

# Camouflage Based Multifunctional Army Robot

<sup>1</sup>Kiran Kumar K, <sup>2</sup>Harshitha S Shetty, <sup>3</sup>Joanne S George, <sup>4</sup>Krithika P, and  
<sup>5</sup>Sunaina Kashyap

<sup>1</sup> Assistant Professor, Dept of Mechatronics,  
Acharya Institute of Technology, Bengaluru, India  
<sup>2,3,4,5</sup> Student, Dept of Mechatronics,  
Acharya Institute of Technology, Bengaluru, India

**Abstract:** *In today's world, the Camouflage Robot is part of a vital role in rescuing missing people and infiltrating into enemy territories. The robot also substitutes soldiers in war zones. These are often designed to work in a hazardous climate. One of the best features about this robot, to summarize it, camouflaging i.e. The sensor detects the surrounding and projects on the body of the system so that the robot remains unobserved. Due to this feature, the robot cannot be easily captured or seen by the enemy. Some military-like organizations make use of robots in a safe and secure environment compared to the military. The main aim of this method is to encourage the object to conceal its presence in the world. The main objective of this paper is to use the wireless multi-purpose Army Robot predicated on Camouflage technology.*

**Keywords**—Army robot, PIR sensor, Wireless Camera, Raspberry PI, Laser Gun and ZigBee

## 1. Introduction

A robot can be defined as an automated computer that sometimes resembles a human being or an animal. Robots have diverted people away from repetitive and hazardous tasks. Modern robots are normally guided by a computer program and an electronic circuit. These robots help make human life much easier, particularly in dangerous environments and operate amid today's military concerns.

In colloquial terms, new, creative technologies and their level of application are increasingly rising in science and technology. This emergence of technology is being strongly transformed by the defense sector and security services to provide our people safety with an increased focus on security systems. National security is being guarded and protected by the army, navy, and air force. There are several limits on which security services can provide protection to the military. The soldiers who gave their lives to their country play a significant and important role for us. There are a lot of questions about the welfare of the soldier. Troops who fall into enemy barracks frequently lose their lives due to lack of contact, the military station must be unable to assess the situation and, as a result, for all troops, many soldiers lost in battlefields Since there was no adequate health support and contact between military personnel and, as a result, military officers.

To perform these increasingly risky duties, Military robots were selected to perform activities that are impossible for humans to deal with. Such robots are working as military aid. Today, because of their accuracy, many military organizations use robots to perform hazardous tasks. Such military-powered robots are typically employed with an integrated network, including video screens, sensors, grips, and cameras. The key purpose behind the Camouflage Robot is to reduce the death toll of military operations or terrorist attacks. The Camouflage Robot acts as a spy and should be sent to strategically important military bases for surveillance and military purposes. Since it is very difficult to detect it with the human eye, the Camouflage robot is also capable of evaluating many of the protection systems produced on the market and serving as a measure to measure their performance.

## 2. Objective

The main objective of our system is to implement the camouflaging in real time with help of emerging technology. The proposed Wi-Fi network system, therefore, eliminates security defects and keeps the situation safe from the enemy. The Camouflage Robot plays a vital role in saving lives, as well as rescue operations for the aftereffect due to the natural disaster. In fact, the robot consists of a device fitted with two cameras, one camera that takes pictures and sees color as a neighbor of the blurring feature, and as a result, the opposing camera is hired for surveillance purposes. As a substitution technique, we used Wi-Fi wire-transceiver to expand the range of contact between the transmitter and the receiver. The robot quietly reaches the enemy area and sends the camera details to the controller. The camera records the image underneath and is consistent with the robot that changes its exterior and the robot cannot be easily spotted by the enemy. The robot's motion is wirelessly controlled by an inbuilt program or a cell phone. Because human life is always precious, the robot is also used to replace soldiers in battlefields and inspired by chameleon-like creatures. Another objective of this robot is to detect enemies who do not belong in the place that the robot is securing.

