

Camouflage Robot

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Abstract—Recent Advancement in robotics has seen many application mainly related with movement and surveillance. Modernizing robots have become a trend but the only thing that was not able to do was to save human life. The robot now a days are most useful device which makes humans life more comfortable and easy but one of the advantage of camouflage robot is that the robot can be also used to save human life. A robot's function is to change colour depending upon the color sensed by the sensor. The camouflage robot is nothing but a robotic car which can move, and can also change the color which is sensed by the camera fixed on the robot. The color is sensed by color sensor and will match the threshold level defined by image processing. This data of sensed color is further processed CC2500, through which microcontroller will get the processed data and accordingly the robot will change its color. By single axis camera the robot is also used for surveillance purpose. As a new trend we have used wireless transceiver to increase the range of communication between transmitter and receiver. This robot can quietly enter into enemy area and sends us the information via camera. The movement of this robot is wirelessly controlled PC. Since human life is always valuable, these robots are the substitution of soldiers in war areas. This Camouflage robot can also be used in star hotels, shopping malls, jewellery showrooms, etc. where there can be threat from intruders or terrorists.

Index Terms—Colour Sensor, Microcontroller (AT89S52), CC2500, GUI, MATLAB (Image Processing), Single Axis Camera, Hardware & Software installation,

I. INTRODUCTION

The idea of the Camouflage Robot is based on the chameleon's camouflage techniques. The aim of the project is to design, manufacture and operate via a PC, used as remote control device, a small mobile robot which can duplicate the colours where it moves on, hence being camouflaged to the outside world. On the one hand, in order to achieve these goals, we used a LED matrix (RGB) which can diffuse uniform colours, coupled to sensors that can precisely identify colours. Furthermore, there are a lot of possible spin offs of this project, if the main principle of our robot is extended to a larger scale: first, regardless the mobility of the robot but just its function of analysing the environment colours, we can imagine a robot following divers colour coded paths and not only black lines like it used to be (e.g. in hospitals, plants...etc.). In addition, the ability of the robot to mock up various specific colours could help to create new products in the field of home design. The main application of our robot is to camouflage and pilot from afar an object, no matter what its size is. So, in the Defence sector, such a system would allow large sized vehicles (e.g. armoured vehicles) to be much more camouflaged: indeed, the camouflage in the army has become necessary to army missions, to move into an enemy land without being seen and protect soldiers since they can act from afar. Besides, in the Intelligence sector, we could use camouflage robots like drones. As a last example, in the area of wildlife Photography, hidden picture or video systems would allow totally new shots with the principle of our robot. Finally, one of the main advantages of the Chameleon Robot is that it is not only resistant to mild weather but also will not harm the environment.

II. IMPLEMENTATION

Before implementation of project, we gathered all the necessary resources and components essential for the development of the same. The project development steps are as follows:

Camouflage robot is implemented in such a way that its changes its color Based on the environment of the surrounding. It also has a camera on it through which it is also used for surveillance purpose.

The procedure for implementing camouflage robot is realized in the following steps:

- The idea and the robot
- The camera
- Hardware installation
- Software installation
- 5. Production of interface

Since as we see nowadays we are thinking of making a robot that what more and unique thing robot can do. Our work idea was evolved from thought when we looked at the environment, thinking why don't the robot changes according to the environment.

So the robot which changes its colour according to the environment was the conclusion.

We also came into the thought the robot which changes its colour and act like camouflage can also be used in the surveillance purpose.

This system would provide considerably less information about the hand. Some features (such as the finger against a background of skin in the example above) would be very hard to distinguish since no depth information would be recoverable. Essentially only "silhouette" (Detection of all skin within the hand without any feature detection information could be accurately extracted. The silhouette data would be relatively noise free (given a background sufficiently distinguishable from the hand) and would require considerably less processor time to compute than either multiple camera system. It is possible to detect a large subset of gestures using silhouette information alone and the single camera system is less noisy, expensive and processor hungry. Although the system exhibits more ambiguity Stereographic system and Multiple two dimensional view system this disadvantage is more than outweighed by the advantages mentioned above. Therefore, it was decided to use the single camera system.

Installing hardware required the following component

- AT89S52
- Motor driver IC (L293D)
- LED

hardware is just required to simply connect all the components, plugged in the power cable and then provide power to the monitor. In hardware installation RGB led (Primary color) are installed with 8051 microcontroller. The microcontroller also give its supply to the dc motors. The robotic up and down left and right motion is controlled by the GUI interface. the camera is also installed on the robot.

Installing software required the following component:

- cu flash to burn Cu code
- keel for Cu programming
- dip trace- PCB layout
- Matlab for image processing.

MATLAB and Image Processing Toolbox provide a flexible environment to explore design ideas and create unique solutions for imaging systems.

Acquiring images through many types of image acquisition devices, from professional grade frame grabbers to USB-based Webcam. Viewing a preview of the live video stream. Triggering acquisitions (includes external hardware triggers). Configuring callback functions that execute when certain events occur. Bringing the image data into the MATLAB workspace.

