Robot Car Using ESP32 Cam

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Abstract: *We have created a gesture-controlled robot car that can be controlled using a mobile application. we are using ESP32 Cam which is a low-cost camera module, and an Esp8266 controller with Bluetooth and Wi-Fi module. The mobile app sends the control signals as per gesture to the Esp8266 controller then this controller sends a signal to the motor driver to drive the motor and then the motor act accordingly the power to the whole circuit is provided by a 12v battery and the switch is connected to cut off the power. 9v battery is also used to power the Esp32 Cam. This robot is able to move and capture video and images as well as able to stream the video captured by the camera. In this project, we are using the ESP32Cam module which has in-built Wi-Fi and Bluetooth module as a camera, and Esp8266 as a controller of the robot car. This project provides a moving CCTV camera which is controlled over the internet and streams live video.*

Keywords: Gesture control car, Remote control Car, Video streaming car, ESP8266 control car.

I. INTRODUCTION

In this project we are making a gesture-controlled robot car which can be controlled using mobile application. In this project we are using ESP32 Cam which is low-cost camera module and Esp8266 controller with Bluetooth and Wi-Fi module. The mobile app send the control signals as per gesture to the Esp8266 controller then this controller send a signal to the motor driver to drive the motor and then then the motor act accordingly the power to whole circuit is provided by 12v battery and the switch is connected to cut off the power. 9v battery is also used to power the Esp32 Cam.

This robot is able to move and capture video and images as well as able to stream the video captured by the camera. In this project we are using ESP32-Cam module which has in-build Wi-Fi and Bluetooth module as a camera and Esp8266 as a controller of the robot car. Motor Driver to drive the motor of the robot car in which the wheels are connected. 12V battery is connected to supply power to the Robot Car. This project provide a moving CCTV camera which can be controlled over the internet and stream the live video. Which will be useful for the applications like patrolling (Regularly patrolling of the streets to keep people safe and assist in notifying the authorities as soon as possible.

There is a very less probability of receiving inaccurate or biased information. Identifying, collecting, rapidly providing information to authorities if it matches any person's criminal. history in its criminal database. For instance, if some criminal is on the run, the bot can send police a message with its last location.), in military applications (The Certain places are only for gathering information and monitoring, thus this Robot car can be used.).

II. PROBLEM STATEMENT

With the fast development of data innovation, a run of video surveillance systems has ended up commonplace in everyday life for reconnaissance and security purposes. Closed-circuit tv (CCTV), regularly known as video observation, is an example of how video cameras send video signals to a restricted number of monitors. When CCTV was at first presented, its moo quality and tall establishment costs restricted its utilization. Another common case is the dashboard camera. In the event of a car mischance or vandalism, dashboard cameras can give video proof. A CCTV is regularly introduced for reconnaissance in zones that require monitoring,

such as banks and clinics or zones where security is required. Hence, its coverage is constrained. We required a framework that will be able to move and stream the video captured and can be controlled remotely over the Internet.
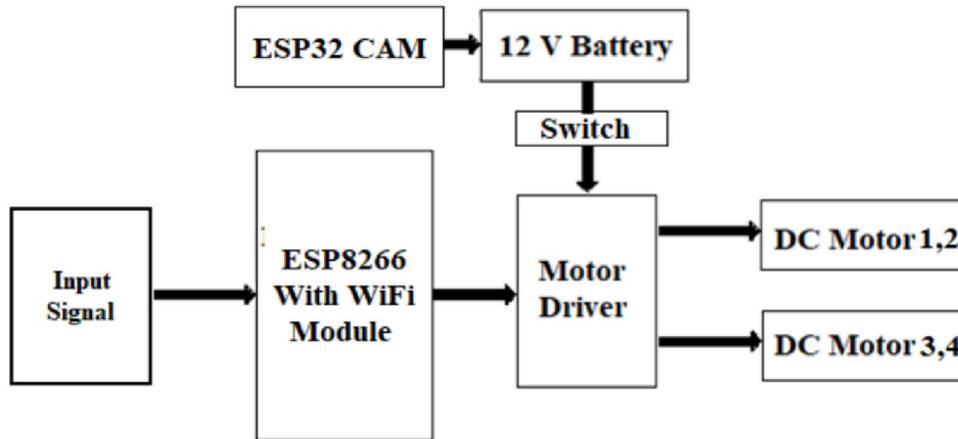
III. BLOCK DIAGRAM

Figure 1 Block Diagram

IV. DESIGN METHODOLOGY

Input Signal: In the input signal block the input signal is given from the Gesture Control App to the Robot Car by using which we are able to control the Robot Car. We can give instruction like move forward, move backwards, move left, move right. This input signal is given to the ESP32-Cam over the internet. For this we have created a Gesture control App with the help of MIT App inventor

ESP8266 with Wi-Fi Module:ESP8266 is used as a controller for this project it also have Bluetooth and Wi-Fi module this controller controls the robot car from the input given from Gesture Control App. The Esp8266 get the input as follows

- F - To move in the forward direction.
- B - To move in the backward direction.
- L - To move in the left direction.
- R - To move in the right direction.