## 3. Existing System

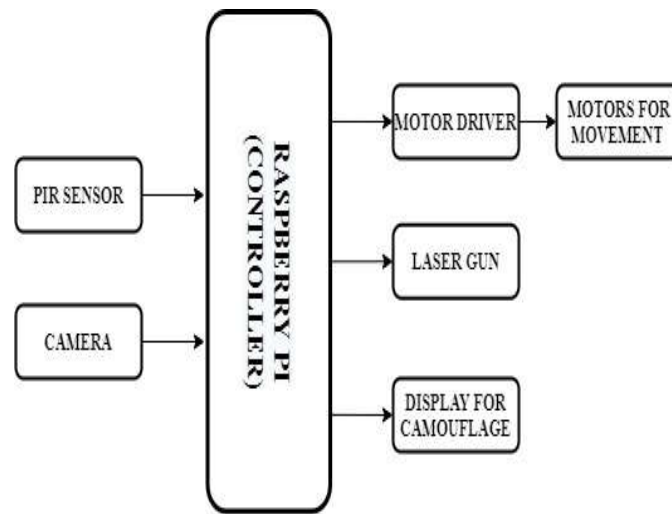
Essentially, the Robot can carry out operations and activities such as locomotion, detecting harmful air, bringing people under the water, metal detection. The Army Robot is a robot with a camera module that can be used as a spy, and Bluetooth does not monitor wireless. Existing systems face many difficulties, such as high costs, including connecting robots to each other during rescue control, non-noise communication between the robot and the control unit, which prevented the robot from functioning in the end, etc. In such implementations, distance can be a limiting function, as Bluetooth has a broad range that can be expanded.

## 4. Proposed System

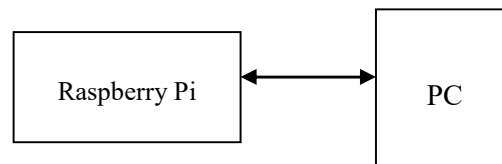
In this system we have been guided by the principles of camouflaging. The goal of the project is to disguise itself, which is why it has a display mounted on the surface. This robot is said to be able to replicate itself independently at different locations in each region and has the ability to reproduce the images of the background with some subconscious spots that allow the robot to scale. The other application of the system is that it can detect enemies. Using Haar-Cascade algorithm, we use it to train the robot to known people only. Upon seeing known people, it will use the targeting system to shoot them. We have also developed a device that can detect and understand information obtained from a smartphone using IoT to propel drivers who successfully follow the robot in any direction they need. The opposite implementation we got with this module works with another robot from another robot using a wireless link when the main robot goes beyond through the IoT range.

For this reason, we use ZigBee to evaluate the interaction between robots. Since it is connected to the network and IoT, the system sends a push notification to the android user when the detection is detected in space. It is important to make the camera more powerful and less costly. The approved user may use the remote monitoring system through the mobile device and the object monitoring in use.

## 5. Proposed Block Diagram



Base Station:



**Figure 1. Rover Block Diagram**

## 6. Components

- **Raspberry Pi** — The Raspberry pi may be a single computer board with master card size which will be used for several tasks that your computer does, like games, data processing, and spread sheets, and also to play HD video.
- **PIR Sensor** — The PIR (Passive Infra-Red) Sensor is employed to check if there are human around by the levels of infrared rays around the object.
- **Laser gun** — A laser may be a device that emits light through the emission of electromagnetic radiation. Here, it is used in place of actual guns to target the needed.
- **Relay** –Relays are the switches which aim at operating various switch automatically.
- **Pi-Camera** — This camera module can connect on to your Raspberry Pi. It uses a MIPI camera serial interface protocol to communicate with the Pi. It is used here to capture images of faces or surroundings depending on the application.
- **DC Motor** — an electrical motor is an electrical machine that converts electricity into energy. Used in the robot to move forwards and backwards.
- **L293D H-Bridge** — The L293D Dual H-Bridge Motor Driver may be a general-purpose high voltage driver. It consists of four half H-Bridges which will be operated as two full H-Bridges. This H-Bridge can either drive 2 motors with direction and speed control or 4 motors with the speed control only.
- **Proximity sensor** — A PIR or a Passive Infrared Sensor are often wont to detect presence of citizenry in its proximity.

