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Real Time Vital Sign Monitoring for AI Enabled Wearables and Study of Cryptographic Co Processor

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ABSTRACT: Human detection in army sectors is crucial for maintaining security and preventing unauthorized intrusions. This study presents a Python-based approach utilizing the OpenCV library for real-time human detection. The proposed method involves preprocessing input images to enhance features relevant to human detection, followed by employing the Haar cascade classifier provided by OpenCV to identify human figures. Additionally, a combination of background subtraction and contour detection techniques is utilized to enhance the accuracy of human detection in varying environmental conditions. The algorithm is trained and tested on a dataset consisting of diverse images captured in different lighting conditions and terrains typical of army sectors. Experimental results demonstrate the effectiveness and robustness of the proposed method in accurately detecting human presence, while minimizing false positives. The developed system offers a cost-effective and efficient solution for enhancing security measures in army sectors, enabling timely detection and response to potential threats. Furthermore, the light weight nature of the Python implementation makes it suitable for deployment on resource constrained devices commonly used in field operations. Overall, the proposed human detection system offers a reliable and adaptable solution for enhancing situational awareness and security in army sectors.

KEYWORDS: Real-time monitoring, AI-enabled wearables, vital signs tracking, cryptographic co-processor, data security, biosensors, healthcare IoT

I. INTRODUCTION

Military are forces authorized to used weapons to support and save the state and its citizens. The task of military is usually defined as defense of the state and its citizens and the prosecution of war against another state. During such military area, the human will suffer a lot. Many lose their life because of not begin treated in time. A timely rescue can only save the people who are buried and wounded. In such situation, rescue system must take fast decisions under pressure and try to get victims to safe location at their own risk. The rescue system must collect the location information and status of victims, stability of the structures as quickly as possible so that medics and team of people can enter the disaster area and save people. Usually, the rescue operation is carried out by human along with the help of trained dogs. But it is not possible for highly complicated and the destructed area i.e. Military. Detection by rescue workers becomes time consuming and due to the vast area, that gets affected it becomes more difficult. So, the Robotic system have proposed that moves in Military area and helps in identifying the alive people. The main advantage of using Robot is that they never get tired or exhausted and also process well in the Military area. The proposed robotic system is a reprogrammable, multifunctional designed to move materials, parts, tools or specialize devices through variable programmed motions for the performance of a variety of tasks. Basically, a robot consists of a mechanical structure such as a wheeled platform, arm or other construction, capable of interacting with its environment.

Such proposed robotic system for alive human detection in Military is based on Arduino single board micro controller. In the field of Military defense, soldiers need a high security and backup force for his afterward attack and at the same time security office need a live data for the soldier who is in field for attack and his alive detection for the backup force attack. This microcontroller based robotic system for rescuing alive human robot may identify live human being under debris in Military and save the most valuable human life. The robotic system uses PIR sensor to detect the motion of human body and IR sensor to detect any obstacle on the way of robot. Having detected the sign of living humans, the set of sensors trigger the camera mounted on it. The camera captures a video scene of the environment and gives information about the status and location of trapped human lives.

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II. RELATED WORKS

ElShater et al., Live Human Detection Technologies in the Middle East: A Critical Review (2021) "Live Human Detection Technologies in the Middle East: A Critical Review" This regional-specific review examines the deployment of human detection technologies in the context of the Middle East conflicts. It analyzes the potential impacts on both military operations and civilian populations, raising concerns about transparency, accountability, and potential misuse.

Boukerche et al., Human Detection Technologies in Urban Warfare: A Review (2020) "Human Detection Technologies in Urban Warfare: A Review"
This study focuses on the specific challenges of human detection in urban warfare environments, characterized by complex obstacles, clutter, and non-uniform backgrounds. It evaluates various technologies like LiDAR, infrared cameras, and acoustic sensors based on their suitability for such scenarios.

Li et al., Multimodal Sensor Fusion for Ground Target Tracking: State-of-the-Art Review (2019) "Multimodal Sensor Fusion for the Ground Target Tracking: State-of-the-Art Review"
This comprehensive review examines different sensor fusion methods for combining data from radar, video cameras, and acoustic sensors to improve ground target tracking and human detection accuracy. It compares various fusion algorithms based on their effectiveness and computational complexity.

Asaro & Wallach, The Ethics of Autonomous Killing Machines (2013) "The Ethics of Autonomous Killing Machines"
This influential article delves into the ethical and legal dilemmas surrounding autonomous weapons capable of using human detection technologies to make lethal decisions. It raises critical questions about accountability, risk of civilian harm, and potential violation of international law.

