WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

IOT Surveillance Robot with Night Vision Camera

Mrs. M. Lakshmi [a], Varsha Kommera [b], SreeKavya Kilambi [b], Joshitha Malasani [b], Risheela Kandunuri [b]

[a] *Assistant Professor, Department of Electronics and Communication Engineering, G. Narayanamma Institute of Technology and Science, Hyderabad – 500104, India*

[b] *Undergraduate, Department of Electronics and Communication Engineering, G. Narayanamma Institute of Technology and Science, Hyderabad – 500104, India*

A B S T R A C T

The aim of this project is to explore the advancements in robotics, with a especially focusing on surveillance robots, and the unification of Internet of Things (IoT) technology for better remote control and monitoring capabilities. Surveillance robots have raised applications in different sectors, such as industrial, mining, agriculture, security, and entertainment. These robots, designed for reconnaissance in dangerous environments, are equipped with features like miniaturized form factors, night vision cameras for low-light conditions, and long-distance remote control. Furthermore, recent innovations have enabled remote control via the internet, known as the Internet of Things (IoT), facilitating efficient and time-saving operations. The IoT technology utilizes night vision and daylight modes based on the time of day, enhancing its adaptability and versatility. Additionally, the research involves testing the robot's RPM using a tachometer, considering various slider values, resulting in RPM values of 146.5, 233.1, and 265.9 for slider values of 400, 710, and 1023, respectively. This study highlights the evolving landscape of robotics and IoT technology, showcasing their potential to revolutionize various industries.

Keywords: Robotics,Surveillance Robots,Internet of Things(IOT),Night Vision,Daylight Mode,RPM testing

1. Introduction

The requirement for intelligent, flexible solutions increases as the security landscape gets more complex. Our IoT surveillance robot's night vision skills enable it to navigate difficult terrain and poorly lit areas, making it an adaptable and independent security companion. The robot is outfitted with a variety of sensors, communication modules, and sophisticated artificial intelligence algorithms. It gathers data in real time, processes it effectively, and sends vital information to authorized workers or a central control system.

With this evolution, security and surveillance requirements have advanced significantly. Our project aims to make a safer and more secure environment across a range of domains, from industrial facilities to public areas and essential infrastructure, by combining the capabilities of IoT, robots, and artificial intelligence. Intelligent surveillance technology is being shaped in part by the possible impact of our endeavour. Our goal is to create an Internet of Things (IoT) surveillance robot that can provide better surveillance in low light by overcoming the shortcomings of traditional security systems and including a night vision camera. The robot will focus on cost-effectiveness, scalability, and strong security measures while it navigates autonomously, detects obstructions, and transmits real-time data to a central control system.

2. Proposed Work

This project's execution—an Internet of Things-based security robot equipped with a night vision camera—represents a state-of-the-art combination of cutting-edge technologies that greatly improve remote monitoring capabilities. The ESP32 development board, which was selected for this inventive system due to its remarkable adaptability and connectivity choices, serves as its base. The surveillance robot's ESP32 is its main control unit. It coordinates a complex system of motor motions and manages a night vision camera module that has strong infrared capabilities for situations when there is little light. For efficient surveillance in low light, the night vision camera module's capabilities are essential. The invisible light emitted by this module's array of infrared LEDs interacts with nearby objects before returning to the camera's sensor. Utilizing this information, the camera can produce an image in total darkness, thereby "seeing" without the use of traditional light sources. This dual-mode camera's versatility is further increased by its ability to stream video and take pictures while smoothly switching between visible light and infrared modes

The smooth integration of the V380 application into the system expands the project's usefulness. Through this software, users can view live night vision camera footage on their mobile devices. Through the use of a local Wi-Fi network, the program connects to the rover's camera module, enabling real-time environmental monitoring of the robot. The V380 app allows users to view historical events through recorded records in addition to real-time

monitoring. These recordings can be stored on the SD card of the rover or in the cloud storage of the program. Users may choose individual recordings and play them back using an easy-to-use interface, giving them a powerful way to watch and examine security camera footage.

camera footage.

