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HAND GESTURE VEHICLE - A SMALL PROTOTYPE

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ABSTRACT

In this modern era where everything is technical, human efforts are being reduced with machines. Every small work is tried to be done with the modern system, so is our project. Moving from one place to another can be done by using our model and does not need much man power. Moving up to some distance manually needs human efforts but this project is made keeping in mind of people who aren't able to do so. A person can move just by tiny movement of hands making it easy and convenient for a disabled person. The model can be use daily for day to day purpose making life much comfortable also providing easy sense of living. We developed an IOT based gesture control wheel chair which takes reading with the help of the accelerometer equipped by a human hand. The wheel chair can move in a desired direction by moving the hand in that specific direction, each gesture generates the values in its corresponding alliance. Accelerometer generates the values and send it to Arduino UNO, encoder joined to Arduino, it encodes the values and send to recipient through nrf24101 transmitter. Decoder position on the wheel chair will decrypt the merit and give it to the L298 motor driver, which will command the motors to proceed the vehicle accordingly. An ultrasonic sensor helps the model to detect an obstacle that comes on its way and find an alternate path to move. Rather than moving the model from hand signal a person can also control it with entreaty programming interface (API) by connecting it to model with the help of Bluetooth module. This project can also been enhanced by adding Line follow mode and voice control mode [1].

KEYWORDS: *Arduino, Accelerometer, Bluetooth, Encoder, Decoder.*

1. INTRODUCTION

IoT is an advanced automation technique which trade with artificial intelligence, sensor, networking, electronic etc. The system developed by IoT has larger transparency, authority, and performance. The Internet of Things describes the network of physical objects with the help of sensors, software for the purpose of exchanging the data and provide a proper connectivity. With the help of IOT we can make different projects that are beneficial for humans as well. The main motive of this project is to command the wheel chair using hand movement and various other methods. The human hand gesture activates the model with the help of an accelerometer. The signal accept from the hand movement are prepared than sent to the receiver through transmitter and the wheel chair perform the required motion, this way the wheel chair is build and the required task is finalized . Thus, this proposed model will be helpful by providing an ease of movement for physically challenged people. The wheel chair can be used in fields such as healthcare and use in a person's day to day life. It might be dangerous or difficult for a human to walk who is not physically fit or is physically challenged, so this model can help out these people this is also helpful in treating patients with physical disorder such that they should not be dependent on someone else omitting themselves as they can move the wheel chair on their own with simple hand gestures [3].

For the peoples with disorder in their hands, we can use the voice control mode. Such that the wheel chair can move easily with the voice command.

1. Providing better living: The main objective of this project is to provide an ease of living to disabled/physically challenged people.

2. Effective and Smart innovation: speed is the required feature of such tool which is satisfied by our model. Moving just by sensing little action makes it smart and easy for use.

3. Sensing capabilities: Smart sensors like accelerometer can sense even a sight vibration, which person cannot even recognize. It has forbearance just about 5 -10%.Therefore this gadgets works very precisely and can be used for such works where mistakes must be reduced.

4. Convenient: much distance can be covered just by little hand gestures. We can do the work which requires maximum human efforts using minimum human energy.

2. LIMITATION

1. Great power consumption, large amount of power is consumed in this wheel chair.

2. Cost inefficient, it comprise of several motors and parts which makes it costly.

3. SYSTEM ARCHITECTURE

3.1. Arduino UNO

Arduino UNO is highly versatile and can be used in a broad range of applications such as robotics, Automation, and IOT devices. Its user friendly interface and compatibility with difference sensors, modules, and shields make it an ideal choice for beginners and advanced users alike. The board as shown in Figure 1 is easy to program, and with a vast online community, resources, and tutorials, learners can quickly get started with a vast online community, resources, and tutorials, learners can quickly get started with their project ideas. Overall, Arduino UNO is reliable and affordable micro-controller board that offers a lot of potentials for creativity and innovation [2].

3.2. ADXL335 Accelerometer

The ADXL335 provides complete 3-axis acceleration computation.

The acceleration varies in 3g in the x, y and z axis.

