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A New Technology For The Ultra-Disabled: The Eye-Controlled Wheel Chair

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ABSTRACT:

A recent research co-authored by the WHO and the World Bank estimates that 15% of the global population is impaired in some way. Powered wheelchairs with advanced navigational capabilities are a huge step towards full participation in society for those with severe physical and mental disabilities. Unless they can handle the joystick with their tongue, severely disabled people find driving a wheelchair to be an arduous undertaking. Locomotion and localization are two issues that paraplegics and the visually impaired face together, making their lives more difficult. In order to address these issues and enable the end-user to carry out safe movements and complete some essential everyday chores, several technologies are now under development. To guide itself, our robotic wheelchair can tilt its head and blink its eyes. Furthermore, by using the same head-tilt action to interact with room gadgets, such as a fan, we may provide the impaired individual greater autonomy. A radio frequency transmitter and receiver are used for this communication. With this, the user may effortlessly use a variety of gadgets.

Keywords: Arduino UNO,IR sensor, Motor driver.

Introduction

The original intent of wheelchairs was to aid the mobility and independence of those with physical disabilities; but, what use is a wheelchair for someone who is seriously disabled? A plethora of smart wheelchairs are available, and as technology develops further, even more advanced models will be available to those with the most severe disabilities. We have made an effort with our wheelchair to make it possible to control the vehicle using basic eye and head motions. In addition, we communicate by linking the wheelchair to all of the room's devices. Here we present the design and execution of an eye-movement controlled wheelchair. People with disabilities or paralysis might find this wheelchair to be a great assistance. The eye blink action may be captured by attaching an infrared sensor to the goggle. The sensor picked up his eye blinking motion and sent a signal to the wheelchair's motor driver circuit, allowing it to go forward or halt. The circuit will execute left, right, forward, backward, and stop operations based on the number of eye blink movements.

Literature Survey

Voice Controlled Wheelchair:

An automated wheelchair that responds to spoken commands is seen here. People with physical disabilities who have trouble using their hands could find a voice-controlled wheelchair to be a great help. The motors propel the motorized wheelchair, and speech recognition allows the user to provide commands. A motor, an Arduino, and a voice recognition module from HM2007 make up the circuit. After the user issues a command, the speech recognition module decodes it and sends the relevant data encoded in memory to the Arduino microcontroller. In response, the movement is regulated by the Arduino microcontroller. For those who are unable to use their hands due to physical disability, the Smart Electronic Wheelchair Using Arduino and Bluetooth Module includes a joystick attachment.

Smart Electronic Wheelchair Using Arduino and Bluetooth Module:

The development of an embedded system for a motorized, voice-operated wheelchair. For those with physical disabilities, the suggested design incorporates a voice activation technology that also allows for manual control. For those with physical disabilities, this paper depicts a "Voice-controlled Wheel chair" that moves in response to voice commands. In order to operate the wheelchair, the user speaks the command into a Bluetooth-enabled mobile device, which is then translated into strings by

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the BT Voice operate for Arduino and sent to the Bluetooth Module SR-04, which is attached to the Arduino board. For instance, the chair will go ahead when the user presses "Go," backward when he presses "Back," and so on. They may also rotate the chair to the left and right, respectively, and stop it when they want it to stop. The patient's time, money, and effort may be better used using this method. The design also has an ultrasonic sensor, which aids in the detection of any obstructions that may lie ahead of the wheelchair and obstruct its path.

