

Camouflage Color Changing Robot For Military Purpose

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Abstract: Camouflage robot is solution for reducing human losses in military operations or terrorist attacks. They play major role in saving human lives. The proposed system consists of one colour sensor camera as part of camouflaging feature and other camera for surveillance purpose. Colour sensor camera senses the colour of surface and according to that robot will change its colour. Because of this feature this robot can't be easily detected by enemies. We have used Wireless transceiver for communication between transmitter and receiver. This robot can quietly enter into enemy area and send us the information via camera. The movement of this robot is wirelessly controlled computer. Since human life is always valuable, these robots are the substitution of soldiers in war areas.

Keywords: Camera, Camouflaging, Colour sensor, Wireless robot, ZigBee

I. Introduction

Human life comes to risk at places where human being cannot survive, war fields, high altitude areas, etc. As human's life is always prior than anything else, the proposed robot is substitution to human life wherein it acts as a security. The proposed system analyzes the surrounding area and also provides live footage to the observer. Camouflage Robot acts as a virtual spy and can be sent into the strategic locations of military importance for observation and warfare purpose^[1]. Since it's very hard to detect it by a naked human eye, the Camouflage robot can be also used to test the various security systems developed in the market and act as a measure to evaluate its efficiency^[1]. With the rapid growth of the Internet, more and more intelligent devices or systems have been embedded into it for service, security and entertainment, including distributed computer systems, surveillance cameras, telescopes, manipulators and mobile robots.^[6]

II. Literature Survey

According to our survey, the reviewed systems used colour detection sensor which have a problem of detecting colour due to which had limitations over a particular range. Metal detector and gas sensors were used which made the system more complex. Those detectors and sensors are removed to reduce the weight of the robot. Also the system consist TV tuner card which made the system complex. So in order to reduce the cost and complexity it is removed.

The aim of engineering camouflage is to make the detection and recognition target difficulty in the machine assisted eye searching target in the big breadth background around.^[3] The sensor switches each primary color RGB, one by one and checks what intensity of color is reflected by the surface of detection. This reflected intensity is converted to 8 bit value. For example a RED surface will strongly reflect RED. While a Yellow surface will reflect RED and GREEN both. According to the induction principle of the three primary colours which create various other colors in nature, once the value of three primary colours is confirmed, the color of the tested object is known. Knowing the value of RGB helps people gain the color of the light which is projected onto the sensor since each color correspond to only one value of RGB.^[2] The proposed system provides a helping hand to our security forces in detection of intruders. The robot can also be used in high altitude areas where human cannot survive. Moreover, the camouflaging feature makes it difficult to detect the robot by naked human eye. There is scope to improve the system by configuring it with multicolor camouflaging.^[1]

III. Proposed System:

To resolve the problems of existing work we propose a new approach is to use Colour sensor camera and obstacle sensor. The propose work will solve the problems of getting damage and detecting colour properly.

