International Journal for Modern Trends in Science and Technology, 9(03): 112-116, 2023

ISSN: 2455-3778 online
DOI: https://doi.org/10.46501/IJMTST0903016
Available online at: http://www.ijmtst.com/vol9issue03.html

Car Controlling with Hand Gestures

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To Cite this Article
S.Anantha Lakshmi, B.Hari Priya, M.B.S.S.Aiswarya, R.Sushma and K.Chandra Sekhar. Car Controlling with Hand Gestures. International Journal for Modern Trends in Science and Technology 2023, 9(03), pp. 112-116. https://doi.org/10.46501/IJMTST0903016

Article Info
Received: 12 February 2023; Accepted: 11 March 2023; Published: 13 March 2023.

ABSTRACT

The use of gesture recognition has long been seen as a solution to bridge the gap between the real and the virtual. The idea presented here introduces an Arduino-based automobile system that eliminates the need for human drivers. An Arduino microcontroller, Zigbee Module, alcohol sensor, and ultrasonic sensor are used to carry out the suggested job. Each hand movement creates values along its associated axis, allowing the driver to control the vehicle's direction just by moving their hand. The Gyroscope sends its readings to an Arduino UNO, which then sends commands to the motors. This concept has the potential to greatly benefit persons with mobility impairments by allowing them to relocate certain things with less strenuous physical actions. As a result, the automotive industry is seeing a proliferation of new technology and methods. As we are now well into the 21st century, advances in AI and the Internet of Things have helped to propel progress in all of these automotive-related fields. Formerly, robotic vehicles were operated by means of wired cables; this method had a number of problems, including a lower degree of compatibility and the fact that they were not able to benefit from Artificial Intelligence or the Internet of Things in practical settings like the military. In this work, we present the concept of a robot-car that can be driven by hand gestures, and we experiment with and show this concept. By analysing the hand's angle and location, the suggested robotic automobile may be driven with a wave of the hand. In addition, the Zigbee module allows the robot to be controlled with a single click on a smartphone running an android operating system and the use of speech recognition through Bluetooth technology. Arduino, a Gyroscope, an Ultrasonic Sensor, an L239d Motor driver IC, a Geared Motor and Connecting Wires, an Alcohol Sensor, and a Zigbee Module are all integral parts of the Vehicle's framework.

KEYWORDS: IoT, Zigbee Module, Gyroscope Alcohol Sensor.

1. INTRODUCTION

The term "Gesture Controlled Vehicle" refers to a vehicle that is operated not by conventional buttons but by the driver's hand movements. Hand gestures are innate to humans, and wireless technology makes them even more effective means of communication. Microcontroller project: a gesture-controlled automobile, whereby the driver directs the vehicle's movement with a hand glove. As opposed to conventional remote-controlled vehicles, this one is much simpler to converse with. You may drive it forward, backward, to the right, or to the left. When the hand is held parallel to the ground, the car comes to a halt. Arduino, Gyroscope, Ultrasonic Sensor, L239d Motor driver IC, Geared Motor, Zigbee Module, Alcoholic Sensor, Jumper Wires, and Connecting Wires all play important roles in the Vehicle's construction. A robot is a machine with intelligence that can be controlled remotely by a computer programme to carry out a wide range of tasks. Robots are crucial to

automation in every industry, from manufacturing to military construction to the healthcare industry and beyond. Time savings is only one of the many benefits people get from using robots. These machines also boost output and dependability, cut down on waste, and improve the environment and the bottom line. Although controlling by physical devices has grown quite effective, robots play a vital role in assisting with chores that are difficult for people with disabilities. Robots may be divided into two broad classes: those that operate independently and those that need human intervention. As a result, using robots that are controlled by gestures is one of the most sophisticated and aesthetically pleasing ways to capture human gestures, which are notoriously difficult for machines to interpret. In this work, we present the concept of a robot-car that can be driven by hand gestures, and we experiment with and show this concept. Our idea includes a car that is a replica of modern automobiles; geared motors determine the vehicle's speed and direction of travel, and the driver uses a glove to steer. Using a glove equipped with a gyroscope, the user may send motion data wirelessly to the vehicle through a Zigbeemodule (wireless).

