

CAMOUFLAGE ARMY ROBOT

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Abstract - Science is a rapidly developing field that produces technologies that make people's lives easier. One such invention is the ROBOT. A robot means a computer programmable to perform a complex series of operations. Military activities are considered the most dangerous area in which to operate. Along with other applications such as online tracking, landmine detection, the cloaking robot is a solution to reduce the loss of human lives by replacing them during such operations. The proposed framework consists of a surveillance camera, masking RGB strips and a metal IR sensor identifying the object. Through this camera, the robot detects the shadow surrounding the zone and changes its shading to mixed known as Camouflage technique.

Key Words— Landmine detection, Surveillance camera, RGB strips, IR Sensor, Camouflage.

I. INTRODUCTION

The idea of an army robot is based on cloaking techniques. The goal of the project is to design, manufacture and operate a robot that can reproduce colors according to the surface of the earth where it will move, masked from the outside world. On the one hand, we used an LED (RGB) capable of dispersing uniform colors in conjunction with sensors to achieve these goals. This robot is designed to independently reproduce color in different areas, with each area able to reproduce a color with specific spots on the ground surface, allowing the robot to model itself as a checkerboard of multiple colors - different colors that it traverses.

On the other hand, we have also created a system that can receive and decipher the information received through IoT and further pilot the motors, which in turn propel the robot in any desired direction. Modern robots are usually guided by a computer program or electronic circuits. The possibilities of robot autonomy and potential impacts have been addressed in fiction and may be a realistic issue in the coming days. The military robot is capable of tasks such as locomotion, noxious gas sensing, subsurface human sensing and metal detection. Army Robot is an autonomous robot consisting of a wireless camera that can be used as a spy. This army robot is more efficient compared to soldiers. The excellence of this robot is that it is controlled wirelessly from a remote controller, which does not pose any risk to the lives of the soldier. Robots are enhanced to

be robust and more robust, guaranteeing success in a risk-prone environment.

The main objective of the paper is to implement a wireless multi-functional army robot based on cloaking technology that moves and moves in risk areas and tries to identify intruders. In military applications, robots use wireless Ad Hoc networks to exchange information with their nearby networks. Due to manpower constraints, most industries use robots for their operations. Different sensors and cameras are used to sense and track the movement of robots to detect obstacles in different directions. Robots protect themselves from rivals during wartime.

II. LITERATURE SURVEY

S Bhargavi and S. Manjunath, "Design of an Intelligent Combat Robot for war fields" International Journal of Advanced Computer Science and Applications (IJACSA), 2(8), March-2022.

The proposed system consists of one camera with a color sensor as part of camouflage and another camera for tracking purposes. A camera with a color sensor detects the color of the surface and the robot changes color accordingly.

N Jayanthi and Hindu "Comparison of Matching Techniques" International Journal of Latest Trends in Engineering and Technology Vol. (7) Issue (3) 2020, pp. 396-401

This article provided an insight into how different image recognition and tracking algorithms perform on different datasets. A wide variety of datasets were selected, from hand gestures to shapes and objects to handwritten manuscript text.

Ghanem Osman Elhaj Abdalla and T Veeramankandasamy "Implementation of Spy Robot for A Surveillance System using Internet Protocol of Raspberry Pi" 2nd IEEE International Conference on Recent Trends in Electronics Information & Communication Technology, Sep. 2020., India

In this article, we mentioned the PIR sensor, which is used to distinguish living objects (by identifying the degree of IR radiation) and which is most suitable for inspection. This paper derived fixing a camera on the robot.

Hitesh Shinde, Kirti Sonawane, Pranit Rane, Atharva Pathak, Sumita Chandak Atharva "Camouflage Color Changing Robot" ISSN: -2321-9653, published on April 2018.

The main purpose of this system is to camouflage itself to hide its existence from the outside world. These robots are also enhanced to provide a guarantee of success in the dangerous area. The main objective of this article is the implementation of a wireless multi-functional army robot, which is based on Camouflage technology. It can be controlled by smartphone using IOT.

P. Hymavathi, T. Jyothi "Surveillance Alive Human Detection Robot using X-bee Technology" SSRG International Journal of Electronics and Communication Engineering (SSRG-IJECE) - volume issue 4, Jan 2020.

