International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 05 | May - 2024 SJIF Rating: 8.448 ISSN: 2582-3930

# WAR FIELD SURVEILLANCE ROBOT WITH METAL DETECTION AND REAL TIME ALERTS

**Mrs. T. GEETHA[1] M.E., M.B.A., (Ph.D).,**
[1]Department of CSE, Assistant Professor, Dhanalakshmi Srinivasan Engineering College, Perambalur

**CHERAN G[2], GOKULNATH G[2], GUNA D[2], JANAKIRAMAN S[2]**
[2]Department of CSE, UG Student, Dhanalakshmi Srinivasan Engineering College, Perambalur

---

**Abstract -** This war field surveillance robot developed for enhanced security and surveillance purposes, allows users to remotely control its movement and access real-time video feeds through a dedicated mobile application. Designed to enhance battlefield safety and situational awareness. The core functionality includes metal detection for identifying potential threats like metal objects, fire with real-time alerts sent directly to the operator's mobile app. This allows for immediate response and informed decision-making.

***Key Words*:** Internet of Things, Robot, Surveillance, War fields, Real time alerts

## I. INTRODUCTION

The robotics and automation fields, which cover a wide range of industries, have seen a dramatic and rapid transformation due to technological advances. The act of closely monitoring or supervising someone or a group, etc., especially when they are being held in custody or are the subject of suspicion, is known as surveillance. For this reason, regions like borders, public spaces, workplaces, and industries are the key places where surveillance is needed. Its primary purpose is action monitoring. Humans or other embedded systems, such as robots and other automation devices, can carry out the surveillance function both indoors and outside. We can eliminate human casualties during wartime monitoring by using the robots. This project's main driving force is the growing need for intelligent surveillance systems that can function in a variety of settings. Traditional surveillance techniques frequently have issues with adaptability, mobility, and real-time data transmission.

The robot is a useful tool for surveillance in a variety of scenarios because it can move on its own and record video with high resolution. Further wireless connection modules enable communication between the robot and a specially created smartphone application giving users an easy-to-use remote-control interface. Users are able to monitor and control the robot remotely due to the seamless connection that is made possible by the integration of IoT capabilities with cloud-based platforms. Having the ability to instantly notify users on their mobile devices upon detection of a metal object, this invention improves the robot utility for security applications and allows for prompt and informed replies.

## II. LITERATURE SURVEY

### A. EXISTING SYSTEM

Since current systems rely on RF technology, Zigbee, and Bluetooth, their robots' communication range is restricted. A robot is controlled through Android Application using a Bluetooth module. To detect the status of the robot, the hardware Arduino UNO microcontroller board is used. A smartphone application that runs on an Android smartphone is used to control a robot. The robot communicates with the regulator over Bluetooth. The regulator can be interfaced to the Bluetooth module using the UART convention, and it will display motions in accordance with the commands that the Android application receives.

### 2.1 CHALLENGES

- Significantly higher initial cost.
- Risk of cable being damaged due to excavations.
- Pairing is required.
- It can be work only short distance utilizing radio wave transmission.

### B. PROPOSED SYSTEM

The dynamic surveillance system is supported by our suggested system. Here, the surveillance system consists of a robot that is online, moves in the appropriate direction, and records video. By using a video reference, the operator in charge of the system's operation may observe live video and manipulate the robot. The user can see this recorded video remotely from any location in the globe. The esp8266 module is programmed with the auth code in order to link the robot to the Blynk app. For live streaming and video capture, we have been using the ESP

32 cam module. The built-in camera on this module supports 5 mega pixels. It features an embedded Wi-Fi module and controller, which we may configure to obtain Internet protocol. Here, we used the internet to configure the IoT and control the robot's movement. Send a notification to a mobile application whenever metal is detected and sound is recorded. We have integrated an alarm system and real-time notification along with a variety of sensors in our preferred strategy. User can control the robot from anywhere in the world.

