, and Arduino. The wheelchair's electric motors are correctly controlled and information from the sensors is easily read thanks to the ARDUINO microprocessor. A joystick is added as an input device for controlling the wheelchair. The wheelchair's frame is equipped with two ultrasonic sensors. The system's Lidar sensor allows it to avoid collisions with both stationary and moving obstacles. The joystick used for wheelchair control is a moving, direction (forward, backward, lift, right) control. Following the transmission of a digital signal, an integrated circuit in the wheelchair's motor driver controls movement. Brush DC motor specifications include 24VDC, 250W, and the joystick is used to individually operate each motor. In many applications, tele-monitoring and tele-control are handled via wireless systems.

4.PROPOSED SYSTEM

The wheelchair is controlled via an Android application connected via a Wi-Fi module and a manual joystick attached to the hand of the chair. With these two, users are less dependent on others. In addition, the chair is equipped with voice control and an infrared sensor to prevent accidents caused by obstacles. The sensor reacts to an approaching obstacle and finally the command is relayed to the Microcontroller, allowing further movement as needed. This project will cover how to control a wheelchair with a mobile phone via wireless communication, some features related to IOT technology, mobile phone components, and wheelchairs. The current presentation shows a wheelchair controlled by a mobile phone by moving the wheelchair forward/ backward / left / right via Android applications such as Arduino and ESP8266. Low speed, slightly medium speed, medium speed, high speed, and very fast user speed control commands are detected by sensors to limit the speed of the DC motor. This character changes the speed in relation to the code. To set the speed and get the speed from the DC motor, there are certain formats that need to be sent via SMS. The ESP8266 has changed the way people use digital devices at home and in the office, migrating traditional wired digital devices to wireless devices. Here I'm using wireless communication, an interface PIC microcontroller, and an Android application. Connect the ESP module to the microcontroller using Arduino software. Control the wheelchair according to the commands received from Android. Motors and control parameters designed with Proteus for BLDC rotate to drive a wheelchair in a real-time implementation using a PIC microcontroller. Motor control technology is safe, efficient, simple and reliable. Controlling the speed and direction of the DC motor is achieved with the help of Android mobile applications using Wi-Fi technology. Wireless communication is also realized in this way. The proposed system also works in terms of cost and response time.

BLOCK DIAGRAM

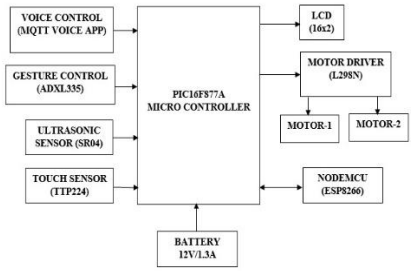

Fig 4.1. Block diagram of Proposed system

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5.WORKING METHODOLOGY

The functional principle is kept as simple as possible. The working principle of the circuit was created using a block diagram of the system interconnects as shown. A DC power supply is required for the system to work. DC power supplies the PIC microcontroller and Wi-Fi module. The Wi-Fi module receives information sent from an Android smartphone with application software coded in C installed. The microcontroller sends instructions, and their execution helps the motor driver to function. The movement and function of the motor can be controlled by Android-based application software. The hardware for this project consists of a Wi-Fi module and a motor driver IC. Wi-Fi module monitoring using the Android mobile application is designed so that the application can be used to control the movement of the motor in different directions. By using the ESP8266connected to the ultrasonic sensor and the microcontroller unit, the speed that controls the motor and the live speed of the motor are displayed on the LCD. The microcontroller reads the SMS messages stored on the SIM card and takes necessary actions such as control.
The user has a Wi-Fi module to control the wheelchair. This system allows the user to vigorously operate the wheelchair with different levels of control. Through the Wi-Fi module for monitoring and control, each motor reaches the board, processes it accordingly, and the output of the PIC is sent to the motor driver IC to control each motor. You can now connect the system wirelessly to the controlled motor (drive section). The motor will stop until you send a command to the microcontroller. Given the input, the motor will move according to the features pre-installed in the microcontroller.

6. HARDWARE DESCRIPTION

6.1 PIC16F887 Microcontroller

PIC stands for Peripheral Interface controller. PIC is a modified family Hardware architecture microcontroller Made by Microchip Technology.

6.2 DC motor drive

A DC motor drive is a type of amplifier or power modulator integrated between a controller and a DC motor. It takes a low current and converts it into a large current suitable for a motor. The DC drive converts alternating current (AC) to direct current (DC) to drive the DC motor.

6.3 Ultrasonic sensor

An ultrasonic sensor is an electronic device that measures the distance of an object by emitting ultrasonic waves and converting the reflected sound into an electrical signal. Ultrasound travels faster than audible sounds (that is, sounds that humans can hear).

6.4. LCD Display

An LCD is a flat panel display or other electronically modulated optical device that uses the light modulation characteristics of a liquid crystal in combination with a polarizing element.

6.5 BLDC Motor

The motor converts the supplied electrical energy into mechanical energy. Various types of motors are commonly used. Among them, brushless DC (BLDC) motors are highly efficient and have excellent controllability, and are widely used in many applications. BLDC motors have the advantage of energy saving over other motor types. The simplest type of motor is a brushed DC motor.

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6.6 Gesture Control

Gesture recognition is a technology that uses sensors to read and interpret hand gestures as commands. In the automotive industry, this feature allows drivers and passengers to interact with the vehicle and control the infotainment system, usually without touching buttons or screens. Gesture controls allow humans to operate the device without touch or audio. Instead, the device can recognize movements and actions, decode them and convert them into features.

6.7 NODE MCU

NODE MCU is an open source low cost IOT platform based on ESP8266 that connects objects and enables data transfer over the Wi-Fi protocol. Initially, it included Fire ware running on the Expressive System's ESP8266 Wi-Fi socket and hardware based on the ESP-12 module.

