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# Design and Implementation of RF Based War Spying Robot with Wireless Night Vision Camera

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*KEYWORDS*
*IOT, Robot, ESP32, Surveillance*

**ABSTRACT**

*This study focuses on developing an IoT-based robotic system with video surveillance functionality, where the control center for human interaction is implemented through a web-based interface. The proposed system uses an ESP32 module as the primary control unit and integrates a Pi Camera along with an SD card for video acquisition and data storage purposes. The Pi Camera is responsible for capturing real-time images and live video streams, while the SD card is utilized for storing and transferring digital information efficiently. The system operates using a 12V power supply that is regulated through an LM2596 module, which converts the input voltage into a stable 5V output required for proper system operation. For robotic movement, an L293D motor driver is connected with DC motors to provide motion control and enable circular movement functionality. The web-based control interface offers efficient remote operation and monitoring capabilities, making the system highly suitable for applications such as military surveillance, reconnaissance missions, border security monitoring, and operation in hazardous environments where direct human presence may involve significant risk and safety concerns.*

## 1. INTRODUCTION

The main objective of the project is to devise and construct a surveillance robot that would enhance a soldier's survivability in the battle ground.

Robot can be operated by its user using the android smart phone. This robot comprises esp32 camera which can remotely broadcast a live stream video to the user's phone, via IOT. While watching the video, the user will be able to maneuver the robot using a web browser.

The robot can perform multiple application such as if any bombs are placed at public places this robot acts as a bomb detector robot using the metal detector sensor and alerts though buzzer. The robot can be detecting the GAS and gives the audible alerts through Buzzer. The prime controlling unit of this project is ESP32 cam. For this

purpose microcontroller loaded program written in embedded C language has been developed.

## 2. OBJECTIVES OF THE PROJECT

Configure the ESP32 Camera and web interface so that human activities in inaccessible places can be captured in real-time.

Use the web interface to allow the paging of the robot's movements and actions; this will make the robot more useful in military reconnaissance and surveillance missions.

Implementation of web interface for robot control and video recording allowing use by operators with basic skills.

Sensor based GAS, metal detection, automatic system and alert.

## 3. EXISTING METHODOLOGY

The most common tests are done by employing DTMF and RF based communication for data communication. It is because a radio frequency communication range is very low relative to other communication technologies that it is used to limit operating range. However, the line-of-sight operation does not allow its use around obstructions, or in places like forests. The fact . Robotic systems intended to operate utilizing mobile phones, for data gathering and transmission, are expected to be more costly as mobile equipment is costly and such systems are ineffective.

## 4. PROPOSED METHODOLOGY

The system comprises an ESP32 Module, several sensors, a power battery, and a Metal detector. The four items would allow the detection of bombs, sounding an alarm whilst displaying the information to an Android phone through an application. The display messages will be triggered when the ultrasonic sensor picks up objects within range. This robot surveils the intruder through a monitored ESP32 module using face detection and face recognition features. Any unrecognized face is treated as an intruder. Sensors including gas and ultrasonic will be connected to the controller. Images of ESP32 cam captured can be streamed live through output. Live streaming we can view in Blink app in mobile.

## PROBLEM DEFINITION

- Robots used in military operations and equipped with IoT video surveillance can be utilized for a variety of tasks that include.
- Robots can monitor any portions of a region for any intruders, weapons and any other threats. Bomb detection: Robots can employ sensors for geo-locating or bomb detection.
- Search and rescue: Robots can be deployed to look for people under debris after earthquakes and other natural calamities.
- Inspection: Robots are capable of inspecting difficult or unreachable places.

Block diagram

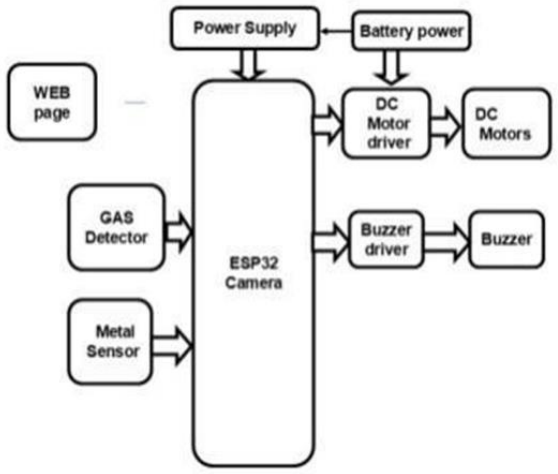
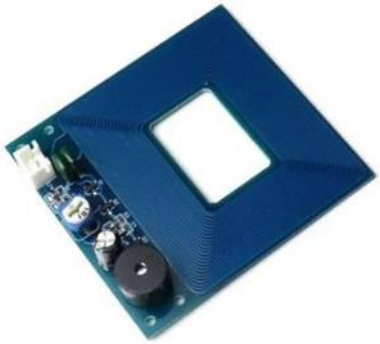



Fig: Block Diagram of IoT-based military robot The main blocks of this project are:

- Battery power supply.
- ESP32 camera module.
- IR/ METAL DETECTION SENSOR.
- DC motors with L298N.
- Buzzer.
- GAS.

ESP32 CAMERA:

METAL SENSOR:



**Advantages:**

- It is very useful for rescue systems.
- Wi-Fi control of robot directions and movement.
- It can be detecting metals and GAS.
- Highly sensitive.
- Low cost.
- Simple and Reliable.

**Disadvantages:**

- The robot requires Wi-Fi network.

**Applications:**

- Military Applications.
- Restricted Areas.

Night Times like Patrolling

## 5. RESULT:

The project "IoT based military robot with video surveillance of human and controlling from web" was a great project as a web application for streaming video using esp 32 camera was developed. Such a robot is as (The USER authorized ELECTRONIC DEVICE) easy controlling and operating the human operator uses an android smart phone. This robot is capable of live streaming video to the user mobile via IOT. While seeing the video, the robot can also be controlled through mobile browser.

This robot can be bomb detecting robot, for instance, if there are some bombs that are planted in the public places while carrying the metal detector sensor this robot would be able to alert through a buzzer. It can also detect gas and sound the buzzer for alerts.

ESP32 CAM is the main controlling device of the project. To accomplish this task, embedded C language program written and loaded into microcontroller.

## 6. CONCLUSION:

It has created features that integrate all of the hardware components employed. Each module's presence has been thoughtfully considered and positioned to maximize the unit's functionality. Second, the project has been successfully executed with the aid of developing technology and very sophisticated ICs. As a result, the project's design and testing were successful

## FUTURE SCOPE:

- We can add ROBOTIC ARM to pick and place the objects.
- We can add radar system to this project.
- The feature of robotics and automation is brimming with possibilities.

## Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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