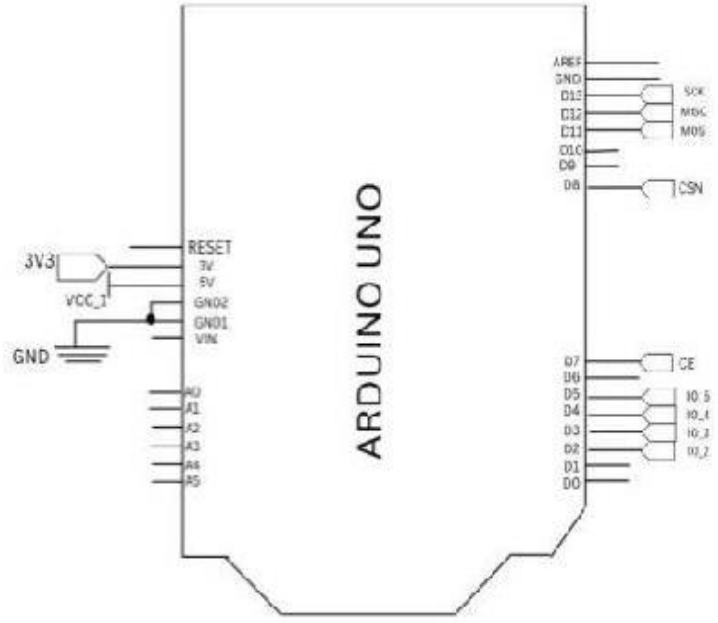

Figure: 1 ARDUINO UNO

- IT provides analog voltages as output that are proportional to the acceleration.
- It contains a polysilicon surface-micro machined sensor and signal conditioning circuitry.

3.3. Authors Bluetooth Module

- HC-05 is a Bluetooth module which is mapped for Wi-Fi communication. This module can be used in a master or serf configuration.
- This module works on 3.3V. We can attach 5V supply voltage as well since the module has on board 5 to 3.3 V regulators.
- It is worn for many applications like wireless headset, game controllers, Wi-Fi mouse, wireless keyboard, and many more consumer solicitations.
- It has range up to <100m which depends upon transmitter and receiver, atmosphere, geographic & urban conditions.

3.4. HT12E Encoder

HT12E encoder IC can convert the aligned data into episodic data for transmission through the RF transmitter. This IC can encode up to 12 bits of data through its 8 input pins and convert it into a serial bit stream The encoder IC also includes a built-in oscillator and a 38kHz carrier frequency generator that can be used to generate the carrier frequency for the IR transmission[2].

3.5. HT12D Decoder

The HT12D decoder has 8 bit address and 4 data bits. The label bits are used to set up the decoder's address, which must match the encoder's address for communication to occur The 4 data bits are used for transmitting various commands, such as turning on/off a device or changing its setting.

3.6. NRF24L01 Module

This chip is commonly used in wireless communication, application such as wireless sensor, networks, remote control systems, and wireless mouse and keyboard devices. It supports data rates of up to 2Mbps, and has a range of 100meters in open air it uses 5P interface for communication and can be powered by a voltage range of 1.9V to 3.6. The NRF24L01 chip has a low form factor low power consumption and is cost sufficient making it a popular choice in many applications.

3.7. L298N Motor Driver

The L298 features built-in protection circuitry including thermal shutdown overvoltage protection and crossover current protection. It also has separate logic supply inputs for controlling the output bridges independent of the VCC input voltage [1].

3.8. IR Module

This sensor can be used to detect motion, temperature, and proximity. Infrared radiation is transmitted by all objects that have a non-zero temperature so, IR sensors can be used to monitor temperature changes in a system. In addition, IR sensors can be used in security systems to detect motion in a room or building. For example, IR sensors may be used in automatic doors to detect the presence of a person and open the door automatically. Overall IR sensors are versatile and essential components in many electronic applications [2].

3.9. Ultrasonic Sensor

Ultrasonic sensors can be worn for a variety of solicitation, including stretch computation, obstacle detection, and level measurement. They are commonly used in robotics, automotive parking sensors,

and industrial automation. One of the advantages of ultrasonic sensors is their ability to operate in harsh environments or in areas with low visibility, such as smoke or fog. They are also non-contact sensors, meaning they do not need to physically touch the object being measured or detected [1].

