IOT- BASED BOMB DEFUSING ROBOT

Prof . Heena Kachhela
Tulsiramji Gaikwad Patil College of Engineering and Technology, Polytechnic,
heena.kachhela@gmail.com

Mr. Aman Bokde
Tulsiramji Gaikwad Patil College of Engineering and Technology, Polytechnic
amanbokde00@gmail.com

Ms. Sneha Bhange
Tulsiramji Gaikwad Patil College of Engineering and Technology, Polytechnic
snehab113@gmail.com

Mr.Afshiyan khan
Tulsiramji Gaikwad Patil College of Engineering and Technology, Polytechnic
afshiyan71@gmail.com

Ms . Bhumika Kale
Tulsiramji Gaikwad Patil College of Engineering and Technology, Polytechnic
kalebhumika71@gmail.com

Mr. Viraj Wankhade
Tulsiramji Gaikwad Patil College of Engineering and Technology, Polytechnic
virajwankhede358@gmail.com

Abstract
Developing an Arduino-controlled spy robot with a night vision wireless camera and Android app control aims to boost surveillance in war zones and borders. The goal is to curb enemy infiltrations and aid in rescue operations, reducing human casualties and thwarting illegal activities. This project offers real-time monitoring in low-light conditions, enhancing security in the military and defense sectors.
Keywords: CCD camera military, PICs, RF, spy robot, video transmission

I. Introduction

The military is irrefutably the essential client of unused Propels and enhancements in methodology and is too regularly the Support of modern enhancements when it comes to envisioning modern developments in military settings. Various fundamental Military advances conveyed out of the blue are presently Progressing to the piece of mechanical robots. In any case, the Significance of military independence and present-day mechanical Independence is still very diverse.

The evolution of robotics and autonomous systems, driven by advancements in technology and motivated by factors such as cost-effectiveness, efficiency, and safety, has led to significant developments in both military applications and industrial settings, with a focus on enhancing capabilities, reducing risks, and addressing complex challenges such as border monitoring and security.

The military has uncommon, Automated hardware whereas, in cutting-edge terms, the robot is a bigger sum of a savvy, versatile, large-scale Fabricating machine. Afterward, to utilization of present-day robots for Military applications will continuously be imaginable. Cost and Improvement of the specialized capacity of the inventive Robot will construct the eagerness of the military clients.

The development of our security and surveillance robot represents a unique approach to addressing critical challenges in security operations. By integrating cutting-edge technologies such as RF communication, Wi-Fi connectivity, CCD cameras, stepper motors, and advanced control systems, our robot offers a holistic solution to enhance security and provide unprecedented levels of functionality. Unlike traditional surveillance systems limited by fixed camera positions and obstructed view points, our robot's omnidirectional views and dynamic maneuverability ensure comprehensive coverage and effective monitoring even in complex environments.

The utilization of RF technology enables seamless data communication and remote control capabilities, empowering security forces to make informed decisions and respond promptly to potential threats. Moreover, our robot's ability to access inaccessible areas and provide real-time audio and video streams from hidden spots and narrow passages underscores its unparalleled utility in ensuring maximum security for individuals and enhancing overall security infrastructure. Through the fusion of innovation, adaptability, and advanced functionalities, our security and surveillance robot sets a new standard in security operations, offering

unmatched levels of security and operational flexibility in diverse security scenarios.

In The inquiry, we will illustrate that the motivation for the Utilization of robots, interior the military and interior industry, Is the substitution of individuals. The clarifications behind this Substitution are, as per the taking after quality, taking a toll, and Acculturation; be that as it may, utilizing an interchange Technique in each field. Directly, the observing of universal periphery zones is an Outstanding overpowering errand. The security strengths Watch the edges beneath opposing conditions. You get Bolster from observation cameras authoritatively amassed, But they cover especially limited zones. The cameras Mounted suitably at a settled position aren't of mind-blowing utilize, as We can't alter the camera see energetic. Additionally, it is Incomprehensible to mount the cameras in the **t**imberland locales As the trees dishearten the camera's point of view The point of organizing a robot is to energize the People through giving security. The development utilized In this defense and security robot has different basic Highlights, for illustration, mechanical vehicle control by RF Innovation and Wi-Fi, actually keeping up a key.

