



## AN IOT APPLICATION FOR MILITARY CAMP SECURITY

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### ABSTRACT

In this security system where we will take the help of micro controllers and some other sensors using which we can give high level or extra security system to the army camp where they are camping. We will install the sensor based intruder system in the surrounding of the military camp and we will deploy a camera based payload if we feel any anomaly around the army camp. We develop the radar system using ultrasonic sensor which will alert the army camp when they are resting or cannot reach or cover the area. This sensor detect the enemy or other wild animal entering into the army camp area and surrounding and it will alert the soldiers to take an action quickly to secure the camp. This project also has a motion detection sensor which will sense the motion around it and alert the soldier to take a quick action using PIR sensors. After sensing the anomaly around the camp soldier cannot go outside directly because they will be the easy target to the enemy. so we created a remote control payload which will be sent in the direction of security breach in this way damage can be reduced easily on the army camp.

**Key words:- Ultrasonic sensor, PIR sensor, payload.**

### I. INTRODUCTION

This is a full security system for both static and mobile military bases, Soldier use to take shifts each time for guarding the military base so some Soldiers will not get proper sleep, rest and they will be the prime target for the enemy attack it may decrease the efficiency in their daily tasks or mission after that, so we introduced this system so that military base will be safe and sound from the external or terrorist attacks. So we use this security system in three level so that the military base will be in extra protection and surveillances so

let's discuss what are level and efficiency of this security system. We often see in the news and other resources that our army is continuously taking the hit by enemy when it's night time or resting time or in

simple terms in unprepared or unpredictable situation which is sad and disturbing.

This problem can be solved to some extent using IOT applications so we developed a project to make our army base more secure and alert even in unpredictable time.

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## II. LITERATURE SURVEY

"Intrusion detection system for military bases using wireless sensors and Arduino" by R. Singh, et al. The proposed system consists of three main components: wireless sensors, Arduino microcontroller, and a central monitoring station. wireless sensors are orderly arranged around the perimeter of the military base to detect any unauthorized movement. These sensors use passive infrared (PIR) and microwave sensors to detect the presence of humans and vehicles, respectively. [1]

"Wireless sensor and devices are using ZigBee network and Arduino for military applications" by S. Singh and S. Kumar. proposes a wireless sensor network using ZigBee protocol and Arduino for military applications. The system is designed to provide an efficient and cost-effective solution for real-time monitoring and data collection in military environments. The proposed system consists of multiple ,The sensor are equipped with ZigBee radio modules, temperature and humidity sensors, and Arduino microcontrollers. These nodes are deployed in the military

environment to collect data such as environmental temperature and environmental humidity levels, and transmit this data to the military camp using ZigBee protocol. [2]

"Real-time target tracker setup for armed force applications using wireless sensors and Arduino" by H. Kim, et al. proposes a real-time target tracking system that is currently used in armed forces for their applications. A setup is designed to track moving targets and provide real-time updates to the military camp, The proposed system consists of sensor and a base station. The sensor are equipped with accelerometers, gyroscopes, and magnetometers, which allow them to measure the motion of the target.. [3]

"Design of an intelligent security system using Arduino for military bases" by H. Wu, et al. The proposed system consists of multiple components, including Arduino microcontrollers, sensors, LCD displays, and a GSM module. The sensors include the PIR sensor, a magnetic door sensor, and a temperature sensor. A PIR sensor catch up to any movement in the range of the sensor, while the magnetic door sensor detects the opening and closing of doors. The temperature sensor is used to track the ambient temperature, The Arduino microcontroller is the brain of the setup, and controls the output to the LCD displays and GSM module. The LCD displays show the current condition of the system and any alerts that have been triggered. The GSM module is used to send SMS alerts to the security personnel when an alarm is triggered. [4]

