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# Smart Surveillance and Combat Robot for Defense Operations

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**Abstract:** The task is the design of a meatpacking robot designed specifically for defense applications, which has the capacity to conduct surveillance and counter attacks. It operates through artificial intelligence for independent motion and object recognition in real time. It comes fitted with vision sensors, sensors, and wireless networking capabilities. It collects and sends information remotely while equipped with sensors and wireless interfaces. The design reduces the exposure of human resources to harmful operations, enhancing operational efficiency and safety. The robot works in manual and autonomous modes based on the mission. Its flexibility makes it ideal for border patrol, enemy tracking, and sensitive reconnaissance operations in hostile environments.

**Index Terms:** Smart Military Robot, Autonomous Patrol, AI-Powered Defense, Remote Combat Unit, Surveillance System, Tactical Robotics.

## I. INTRODUCTION

The Smart Combat and Surveillance Robot is a cutting-edge defense system that can be used to function in hostile and risky environments, minimizing the requirement of human soldiers for direct combat or reconnaissance operations. As the demand for increased security and automation in military use continues to rise, this robot integrates real-time surveillance, smart threat detection, and tactical response features.

With the aid of sophisticated sensors like HD cameras, motion sensors, and infrared vision, the robot can operate day and night. It collects detailed environmental information, which is processed through embedded Artificial Intelligence (AI). It can thus detect suspicious activity or intruders and respond accordingly based on pre-programmed response or instructions from remote operators.

Its AI also allows for autonomous decision-making, thus rendering the robot handy in timely situations where there can be delayed human intervention. Furthermore, the system features secure wireless communication to stream video real-time and provide remote control even where connectivity or electronic interference is low.

The robot is built to traverse different terrains, ranging from rough outdoor environments and harsh urban environments, due to its rugged construction and effective mobility system. In emergencies, it is able to turn into combat mode, using embedded weapons to disarm threats effectively without exposing human operators to harm.

This system also prioritizes power efficiency and long-duration operation, and it is well-suited for long missions without frequent maintenance. It is well-suited for missions like border patrol, strategic surveillance, bomb detection, and battlefield support.

Looking ahead, advancements in AI, battery life, and miniaturization will continue to advance its capabilities. The robot is not just a leap in terms of military automation but also has the potential for use in emergency response, law enforcement, and disaster relief.

## II. LITERATURE SURVEY

The study by K. Ravikiran1, J. Ajay Kumar Reddy, J. Harika [1] This work investigates the design of an intelligent surveillance robot suitable for military terrain, employing IoT to facilitate real-time monitoring and remote access. Equipped with GPS, cameras, and other sensors, the robot is able to move around and monitor risky areas without any human intervention. Its wireless capability facilitates data transfer to command centers, supporting speedy decision-making. The system reduces the risk exposure of military personnel to hazardous situations.



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Through constant automated operation, the system provides secure coverage. Overall, the robot offers a smart and effective means of improving the surveillance capabilities of the military

The study by Pranita Mohite, Mansi Jadhav, Sabah Bagwan, Anuradha Bakare [2] This project introduces a Bomb Detecting Bot meant to detect explosive materials in potentially hazardous environments. Fitted with advanced sensors, it can sense metal objects, chemical traces, or pressure changes associated with bombs. The bot may be controlled remotely or programmed to move on it own, keeping human staff safe. It provides real-time alerts and information to a monitoring system for rapid response. This technology is beneficial in military areas, public places, and in bomb threat emergencies. Bomb detection automation enhances safety and accuracy. The system performs effectively on different terrains with less human intervention. Overall, it offers a safe and advanced solution to explosive threat detection.

Research by Ankita Rohane, Tejas Shinde, Sumit Khamitkar, Amod Deshpande [3] With increasing explosive threats, safe bomb detection and disposal are now of the utmost importance. Manually handling explosives is an extreme risk that requires smarter methods. Sophisticated robots now come to the rescue by detecting and disabling bombs at a safe distance. Such systems employ sensors, AI, and remote operation to work efficiently in hazardous areas. Their size and versatility enable entry into cramped and dangerous places. They secure lives on critical assignments by enabling swift and safe actions. Emerging technologies further enhance their accuracy and decision-making capabilities. Upcoming models will hopefully become more autonomous and reliable. This development represents a significant breakthrough in crisis intervention and defense. It ultimately enhances overall public safety and security systems.