The main purpose of this paper is for X-bee connection and implementation of a multi-purpose robot by wireless technology, the model can be controlled by a personal computer (PC) to navigate the disaster areas and identify the enemy.

III. PROPOSED METHOD

Both input and output are done on the robot side, while all image processing is done on the computer side. The robot has all these input devices like color camera, video feed camera and obstacle sensor to collect all required data for processing. This data is then wirelessly transmitted to a PC via a Wi-Fi trans-receiver. The computer then processes the received data using various image processing algorithms. Determines the background color and passes this data to the robot. Through the PC, the user can also command the movement of the robot. One of the important functions of the PC is to display the live video received from the robot.

All transmission is done serially using a Wi-Fi trans-receiver. The robot can generate output from the color input obtained from the camera by changing the color of the LEDs. This is done by turning on one of the three relays present on the robot. The PC, will be able to control the movement of the robot.

1. GUN TARGETING

We will build an airsoft (or nerf) motion tracking turret with a Raspberry Pi 3. We have created two separate operating modes: Interactive and Motion Detection. Interactive lets you control the turret remotely and stream live video. Motion detection uses OpenCV and computer vision to track moving targets in front of the camera.

2. CAMOUFLAGE TECHNIQUE:

The robot is being camouflaged and is controlled from a far distance. Camouflage is essential in the army missions. The color is sensed by using camera and a proportional value is fed to the led strip using the Raspberry pi. The algorithm used is Color Thresholding algorithm. The Color Thresholding algorithm works as the first stage of any image processing task is to have an image for detecting colors in it. One can capture it from the camera or load a previously clicked image from the memory. Read the input image in RGB format which is the most commonly used format to represent colored images, if the resolution of the image is $M \times N$, then the RGB format of the image will be a three-dimensional matrix of size $M \times N \times 3$ where each dimension of the matrix represents the red, green and blue color components of the image. This color is then sent to the robot via Zigbee / Wi-Fi. The robot then will process the received data and will turn on the relay of according to the color received. This entire work is done on raspberry pi with Raspbian operating system ported on it. Surveillance System consists of mainly two parts:

- **Hard-wired surveillance systems:** These systems use wires to connect the cameras, motion detectors, power supply and LAN cable with the Raspberry pi.
- **Remote Access Systems:** These systems have the capability to monitor and control a security system from a location away from the surveillance area through android device.

4. LAND MINE DETECTION:

The process of clearing landmines begins with the detection of landmines in the ground. Non touch based detection methods are required for secure detection. These methods include detecting landmines by non-contact sensors such as metal detectors and radars. Among these sensors, ground-based radar or GPR is an attractive choice for landmine detection due to its advantages over other sensors. Hence, GPR can be used as a stand-alone sensor or as a complementary sensor to a metal detector. It can detect both metallic and non-metallic landmines. In addition, its weight can be light, so it can be installed in a hand-held system or in a vehicle-mounted system in the form of an array of multiple antenna elements.

IV. BLOCK DIAGRAM

This system consists of Raspberry Pi which controls IR sensor, heart beat sensor, ultrasonic sensor, metal detector, gas detector to detect any intruders, heart rate monitoring, distance detection, dangerous landmines and noxious gases respectively. It can be controlled using a WIFI module. It is the interface between the user and the system. The motor controller drives the robot according to

the commands entered by the user using the WI-FI module.

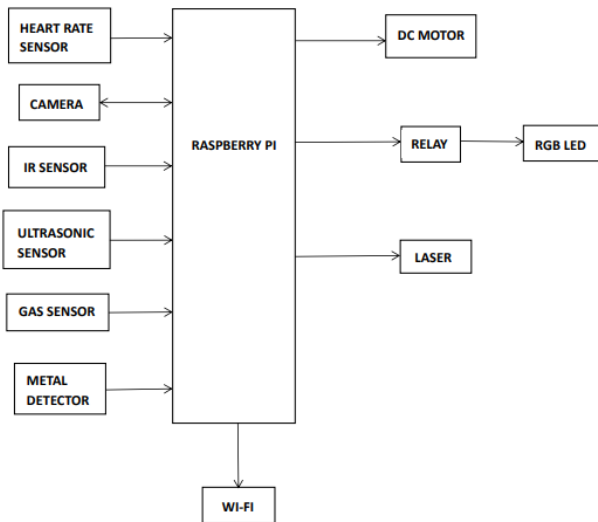


Fig 4.1: Proposed system block diagram

V. WORKING

A. Rover Movement:

Raspberry pi is used for two modes of action. The Remote-Control mode, where the rover is controlled manually from remote web server connecting it with an internet connection. This is done when the signal is passed from the Raspberry Pi and being the master controls the movement of the rover. The movement of the robot is controlled with keys for all four directions besides with start and stop function in the web server. During autonomous mode the rover is programmed through the Raspberry Pi while the ultrasonic sensor detects in case of any obstacle and changes its direction accordingly.

