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SURVEILLANCE ROBOT FOR MILITARY APPLICATION USING IOT

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ABSTRACT

The use of robotic surveillance systems for reasons such as border monitoring or in remote locations like war zones is discussed in this study. The system can replace the border guard soldier in charge of providing surveillance. The robotic vehicle can autonomously recognize human presence and transmit information to the control station. Both surveillance and reconnaissance situations are catered for by this technology. Every human being must have security. The robot also has a smart camera that, when necessary, may be used to record live video and take pictures o.. These systems can take the place of border guards by watching for human activity and sending information back to a control center. The rising need for enhanced security and real-time monitoring in military operations has led to the evolution of advanced surveillance technologies. This paper outlines the development of a surveillance robot utilizing Internet of Things (IoT) technology, designed specifically for military applications

Keywords: Wireless system, Internet of Things (IoT), smart surveillance.

1. INTRODUCTION

Real-time data gathering, analysis, and prompt information distribution to the operator are all components surveillance. The defence aplications, surveillance is crucial to keeping an eye out for potential threats so that required action can be taken to protect citizens. Monitoring a group of circumstances, a region, or a person is the task of surveillance. This typically happens in a military setting where monitoring enemy territory, hostage situations, or conflict zones. Our goal in this paper is to offer a solution or example for a wirelessly controlled robot vehicle that can recognize an object, gauge how far away a human is from the vehicle, and wirelessly feed video of its surroundings to the operator. The development of technology in recent years, it is now possible to remotely monitor important locations using robots rather than people.

2. LITERATURE REVIEW

Vardhini et al.[1]"suggested IoT based Autonomous Robot Design Implementation for Military Applications". The study focuses on the use of a WIFI module for transmitting surveillance images captured by a high-quality camera in an IoT-based autonomous robot designed for military applications.

Telkar et al.[2] "IoT Based Smart Multi Application Surveillance Robot". This paper describes a smart surveillance robot equipped with various technologies such as a laser gun, communication sensors, GSM, GPS, and a night vision camera. The robot is designed for military safety and can provide live video streaming for real- time surveillance.

Rajeshwaran et al.[3]" Sensor Assisted War Field Spying Robot using Internet of Things (IoT)". This paper discusses the design of a robot that can silently infiltrate enemy areas to gather intelligence. It transmits data via a wireless camera and can be controlled remotely, making it useful not only in military applications but also in other high-threat environments like malls and hotels. The system aims to reduce casualties during terrorist attacks.

Ashokkumar et al.[4] "Integrated IOT based design and Android operated Multi-purpose Field Surveillance Robot for Military Use". This paper details a project aimed at creating a multi-purpose surveillance robot that can be operated using an Android device for military application.

3. METHODOLOGY

A surveillance robot for military applications is designed to assist in intelligence gathering, surveillance, reconnaissance, and sometimes even in direct combat or support operations. The methodology for deploying and using such a robot involves multiple stages, from design and development to deployment and operation.

1)Project Planning and Analysis:-

- Requirement Gathering:- Engage with military stakeholders to understand specific needs and of constraints for the surveillance military robots. Define key performance indicators, operational environments, and mission objectives of project.
- Feasibility Study:- Evaluate existing technologies and determine their suitability for integration it into the robot.

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- Specifications:- Develop detailed design requirements based on gathered data, including hardware and software specifications.

2) Monitoring and Maintenance:-

- Operational Monitoring:- Monitor the robot's performance in active deployments to ensure it meets. Operational requirements. Collect data on system performance, reliability, and user feedback.
- Meeting objectives:- Analyze lessons learned and document best practices for future projects.

3) Project Review and Evaluation:-

- Review:- Conduct a comprehensive review of the project to assess its success in Meeting.
- objectives:- Analyze lessons learned and document best practices for future projects.
- Evaluation:- Evaluate the impact of the surveillance robot on military operations and decision-making Identify areas for further improvement and potential upgrades

4) Documentation and Reporting:-

- Technical Documentation:- Prepare detailed technical documentation for the robot's design, operation, and maintenance.