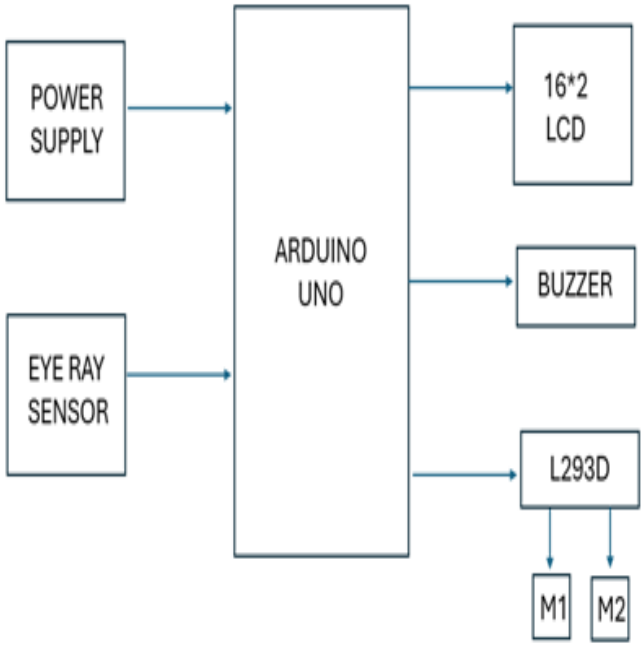
Voice Controlled Wheelchair using Arduino:

Conventional, manual, or motorized wheelchairs may meet the demands of a large number of disabled people. Some people with disabilities have a very hard time using wheelchairs. To reduce the amount of human interaction, there has been much study on computer-controlled chairs that employ sensors and clever control algorithms. Here I detail the process of designing an embedded system-based smart motorized wheelchair for those with physical disabilities. People with physical disabilities may use the voice activation system that incorporates manual operation with the help of the proposed design. To aid with the wheelchair's navigation, an Arduino microcontroller and a speaker-dependent speech recognition processor have been used. An erroneous spoken command has no effect on the wheelchair. The wheelchair's direction is controlled by the microcontroller in response to the joystick's selection. Additionally, voice commands may be used to control this. Obstacles may be sidestepped with the use of ultrasonic sensors.

METHODOLOGY

Working:

In this setup, the wheelchair was controlled by means of an eye blink sensor. We begin by creating a map of the home or other location of interest, and then we utilize the controller and an eye-blink sensor to communicate with the wheelchair. Once the eye blink sensors detect a single blink, the system is programmed to proceed to the bedroom; twice, to the kitchen; three times, to the restrooms, and so on. No more directing the wheelchair according to directions; the suggested approach is far more practical.



Block diagram

Arduino Uno

A microcontroller board based on the Atmega328, the Arduino Uno is described in the datasheet. A 16 MHz crystal oscillator, 6 analogue inputs, 14 digital input/output pins (including 6 PWM outputs), 1 USB port, 1 power connector, 1 ICSP header, and 1 reset button are all part of it. All you need is a USB cable, an AC-to-DC converter, or a battery to get it going; it comes with everything you need to support the microcontroller.

LCD

In front of a light source or reflector, a thin, flat display device called a liquid crystal display (LCD) arrays a large number of color or monochrome pixels. Pile of liquid crystal molecules held aloft by two transparent electrodes and two polarizing filters, whose polarity axes orthogonal to one another, make up each pixel. If there weren't liquid crystals interposed, one would block the other from light. Light that enters one filter is able to pass through the other because the liquid crystal bends its polarity.

ESP8266 Wi-Fi Module

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This project revolves on this. The module plays a crucial role in the project as it is centered on WIFI control of appliances. A low-cost Wi-Fi chip with full TCP/IP capability, the ESP8266 Arduino compatible module has an amazing built-in MCU (Micro Controller Unit) that allows you to control I/O digital pins using a simple programming language that is almost pseudo-code like. The Chinese company Es press if Systems is situated in Shanghai and makes this gadget. In August 2014, this chip made its debut in the ESP-01 version module manufactured by the third-party company AIThinker. The MCU can establish basic TCP/IP connections and connect to WiFi networks with the help of this little module. In his Many hackers and tech enthusiasts were interested in exploring and using it for a wide range of projects because to its tiny size and very inexpensive pricing (1.7$ to 3.5$). Since it has been so successful, Espressif has released other variants with varying proportions and technological specs. Among the following is the ESP32. Numerous projects and applications, such as home automation, may be found online.