B. Capturing Image:

The earlier concept of an automatic targeting system is to detect and target a live object or any movement in a high security area like a Border using automation. Automation is the sensor base of the weapon's automatic aiming system; it will aim at a live object within the range of the sensor. Aiming of automatic weapons is primarily based on PIR sensors, camera, microcontroller. This system is designed to monitor the object in real time and provide security through the peripherals connected to this system. The work of the system consists of several steps, which include the processing of the video signal from the camera. The video is first converted to raw digital format and then its luminance part is extracted using image processing algorithms. Each frame is then compared to the previous frame to detect motion in the current frame. This is done using the background subtraction method. In this work, we used scaling and smoothing techniques to remove noise and improve image sharpness. We then calculated the difference image by subtracting the background

information. The resulting raw binary image is then further processed using morphological operations, which leads to the detection of more objects.

VI. RESULTS AND CONCLUSIONS

The Camouflage Army Robot is an advanced robotic system equipped with cutting-edge technology. It blends seamlessly into its surroundings, making it almost invisible to the naked eye, while also using heart rate monitoring to assess the well-being of soldiers on the battlefield. In addition, it boasts features such as face detection, sensing harmful gases and metal or landmine detection, increasing its versatility and effectiveness in detecting threats and ensuring the safety of military personnel.

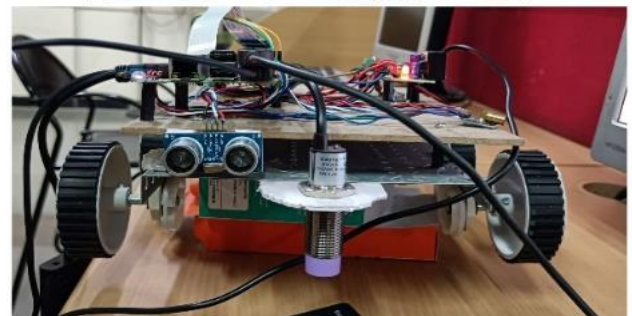
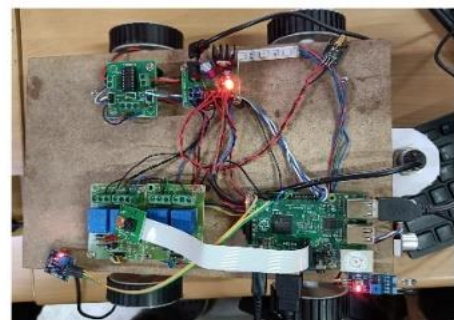


Figure 6.1: Camouflage Army Robot

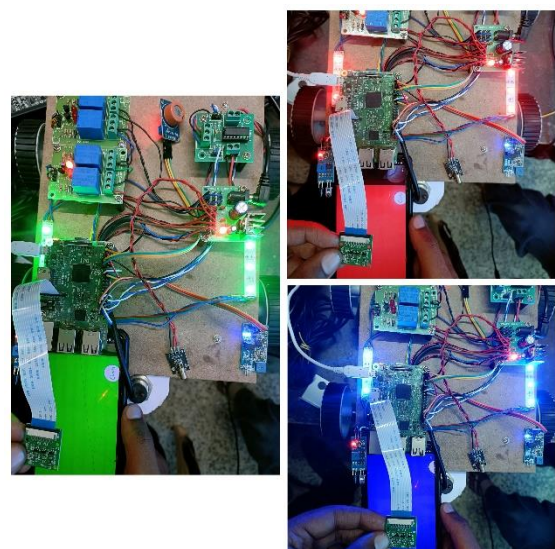


Figure 6.2: Camouflage Technique

This cutting-edge robot utilizes its camera to detect RGB colours and seamlessly projects them onto RGB LED strips. Unleashing the power of camouflage, the Camouflage Army Robot employs RGB colour detection through its camera and projects the detected colours onto RGB LED strips, rendering it virtually invisible in its environment.