1.1 PROBLEM STATEMENT

Conventional robots operated by wired buttons become cumbersome, and their range is severely constrained. A wearable hand glove will serve as the interface between the user and the wireless hand controlled robot, with the latter's motions being dictated by the user's hand gestures. Our project's overarching goal is to build a system that can identify human input in order to complete predetermined tasks. As part of this project, we will develop a glove that can be worn on the hand and that has sensors attached to it in order to record the user's hand movements and translate them into electrical signals. We used a Zigbee module, a gyroscope, an ultrasonic sensor, and an alcohol sensor to address the limitations of previous gesture recognition efforts that relied on Bluetooth. Our research uses hand gesture and hand motion technologies to operate an autonomous car. As the Gyroscope can transmit signals directly to the Arduino, we choose to utilise it in our project. With the use of an alcohol sensor, you can tell whether a person is inebriated or sober. Here, an ultrasonic sensor is used to detect obstacles; if one is found, the car will come to a halt. Bluetooth and ZigBee are two popular wireless technologies for exchanging data using radio waves. ZigBee is a wireless technology standard for personal area networks that use low-power digital radio waves, while Bluetooth is a wireless technology used for short-range device connections.

2. LITERATURE REVIEW

Prof. R. V. Dharaskar Chhabria, S. A. Sandeep Ganorkar argued that the vocal interaction between humans and robots is crucial in a variety of contexts. They developed a vocal interface to command the robot. As a form of communication, human hand gestures are remarkably consistent and adaptable.

The movement interface for commanding a flexible robot using hand gestures was suggested by Stefan Waldherr and Sebastian Thrun. Here, cameras are being used to track people and pick up signals, such as when the robot should move. Robots may now do their normal tasks and use their tracing abilities.

The hand gesture recognition framework has a number of problems, some of which were suggested and shown by RafiqulZaman Khan and Noor Adnan. To get precise and suitable values for hand movement recognition with the capability to connect with Computer programmes.

Analapandit suggested a fundamental wearable hand motion device based on established clinical and early modern day considerations. Contact and console are used to establish connections with frameworks. Here, people are using gadgets to transmit information, both to one another and to many other devices. Effective collaboration.

Christian philandering "acceptance of a wobot odd? Impact of Robotic Appearance on Customers' Attitudes Towards Physical Contact ". Physical forms of human-robot interaction such as hand-holding, hugging, and the like are within the capabilities of today's robots. Careful planning is required to provide a coherent physical communication structure that allows for consistent interfacing and restricts vulnerability to threat.

The study presents a control scheme for mobile robots that is based on the use of hand gestures. These mobile robots may be moved about by the user by making various hand gestures that act as commands to the robot. Gesture recognition makes use of a number of

image processing, image counter processing, and other methods. Information that has been identified and encoded is used to guide a mobile robot.

With this implementation, the user's motions control the mobile robot's path. For gesture recognition, this device employs a PIC Microcontroller housed in the transmitter unit.

Ultimately, we want to control a moving robot using simple motions of the human hand. To do this, a circular Hough transform-based approach is used to the recorded hand images to choose the best targets. The robot's mobility is then controlled by signals sent to a receiver.

This study discusses the fundamentals of human-robot communication via the use of hand gestures. A Leap motion sensor can do this. In this scenario, we will assume that the robot is capable of empathetic communication. The results of this research shed light on how people may communicate with robots by employing appropriate hand gestures.

The authors of this work provide a gesture-based interface for controlling a robot automobile. In order to track the user's hand movements, a three-axis accelerometer is used. Data may be sent wirelessly to a microcontroller using any available connection. The data from the received signals is then translated into one of six instructions used to direct the robot automobile around its environment.

In this article, we show how to use the Arduino Lily pad to operate an automaton via the use of hand gestures. The projected model is controlled by a motion device worn on the gloves. The primary focus of this technique is to direct the robot with a wave of the hand.

The primary goal of this project is to create a gesture controller based on accelerometers and gyroscopes that can be used to drive a robotic arm instead of a traditional joystick or keyboard. The primary contribution of this research is the implementation of a simple and efficient object detection system on the robot's physical model. We evaluate the proposed object identification algorithm and gesture controller based on the outcomes of our experiments.

The robot in this study is controlled by hand movements. They suggested an alternative approach to user hand identification and hand gesture detection that uses the robot's camera to identify the hand in several consecutive images. As a result of their efforts, the robot now moves in the same direction as the identified hand. Improving the hand detection rate in future research participants is a priority.

3. METHODOLOGY

The integrated circuit L293D is a dual H-bridge motor driver (IC). Motor drivers are essentially current amplifiers since they take a low-current control signal and output a much larger signal to the motor. Motors are powered by a signal with a larger current and so this is how it is generated. There are two H-bridge driver circuits already installed in the L293D. Both forward and backward motion may be applied to two DC motors at once in normal mode of operation. Two motor actions may be regulated by an input logic. Every driver that has an associated enable input that is set to high is enabled. The effects of the inputs are felt in the outputs, which become dynamic and in sync with them. When the enable input is low, the driver is not active and the outputs have a high resistance. An RF-operated robot is under project control. This endeavour makes use of regular 433 MHz RF modules. The AT89C51 microcontroller is used here.

