IOT_BASED_MONITORING_ROBOT_CAR_SYSTEM

by Beer Singh

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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. The main objective of it to design an automatic system(car) which navigates via Blynk app through mobile phones or laptop.

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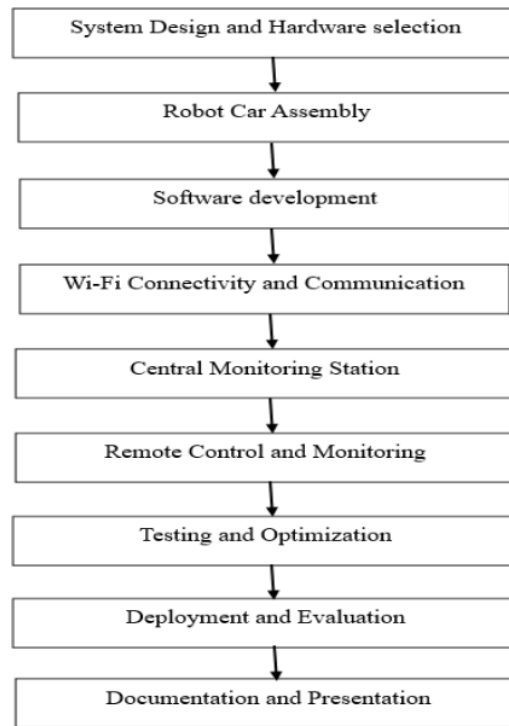
INTRODUCTION

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 is monitored through a web-application. This web-application can be opened through any of desktop, laptop &mobile. Robotic system can be access and controlled via internet at any place & located at any location. The Particle photon is an IoT board (NodeMCU ESP8266) with Wi-Fi and ESP 32 Cam module. Board operates the Wi-Fi connection. Board automatically connects with the services of cloud particles & system to be controlled through internet by sending the data via services of cloud companies.

To control the board over the internet, a webpage has been designed that uses the Blynk cloud and the Blynk app send data to board by using a method (HTTP HOST). Webpages recognised the board with device unique ID & connects to the service of cloud particles via token access.
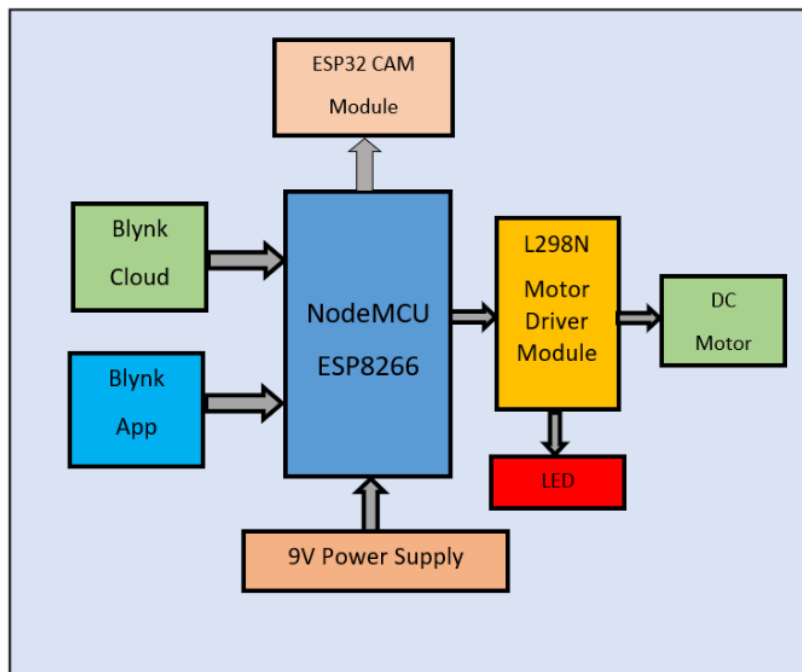
PROPOSED METHODOLOGY

The combination of Node MCU-(ESP8266), CAM module (ESP32), Blynk Cloud webpage, motor driver Module(L298N) and Blynk app helps to move the robot. PC handles various job i.e., received data from blynk app, sending data to NodeMCU from blynk cloud, & sending instructions to navigate the circuit for motor driving. Blynk app used for helping in the diversion for the circuit used motor driving.

Proposed methodology is:

```
System Design and Hardware selection
          ↓
Robot Car Assembly
          ↓
Software development
          ↓
Wi-Fi Connectivity and Communication
          ↓
Central Monitoring Station
          ↓
Remote Control and Monitoring
          ↓
Testing and Optimization
          ↓
Deployment and Evaluation
          ↓
Documentation and Presentation
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BLOCK DIAGRAM

HARDWARE USED

1. Node MCU (ESP8266):

   Node MCU ESP8266 a open source development board with combination of ESP8266 wi-fi module & integrated USB-to-Serial chip. That creates a simple & convenient method for 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. MOTOR DRIVER MODULE(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. L298N module typically comprises 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-MOTOR:

   DC motors or direct current motor follow the law of electromechanical energy conversion means electric energy is converted into mechanical energy(rotational.). DC motor used for many applications due to their simplicity, controllability, and versatility. DC motors follow electromagnetic induction principle, where interaction of 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 are used because of high energy density, lightweight & long cycle life.

5. CAM MODULE(ESP-32):

   CAM module is a combination of microcontroller ESP-32 & camera module known as compact development board, providing a adaptable environment for various internet of things (IoT) and image processing projects. The ESP32 system-on-chip (SoC) developed by Express if systems and features integrated wi-fi and making it suitable for broad area of applications.

SOFTWARE USED

1. ARDUINO-IDE:

   (a)Type: Open-Source Software

   (b) Arduino IDE: Arduino integrated development environment

   (c)Platform: cross-platform application (Windows, macOS, Linux)

   (d) Programming language: Java.

2. BLYNK APP:

        Blynk (mobile application platform) that allows users to build custom IoT projects & 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 interface between the mobile app & IoT devices. The Blynk cloud acts as a bridge, forwarding data and commands between the app & 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.

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FINAL GRADE

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GENERAL COMMENTS

Instructor

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5