A graphical user interface (GUI) is a graphical display in one or more windows containing controls, called components, that enable a user to perform interactive tasks. The user of the GUI does not have to create a script or type commands at the command line to accomplish the tasks. Unlike coding programs to accomplish tasks, the user of a GUI need not understand the details of how the tasks are performed.

following are the three images which shows the outputs fig 1 shows initialization of camera, fig 2 shows blob detection and fig 3 shows GUI.

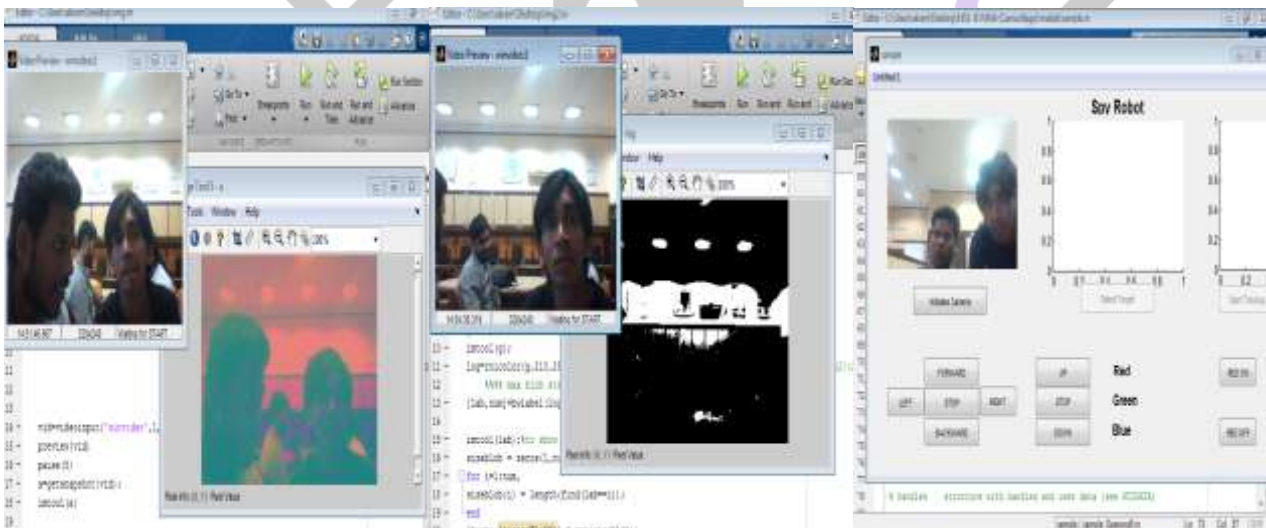


Fig. 1

Fig. 2

Fig. 3

III.RESULTSANDDISCUSSION

We developed, a robot which changes the colour accordingly which is sensed by the camera attached on it. we conducted some test as discuss below.

In first test scenario, we captured red green and blue colour and accordingly the robot changes its colour then we captured maximum portion of red colour and minimum portion of green colour thus the robot changes to red.

At the last stage we captured the equal proportion two colours and then there was no change in the colour of robot.

The table given gives a clear explanation:

Table 1

Sr.no	Colour Sensed		Colour of Robot
1	RED		RED
2	GREEN		GREEN
3	BLUE		BLUE
4	60% RED	40% GREEN	RED
5	50% RED	50% GREEN	NO CHANGE

As from the result, we observed that recognition accuracy is increased to a great extent by using high mega pixel camera(>5mp). This is because the low pixel camera can blur the image so the sensor will not be able to sense the colour and thus the robot will not change the colour.

IV.CONCLUSION

We intend to keep researching on the robot who can change its colour by sensing the environment. Through which we also came into the conclusion that the robot can be used for surveillances purposes by single axis camera robot is used for changing the color as well as in surveillance. When the camera senses the colour(R G B) then the robot will automatically changes its colour. If the color is other then RGB the robot will retain its earlier colour. As we all know, these days India is sick off massive terror attacks, bomb explosions at plush resorts. To avoid such disasters technological power must exceed HUMAN power. Human life and time are priceless. It's our onus to take an initiative to design a model of an apt robot that meets combatant needs. So to avoid terror attacks, to ensure more security at the border and high density areas it's wise to maintain a world class military technology in accordance with combatant needs. Even every nation needs its own defense system for their integrity and security. In such a way construction of these robots will carry nation's name, fame globally.

The following **Figure 4** shows the final output of the proposed project work.



Fig. 4

V.FUTURE WORK

Since we have focused on the robot which changes its colour by sensing only three colour in the environment. Through which we also came into the conclusion that the robot can be used for surveillances purposes by single axis camera robot is used for changing the colour as well as in surveillance. When the camera senses the colour(R G B) then the robot will automatically changes its colour. If the colour is other than RGB the robot will retain its earlier colour.

So now in this project we are going to change three colour's i.e. red green and blue so in Future many combination of colour's can be changed.

In future we can increase the communication distance between the robot and the user. We can also add ARM to the robot so that it will be able to clear the obstacles in its way.

To ensure more security at the border and high density areas it's wise to maintain a world class military technology in accordance with combatant needs. Even every nation needs its own defines system for their integrity and security. So the in future the camouflage robot with arm and with long range communication and which changes many colour can play vital role in defences and military security.

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