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Camouflage Color Changing Robot

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Abstract: Science is a field developing with a rapid pace, creating the technology that can make human life easier. One such invention of this field is ROBOT. The word robot means a machine that can be programmed to carry out complex series of actions. Military operations are considered to be the most dangerous work environment. The camouflage robot is the solution for reducing loss of human life by replacing it in such operations. The proposed system consists one camera for surveillance & one camera for color sensing purpose. The robot senses the color of the surrounding through this camera & changes its color to blend in with it. This makes difficult to be spotted by the unaided enemy eyes. The robot can be remotely controlled via a computer & wireless Trans Receiver is used to establish the connection between them.
Keywords: Camera, Camouflage, Color Sensor, Wireless Robot, ZigBee, MATLAB.

I. INTRODUCTION

Human life is at risk at difficult to survive conditions such as high-altitude area, xerophytic conditions, war fields, 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 analyses the surrounding area & also provides live footage to the observer. Camouflage Robot acts as a virtual spy & can be sent into the strategic locations of military importance for observation & 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 & act as a measure to evaluate its efficiency [1]. With the rapid growth of the Internet, the development rate of Internet of Things based applications has increased exponentially. [6]

II. LITERATURE SURVEY

According to the survey, the reviewed systems used color detection sensor which requires the object to be really close in order to detect the color of the object.

This creates a range issue for the system. Metal & gas detectors were used in some systems, but to keep the weight and complexity of this system low both the metal and gas detectors are neglected. The aim of engineering camouflage is to make detection and recognition of target difficult by adapting to the visual conditions of the environment. [3] The camouflaging feature makes it difficult to detect the robot by unaided human eye.

The color sensor detects the color of surrounding surfaces & determines the color of surrounding. The robot can only implement primary (RGB) color. [2] The robot helps military forces to improve the security measures by providing additional surveillance to the remote locations which exhibits harsh environmental conditions. The robot can also be used in high altitude areas where human cannot survive. There is scope to improve the system by configuring it with multicolor camouflaging. [1]

III. IMPLEMENTATION

First, input devices like cameras & ZigBee Trans Receiver should be connected to the computer & then run the MATLAB software as shown in fig 3. Now run the graphical user interface file & start all cameras by clicking Initialize Camera button. Keep the object with sample color in front of the color detecting camera and click the Select Target button to capture the image color of that object as shown in fig 3.1.

