



LITERATURE SURVEY ON DESIGN AND IMPLEMENTATION OF BORDER SURVEILLANCE BOT

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Abstract: Most of the military organization now takes the help of robots to carry out many risky jobs that cannot be done by the soldier. These robots used in military are usually employed with the integrated system, including video screens, sensors, gripper and cameras. The military robots also have different shapes according to the purposes of each robot. Here the new system is proposed with the help of low power IOT wireless sensor network to trace out the intruders (unknown persons) and the robot will take the necessary action automatically. Thus, the proposed system, an Intelligent Unmanned Robot (IUR) using IOT saves human life and reduces manual error in defense side. This is specially designed robotic system to save human life and protect the country from enemies.

Keywords: Military robot, IOT, Wireless network, MQTT, sensors, camera, detection.

1. INTRODUCTION

The Kargil war also known as the Kargil conflict, was armed conflict between India and Pakistan that took place between May and July 1999 in the Kargil district of Kashmir and elsewhere along the Line of Control (LOC). The conflict is also referred to as Operation Vijay (Victory in Hindi) which was the name of the Indian operation to clear the Kargil sector. The cause of the war was the Infiltration of Pakistani soldiers and Kashmiri militants into positions on the Indian side of the LOC, which serves as the defacto border between the two states. During the initial stages of the war, Pakistan blamed the fighting entirely on independent.

Kashmiri insurgents, but documents left behind by casualties and later statements by Pakistan's Prime Minister and Chief of Army Staff showed involvement of Pakistani paramilitary forces, led by General Ashraf Rashid. The Indian Army, later on supported by the Indian Air Force, recaptured a majority of the positions on the Indian side of the LOC infiltrated by the Pakistani troops and militants. With international diplomatic opposition, the Pakistani forces withdrew from the remaining Indian positions along the LOC.

The war is one of the most recent examples of high altitude warfare in mountainous terrain, which posed significant logistical problems for the combating sides. INDIAN government had to face huge loss because of the war. Human loss, machine loss, aircrafts, tankers. Indian economy decreased by 38%, cost of all commodities increased, taxes increased all together country had to face tremendous loss. The proposed system is based on IOT. The system uses an IR and camera based security system for protected areas and borders, which senses intruders, trespassers and transfer video to other end.

DO WE HAVE SOLUTION FOR THIS??

YES, PREVENTION IS BETTER THAN CURE. OUR PROJECT IS THE SOLUTION FOR THIS AT THE PROTECTED AREAS AND LOC (LINE OF CONTROL)

- Internet of things (IoT) is the network of physical devices which enables these objects to connect and exchange data.
- This Project is a IR & camera based security system for protected areas & borders, which senses the Intruders, trespassers and transfer video to other end. For confirmation.



- In this Project, we are going to have an IR Sensor which senses any intruders / trespassers and will activate the alarm as well as switch on the guns in that particular place.
- In this project we will shoot the intruder when he cross the border, the bullet is equipped with a GPS facility if the intruder escapes the we can track him with the help of ARM 11 devices or smartphone.
- It will also activate the Camera, which will start capture the live video and transmit the same to the receiver end, the smart phone.
- In the same time it will start gives alarm and the data will transferred through the RF Transmitter & Receiver to the mobile device.

2. LITERATURE REVIEWS

Design and Development of multifunctional Robot for Military purpose

Applications [1] Robots are specially design for human to make our life easier. Robots are design for various purposes like military purpose, industry, for home based application. At border different types of tanks, missiles and guns are used by the enemy. This causes problems and will harm our force or soldiers. To address the above problem a robot is designed and developed for military purpose application to protect our army. The method involves a biped walking robot using parallel leg mechanism i.e. PLM which includes different functions like capturing real world data using digital image processing used to detect its obstacle which is found in its path. The limitations in the system is that it can move only on plain surfaces, but coming to the system fails to perform the operation effectively.

Touch screen controlled Defence Robot [2] The robot system can be built with the existing economic conditions that can be used for different sophisticated robotic applications. The control system consists of Touch screen and ZigBee modules, a microcontroller that controls the robot. The system provides continuous visual monitoring through the wireless camera attached to the robot and sends continuous data to the control unit. A multifunctional Robot is been designed according to the specifications made above which uses ZigBee Technology. Zigbee cannot be used to cover very long distance, it can only deal with low complexities and is very slow. Due to their low range coverage the current project uses GSM, which is used in concentrators to transmit data to the main station, or in high end multi-function meters.