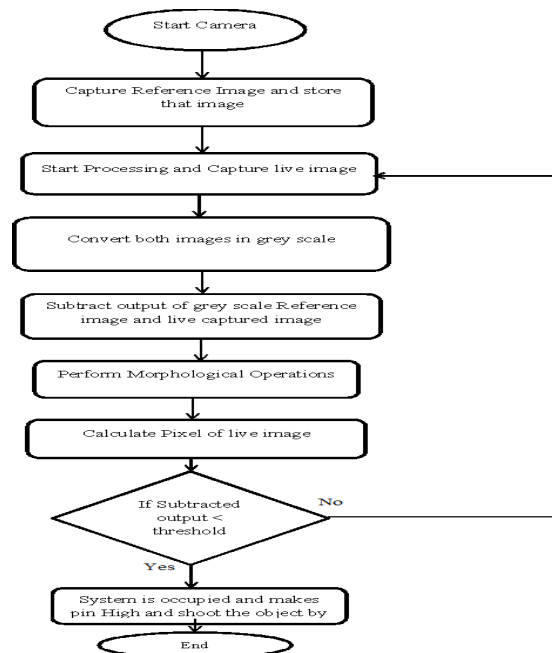
- **Power Supply** — A transformer IC keeps the output voltage at a continuing value.
- **Raspberry Pi Display** — The display ( $800 \times 480$ ) connects with an adapter board that handles signal and power conversion. Used mainly for the camouflaging of the bot and controlling it.

## 7. Working

### 7.1. Rover Movement

Raspberry pi is employed for 2 modes of action: The REMOTE-CONTROL MODE, where the rover is controlled manually from remote device through the online server connecting it with internet connection. this is often done when the signal is passed from the Raspberry Pi and it 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 within the web server. During AUTONOMOUS MODE, the rover is programmed through the Raspberry Pi while the PIR sensor detects just in case of any obstacle and changes its direction accordingly.

### 7.2. Capturing Image



**Figure 2. Flowchart of Image Capture**

A webcam may be a camera that delivers real-time images to your device or network, typically through USB, Ethernet, or WiFi. The purpose of this system is to track the object in real-time and to provide security with arrangements relating to the current system. System output consists of a few steps involving the computing of signals received from the camera. The video will first have the luminescence part be extracted from the original digital format and then partially released. A comparison is carried out to check if there is movement within the frame of the one being processed. It is done using the method of background substitution. In order to reduce noise and enhance sharpness of the picture, scaling and smoothing techniques were applied to it. We then measured the difference in the image by deleting the background information. The binary image is then drawn to and

examined via a morphological process, which leads to discovery of many objects. In order to attach the image, blob analysis was used.

## 8. Advantages and Applications

### 8.1. Advantages

- This system is an efficient and a secure system to form sure there are not any humans left behind during an operation.
- The System is safe even for the user thanks to the utilization of robotics, and no manual work
- The system uses Wi-Fi, and this makes the system both accurate and reliable.

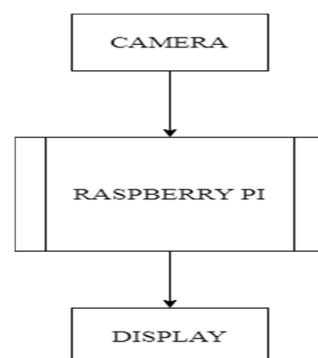
### 8.2. Applications

- In military application to detect the presence of person.
- In operation where, human reach is not possible.
- In war fields to regulate the unmanned aerial vehicle.