## I. SYSTEM DESIGN

The robotic and user components make up the two primary sections of the system. A laptop or mobile device may be used by the user section to communicate with the robot end. The primary idea behind the Internet of Things is that we may link the user section to the internet in order to implement the idea of widening the range of communication.

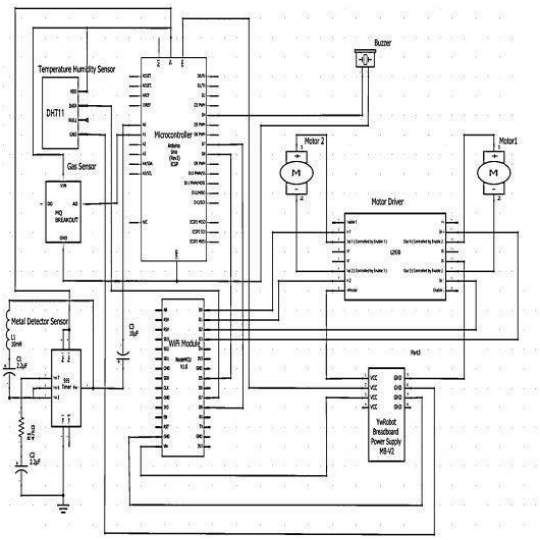
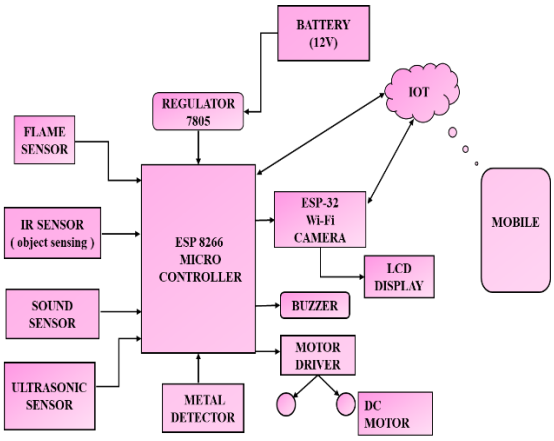



**Fig** 3.1 Circuit Diagram

**Fig** 3.2 Block Diagram




## III. HARDWARE USED

Numerous hardware components are required for this surveillance robot. Due to technology improvements, these surveillance robots are used in both residential and rural areas. The main components of our project are shown below, along with details on their attributes and goals:

### 1. ESP8266 MICROCONTROLLER

Relying on the ESP8266 Wi-Fi module, the Node MCU is a well-known open- source development kit and firmware. It makes it simple to use the Arduino IDE or the Lua scripting language to program and construct Internet of Things (IoT) devices. Its price, integrated Wi-Fi, and community support make it a popular choice for IoT application prototyping.

### 2. POWER SUPPLY

A 12V lead acid battery offers a good balance between power availability, component compatibility, and ease of integration. voltage regulators, motors, and other components that operate efficiently at 12V, making it a convenient choice for our project.

### 3. REGULATOR

It is possible to find negative voltage regulators, mostly for usage with dual supply. 'Overload prevention' and 'thermal protection', which guard against overheating, are automatic features included in most regulators. The 7805 +5V 1A regulator, which is displayed on the right, is one of the several fixed voltage regulator integrated circuits (ICs) with three leads that resemble power transistors. In case a heat sink is required, a hole is provided for its attachment.

### 4. MOTOR DRIVER

A well-liked dual H-bridge motor driver integrated circuit (IC) for robotics and other motion control applications is the L298N. This allows for the regulation of the speed and direction of two DC motors or the stepping sequence of a bipolar stepper motor. Observing polarity, connect the output terminals to the L298N module's OUT1, OUT2, and so on. Attach the control signals (e.g., digital HIGH/LOW signals for direction control, PWM signals for speed control) to the IN1, IN2, IN3, and IN4 pins of the L298N module from your control system. The motors attached to the L298N module can be controlled in terms of speed and direction using the control signals provided by your control system.

