IOT BASED MONITORNG ROBOT CAR SYSTEM

Nirnkar Maurya
UG Students
Department of Electronics & Communication Engineering
SR Institute of Management & Technology
Lucknow, Uttar Pradesh, India
Email: nirnkarm@gmail.com

Beer Singh
Assistant Professor
Department of Electronics & Communication Engineering
SR Institute of Management & Technology
Lucknow, Uttar Pradesh, India
Email: beer8036@gmail.com

ABSTRACT

The IoT -based Monitoring Robot Car System presented in this paper harnesses the capabilities of ESP8266 and ESP32 microcontrollers to create an intelligent, versatile and cost-effective robot car for surveillance and monitoring applications. By integrating IoT technologies with the power of these microcontrollers, the system enables remote monitoring and control, data acquisition and real-time alerts. The ESP8266 serves as the main communication module, facilitating wireless connectivity and data transmission between the robot car and a central monitoring station. Meanwhile, the ESP32 cam module is a camera module which is used for live monitoring of any areas. The system's design prioritizes ease of use and adaptability, employing a user-friendly web-based interface to control the robot car. The central monitoring station can be accessed remotely through a mobile application, providing operators with real-time video streaming. This paper aims to produce an automated car. The automated car navigates via Blynk app through mobile phones or laptop.

Keywords: Arduino IDE Software, ESP8266, ESP32, IoT, L298N motor driver, Robot Car, Surveillance.

INTRODUCTION

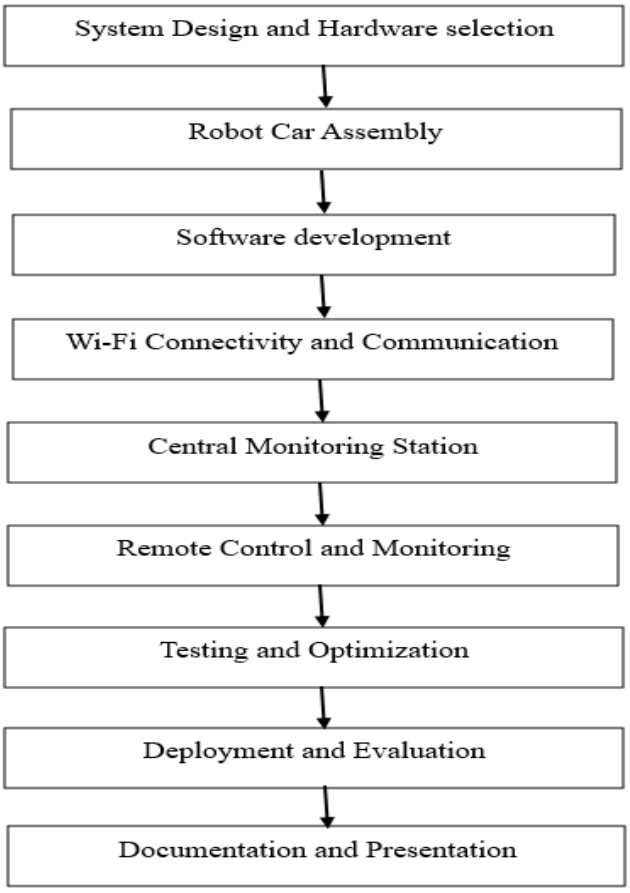
Today, we are thrilled to present our innovative creation: the IoT based monitoring robotic Car System powered by ESP8266 and ESP32 microcontrollers. This cutting-edge robotic system combines the capabilities of these powerful IoT devices to deliver a versatile and intelligent monitoring solution for various applications. The robot car can be controlled through a webpage and apps. The webpage can be opened on any desktop, laptop or mobile. The robotic vehicle can be located at any location with internet access and can be controlled remotely from anywhere. The Particle photon is an IoT board (NodeMCU ESP8266) with Wi-Fi and ESP 32 Cam module. The Board operates the Wi-Fi connection. The Board automatically connects to the particle's cloud services and can be controlled over the internet by sending the data through the company's cloud service.

To control the board over the internet, a webpage has been designed that uses the Blynk cloud and the Blynk app to send data to the board using the HTTP host method. The webpages recognised the board by a device unique ID and connects to the particles cloud service via an access token.