## 9. Result and Discussion

The rover can move either on pre-programmed path or are often made to maneuver autonomously. For the primary stage of this project, the rover moves during a path of front and back. With the revolving the position of the camera, the prototype does not have to take an about-face.

### 9.1. Camouflaging



**Figure 3. Camouflage Working**

As are often seen, with the assistance of the Raspberry Pi Display, the live streaming done from camera of the bottom below are often seen. There happens to be a small delay of 10-20 seconds thanks to the color detecting program. With further refining of the program, the delays are often reduced.

### 9.2. Face Detection

For face detection, First, the dataset of 100 images of known person is collected and a user ID (face\_id = 1,2,3..... Etc.) is assigned. Next, the educational program is run, to make a .yml file. Finally, the Face Recognition program is run. During the run of the program, there arises two cases: -

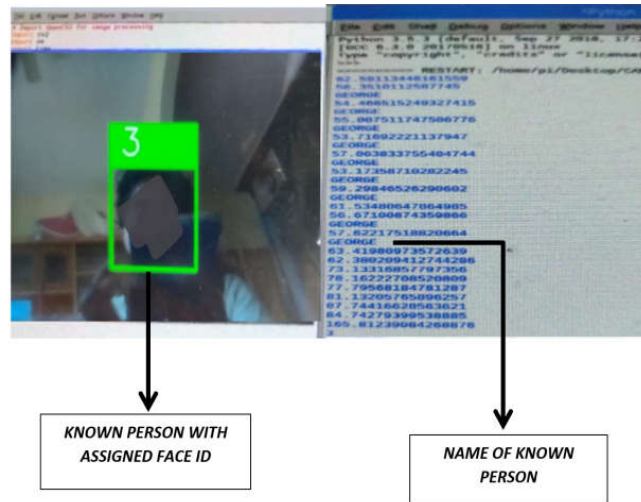


Figure 4. Known Person

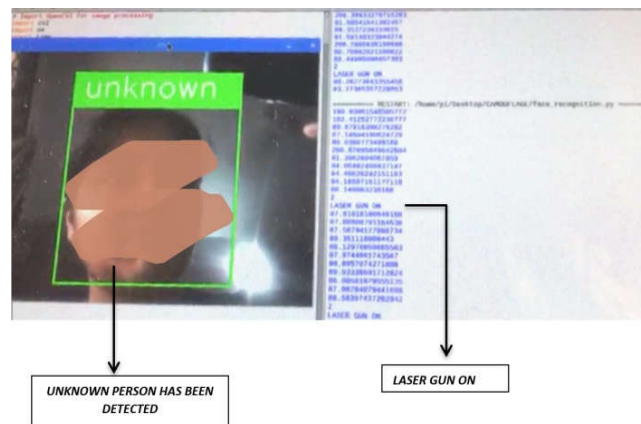


Figure 5. Unknown Person

### 10. Conclusion

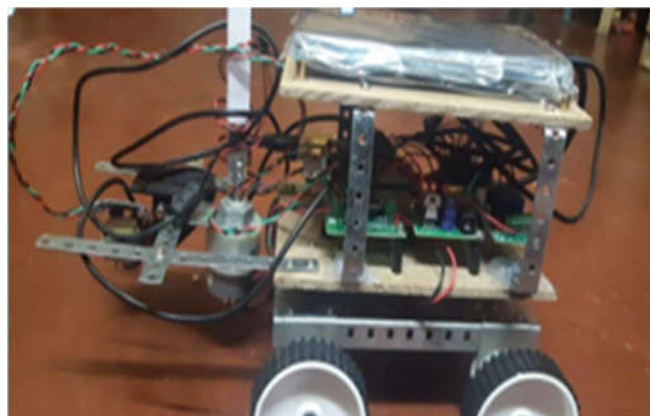


Figure 6. Final Model of Robot

The prototype that has been put forth, is a substitution for human beings. This system can be made to act as a surveillance system, in addition to saving human lives. The most important objective that has been accomplished in this system is that of the camouflaging. The robot can change its appearance with respect to its environment. In this manner it is kept hidden from enemy sight and acts as a virtual spy. This is crucial to the safety of the

