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VOICE AND GESTURE CONTROLLEDROBOT

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Abstract: A robot is a sort of automated machine that can do specified jobs quickly and precisely with little or no human assistance. This is a two-in-one project that allows you to control a robot using either voice commands or simple gestures. It basically describes how to operate a robot with speech or gestures. Separate portions of the robot control circuit are dedicated to voice and gesture. Each part has its own setof sensors. An electret microphone serves as the sound sensor in the voice part, while an accelerometer serves as the sensor in the gesture mode.

***Index Terms*- Ardunio;ESP;Gyroscope;Camera; Robot; Motor drivers;**

I.INTRODUCTION

Voice Controlled Robotic Vehicle is a project that allows users to drive robots using voice commands received via an Android application. To capture and read spoken commands, the control unit is connected to a Bluetooth device. The robotic vehicle subsequently acts in accordance with the command given by the android application. For this, a microcontroller has been included into the system, allowing the car to be controlled via an Android application. Any Android-based smartphone, tablet,or other device with an Android operating system can be used as the controlling device. The android controlling system has a user-friendly interactive GUI that allows the user to easily control the car. The transmitter uses an android application required for transmitting the Gesture Controlled. A robot that can be operated using simple human movements is known as a robot. All that is required of the user is to wear a gesture gadget with a sensor. The sensor will record the movement of the hand in a specified direction, causing the robot to move in the same direction. Through radio waves, the robot and the Gesture instrument are connected wirelessly. Because of the wireless communication, the user can communicate with the robot in a more friendly manner.

II. LITERATURE SURVEY

To make processing voice commands easier and more effective, a smartphone is used. They are increasingly employed in many applications due to their independent OS and internet connection. [1].The Internet is one of the main aspects that we will be utilising. The phone and robot can talk to each other over the internet. The most popular and effective Operating System for smartphones is Android OS, which was created by Google Inc. When communicating between two devices, such as a microcontroller and a smart phone, the Internet transmits data quickly and effectively. [2].On flat surfaces, the robot can either maintain a fixed linear speed or have variable speed. A microcontroller named NodeMcu is used to do voice recognition. An ultrasonic module is implemented for obstacle detection and avoidance. It is programmed to stop the robot if there is any hindrance in its path and will alert the operator to use another spoken command. [3].A number of the different technologies that have been used for hand- based recognition systems have produced positive outcomes. The ultimate goal is to use these methods to operate specific systems, such as air conditioners and smartphone apps. Data glove-based approaches are among the mostused methods. [4]. In this method, sensors are mounted to the glove to capture gestures. The signals produced by the sensors are analysed, and the associated commands are carried out. Conversion of gestures into speech is one instance of this. [5]. where advanced computing methods are used to translate hand motions into speech. Accelerometers are used as sensors on the gloves to translate changes in hand position into signals that the processor can understand and use to carry out the commands. [6].The industrial robot is programmed using natural movements and words. ANN was used to recognise postures and gestures. Using cameras that record images of hands and decode them to carry out instructions is a vision-based technique. [7].A single camera or a number of cameras may be employed. In order to extract features that will be utilised to train classifiers using various machine learning techniques, multiple sophisticated algorithms are employed. The colour glove-based technique combines the vision-based and glove- basedapproaches in that each segment of the glove has a unique marker, enabling the extraction of geometric characteristics from the glove and assisting in the localization of the gesture. Lamberti L. et al. carry out one such implementation.[8]

III. PROPOSED SYSTEM

The robot can be divided into two categories: hand gesture robots and voice-controlled robots. The Google speech recognition technology is being utilised to create android software that takes voice command data and convertsit to text. The android app converts speech to text and sends the transformed text data to the ESP8266 wife module. The ESP8266 was used to enable command transmission and receipt. The robot was programmed to move forward, backward, left, right, and stop in response to the commands. The gesture of our hand is detected by an accelerometer sensor. The signals are sent by one Arduino, and the signals are received by the other Arduino, which moves the robotaccordingly. The signals are sent by the transmitter through an ESP01 module, which we employ for wireless communication. The transmitter circuit must be tied to our hands, and the robot will move as we move our hands. An L298N motor driver.