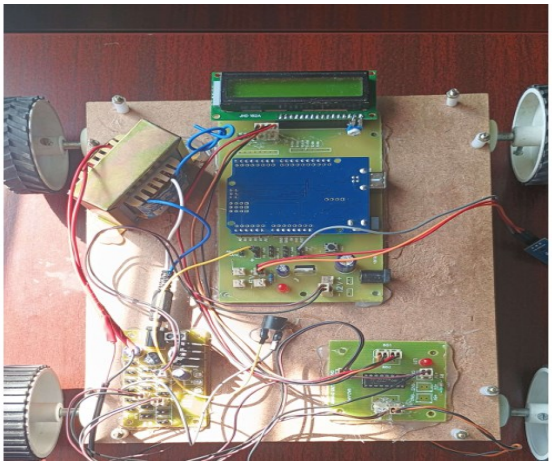
RELAYS:

Many household and commercial equipment, as well as industrial control systems, make use of electrically controlled switches called relays. By using a relay, two independent voltage sources may be isolated from one another; in other words, a little quantity of voltage or current on one side can manage a big amount of current or voltage on the other side, and vice versa.

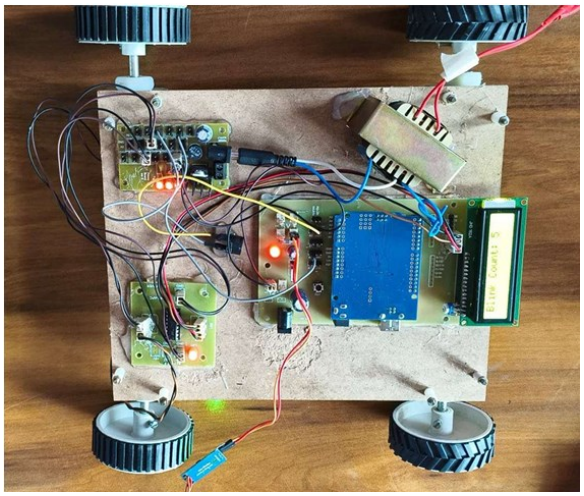
BLUETOOTH MODULE

Wireless headsets, gaming controllers, mice, keyboards, and a plethora of other consumer electronics make use of it. The range may be as little as less than 100 meters, depending on factors such as the transmitter and receiver, the weather, and terrain and metropolitan areas. One may construct a wireless Personal Area Network (PAN) using this IEEE 802.15.1 defined protocol. It transmits data wirelessly using frequency-hopping spread spectrum (FHSS) technology. To talk to other devices, it use serial communication. The USART is the means by which it exchanges data with the microcontroller.

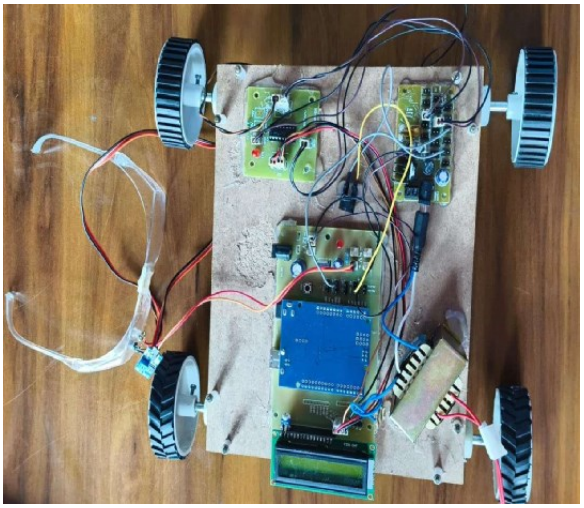
RESULTS



Output 1



Output 2



Final output

CONCLUSION

Finally, arduino and the C programming language allow for the improved construction of an eye-controlled wheelchair. People with disabilities or paralysis might find this wheelchair to be a great assistance. The eye blink action may be captured by attaching an infrared sensor to the goggle. The sensor picked up his eye blinking motion and sent a signal to the wheelchair's motor driver circuit, allowing it to go forward or halt. The quantity of eye blinks will tell the circuit to go left, right, forward, backward, or halt, among other possible actions.

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