Remove from hindrances in its way. A tall caliber inaccessible Camcorder outfitted the security powers watch the edges Beneath opposing conditions.

A conclusive Central point of this structure is to provide the person with the most Extraordinary security mind-blowing We are utilizing RF innovation for information communication Between the robot and the client. Through a CCD camera, we Are going to get makeovers real-time recordings of the put Where the robot is moving. Here PIC microcontroller is the Brain of the framework, controlling all the assignments and activities Performed by the robot.

II.   Literature Review

The development of espionage robots represents a groundbreaking leap in military strategy, tailored specifically to mitigate the risks inherent in reconnaissance missions within hostile territories. These robots are not merely tools; they are a fusion of cutting-edge technology and strategic foresight, designed to revolutionize how intelligence is gathered in the modern battlefield. Here's how these espionage robots stand out:

1.   Stealth and Agility: Unlike traditional reconnaissance methods that may be detectable by adversaries, espionage robots are designed to operate with stealth and agility. Their sleek, low-profile design and advanced propulsion systems enable them to navigate rugged terrain and urban environments with ease, all while remaining undetected by enemy forces.

2. Adaptive Sensory Systems: Equipped with a sophisticated array of sensors beyond just night vision cameras, these robots possess adaptive sensory systems that can detect a wide range of environmental factors, from chemical signatures to electromagnetic disturbances. This multi-modal approach to intelligence gathering provides commanders with a comprehensive understanding of the battlefield dynamics.

3. Autonomous Decision-Making: While human operators can guide and monitor the robots remotely, these machines are also capable of autonomous decision-making. Through advanced AI algorithms, they can analyze incoming data, assess threats, and adapt their tactics accordingly, allowing for swift and decisive action in dynamic environments.

4. Interconnected Network: Each espionage robot operates as part of a larger interconnected network, sharing data and coordinating movements in real-time. This networked approach enhances situational awareness and enables collaborative intelligence gathering, giving military commanders a tactical edge on the battlefield.

III.   Problem Representation

This project introduces a combat robot designed to minimize human casualties in terrorist attacks like 26/11. The robot is Bluetooth-operated, self-powered, and equipped with controls similar to a normal car. It features a wireless camera for remote enemy monitoring and a shooting gun mechanism for defense.

A gripper is used for bomb disposal, while a temperature module and metal detector enhance detection capabilities. Control is via an Android application, making deployment feasible in various high-risk locations to enhance security against intruders or terrorists The robot's design allows it to silently enter enemy areas, gathering vital information through its camera eyes. It is equipped with a shooting gun mechanism mounted on top for engaging enemies and a gripper for safely handling and disposing of bombs.

The temperature module detects any increase in temperature, while the metal detector helps locate hidden bombs. The robot's control system is operated through an Android application, providing a user-friendly interface for controlling its movements and actions. This advanced spy robot is a crucial asset in combating terrorism, particularly in areas prone to attacks, such as star hotels, shopping malls, and jewelry showrooms. Its deployment ensures a proactive
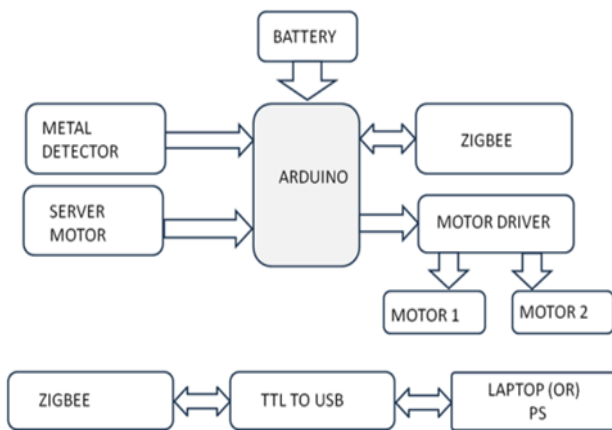
Existing System

Existing surveillance robots are limited by their ability to sense only a few physical quantities, leading to a reliance on expensive video cameras for live video streaming during manual control. Despite advancements, current robots have a constrained coverage range. A significant gap remains in the development of robots capable of accurately guiding munitions or missiles to specific targets, such as pointing a laser toward the weakest portion of a tanker. This requires sophisticated target recognition and control systems, highlighting the ongoing need for innovation in robotics for military applications.