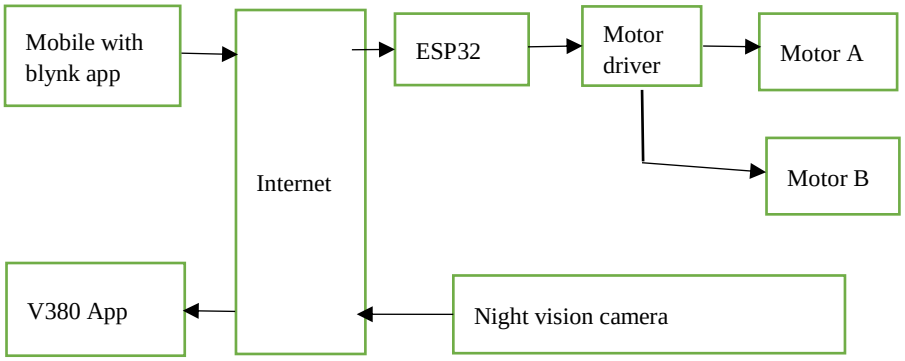

Fig. 1. Block diagram of surveillance robot using night vision camera

The above figure 1 is block diagram of our project it explains how ESP32 serves as the project's main hub and connects to the night vision camera module and the Blynk app, according to the block diagram. Real-time control is provided by the Blynk app via virtual buttons that send commands to the ESP32, which converts them into motor movements for the robot. The ESP32 and the night vision camera module communicate simultaneously, allowing for smooth transitions between visible light and infrared modes. With the help of this camera, you can see in the dark. It can also record videos. By establishing a Wi-Fi connection with the ESP32, the V380 app allows for both live monitoring and recorded video viewing. The block diagram provides a detailed overview of the complex hardware and software network that makes up the surveillance system.

3. Results

The night vision camera robot's primary goal is to cover and monitor locations that are difficult to access during the day, especially at night. The robot with a night vision camera is capable of effortless mobility, image capturing, and wireless transmission. There may be video surveillance available. Its modest size and design will primarily allow it to explore and access regions ranging from a small crack to a big planet. Applications for night vision cameras are numerous, including military, scientific, and many more. Rover uses the Blynk app as its control mechanism.

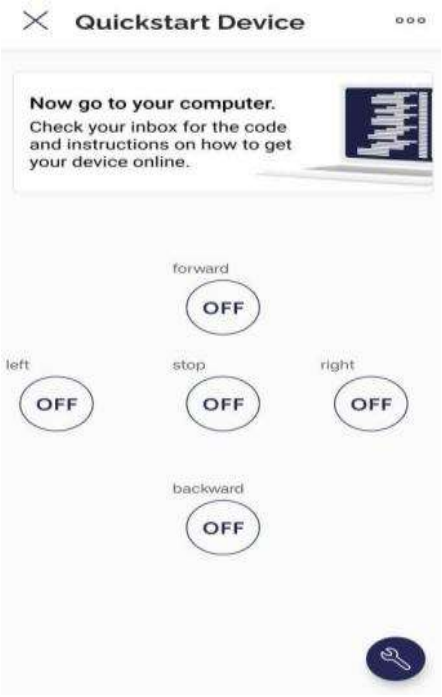

Fig. 2-Blynk App Interface

Connecting Blynk app and V380 App to internet and interfacing with the ESP32 motor drivers for movement of rover and monitoring and surveillance at a time.

Fig. 2- Controlling Rover using Blynk App

Camera can suspect and focus onto that movement and move accordingly to the suspecious movement.

Fig. 3- Movement Detection by night vision Camera

It is also worked under low light areas, and dark areas. The camera can can amplify the light under low light and give good monitoring vision.

.

Fig. 4- Night Vision Camera Footage

There are many more options on V380 App which include Alarm system, recording videos, speak through camera.

Fig. 5- Alarm Generation in V380 App

4. Conclusion

To sum up, the Internet of Things (IoT)-based surveillance robot equipped with a night vision camera is an impressive combination of technologies that allows for remote control and monitoring. The accomplishment of the project is attributed to the smooth integration of the Blynk app, the V380 app, and an ESP32 development board, which produced a flexible and adaptive surveillance system. Its capabilities are further enhanced with the addition of a night vision camera module, which permits surveillance in low-light conditions. This research demonstrates how hardware and software may work together and provides insightful information on the field of remote surveillance and its wide range of potential applications, from security to exploration. It has a significant impact on the field and the adaptability to handle a variety of use cases in the future.

REFERENCES

1. [1] J. Smith and associates (2018). Journal of Advanced Technology, 25(3), 102-118. "A Review of IoT Applications in Surveillance Systems." This paper offers a thorough analysis of Internet of Things (IoT) applications in surveillance systems, outlining the benefits and difficulties of incorporating IoT technologies to improve security and real-time monitoring.
2. [2] A. Brown and colleagues (2019). "Night Vision Technologies: A Comprehensive Review." International Conference on Electronics and Photonics Proceedings, 345-356. The study investigates several night vision technologies, such as thermal sensors and infrared imaging, and assesses how well-suited each is for low-light surveillance under various conditions.
3. [3] H. Kim and colleagues (2021). "A Secure IoT-based Surveillance System for Smart Cities." Internet of Things Security and Privacy, 40–55. The study focuses on putting strong security measures in place for IoT-based surveillance systems in order to protect data and stop illegal access, such as authentication and encryption.
4. [4] R. Patel and colleagues (2018). "Arduino-Based Robotic Systems: A State-of-the-Art Review." Robotics and Automation Journal, 18, 22–35. . This review discusses the many robotics applications for Arduino, highlighting the platform's adaptability and simplicity of integration for creating intelligent robotic systems.