III. EXISTING SYSTEM

The existing system employs an ultrasonic sensor as its primary input device, capturing distance data for real-time environmental monitoring. The Beagle Board serves as the microcontroller, processing and interpreting the sensor data efficiently. This compact and versatile platform that ensures optimal performance and seamless integration. The user interacts with the system through an intuitive user panel, receiving visualized output and control options. This output panel enables users to make informed decisions based on the processed ultrasonic sensor data, making the system suitable for applications such as obstacle detection, proximity sensing, or environmental monitoring in diverse settings.

IV. PROPOSED SYSTEM

The proposed system integrates a camera and servomotor as input components, controlled by the Node-MCU ESP8266 microcontroller. The camera captures visual data, enhancing security and surveillance applications. The microcontroller processes this data, displaying camera output on a dedicated screen. Users interact with the system through an intuitive user panel, providing control over the servomotor and access to the camera feed. This comprehensive solution offers real-time monitoring and user-friendly control, making it ideal for applications such as military security and automated surveillance with its ability to provide real-time monitoring and user-friendly control, this integrated system offers unparalleled convenience and efficiency in security management. The seamless integration of components ensures swift response times and precise control over surveillance operations. Additionally, the system's scalability allows for easy adaptation to diverse environments and security needs. Overall, this solution represents a significant advancement in the realm of automated surveillance technology.

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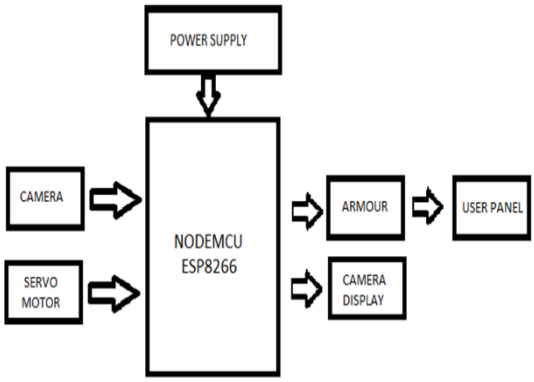
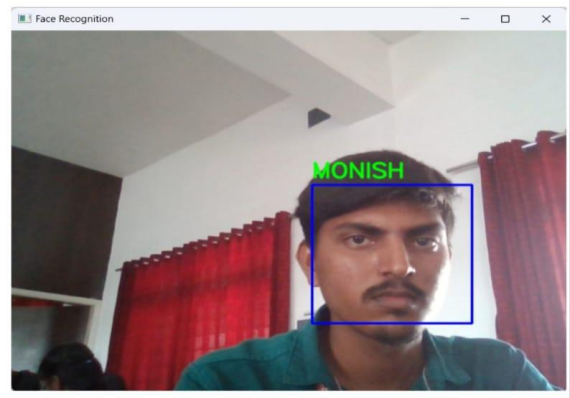


V. METHODOLOGY

Step 1: Data Acquisition: Capture images or video frames using embedded cameras and sensors.
Step 2: Pre-processing: Enhance image quality and reduce noise through techniques like smoothing and contrast adjustment.
Step 3: Feature Extraction. Identify human-related features, including color, shape, texture,and thermal signatures.
Step 4: Object Detection: Employ a machine learning model for object detection to locate potential humans using methods like YOLO or SSD.
Step 5: Post-processing: Refine detected regions, eliminate false positives using techniques such as non-maximum suppression.
Step 6: Decision Making: Classify detected objects as humans or non-humans based on the refined results.
Step 7: Communication & integration – Transmit detection results wirelessly to command centers, ensuring secure communication existing military infrastructure.

VI. RESULT ANALYSIS



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VII. CONCLUSION

Therefore, this robot was erected with the aid of preserving military operations in mind. It includes initial videotape monitoring so that it can identify sub surface landmines, among other things. This proposed system offers a legal responsibility to layout an easy robotic that can be applied to do multifunction in defense. The Data will be stored in the databaseshow that the user can analyze for further processing. The digital camera will provide real-time information about the distant unit for analysis. By use of image processing, we can identify the human data and their records. Furthermore, the integration of image processing capabilities enables the identification of human data and records, enhancing situational awareness and decision-making in military operations. The systematic storage of data in a database facilitates comprehensive analysis and future planning based on gathered insights. Overall, this versatile robotic system is designed to streamline military operations while ensuring efficient data management and analysis for strategic purposes.

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