" A smart surveillance system for military camps using Arduino and wireless sensor network" by S. Sharma and S. Arora. S proposes a smart surveillance system that uses Arduino and wireless protocol with sensors to detect and prevent security threats in military camps, The proposed

system consists of multiple components, including Arduino microcontrollers, wireless sensor, cameras, and a central monitoring system. The wireless sensor nodes are distributed throughout the camp and are used to detect and report any security threats. The cameras are used to capture visual data of the camp and are connected to the Arduino microcontrollers. The Arduino microcontrollers act as the gateway between the wireless sensor nodes and the central monitoring system. They receive input from the sensors and cameras and send the data to the central monitoring system for analysis. [5]

### III. EXISTING SYSTEM

Existing military security systems are specifically designed to safeguard nations and their valuable assets from a variety of threats and adversaries. These systems incorporate cutting-edge technologies like surveillance cameras, radars, and encryption protocols to guarantee the confidentiality and integrity of sensitive data. They possess the capability to detect and intercept potential threats, empowering military personnel to respond swiftly and effectively. Nevertheless, one notable drawback of these systems lies in their susceptibility to cyber attacks. With the constant advancement of technology, malicious actors are continuously devising new methods to exploit vulnerabilities in military networks and systems. A successful cyber attack on a military security system can result in catastrophic consequences, compromising crucial information and undermining the overall efficacy of the defense infrastructure. Thus, continuous investment in robust cyber security measures and regular updates to combat evolving threats are imperative to counteract this disadvantage.

### IV. PROPOSED SYSTEM

The proposed system for a military vehicle embedded with an ESP32CAM board, PIR

sensor, and ultrasonic sensor as a security system is designed to enhance the security of military operations. The system is capable of detecting potential security threats and providing real-time alarm to given SSS driver and command center. The proposed system includes the following components: ESP32CAM Board: The ESP32CAM board is a powerful microcontroller board that includes an ESP32 system-on-chip, Wi-Fi and Bluetooth connectivity, and a camera module. It serves as the central processing unit and controller for the system. PIR Sensor: The PIR sensor is used to detect the presence of human or animal motion in the surrounding area. The sensor detects the heat signature of moving objects and sends the signal to the ESP32CAM board for analysis. Ultrasonic Sensor: The ultrasonic sensor is used to detect the distance between the vehicle and surrounding objects. The sensor sends a signal to the ESP32CAM board when an object is too close to the vehicle. Real-time Monitoring System: The real-time monitoring system provides alerts to the driver and command center when potential security threats are detected. The system can be configured to send alerts via SMS or email, and can also trigger an alarm or activate a response protocol. Data Recording and Storage System: The data recording and storage system stores the sensor data and events for further investigation. The system can be configured to store data locally or on a cloud-based server for remote access. User Interface: The user interface provides a dashboard for monitoring the sensor data and alerts. The user interface can display the sensor data in real-time, generate reports, and provide an event log for further analysis. The proposed system for a military vehicle embedded with an ESP32CAM board, PIR sensor, and ultrasonic sensor as a security setup provides efficient protection for military

operations. The setup consist of an ESP32CAM board, PIR sensor, ultrasonic sensor, real-time monitoring system, data recording and storage system, and user interface. The system can be controlled completely to comply with regulatory and compliance requirements, including confidentiality, integrity, and availability of sensitive information and data.

**V. HARDWARE REQUIREMENTS**

SL. NO	COMPONENT NAME	SPECIFICATION	COUNT
01	Arduino Board	Atmega 2560	1
02	Ultrasonic sensor	HC-SR04	1
03	CAM board	ESP32	1
04	PIR	Infrared sensor	1
05	CAR kit	Simple kit with 4/2 wheels	1
06	DC motor	ESP8266	1
07	LN298N Motordrivers	Use to control motors	1
08	FTDI Module	SPST reset switch	1
09	Jumpers	DS18B20	1