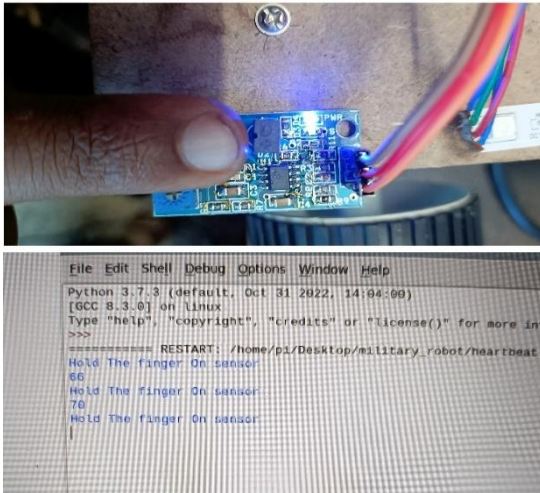


Figure 6.3: Heart rate monitoring

Equipped with a heart rate monitoring sensor, it detects soldiers' heart rates and displays them on-screen, enhancing situational awareness and ensuring optimal health during critical missions.

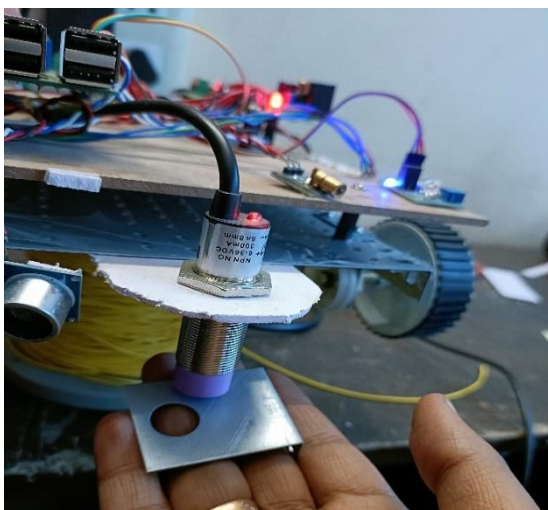


Figure 6.4: Metal Detection

The Camouflage Army Robot employs a metal detector for landmine detection, effectively locating hidden threats. It displays real-time metal detection results on its screen, ensuring safer navigation for military personnel.

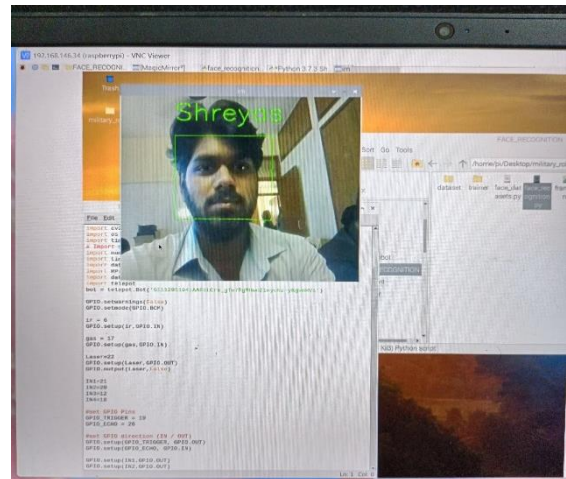


Figure 6.5: Face Detection

Camouflage army robot employs Haar cascade algorithm for face detection, accurately distinguishing between enemy forces and our own troops. The integration of Haar cascade algorithm in the camouflage army robot enables precise identification of friend or foe, enhancing situational awareness on the battlefield.

VII. CONCLUSION

The proposed system is a substitute for human life. As human life is always prioritized, this proposed robot helps to act as a security system and life saver. It plays and plays an important role in monitoring the areas of war fields and captures the surroundings. As it is based on the colour changing effect of Chameleons, the robot changes its colour according to the surrounding environment and is hidden from the enemy's view. In addition, the cloaking feature makes it difficult for the robot to be detected by the human eye alone. The robot also captures live footage from the surroundings so we can monetize and analyse the battlefield territory. If any obstacle is detected, it will be notified, and the robot will stop. In all, the proposed system provides a helping hand to our security forces in detecting intruders. The robot can also be used at high altitudes where humans cannot survive.

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