Innovatively, this multifunctional robot is structured into distinct modules, each with specialized functionality, showcasing a cutting-edge approach to surveillance and defense technology. Advancements in the field have propelled these robots to the forefront of remote and defense applications. The power distribution prioritizes modules such as the microcontroller, communication unit, sensing apparatus, and driving mechanism [23-36], culminating in a sophisticated and versatile robotic system. The primary objective is to equip the robot with the capabilities of a defense soldier, a bomb detector, and a surveillance unit for border areas, highlighting its pivotal role in enhancing security and operational efficiency.

Arduino Uno
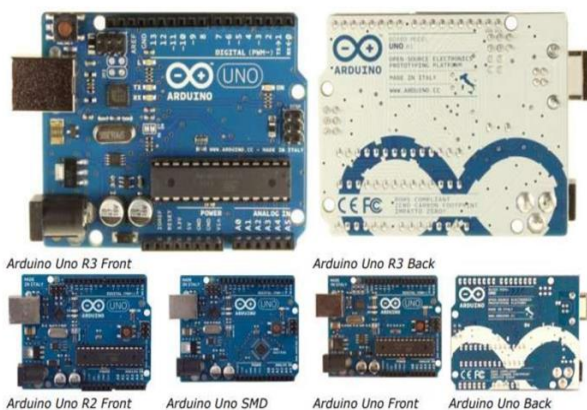
How Does it works

Stealth Activation

The robot remains in a dormant state until activated by a secret code or signal from the remote control, ensuring stealthy deployment.

Secure Communication

Communication between the remote and the robot is encrypted to prevent unauthorized access or interception of commands.

Dynamic Surveillance

Upon activation, the robot's CCD camera scans its surroundings and transmits live video feed to the remote control for real-time surveillance.

Adaptive Lighting

The LED light on the CCD camera automatically adjusts its intensity based on ambient light conditions, providing optimal visibility in dark areas without raising suspicion.

Intelligent Navigation

Using advanced algorithms, the robot navigates through obstacles and terrain, adapting its speed and direction to ensure efficient movement.

Remote Control Interface

The 4-bit LCD on the remote displays a 360-degree omnidirectional view, allowing the user to monitor the robot's surroundings comprehensively.

Covert Operations

The RF module facilitates seamless communication between the remote and the robot, enabling the user to control the robot's speed, turning, and camera orientation discreetly.

Autonomous Mode

The robot can switch to autonomous mode, where it intelligently patrols predefined areas, capturing and transmitting surveillance data without manual intervention.

Emergency Protocols

In case of signal loss or interference, the robot autonomously navigates back to a designated safe zone or activates a fail-safe protocol to prevent detection or capture.

IV. Methodology

Purpose and Functionality:

o   Emphasize the unique purpose of the spying robot, which includes transmitting video material or information to   a mediation or spying group.

o   Highlight the efficiency of the robot due to its small size, allowing it to travel more efficiently.

Camera System:
o Describe the use of a CCD camera for capturing and transmitting data to the robot.
o Explain how the camera is controlled remotely to gather information discreetly.

Remote Control Interface:
o Detail the 4-bit LCD on the remote control for monitoring the robot's direction.
o Mention any additional features on the remote control for enhanced control over the robot.

Night Vision Capability:
o Describe the LED light setup on the CCD camera and its circuitry for operating in dark areas or at night.
o Explain how this feature enhances the robot's functionality during low-light conditions.