Table 1 hardware requirement

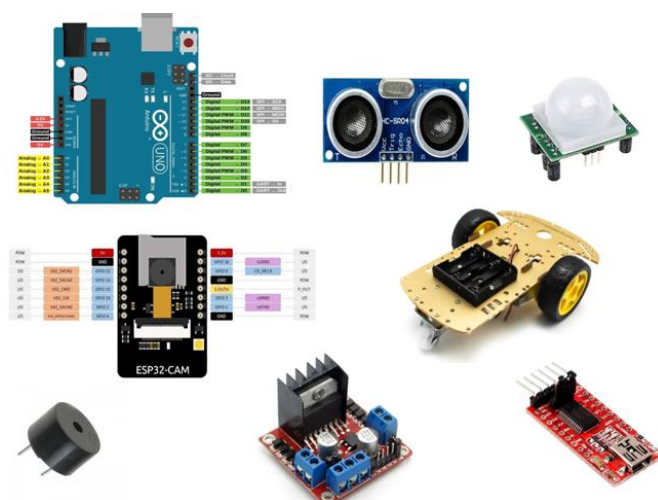


Figure 1 (hardware requirement)

**VI. SOFTWARE REQUIREMENTS**

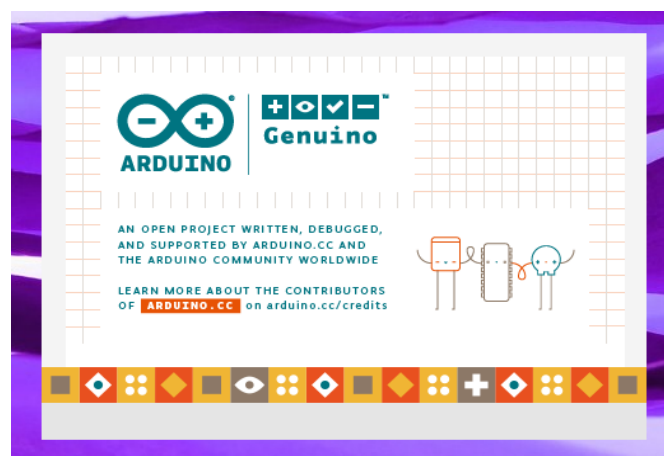


Figure 2 (software requirement)

**VII. IMPLEMENTATION**

The proposed project “IOT Based protection setup for military applications” consists of RADAR, MOTION SENSORS and PAYLOAD. RADAR using Ultrasonic Sensors so that any anomaly can be detected using the RADAR system ,we is connected to the arduino board to ultrasonic sensor which will emit the ultrasonic sound or wave in

the particular direction continuously and then if any object comes in range of the object the wave or sound it will bounce back and the distance will be measured by the time threshold it takes to get reflected on the sensor again. For intruder detection system we use PIR Sensor so the PIR sensors so that it can detect the motion of the any intruder who is trying to sneak in the military protected area. because PIR sensors ,the sensors uses couple of pyroelectric sensors that detects the heat and temperature energy in the given environment, the given two sensors are embedded with each other so when the signal differential among this two sensors varies. Next for the payload we use car kit , esp32 cam board, wheels, dc driver motors and motor drivers ,payload that are ready to go and help to check the area where the security breach took place here we use ESP32 cam board using this programming board we can see the behavior of enemy and it will rush towards the anomaly area ESP32 cam will help to see the outside environment and it is capable of providing the environment or user interface to control the payload using buttons that are designed using some simple code. After creating all this modules we will install them around the camp or base and we will attach this devices with batteries so the sensors can work without wires, in plane area we will install RADAR so that any moment in the area is tracked, then we will install Intruder detection system on the surrounding trees where they will notice any motion and then alert the military base by buzzer or LED light , next we use ESP32 equipped payload to check the area where there is an anomaly of security breach so the soldiers won't be a prime target to the enemy. This is how the protection setup for the army project is implemented.