IOT based Surveillance Robot [3] The proposed security solution hinges on our novel integration of camera on Raspberry Pi. Raspberry Pi operates and controls video camera for surveillance and records video for future playback. The other major advantage is that it is a simple circuit where particular operating system has to be installed so that the image can be displayed. Raspberry Pi consumes more power when compared to a PC using INTEL Pentium 2 processor. The Raspberry Pi's memory is also limited which is been overcome in the current proposed system which uses External EEPROM memory AT24C02/4/8/16/32A having high flexibility in volume. Raspberry Pi uses L293D Driver chip. The disadvantage of this is, it has a 1.5 voltage drop within the chip. Also, using Raspberry Pi the performance decreases significantly, it also has less Graphical capabilities and can only be programmed on limited number of languages.

IOT Based Wireless Multifunctional Robot for Military applications [4] The project is presenting an IOT Based Wireless multifunctional robot for military application with Raspberry pi 3 using MQTT protocol and it is done by integrating various sensors, Cameras, Grippers and actuators into web application using MQTT and HTTP protocol. The system uses ARDUINO controller. ARDUINO controller has only 10 bits of resolution which is the disadvantage of it.

RASPBERRY PI 3 consumes more power when compared to any other PC using INTEL Pentium 2 processor and also have got limited memory. MQTT protocol also has many disadvantages like SYN attacks, sequence manipulation, amorphous identification, DNS flaws.



Wireless Multifunctional Robot for Military Applications [5] The system presents a modern approach for surveillance at remote and border areas using multifunctional robot based on current 3G technology used in defence and military applications. The robotic vehicle has ability to substitute the soldier at border areas to provide surveillance. The robotic vehicle works both as autonomous and manually controlled vehicle using internet as communication medium. This multisensory robot used to detect human, bombs, harmful gases and fire at remote and war field areas. The robot functionality is been controlled by PIC18F452 controller. The PIC18F452 controller uses RISC computation, which makes the program lengthy. In the PIC controller program memory is not accessible and only a single accumulator is present for computations.

Humanoid Robot Surface Recognition [6] Utilizes ultra-thin force sensors and Arduino for surface classification. It is of Enhanced Stability, Real-time Adaptation, Latency Issues
Complexity of Implementation. humanoid robot by its most strict definition is an actuated human-size biped robot with a torso, arms, and a head, designed to achieve some of human capabilities. By augmenting human capabilities, humanoid robots will enhance productivity, safety, and overall efficiency, shaping a future where technology seamlessly.

Security Considerations in AI-Robotics [7] The paper uses a survey approach with a taxonomy to examine physical and digital vulnerabilities in AI-Robotic systems. It identifies attack surfaces, their impacts, and discusses security strategies against inference attacks. It has the Enhanced Autonomy, Improved Quality of life but doesn't have Ethical Concerns, Security Vulnerabilities.

Hazardous Gas & Mine Detecting Robot [8] The mine detecting robot works in dual mode, which means that, the robot can be controlled in both Manual mode and automatic mode. This is the Distinguishing factor while compared to the other kind of robots, as the most of the bots work in manual Mode. The automatic mode robot is programmed Within the embedded chip and it makes the robot to act as human beings. This version of robot is mainly Defined by the factor named Artificial Intelligence. The second distinguishing factor from the other robots is that, the proposed robot is capable of sensing Humans, who are trapped inside the coal mines. This is Done with the help of sensor (PIR) which help in Detecting obstacles.

Touch screen Controlled defence robot [9] The defence robot is fully controlled by the touch screen and the commands from the touchscreen via ZigBee Transmitter were received by the microcontroller. So this defense robot can be used in military applications. Automated defense robot building is planned, that has a laser gun attached, which is utilized for pointing laser rays to destroy the target object.

Unnamed multifunctional robot using Zigbee adopter network for defence application [10] This project focuses on the development of a multifunctional robot designed for military and defense applications, utilizing a Zigbee wireless network for communication and control. The robot is equipped with various sensors and capabilities to enhance its operational effectiveness in hazardous environments. Robot represents a significant advancement in military robotics, leveraging modern IoT technologies and Zigbee communication to enhance safety and operational effectiveness in defense applications. Its multifunctional capabilities make it a valuable asset for military organizations, providing critical support in high-risk scenarios.