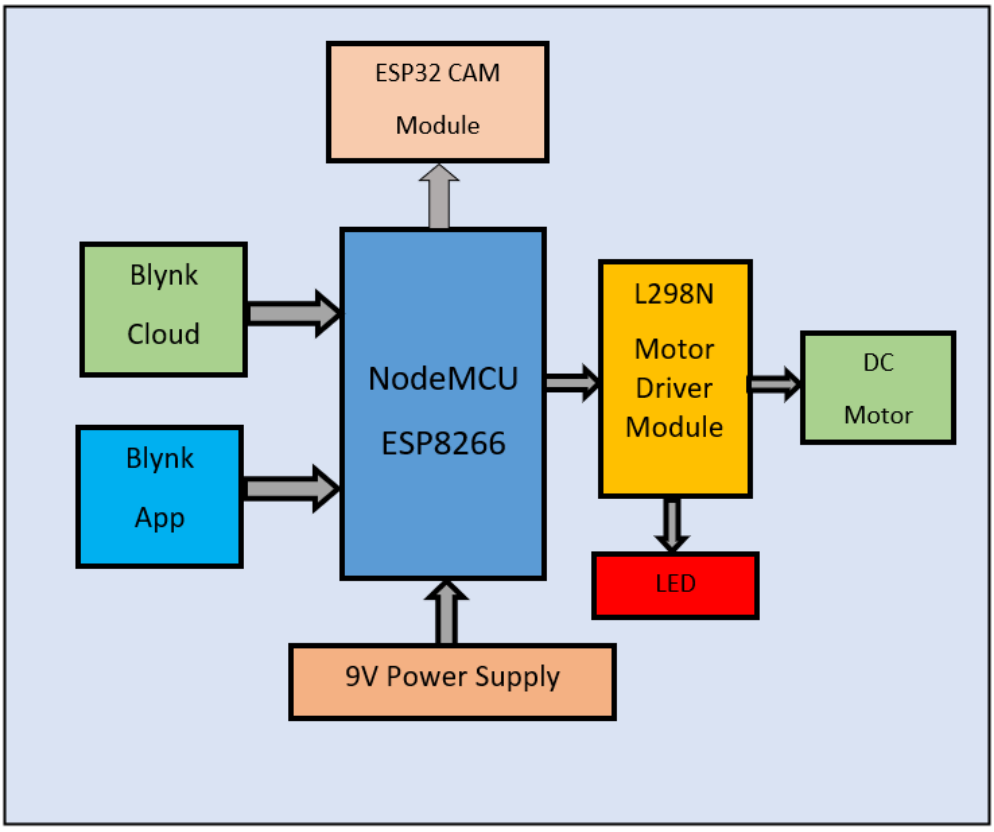
PROPOSED METHODOLOGY

The combination of NodeMCU ESP8266, ESP32 CAM module, Blynk Cloud webpage, L298N motor driver Module and Blynk app helps to move the robot. PC handles multiple tasks i.e., receiving data from blynk app, sending data to NodeMCU from blynk cloud, and sending instructions to the motor driver circuit to navigate. Blynk app helps in taking diversion via the motor driver circuit.

The proposed methodology is:



BLOCK DIAGRAM



HARDWARE USED

1. NodeMCU ESP8266:

   NodeMCU ESP8266 is an open-source development board that combines the ESP8266 wi-fi module with an integrated USB-to-Serial chip. It provides an easy and convenient way to prototype and develop internet of things (IoT) projects and wi-fi enabled applications. The ESP8266 wi-fi module is the core component of NodeMCU. It is a low-cost, low-power system-on-chip (SoC) that includes a microcontroller unit (MCU) with a built-in wi-fi module. The ESP866 offers a powerful computing capability and supports wi-fi connectivity, making it an excellent choice got IoT applications.

2. L298N MOTOR DRIVER MODULE:

   The L298N motor driver module is a popular and widely used dual H-bridge motor driver IC designed to control and drive DC motors and bipolar stepper motors. The L298N module typically consists of the L298N IC, which is the main motor driver chip, and other supporting components such as diodes, resistors, and capacitors. It has two separate h-bridge circuits, each capable of controlling one motor independently.