Communication System:
o Discuss the use of RF modules for seamless communication between the remote control and the robot.
o Highlight the importance of reliable signal transmission for controlling the robot's speed, turning, and overall functionality.
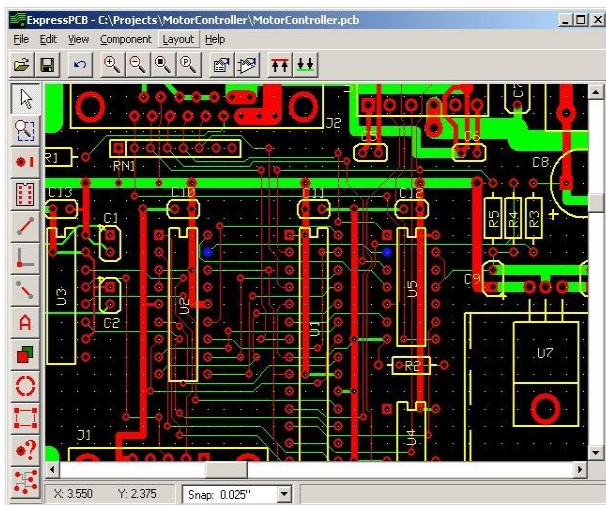

Motor Control:
o Explain the use of brushed DC motors and L298N motor drivers for precise control over the robot's movement, including speed and turning.

Software Tools:
o Specify the IDE (Integrated Development Environment) used for programming the microcontrollers (e.g., PIC 16F628A and PIC 16F877).
o Mention the programming languages employed, such as C and Python, for developing the robot's functionality.

o Explain the role of Microsoft Excel in data tracking and analysis to improve system efficiency and performance.
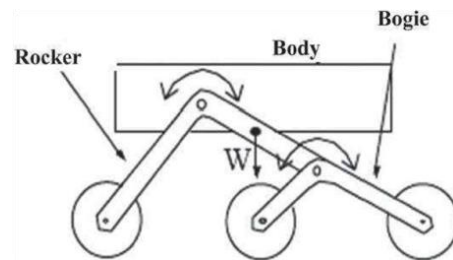
V. Working Flow

Purpose and Design Overview
Designing a movable military mediator or spying robot controlled by remote for discreet operations.
Utilizing PIC 16F628A and PIC 16F877 microcontrollers for precise control and functionality.

Camera System
Incorporating a CCD camera for data acquisition and transmission.
Implementing LED lights for low-light or night operations.

Remote Control Interface
Using a 4-bit LCD on the remote for user direction monitoring.
Employing RF modules for seamless signal transmission between the remote and the robot.

Motor Control and Driver
Integrating brushed DC motors with L298N motor drivers for accurate movement control.
Utilizing the motor drivers to control both the robot's movement and the CCD camera's orientation.

Microcontroller Pin Configuration
Defining the pin usage and control bits for PORT A and PORT B of the PIC microcontrollers.
Explaining the connection between the microcontrollers and the motor drivers for improved control.

CCD Camera Details
Describing the CCD camera's specifications, such as range, resolution, and power source requirements.
Highlighting the camera's ability to change directions for optimal viewing angles.

Remote Control System
Detailing the remote control's components, including press buttons, LCD, and antenna.

Explaining the role of the PIC 16F628A microcontroller and RF module in signal transmission and reception.

Robot Vehicle Configuration

Outlining the components of the military spying robot, including wheels, motors, RF module, and microcontroller.

Emphasizing the importance of accuracy in movement control and the integration of limit switches for safety and control.

By presenting the problem statement in a structured and detailed manner, it highlights the innovative features and complexity of your spying robot controlled by remotes project.
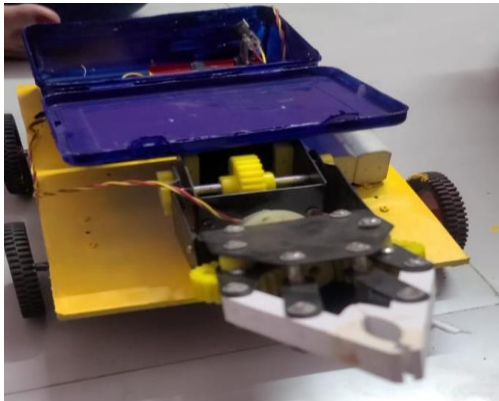

Fig. Module Working

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