system. Moreover, the face detection in this system lends to the security applications of the robot, in the manner of targeting unknown personnel. The robot can be used in places and environments that are hazardous to human beings. The robot can be used as a standalone or can be made as part of a system of robots that communicate with each other. Therefore, it can be used as a spy or border security. All in all, the aim of providing a helping hand to the defence system of the country has been accomplished.

## Acknowledgment

The paper is based on creating a robot that can assist soldiers during the time of crisis. We analyzed and did the modifications required in the existing system. This helps the army by assuring to reach the positions that are difficult for a soldier to reach, Thus, ensuring their safety. We, all the authors are very much thankful for the continuous support and inspiration received from our guide and very grateful to our family members for moral & financial support, and inspiration.

## References

- [1] *Harish Kumar Kaura<sup>1</sup>, Vipul Honrao<sup>2</sup>, Sayali Patil<sup>3</sup>, Pravish Shetty<sup>4</sup>, "Gesture Controlled Robot using Image Processing" IJARAI,2013.*
- [2] *Nirmal T M "Multipurpose Robot for Patients and Military Applications" IJECCT,2014*
- [3] *Chinmay Kulkarni, SuhasGrama, PramodGubbi Suresh, Chaitanya Krishna, Joseph Antony "Surveillance Robot Using Arduino Microcontroller, Android APIs, and the Internet" IEEE Computer society,2014.*
- [4] *David Kohanbash "A Safety Architecture for Autonomous Agricultural Vehicles" IEEE, 2014.*
- [5] *"Arduino Based Bluetooth Controlled Robot" SubankarRoy, TashiRapdenWangchuk<sup>2</sup>, Rajesh Bhatt, IJETT,2016.*
- [6] *Wai Mo Mo Khaing<sup>1</sup>, Kyaw Thiha<sup>2</sup>" DESIGN And implementation of remote operated spy robot control system" IJSETR, 2014.*
- [7] *Vivek Khot, Ravindra Joshi, Aashay Chavan, Sanket Dhumal, "Camouflaged Colour Changing Robot for Military Purpose", International Journal of Advanced Research in Computer Science and Software Engineering, Volume 5, Issue 3, March 2015.*
- [8] *Xiang Zhang, Ce Zhu, "Camouflage modeling for moving object detection", IEEE, 03 September 2015.*
- [9] *Vishesh Goel, Tarun Jain, Sahil Singhal, Silica Kole, "Specific Colour Detection in Images using RGB Modeling in MATLAB", International Journal of Computer Applications, Vol.161-No 8, March 2017.*
- [10] *N. Jayanthi, S. Indu, "Comparison of Image Matching Techniques", International Journal of The Latest Trends in Engineering and Technology, Vol. (7) Issue (3), pp. 396-401.*
- [11] *Dr. Shantanu K. Dixit, "Design and Implementation of e-surveillance Robot for Video Monitoring and Living Body Detection", International Journal of Scientific and Research Publication, Volume 4, issue 4, April 2014, ISSN 2250- 3153.*
- [12] *Dhiraj Singh Patel, "Mobile Operated Spy Robot": International Journal of Emerging Technology, and Advance Engineering, Volume 3, special issue 2, Jan 2013.*
- [13] *Dr. S. Bhargavi "Design of an Intelligent Combat Robot for War Field", International Journal of Advance Compute Science and Application, Volume 2, no.8, 2011.*
- [14] *A. Khamis, M. Pérez Vernet, K. Schilling, "A Remote Experiment on control of Mobile Robots", 10th Mediterranean Conference on Control and Automation ED2002.*