System Block Diagram

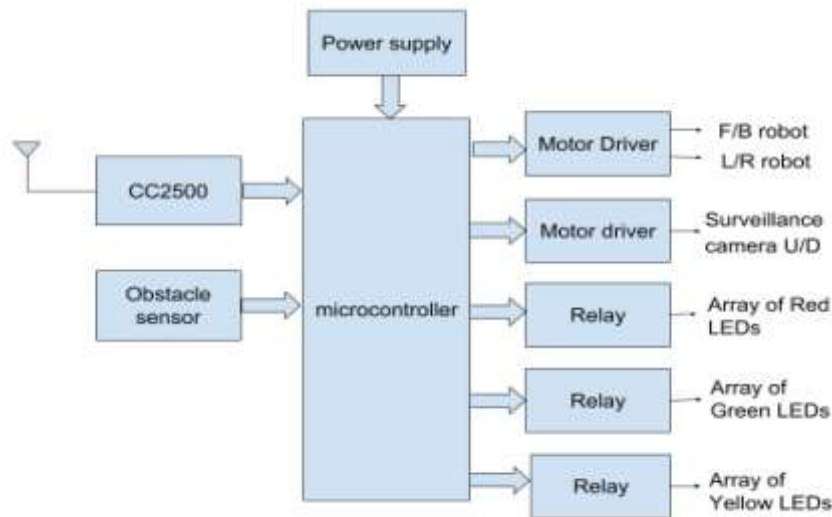


Figure 3.1.a Block Diagram Hardware Side

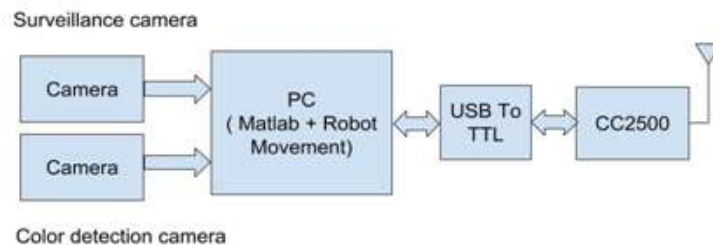


Figure 3.1.b Block Diagram Computer Side

Flow of Working

The diagram of the project can be divided into two sub parts Robot side (fig. 3.1.a) and PC side (3.1.b). On robot side both the Input and Output is done whereas on PC side all the image processing is done. Robot has all these input devices like color sensing camera, video feeding camera and obstacle sensor to collect all the required data for processing. This data is then transmitted wirelessly to PC via zigbee trans-receiver. Computer then does the processing of the received data using various algorithms for image processing in MATLAB. It determines the color of background and transmits this data to robot. Through PC the user can also movement commands to the robot. One of the important functions of PC is to display the live video feed received from the robot. All the transmission is done serially using zigbee trans-receiver. Robot can output the received color by changing the color of LEDs covering the chasis. This is done by turning on one of the three relays present on the robot.

IV. Implementation:

The following flowchart explains the implementation of the hardware as well as software part of the project. The software used is MATLAB using which we will be able to handle the movement of the robot.

The algorithms used are Colour Thresholding and Blob Detection 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.^[4] Blob location strategies concentrate on discovering regions that contrast in different properties, for example, brightness or shading, contrasted with encompassing locales, in a digital image. Blob is a locale of an image in which a few properties are steady or around consistent and every one of the points in a blob can be considered in some sense

to be like each other. [5]

As the robot is switched on, the color detecting camera starts recording the video and sends it to the PC side via the Zigbee to be processed. On PC side MATLAB is responsible for processing the data received wirelessly. It first divides the received video into Frames. The color based thresholding algorithm and blob detection algorithm are applied on these frames to determine the color of the current background. This color is then sent to the robot via zigbee. The microcontroller of robot then will process the received data and will turn on the relay of according to the color received.

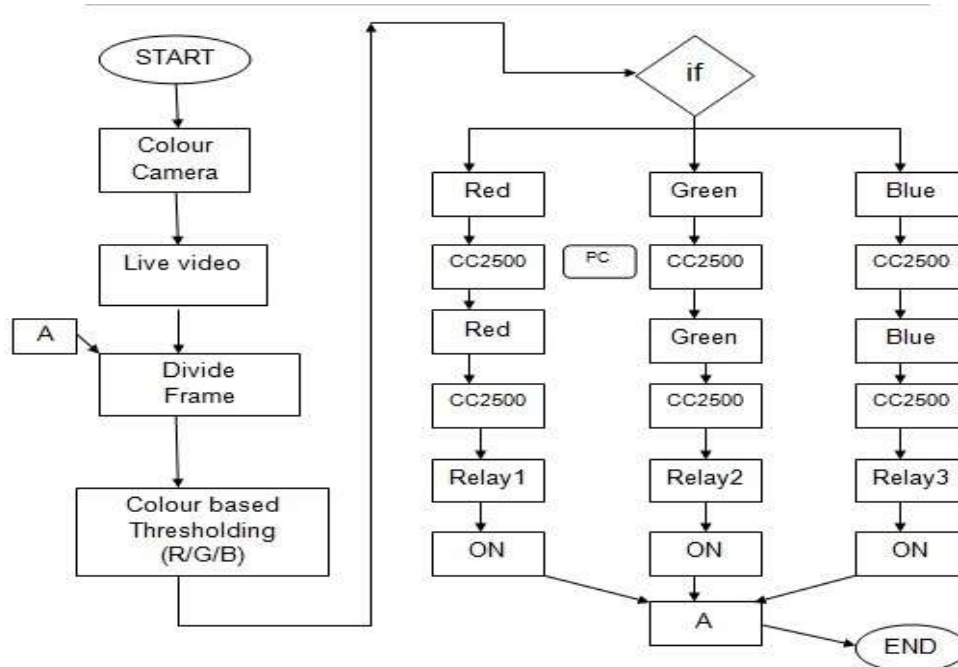


Figure4. Implementation flowchart

V. Conclusion

The proposed system is a substitution to human life. As Human life is always more prioritize this proposed robot helps to act as a security system and also a life savior. It enacts and plays an important role of keeping eye on the war field areas and captures the surroundings. As it is based on the Chameleons color changing effect, the robot changes its color according to the surrounding environment and is hidden from the enemy’s insight. Moreover, the camouflaging feature makes it difficult to detect the robot by naked human eye. The robot also captures live footage of the surrounding area so that we can monitorize and analyze the war field’s territory. If any obstacle is detected, that will be notified and robot will stop moving. So, in all the proposed system provides a helping hand to our security forces in detection of intruders. The robot can also be used in high altitude areas where human cannot survive.

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