Double click on the image to apply the blob detection algorithm, then the color based thresholding algorithm is applied to evaluate the intensity of each primary color in the selected blog. Repeat this procedure for all three primary colors RGB & record the sample intensities for each. Now click Start Tracking button to start the tracking process. The robot will continuously take input from the color detection camera & will change its color based on surrounding colors as shown in fig 3.2.
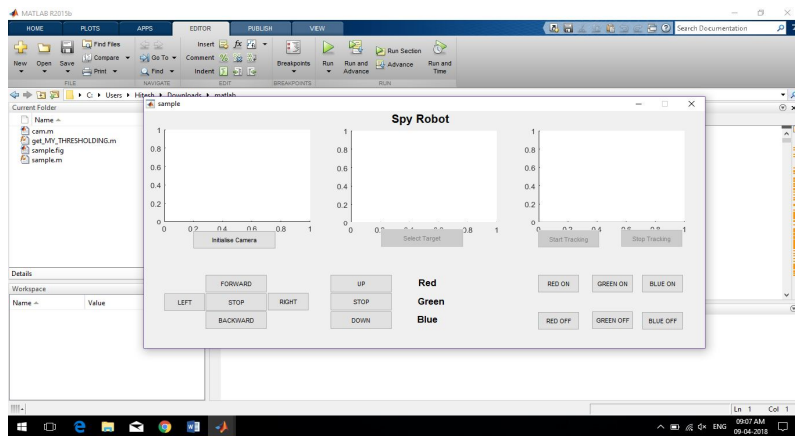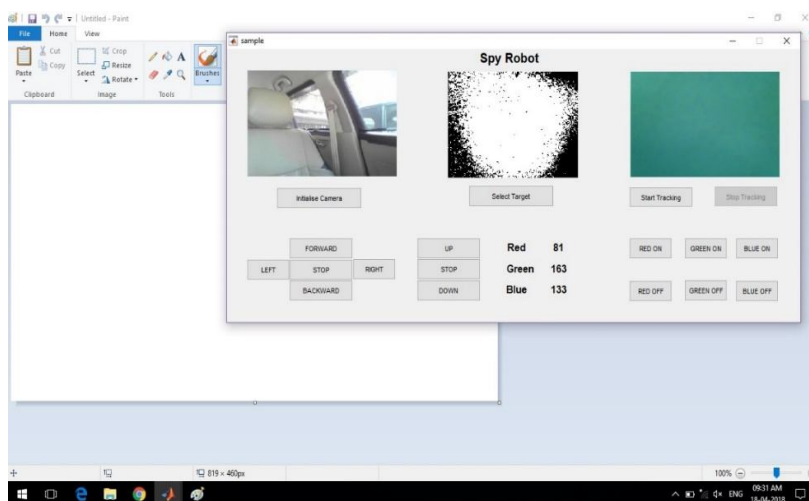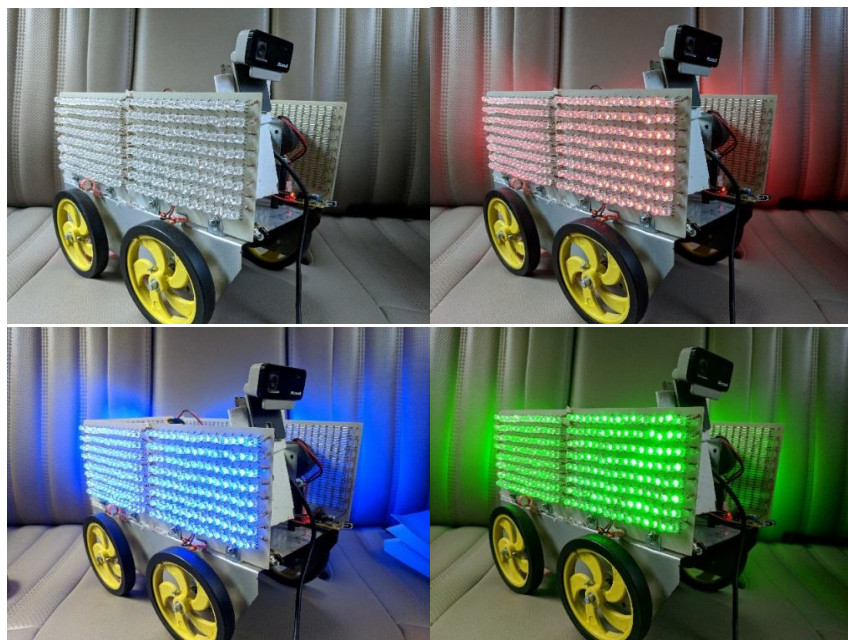
Fig. 1 MATLAB GUI.

Fig. 2.1 Selecting Target.

Fig. 3.2 Robot changing color according to the input.

IV. CONCLUSIONS

Previously implemented systems used components such as color sensors & 8-bit processors which had their own drawbacks. This system makes use of a better camera for color detection & a 16-bit processor which improves the performance of the system by a significant amount, eliminating the drawbacks of previously implemented systems. Moreover, the camouflaging feature makes it difficult to detect the robot by naked human eye. Thus, the robot will change its color according to surrounding surfaces & can be easily hidden from enemies. The robot is also equipped with wireless camera which will help the user to keep eye on enemy territory & to be controlled from remote location wirelessly. If any obstacle is detected, the user will be notified & robot will stop moving.

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