3. DC MOTORS:

   DC motors, short for direct current motors, are electrical machines that convert electrical energy into mechanical rotational motion. They are widely used in various applications due to their simplicity, controllability, and versatility. DC motors operates on the principle of electromagnetic induction, where the interaction of a magnetic field and electric current generates rotational motion.

4. BATTERY:

   A 9V DC battery is a type of battery that can provides a direct current (DC) output voltage of 9 volts. These batteries are commonly used in various applications where a stable and reliable 9-volt power source is required. Lithium-Ion (Li-ion) batteries have gained popularity due to their high energy density, lightweight, long cycle life.

5. ESP32 CAM MODULE:

   The ESP32- cam module is a compact development board that combines the ESP32 microcontroller and a camera module, providing a versatile platform for various internet of things (IoT) and image processing projects. It is based on the ESP32 system-on-chip (SoC) developed by Espressif systems and features integrated wi-fi and making it suitable for a wide range of applications.

SOFTWARE USED

1. ARDUINO IDE:

   Arduino IDE software is an open-source software. The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in the programming language Java. It is used to write and upload programs to Arduino compatible boards, but also, with the help of 3rd party cores, other vendor development boards. The Arduino IDE supports the languages C and C++ using special rules of code structuring.

2. BLYNK APP:

   Blynk is a mobile application platform that allows users to build custom IoT projects and control them their smartphones or tablets. It provides a user-friendly interface and requires minimal coding, making it accessible to both beginners and experienced developers. Blynk is a commonly used in DIY electronics projects, home automation, robotics and IoT applications.

3. BLYNK CLOUD:

   The Blynk employs a cloud-based infrastructure to enable communication between the mobile app and IoT devices. The Blynk cloud acts as a bridge, forwarding data and commands between the app and the connected hardware.

APPLICATIONS

The IoT-based Monitoring Robot Car system with ESP8266 and ESP32 finds application in various domains, including:

1. Home Security: Providing a cost-effective and efficient surveillance solution for homeowners to monitor their properties remotely.
2. Industrial Monitoring: Assisting I n monitoring, manufacturing facilities and warehouses for safety and efficiency.
3. Environmental Research: Collecting real-time environment data for research and analysis in ecological studies.
4. Educational Projects: Serving as an excellent educational tool for students and enthusiasts to learn about IoT, robotics and programming.

CONCLUSION

In this paper, with the convergence of ESP8266 and ESP32 Cam microcontrollers, our IoT-based monitoring robot car system brings together the best of IoT and robotics technologies. Its capabilities for remote monitoring, autonomous navigation, and environment sensing make it a versatile and powerful tool across various applications. This paper introduces a novel IoT-based approach that leverages the combined potential of microcontrollers to create an efficient, intelligent and adaptable robot car system for monitoring and surveillance. The successful implementation of this demonstrates the potential for future advancements in IoT-enabled robotics, fostering enhanced safety, productivity.

REFERENCES

[1.] "IoT Surveillance robot using Esp32 wi-fi cam & Arduino"; Dr. Nookala venu; ISSN print 2319 1775 online 2320 7876.

[2.] "IoT based surveillance robot", published by: http://www.ijert.org, ISSN: 2278-0181

[3.] "Sritu Hobby", https://srituhobby.com/how-to-make-a-wifi-controlled-car-using-nodemcu-and-blynk-app-step-by-step-instructions/

[4.] "Sritu Hobby", https://srituhobby.com/what-is-the-esp32-cam-module-and-how-to-use-it-step-by-step/

[5.] "Make it.ca", https://www.make-it.ca/nodemcu-details-specifications/

[6.]“Yellow Purple”, https://www.youtube.com/watch?v=7-3piBHV1W0&t=15s

[7.]“Tech StudyCell”, https://www.youtube.com/watch?v=q-KIpFIbRMk

[8.]“Sun Robotronics” https://www.youtube.com/watch?v=dgMfvh9oerM

[9.]“Hash Include electronics”, https://www.youtube.com/watch?v=HfQ7lhhgDOk