This robot can operate without constant supervision. They are mostly put to use in industrial settings and may be fitted with laser guidance. You may navigate using a variety of methods, such as inductive lines laid under the ground, magnetic or optical strips installed on the outside of a building, or even lasers. This new robot is an upgraded version of one we created a while back. The goal of the intelligent spy robot project has always been surveillance. It can be managed from up to 100 metres away thanks to its radio controls. We will likely send young soldiers into enemy territory to spy on them.

Which is a dangerous occupation that often costs lives? All the industrialised and advanced countries are working on producing it, a little spy robot that can fight against adversary. Our robot is one little step closer to engaging in such endeavours.

Each robot's motors will cut out simultaneously, and after a few seconds, the robots will reverse course, making a left or right turn before stopping again. Used in 3D-Gaming, Inertial Sensor Tilt Compensation, Navigation, and Dead Reckoning. The serial data is received by the transmitter, and then it sends the data wirelessly through RF via the antenna linked to pin4 of

the transmitter. The data is sent at a rate of 1 Kbps to 10 Kbps. One uses a radio frequency (RF) receiver tuned to the same frequency as the signal being sent to pick up the data being sent.

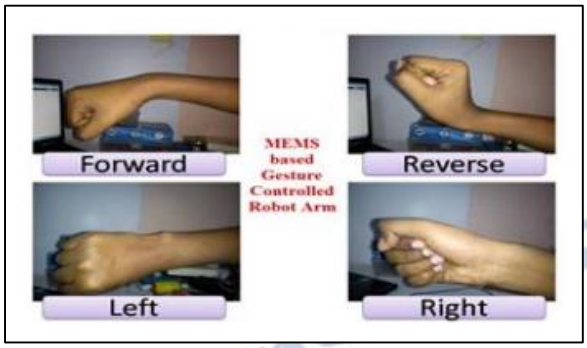


Fig 1: Movement Signs

Fig 2 shows the whole mechanism and functions of the suggested autonomous hand gestures controlled automobile for ease of study. In contrast, I/P and O/P signify the input and output of the system, respectively. Both remote and wireless control are available for the robot vehicle. In the first place, there's the hand-signing method. The hand-mounted accelerometer first picks up on acceleration forces in the hand's direction and transmits that data to a nearby Arduino UNO board. After the data has been received, the vehicle's Arduino Uno will compare the received angles to a fixed set of angles, and then send a signal to the motor module to drive the robot car in the desired direction. It's easy to see that the robot car's wheel movements for going ahead, reversing, braking, turning left, and turning right all fall inside a predetermined set of angles. The second option is to use an android mobile application to command a robot automobile. Such an app already exists for android mobile devices and can be downloaded from the Google Play store. When the user pushes the relevant touch button, a signal is sent from the system's receiver to the Arduino UNO in the automobile through the ZIgbee module. In response to the following signal command, Arduino will compare the data it has received with a set of instructions stored in its memory and then send the appropriate signal to the motor module, causing the robot car's wheels to rotate in the appropriate direction.

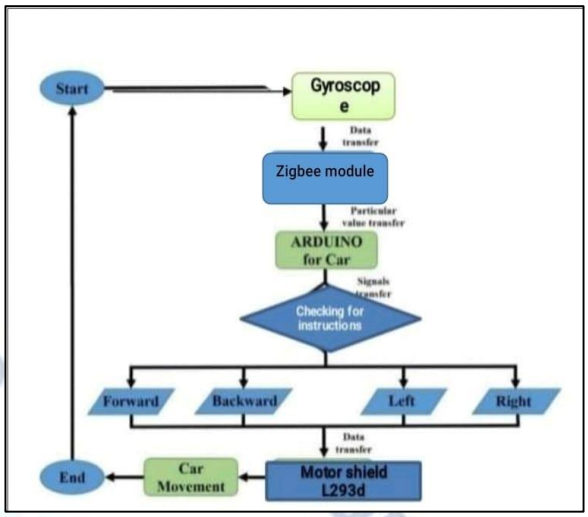


Fig2: Flow chart for car controlling with hand gestures

By placing a gyroscope and Bluetooth module on our hands, the automobile responded to our gestures and moved. Zigbee module is used to send data to Arduino. Gyroscope data is sent to Arduino to indicate which way the board is tilting. Tilting our hands forward propels the automobile ahead until another command is issued. Here, Arduino plays the role of a conduit, transmitting signals to the motor driver to cause the vehicle to move. The automobile will be halted if we maintain a steady hand position. In this case, we used an ultrasonic sensor to determine what's in the area and so avoid accidents, and an alcoholic-detection sensor to establish whether or not a person is intoxicated.