### 5. ULTRASONIC SENSOR

Ultrasonic sensors, which provide a non- contact way of measuring distance and detecting objects, have become essential parts of contemporary technology. An ultrasonic wave transmitter and a receiver that picks up the waves when they bounce off things make up an ultrasonic sensor. The sensor uses the speed of sound in air to calculate the precise distance by measuring the

time it takes for the waves to reach the target and back. This mechanism enables effective obstacle detection, object avoidance, and liquid level measurement, among other functionalities.

### 6. SOUND SENSOR

The function of a sound sensor is to convert sound waves from the surrounding environment into electrical signals. Alternatively, it can also be called a sound detector or microphone sensor.

### 7. METAL DETECTOR SENSOR

Metal detection sensors are devices designed to identify the presence of metal objects in their vicinity. These sensors are widely used in various applications, including security screening, industrial manufacturing, and treasure hunting. The fundamental idea underlying metal detection is to create a magnetic field and then look for variations in that field that indicate the presence of metal. The sensitivity, depth range, and specific features of metal detection sensors can vary based on the application and the design of the sensor. The sensitivity, depth range, and specific features of metal detection sensors can vary based on the application and the design of the sensor. To improve their effectiveness in different settings, advanced metal detectors can have numerous coils, digital signal processing, and other capabilities.

### 8. FLAME SENSOR

Flame sensors are pivotal devices in industrial safety and control systems, designed to detect the presence of flames through the analysis of ultraviolet (UV) or infrared (IR) radiation emitted by combustion.

### 9. ESP32 Wi-Fi CAMERA

A digital camera that can send and receive data over a Wi-Fi network is called a Wi-Fi camera, sometimes referred to as an Internet Protocol (IP) camera. These cameras are commonly used for surveillance, monitoring, and remote viewing applications. When setting up a Wi-Fi camera, it's essential to secure the camera and the network to prevent unauthorized access.

## IV. SOFTWARE USED

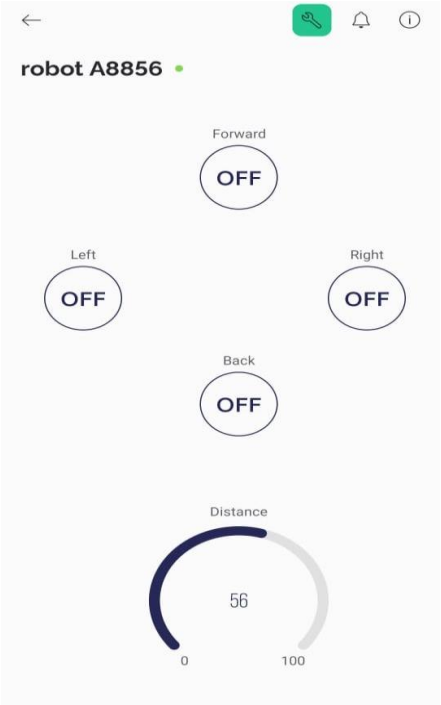
### 1. ARDUINO IDE

Writing code and uploading it to the Arduino board is done with open-source software. The Arduino IDE has a text editor for writing code, a message section, a text console, several menus, and a button-filled toolbar. Sketch is the name given to the programming codes. The sketches are stored in files ending in.ino. We can program robotic movements and sensors that communicate with an Arduino board using this software, which is compatible with Windows, MAC, and Linux operating systems.

### 2. BLYNK APP

An IOT-based app is Blynk. With this app, one can operate a robot. Prior to choosing the esp8266 device, we must first build the project in the Blynk app. Next, we must configure the project's controls, such as joysticks and switches. We must choose whatever I/O pins we want to utilize for this project after the controlling panels ask which ESP8266 I/O pins we are utilizing. Five I/O pins total-four for motors and one for object distance measurement have been utilized.