## VIII. RESULTS

We have conducted some experiments to know the quality of performance of all the modules. It has been tested on more than one way, to make the military base secure and sounded the RADAR will check any object that come near the range of it. An Intruder detection system is used to detect the enemy or a wild animal that is trying breach into military camp area, Finally the Payload is used to send to the direction where the security is breached this is all the function we have been tested in our projects.

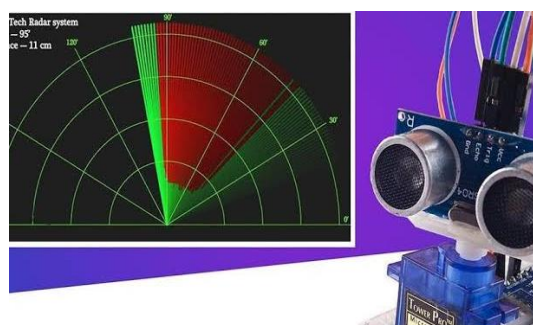


Figure 3.1 ultrasonic radar

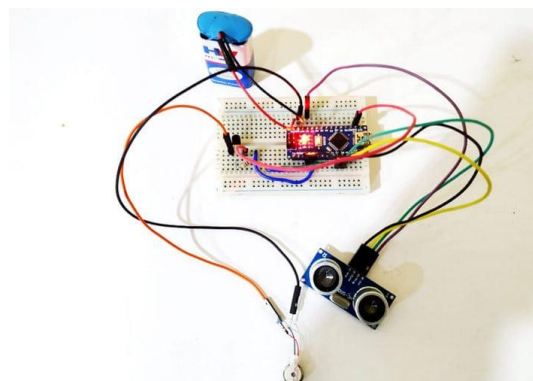


Figure 3.2 ultrasonic radar



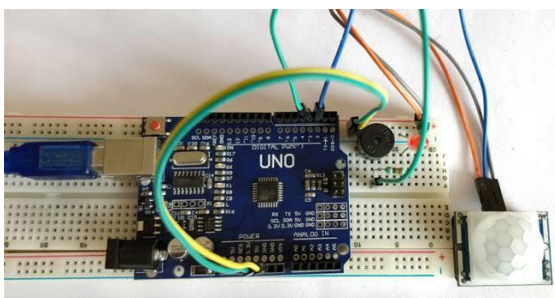


Figure 4 PIR Sensor alert system

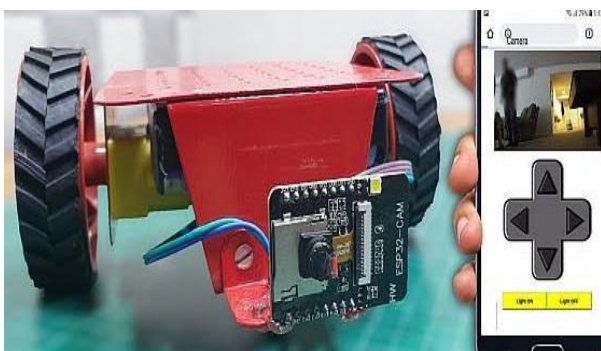


Figure 5 remote control payload

## IX. CONCLUSION

The integration of advanced technologies in military operations is essential for ensuring the safety and security of military personnel and assets. In recent years, the use of sensor-based systems has become increasingly popular in military applications. One such system is the military vehicle embedded with an ESP32CAM board, PIR sensor, and ultrasonic sensor for security purposes. This system provides a comprehensive security solution for military vehicles, detecting potential threats and providing real-time alerts to the driver and command center. The ESP32CAM board serves as the central processing unit and controller for the system, providing powerful computing capabilities, Wi-Fi and Bluetooth connectivity, and a camera module. The PIR sensor detects the

presence of human or animal motion in the surrounding area, while the ultrasonic sensor measures the amount of distance between the vehicle and surrounding objects. By combining these sensors, the system can detect potential threats in the surrounding environment and provide real-time alerts to the driver and command center.

## X. REFERENCES

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