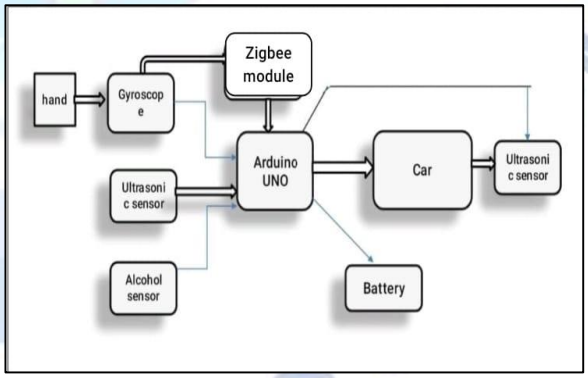
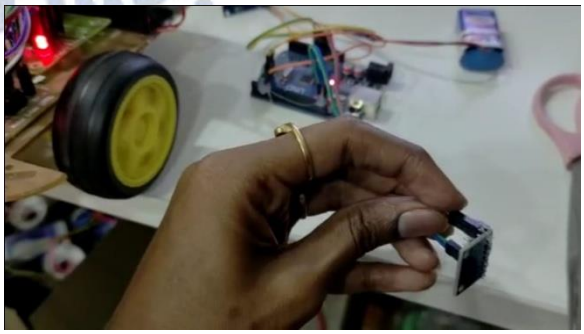
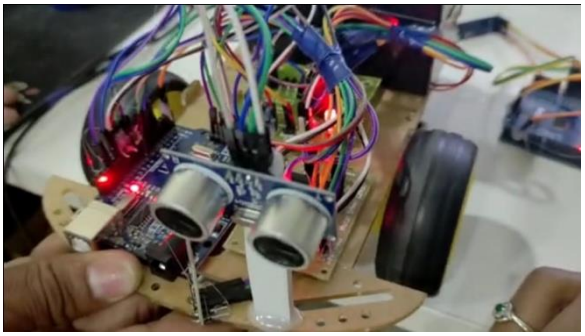
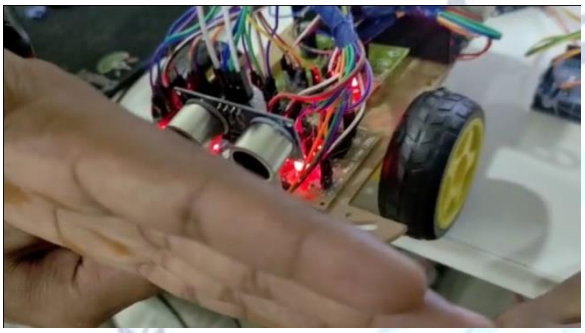


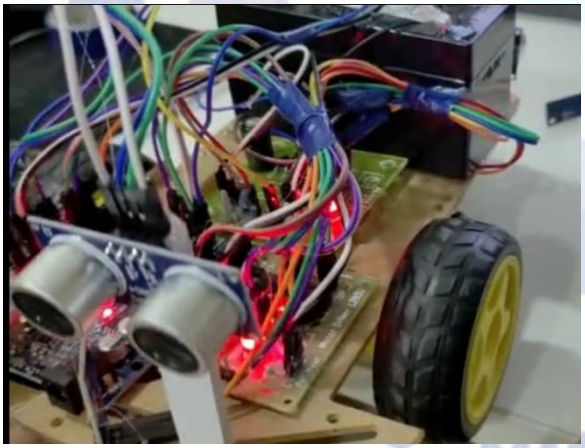
Fig3: Block Diagram of Proposed Model

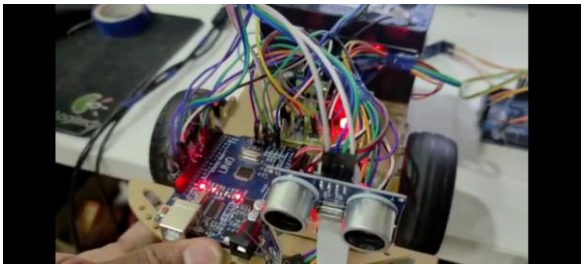
4. RESULTS











5. CONCLUSION & FUTURE SCOPE

In this research, we demonstrated a hand-gesture interface for navigating a robot vehicle. Movements of the hands may be used as direct controls for a vehicle. Here, a Zigbee network and a gyroscope were employed for remote control. In addition, we utilised hand signals to steer the car to the right or left. As an added safety measure, we used ultrasonic sensors to determine what each item was. Furthermore, an alcoholic sensor can tell whether a person is indeed inebriated. Yet, the suggested single-equipment with multiple-application system offers benefits, including being user-friendly, cheap, using little power, being straightforward and quick to implement, and being compact. The space needed for it to conform to the hardware circuits is hence minimal. Moreover, the developed prototype is very resilient against unforeseen difficulties, and it can be simply expanded further in the hardware area, and other applications may be added to decrease the human work of updating.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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