The research conducted by Mr .S. Sreenivasulu, C. Sai Priya, P. Adithya Vardhan, T. Vamsi [4] This project involves the development of a bomb detection and disposal robot with Arduino as the primary controller. The robot has sensors to detect explosive materials and a robotic arm to handle or neutralize them safely. It can be remotely operated, enabling personnel to remain at a safe distance while working in dangerous areas. Adriano provides smooth regulation of the system with affordable and versatile design. Real-time communication aids rapid decision-making for bomb threat situations. In general, the robot offers a cost-effective, efficient, and safe way of detecting and disposing of explosive threats

The study. Mr. A. Rajesh1, P. Shiva Krishna2, K. Ajay Kumar3, M. Bhanu Prasad4 [5] The project entails the development of a military surveillance robot that can be remotely controlled using a web-based interface via IoT technology. The robot, which is fitted with cameras and sensors, gathers and sends real-time information from sensitive or hostile zones. Internet-based remote control guarantees that operators are able to control the robot from a safe distance. The system augments situational awareness while reducing the risk to soldiers. It can traverse rugged terrain and offer real-time surveillance. In general, this robot based on IoT provides a secure, efficient, and up-to-date solution for defense surveillance.

Research conducted by MRS.U Jhanani Shree ,Rhogan S V ,Rithik Krishna S [6] The Warfield Spying Robot with Night Vision Camera is intended for secret surveillance in situations with low light or nighttime battle areas. It has sophisticated sensors that take good images even in total darkness. The robot will move automatically and detect obstacles, sending real-time information wirelessly. It is a critical factor in military surveillance, minimizing the exposure of humans to hazards. With the advancement of technology, such robots will be a key component of future warfare. They present an effective and dependable solution to collection of tactical intelligence in hostile and dangerous environments

The study by Lekha R, Manju Ravi, Sushma M Hegde [7], The Spy Robot for Military Surveillance aims at collecting intelligence in risky areas without endangering human lives. With high-definition cameras, sensors, and night vision, it functions well under different lighting conditions. The robot navigates independently and transmits real-time information to military forces. This lessens the use of human agents in dangerous missions. With advancement in technology, such robots will be essential tools in contemporary

The research conducted by the Shermel Santhiago P, Dr. Saravanan R, Shreenikethan S, Mr. K. Venu Gopal, Lokesh H [8] The Military Surveillance Robot is intended for real-time intelligence gathering in dangerous environments. It employs sophisticated sensors and cameras, performing well in day and night. The robot navigates difficult terrain on its own, transmitting vital information to command center's. Wireless communication provides secure, effective data transfer with minimal human intervention. This technology adds to operational safety and efficiency. With evolving military tactics, such robots will have a central part to play in enhancing mission success.

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The Research conducted by Harsh Dugar ,Rajat Gahlot ,Vedant Rathi, Raushan Kumar [9]The military surveillance in risky areas tends to risk human lives at severe levels. To counter this, a wireless robot has been designed to survey vulnerable areas from a distance. The robot employs a camera and sensors to sense motion, transmit live videos, and detect threats such as landmines. The robot can move efficiently on uneven ground and provides real-time intelligence to a distant operator. This minimizes the number of soldiers required in unsafe areas. Overall, it provides an economical, safe, and efficient means of ongoing defense monitoring.

The research conducted by Shameem Banu L,Mallikarjun S H, Rudresh T K,[10] Disposal of bombs in hazardous zones is extremely risky for the personnel. In order to overcome this, a wireless robot has been developed to detect and destroy explosives from a remote location. With a robotic arm, gripper, and camera, it is controlled at a safe distance, minimizing the exposure of people to harm. The robot increases accuracy in bomb defusing, ensuring efficiency and safety. Its wireless control system makes it capable of operating over a greater distance, making it flexible for different environments. This technology enhances bomb defusing operations and adds to current defense technologies.

The research conducted by Vaishnavi Yogesh Ganjale's, Shraddha Ajay Kale's, Shruti Satish Memane 's [11] Bomb disposal is very risky when manual operations are done by expert operatives. The given project brings an introduction to robotic-based bomb defusing which involves explosive detection as well as diffuse operation by remotely employing a camera and a multi-joint robot arm. This gives live view so the operatives can perform safe-distance operation. The robot can enter dangerous areas without putting lives at risk. Emergency stop and power-saving features enhance reliability. Overall, it provides a safer, more efficient option compared to conventional bomb defuse .warfare. They ensure effective, secure intelligence gathering, which improves success in missions.

#### III. CONCLUSION

The project effectively delivers a feasible solution to improve safety and efficiency in military operations through the creation of a smart surveillance and combat robot. The system combines real-time monitoring, threat detection, and simple defensive response, which makes it an important asset in risky environments. By assuming duties like area patrol, enemy identification, and remote engagement, the robot minimizes direct exposure of soldiers to danger.

The robot shows how sensors, cameras, and wireless communication can be integrated to form an effective multifunctional platform.over all Both autonomous and manual control possibilities make the robot flexible enough for different mission scenarios, the project sets a solid basis for integrating robotics in defense strategies and facilitating the overall shift towards automation in security operations.

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