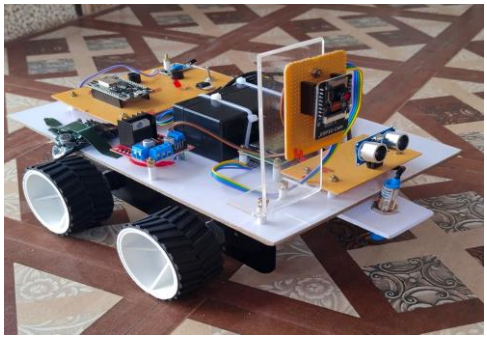
**Fig 5.1** Blynk Controller App

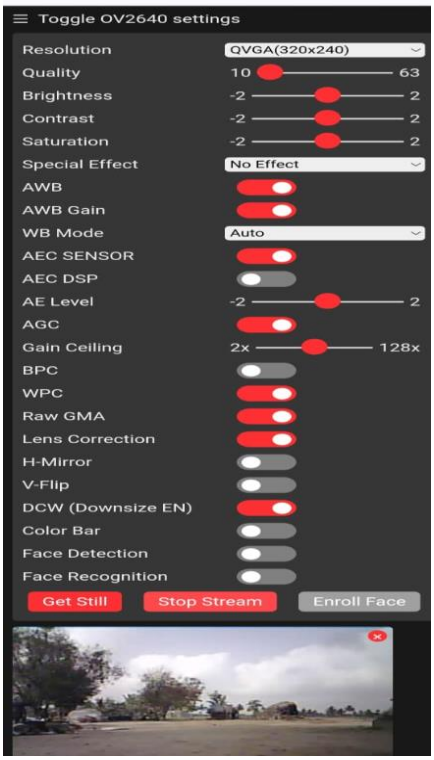



## V. APPLICATION

- ✓ Surveillance along border
- ✓ Urban Warfare
- ✓ Search and Rescue
- ✓ Basecamp Security

## VI. RESULT






## VII. CONCLUSION

In conclusion, the war field surveillance robot not only meets the current demands for autonomous surveillance but also lays the foundation for future developments in the intersection of robotics and IoT technologies. Its successful implementation and demonstrated capabilities mark a significant stride toward creating intelligent, adaptable, and remotely accessible robotic systems for a wide range of applications.

In the future, the robot might also be equipped with gas sensors to identify any hazardous gases present in the surroundings. A bomb disposal kit might potentially be included in the robot to help disperse bombs in combat zones. To find the location of an object, GPS tracking might be included.

## VIII. REFERENCES

[1] Hybrid Model for Robotic Surveillance using Advance Computing Techniques with IoT. N.K. Darwante, Ashutosh Sonawane (2023).

[2] Real-Time Optical Wireless Video Surveillance System for High Visual Fidelity Underwater Monitoring. Tien Khee Ng, Boon S. Ooi, Mohammed Sait (2023).

[3] Remote Driving Control with Real- Time Video Streaming Over Wireless Networks: Design and Evaluation. Yang Yu, Sangh wan Lee (2022).

[4] A Hybrid Tracking Control Strategy for Nonholonomic Wheeled Mobile Robot Incorporating Deep Reinforcement Learning Approach. Peng Liang, Qingfang Zhang, Rui Deng (2022).

[5] Event Camera Based Real-Time Detection and Tracking of Indoor Ground Robots. Craig Iaboni, Himanshu Patel, Deepan Lobo, Ji- WonChoi2 (2021).

[6] Integration of the Mobile Robot and Internet of Things to Monitor Older People. Placido Rogerio Pinheir, Pedro Gabriel Caliope Dantas Pinheiro, Raimir Holanda Filho, Joao P. A. Barrozo (2020).

[7] Energy Comparison of Controllers Used for a Differential Drive Wheeled Mobile Robot. Alexandr Stefek, Thuan Van Pham, Vaclav Krivanek, Khac Lam Pham (2021).

[8] Intelligent Surrounding Recognition for Robot Direction Control. Shih- Chan Hsia, Szu-Hong Wang, Bo- Yung Wang, Chuan-Yu Chang (2020).

[9] Multi-Robot Persistent Surveillance with Connectivity Constraints. Jurgen Scherer, Bernhard Rinner (2010).

[10] Exploiting High Millimeter Wave Bands for Military Communications. James F. Harvey, Michael B. Steer, Theodore S. Rappaport (2019).