4. SYSTEM BLOCK DIAGRAM

The design and develop military security robot using IoT represents a significant advancement in modern security and surveillance technology. Microcontroller/Processor Central unit that processes all the information from sensors, cameras, and other components. It controls the robot's movements and data transmission.

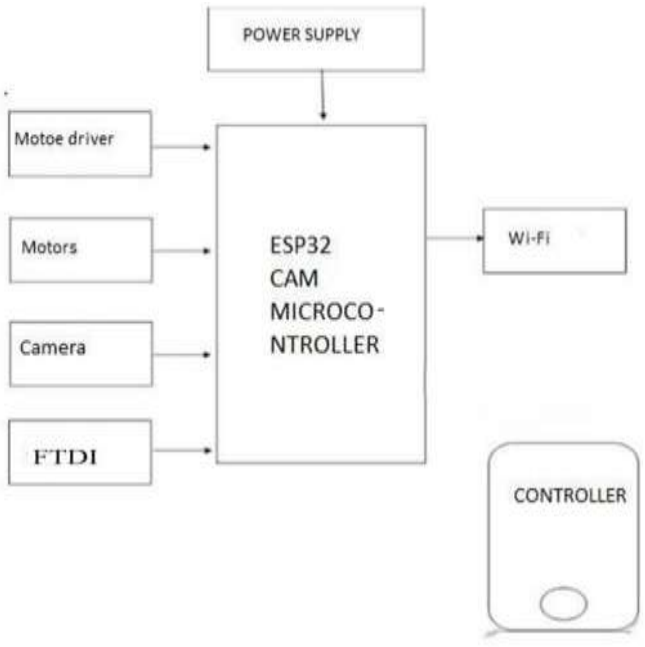

Fig.1 Block diagram of implemented work

4.1 Working:- A basic block diagram for a Surveillance Robot for Military Application might include the following components of the system as are ower Supply Provides energy to the robot and all its subsystems (battery or external power source) system. Camera/Imaging System captures live video footage or images of the surrounding environment. This can include thermal cameras, night vision, or regular cameras for surveillance. This block diagram and workflow represent a high-level design of a military surveillance robot. The robot's effectiveness depends on the integration of these components, as well as advanced algorithms for autonomous behavior and real-time data transmission. esponsible for robot movement and mobility (e.g., wheels or tracks). These are controlled by the microcontroller to navigate the robot This block diagram represents a high-level structure.

4.2 Hardware Description:-

ESP32 CAM:-

The ESP32-CAM is an affordable microcontroller board equipped with a built-in camera, making it popular for IoT, robotics, and monitoring applications. It features the ESP32-S chip for wireless communication and an OV2640 camera for capturing images or streaming video.

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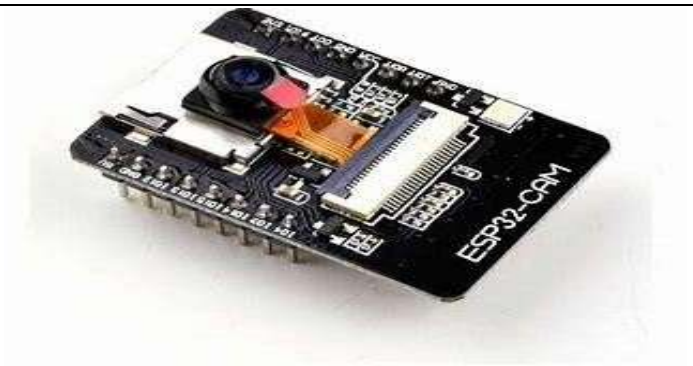

Fig:4.1 ESP32 CAM

FTDI Module:-

It is a serial converter module, commonly referred to as an FTDI USB-to-Serial Converter, is a small device that enables communication between a computer's USB port and devices with serial interfaces. It is widely used in debugging hardware like Arduino boards and modules such as the ESP32-CAM.