According to this inputs the controller will send signal to motor driver to move the robot accordingly. If the signal is F then the controller send signal to the motor driver to move forward. and If the signal is B then the controller send signal to the motor driver to move backward. If the signal is L then the controller send signal to the motor driver to move left. and If the signal is R then the controller send signal to the motor driver to move right. this process is done by highing the output pins of Esp8266 controller that are connected to the motor driver

- **Motor Driver:** This L298N Motor Driver Module is a high power motor driver module for driving DC and Stepper Motors. This module consists of an L298 motor driver IC and a 78M05 5V regulator. L298N Module can control up to 4 DC motors, or 2 DC motors with directional and speed control. We are using L298N motor driver act as a interface between esp8266 controller and the gear motors. This motor driver provide supply to gear motors connected to wheels to move the robot accordingly. the motor driver can directly control the robot car according to the controller signal by supplying power to gear motor according to the input signal from controller. if the signal says that to move the robot in forward direction then the motor driver moves the robot in forward direction by moving all the motors in forward direction i.e. motor 1, motor 2, motor 3, motor 4 . if the signal says that to move the robot in backward direction then the motor driver moves the robot in backward direction by moving all the motors in backward direction i.e. motor 1, motor 2, motor 3, motor 4 . if the signal says that to move the robot in left direction then the motor driver moves the robot in left direction by moving two motors in forward direction i.e. motor 1 and motor 3. if the signal says that to move the robot in right direction then the motor driver moves the robot in right direction by moving two motors in forward direction i.e. motor2 and motor 4.

- **Battery:** 12v battery is used to supply power to the robot. This 12V battery provide the power to the motor driver and ESP8266. and second is 9v battery is used to power Esp32 Cam so that the module is able to stream video.

- **DC Motors:** Dc motors are the gear motors that is connected to the wheels of the robot and controlled with the help of motor driver. When the motor is powered by DC current, a magnetic field is created within the stator, attracting and repelling the magnets on the rotor. This causes the rotor to start rotating. To keep the rotor rotating, the motor has a commutator

- **ESP32 cam:**ESP32 cam is used as a camera for this project it also have Bluetooth and WI-FI module the theWI-FI module is used to connect with wifi and we are streaming the video capture by the ESP32-CAM that capture the video and stream it over the internet.

- **Switch:** The switch is used to cut off the power provided to the robot car when the switch is ON then the power is on and when the switch is OFF the robot car will not have power to operate.

V. RESULT

The Robot Car Using Esp32 Cam is capable to stream video over the internet to the mobile application and the car can be controlled using the mobile application Gesture Control App with the help of gestures. The Robot Car Using Esp32 Cam will move according to the movements of the mobile.

When we push a button on the car the power from the 12v battery is provided to the car. After that, we have to enter the IP address of ESP8266 in the mobile application that we have developed. then click on the start button to control the car with the help of gestures. when we turn the mobile in the front side then the car moves in the forward direction. when we turn the mobile on the back side then the car moves in the backward direction. when we turn the mobile in the left side then the car moves in the left direction. when we turn the mobile to the right side then the car moves in the right direction.

- F - To move in the forward direction.
- B - To move in the backward direction.
- L - To move in the left direction.
- R - To move in the right direction.

we can stop by clicking the stop button present in the application. and we can view the video streamed by ESP32 Cam in the application.
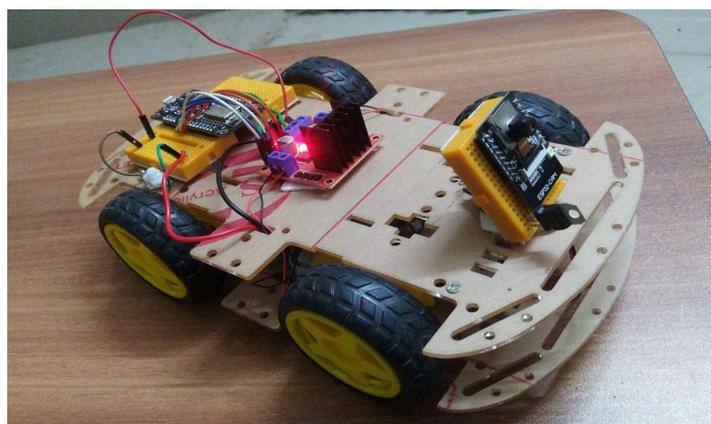

Figure 2: Robot Car using Esp32 Cam

VI. CONCLUSION

This paper highlights theRobot Car Using Esp32 Cam in this project we have created robot car which is controlled with the help of web server. we have created Gesture Control App with the help of MIT App Inventor this app is used to control robot car with the help of gestures and we can also view esp32cam streamed video in the mobile application

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