Summary of Literature review:

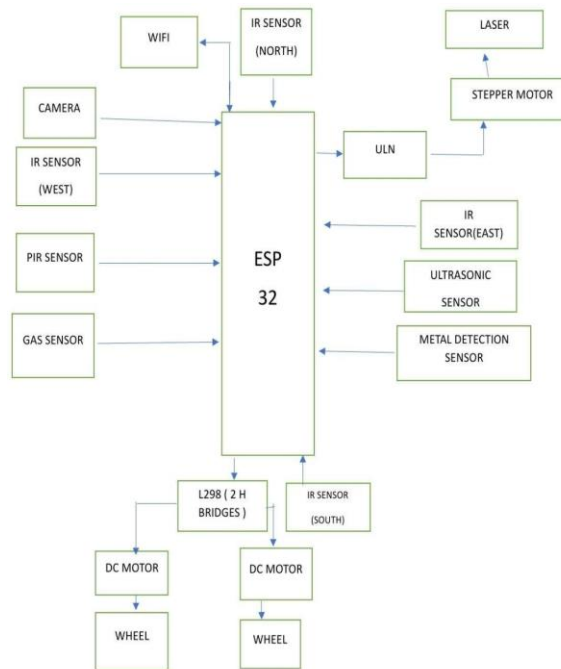
- These studies highlight the growing trend of developing cost-effective, real-time border/boundary security forces monitoring systems that Use sensors and microcontrollers to monitor and surveillance continuously.
- The focus on Arduino-based solutions and the Use of sensors for continuous monitoring aligns closely with the objectives of this project. However, many of the existing Solutions either focus on IoT systems or are not fully focused on providing different types of detectors, surveillance, real time data analysis.

- Our approach combines the strengths of these previous works by developing a system that is both low-cost and efficient, without relying on the complexities of IoT-based systems.
- The integration of Arduino-based sensors with a real-time alert makes this solution more accessible for defense system.

3. COMPARISON BETWEEN HUMAN TERMS AND ROBOT TERMS

HUMAN TERMS	ROBOT TERMS
<ul style="list-style-type: none"> ▪ Brain ▪ Senses ▪ Blood ▪ Hands ▪ Feet 	<ul style="list-style-type: none"> ▪ Computer ▪ Sensors ▪ Electrical/ Hydraulic Power ▪ Manipulator ▪ Wheels (normally)
Robots can be Turtles, Vehicles, Rovers, Walkers	

4. PROPOSED METHODOLOGY



Brief explanation:

The project's methodology focuses on strengthening the surveillance and defense mechanisms along the border areas to prevent illegal activities, such as infiltration, smuggling, and terrorism.

Here's a brief explanation of the methodology used in this project:

- **Technological Integration:** The project utilizes surveillance technologies such as bomb, gas, ir sensors, esp32 Built-in camera, and motion sensors to monitor the border in real-time. This allows for better detection and response to threats.



- Intelligence Gathering: Enhanced intelligencesharing between various agencies ensures that any movements across the border are detected early, leading to timely interventions.
- Active Patrol and Quick Response Teams: it sends alert message to the operator and also takes action like shooting, sending videos.

5. EXPECTED OUTCOME

The existing system is not that much feasible, scalable, reliable, economical, because Those systems don't have AI based location tracking system, image capturing, auto Notification and navigation system so our proposed work consisting of microcontroller and sensors, Once the prototype is placed in position and on the machine the sensors read real time data.

It provides real-time data of the sensor values to the monitor through the soldier Works 24/7 with 360 degree camera surveillance. It shoots with the laser gun if it Sees any movements near the boundary lines and senses the harmful gases, mines. It tracks and monitors potential hazards, and alert the military. Measures the infrared light radiating from objects in its field of view. It can track and monitor potential hazards, and alert the military. It uses AI photographic system to capture the images and send it. It has navigation system.

6. CONCLUSION

In conclusion, the “ Border surveillance Bot” project has provided valuable insights into the functioning, operational challenges, and strategies of the Border Security Force in safeguarding national borders. Throughout the project, we examined the methods, efficiency, and the need for continuous adaptation to modern security threats. The findings underscore the importance of enhancing the training, technology, and infrastructure of the border surveillance bot to Improve their improving coordination with other security agencies, and adopting advanced surveillance technologies, operational capacity for ensuring the protection of our borders and the safety of citizens.

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