Fig:4.2 FTDI Module

Motor driver:-

The motor driver is a crucial electronic component used to manage the operation of various types of motors, including DC, stepper and servo motors. Motor drivers are vital in applications like robotics, industrial automation, and IoT systems**.** It acts as a bridge between the motor and the control system, such as a microcontroller, by supplying the required current and voltage for the motor to function effectively.

Fig:4.3 Motor drive

Motors:-

DC motors simultaneously and supports speed and direction adjustments. DC motor is an electrical machine that converts electrical energy into mechanical energy. The input of electrical energy is the direct current which is transformed into the mechanical rotation. Four DC motors are used in this project.

Fig:4.4 DC Motor

5. RESULTS

Surveillance robots in the military improve safety and efficiency. They monitor dangerous areas in real-time, reducing the need for soldiers to be exposed to threats. Equipped with AI, sensors, and cameras, they gather critical data even in poor visibility. These robots are versatile, used in border patrol, urban combat, and disaster relief, while also being cost-effective and durable.The robot is being controlled using IP address on crome and wifi is used for this purpose.

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Observation and controlling:-

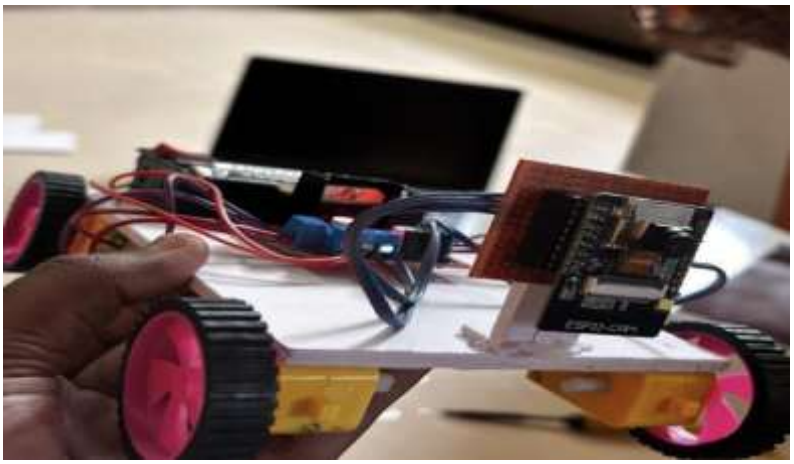

Fig:5.1 Robot Modal

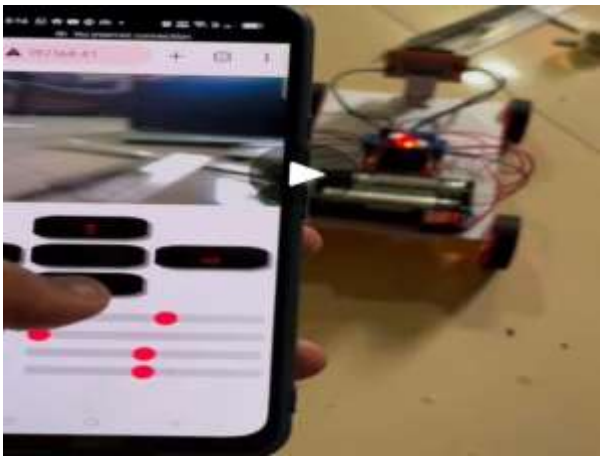

Fig:5.2 controlling using IP address

6. FUTURE SCOPES

1. Base Security:- Continuous monitoring of military bases to detect unauthorized WiFi networks that could be used for spying or sabotage.
2. Battlefield Surveillance:- Deployment in combat zones to detect enemy communication networks.
3. Forward Operating Bases (FOBs): Enhancing the security of temporary military installations by monitoring for unauthorized wireless communications.
4. Border Patrol: Assisting in monitoring border areas to detect unauthorized

7. CONCLUSION

The design and develop military security robot using IoT represents a significant advancement in modern security and surveillance technology. This system leverages the connectivity and data sharing capabilities of IoT to enhance the effectiveness of security operations in military environments.The robot utilizing IoT is a transformative tool that enhances security measures through advanced detection and automation.While challenges remain, its potential to revolutionize military security operations.

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