6.8 Touch sensor

A touch sensor is a type of device that records a physical touch or hug on a device or object. This allows a device or object to detect touch or proximity, usually by a human user or operator.

7. Software description

7.1 Voice control app (MQTT)

MQTT (Telemetry Transport) is a lightweight open messaging protocol that provides an easy way to deliver telemetry information to resource-constrained network clients in a low-bandwidth environment. Protocols that use the publish /subscribe communication pattern are used for machine to-machine communication.

7.2 MQT DASHBOARDS

MQTT Dash is an MQTT client for Android for building dashboards. Viewing detailed information (from the topic you are subscribing to) and various dashboards with different interface weights to choose from make it very easy to publish your data.

8.RESULT AND ANALYSIS

A) FORWARD DIRECTION

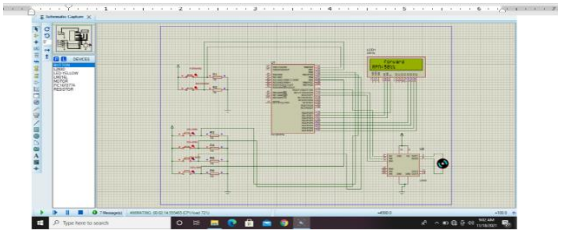

Fig 8.1 forward direction

Figure 8.1 depicts. Six buttons are accessible for the DC 12V dc motor applied to 24V in this project. The project-specific design of the 6 buttons (forward, backward, left, right). 25% of the motor's movement is to the other side. The motor revolves for two seconds while the button is ON. The motor's real-time speed is shown on the LCD. The motor can be turned forward, backward**,** and even left and right until it comes to a stop**.**

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B) BACKWARD DIRECTION

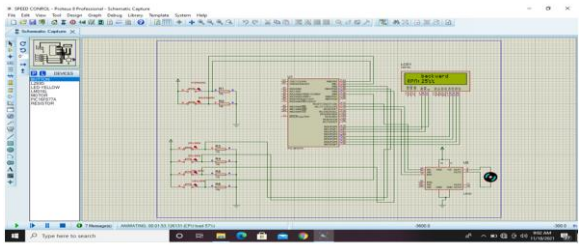

Fig 8.2 Backward direction

Figure 5.2 depicts. The motor requires a 12v dc power, and the project is constructed with 6 buttons. To rotate the motor in the forward direction, push the button for two seconds while moving the motor by 50%. The motor's real-time speed is shown on the LCD. The engine may rotate in both forward and reverse, as well as in both left and right directions, until it comes to a stop.

C) Obstacle Detection

Figure 8.3 depicts. When the wheelchair gets close to anything moving the wheelchair (less than 30cm away) an ultrasonic sensor that continuously reads the distance near the wheelchair sends a motor motion signal that stops both wheels.

Fig 8.3. Obstacle Sensor

The system can successfully detect and shut down obstacles up to the defined range.

D) HAND GESTURE

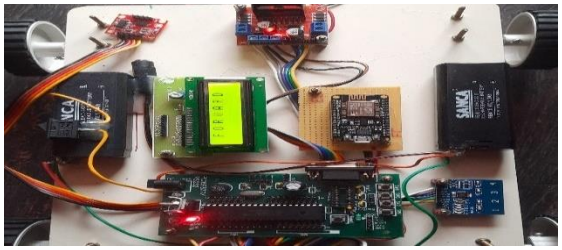

Fig 8.4. Hand Gesture

In Figure 4, as mentioned above, one can adjust the gesture of his choice and move the system in that direction.

ACTIVE	DIRECTION
Tilt forward	Forward
Tilt backward	Backward
Tilt left	Directed towards left
Tilt right	Directed towards right
Keep stop	Stop

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E) VOICE CONTROL

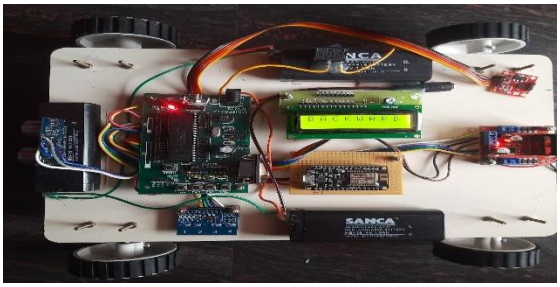
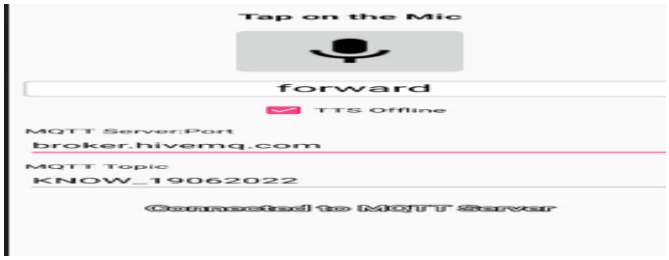


Fig 8.5 Voice Control

In Figure 5, as described above, the user can control the wheelchair with his own voice and issue commands, and the wheelchair will move accordingly. He can also brake. The results are as follows.



voice control app

Speech	Character send
Forward	"F"
Backward	"B"
Left	"L"
Right	"R"
Stop	"S"

9.CONCLUSION & FUTURE SCOPE

The proposed wheelchair system Very convenient for the physically challenged and it works effectively in both Voice commands and gestures are also it Recognize obstacles. Our suggestion Wheelchairs prevent accidents. People with disabilities, especially paralyzed and elderly people, move using only voice commands and gesture controls. Used by patients with speech disorders (dumps) due to long-distance Wi-Fi control. To help people of average weight move at a constant speed in a controlled way.

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