3.10. Implementation

3.10.1 Circuit Connections

The input readings are extract from the by hand using the accelerometer. These perusal are send from Arduino UNO to the RF transmitter which is attached to wheel chair as shown in Figure 2 and 3 [3].

The HT12D decoder receives the signals from the encoder and converts them into the data signals that are used to control the motors.

The L298N motor driver is responsible for driving the motors in the wheelchair. It receives the signals from the HT12D and sends the appropriate power and direction signals to the motors [3].

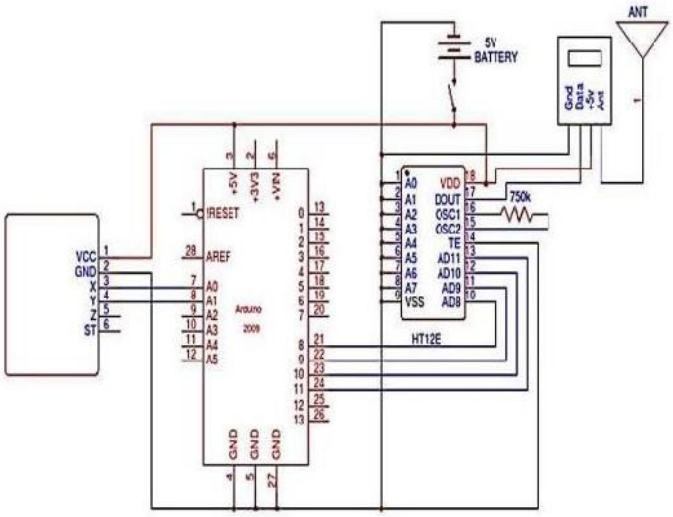

Figure 2. Circuit Diagram

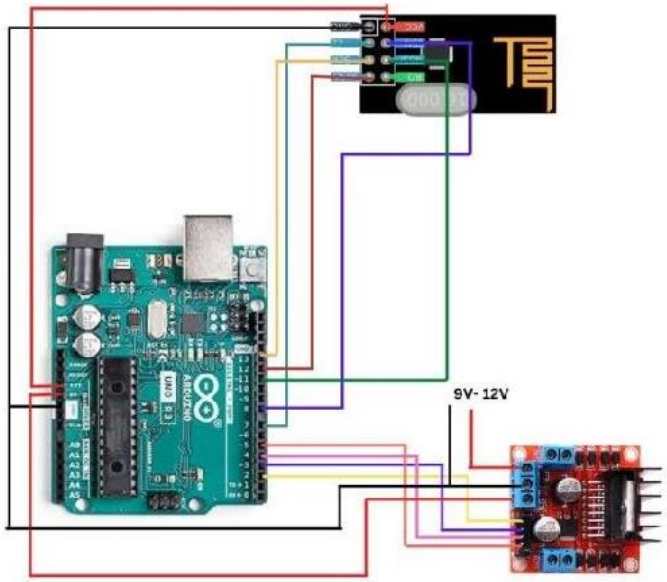

Figure 3. Actual Circuit

3.10.2 Working

The different hand gestures that the wheel chair can recognized as shown in figure 4 are **STOP, RIGHT, LEFT, BACKWARD, FORWARD.**

The following are the hand gestures used in controlling the wheel chair.

Figure 4. Different Hand Gesture

4. CONCLUSIONS

In conclusion, the IoT-controlled smart wheelchair is a revolutionary development that has made life more comfortable and safer for the disabled. It is essential in helping the disabled to move around more efficiently and gives them more independence. Opening up new opportunities and enabling them to participate in society. The continuous innovations and advancements in IoT technology promise a brighter future for individuals with mobility limitations as it aims to improve their quality of life and enhance their overall well-being.

5. FUTURE SCOPE

Moreover, the hand gesture wheelchair can be integrated with artificial intelligence (AI) technology to make it more intuitive and personalized. This Al-powered wheelchair can learn the user's preference, behaviour, and environment and adapt accordingly, making the wheelchair more efficient and user-friendly.

Another important feature that can be added to the wheelchair is the ability to charge itself. Using solar technology the wheelchair can be equipped with solar panels that will charge the battery as the user moves around in the sunlight. This feature can alleviate the need for constant charging and provide a more sustainable and environmentally friendly solution.

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