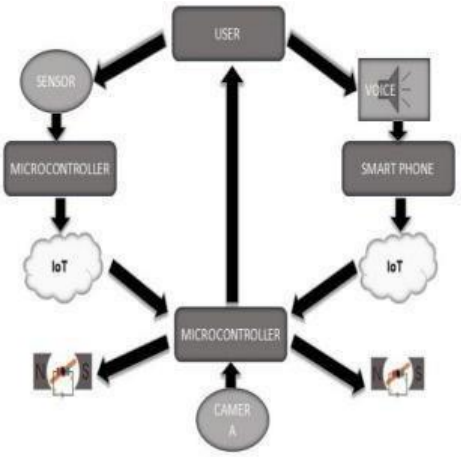

Fig 1: Block diagram of Voice and Gesture controlled robot

IV. WORKING

A. Voice Controlled:

Receiving voice commands from the user is the first stage in completing this project. The user gives voice commands to the Google Assistant, which is included in the Android smart phone, in this project. The voice commands are then sent to the ESP8266 module via software services such as IFTTT and Adafruit IO, which will be covered in greater detail later. The string comparison will be done in the ESP32 module.for received voice commands, and then the appropriate loop will be run. The commands are then sent from the ESP8266 module to the L298N motor driver, which operates the dc motors according to the commands. It also demonstrates that the appliances may be operated without an android phone by sending a standard SMS. Thispaper might simply be changed to incorporate a spy camera that can transmit videos to the user via Wi-Fi. For this project, solarcells are used instead of a standard lithium ion battery. If This Then That (IFTTT) is a free web-based application that allows you to create applets, which are chains of basic conditional statements. Changes in other web services, such as Twitter, can trigger an applet.

Voice Commands through App	Output (Movement)
Forward	Vehicle moves forward
Back	Vehicle moves backward
Right	Vehicle moves rightward
Left	Vehicle moves leftward
Keep watch in all directions	Vehicle moves in all directions with some delay
Stop	Vehicle movements stop

Table 1: Command for Voice Control

B. Gesture Controlled:

The accelerometer in a gesture-controlled robot records hand motions and delivers the information to a comparator, which assigns suitable voltage levels to the recorded movements. The data is subsequently passed through an encoder, which prepares it for RF transmission. The user's hand movement is identified by the device in our hand, and the robot moves accordingly. When we place our hand in front of the robot, it begins to move forward and continues until the next order is delivered. When we move our hand backwards, the robot changes its state and begins to move backwards until another order is issued. When we tilt it to the left, it will turn left till the next order is given. When we move our hand to the right, the robot moves to the right.The accelerometer is a three-axis acceleration measuring device with a range of +-3g. To measure acceleration, this gadget uses a polysilicon surface sensor and a signal conditioning circuit. This device's output is analogue in nature and proportional to acceleration. When we tilt this instrument, it measures the static acceleration of gravity. And produces a motion or vibration as aresult.

Fig 2:Commands for Gesture control

ADVANTAGES AND DISADVANTAGES

A. *Advantages*

It can be Operated Form A long distance People with Disabilities Can Easily Control it.Works on simple voice commands

B. *Disadvantages*

It does not work in remote areasLack of accuracy
Accents and Speech Recognition

V.RESULTS

We can control the robot by speaking commands, as shown in the figure 3 and the robot's body is constructed. Until recently,the robot has only been commanded by humans. In four directions (forward, backward, forward, forward, forward, forward, forward, The vehicle advances. Backward movement of the vehicle The right vehicle advances to the right. Left Vehicle advances to the left. Keep an eye on all vehicle movements in all directions with a slight delay Stop vehicle movements). The robot's speed can be regulated by lowering or increasing the RPM of the DC motors. Where the data (command data) is saved inthe cloud platform and the ESP8266 module is controlled via Google Assistant.

Fig 3: Voice Result

During this project, a Gesture Controlled Robot with Arduino Uno microcontroller was created, which can be controlled by human hand movements as shown in the figure 4. This necessitates the usage of a small transmitting device on our hand, which includes a gyroscope that communicates specific commands to the robot in order for it to manoeuvre in accordance with the user's hand gesture, as well as one receiver at the robot. The RF module has a range of 100 metres and operates at a frequency of 434 MHz. The data is transmitted at a rate of 1Kbps to 10Kbps. The RF receiver, which operates at the same frequency as thetransmitter, receives the transmitted data. RF (radio frequency) transmission is always preferable than IR (infrared) transmission.

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Fig 4 : Gesture Result

VI. CONCLUSION

We proposed a robot prototype based on "Human Gesture Recognition" with Voice Recognition in the article, i.e., to control a robot using gestures and voice without any complications. The robot is controlled via a 3-axis gyroscope and an ESP01 module,which serves as the system's input device and captures human hand gestures and voice recognition. The gyroscope is a reliable and simple to operate input device. It decreases the user's physical exertion and gives them the ability and freedom to operatethe robot in whatever direction they want. This is also true of the WIFI module. In addition to successfully using the gyroscope and WIFI module in the robot, we also used ultrasonic. sensors that would assist a user in detecting any obstacles in his or her path as well as providing the distance between the obstacle and the robot. In current age of technology, where humans and robots collaborate to advance technology, such a prototype might be useful in a variety of disciplines and lead the way for future generation.

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