Camouflage Robot-A Color Changing Spy Robot

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ABSTRACT

Camouflage Robot plays a vital role in saving human loses as well as the damages that occur during disasters. Thus it will gain more importance in the upcoming era. The robot basically consists of a vehicle mounted with two cameras, one camera which captures the images and detects color accordingly as part of camouflaging feature and the other camera is used for surveillance purposes. As a new trend we have used wireless transceiver ZigBee to increase the range of communication between transmitter and receiver. The robot can quietly enter into enemy area and send information via camera to the controller. One of the salient features of this robot is camouflaging i.e. the camera captures the image and the color of the surrounding will be detected at the backend and according to that robot will change its color. Because of this feature the robot cannot be easily detected by enemies. The movement of the robot is wirelessly controlled via PC or laptop. Since human life is always valuable, this robot can be the substitution of soldiers in war areas. It is inspired by creatures such as chameleon. The Camouflage robot can also be used in star hotels, shopping malls, jewelry showrooms, operation aids, rescue crews during disasters , etc.. .Or at places such as where there can be threats from intruders or terrorists.

Keyword: - *Camouflage, Surveillance, ZigBee.*

1. INTRODUCTION

Science is developing new technologies to ease human life. One such invention of this technology is specialized robots in the field of Artificial Intelligence. The word robot means "A machine capable of carrying out a complex series of actions automatically, especially one programmable by a computer". These robots help to make human life much easier especially in dangerous areas & works. One of the concern areas of today is the military. Military robots are specially used to take the risky job which is difficult to be handled manually by humans. These robots act as the assistant of a soldier. Today, many military organizations take the help of military robots to perform risky jobs due to their accuracy of performing the jobs .These robots used in military are usually employed with the integrated system, including video screens, sensors, gripper and cameras. The main motive behind Camouflage Robot is to reduce human losses in military operations or terrorist attacks. Camouflage Robot acts as a virtual spy and can be sent into the strategic locations of military importance for observation and warfare purpose. 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. The main objective of the Camouflage Robot is to enhance the machinery of the defense system. Secondary objective is to work in the field of Zoology for wildlife photography. 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 a robot via PC, used as remote control device, a small

mobile robot which can duplicate the colors where it moves on, hence being camouflaged to the outside world. To achieve these goals, we used a LED matrix (RGB) which can diffuse uniform colors. Initially, the robot can camouflage itself in red, green and blue color. The main application of our robot is to camouflage and pilot from afar an object, no matter what its size is. So, in the Defense sector, such a system would allow large sized vehicles (e.g. armored 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 spying 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.

2. IMPLEMENTATION

In this project, control of robotic unit is from remote end and also we are able to get the videos from the robot end for the purpose of surveillance. Camera will send real time video and snapshots after a particular time interval, which could be seen on a remote monitor, and action can be taken accordingly. DC motors are being used for the movement of robotic wheels for camera movement i.e. upward and downward movement [2]. The robot is surrounded by relay of LED's which turns ON when a color is detected and camouflages the robot. Heart of our robot is Atmel's AT89S52. The AT89S52 Microcontroller [1] is an 8-bit microcontroller with 8K Bytes of In-System Programming Flash Memory. For wirelessly transmitting commands to the robot ZigBee transceiver i.e. CC2500 is used.

Fig -1: CC2500 Module

CC2500 is a FSK /MSK Transceiver module. It provide extensive hardware support for packet handling ,data buffering ,burst transmissions , clear channel assessment, link quality indication and wake on radio . It's data stream can be Manchester coded by the modulator and decoded by the demodulator .It has a high performance and easily to design your product. It can be used in 2400-2483.5MHz ISM/SRD band systems, Consumer Electronics, Wireless game controllers, Wireless audio wireless vKB/Mouse and others wireless systems.

The wheels of robot and movement of camera are controlled by DC motors. The user controls it with the help of GUI designed, where it also shows the video streaming of the environment. At the robotic unit, microcontroller is used for the control of DC motors.

For the software implementation, we deployed two software packages. First one is the Keil µVision 4.0. second one is the µcFlash. The Keil µVision Debugger accurately simulates on-chip peripherals (I²C, CAN, UART, SPI, Interrupts, I/O Ports, A/D Converter, D/A Converter, and PWM Modules) of 89S52device. Simulation helps to understand hardware configurations and avoids time wasted on setup problems. With simulation, we can write and test applications before target hardware is available. The system program written in assembly language using KEIL IDE software will be stored in Microcontroller [1].

Keil development tools for the Microcontroller Architecture support every level of software developer from the professional applications engineer to the student for learning about embedded software development. The Keil Development Tools are designed to solve the complex problems facing embedded software developers.

µcFlash is used to dump the code to microcontroller from PC.
Computer side software called µcFlash is executed that accepts the Intel HEX format file generated from compiler Keil to be sent to targeted microcontroller. It detects the hardware connected to the serial port.
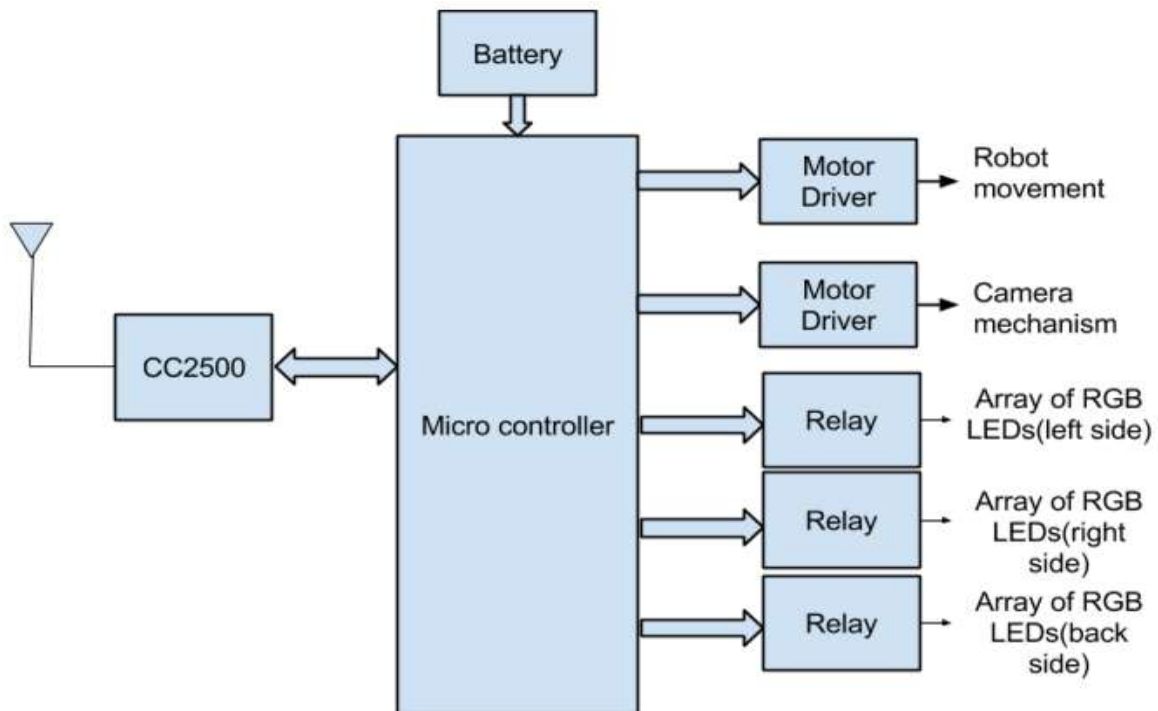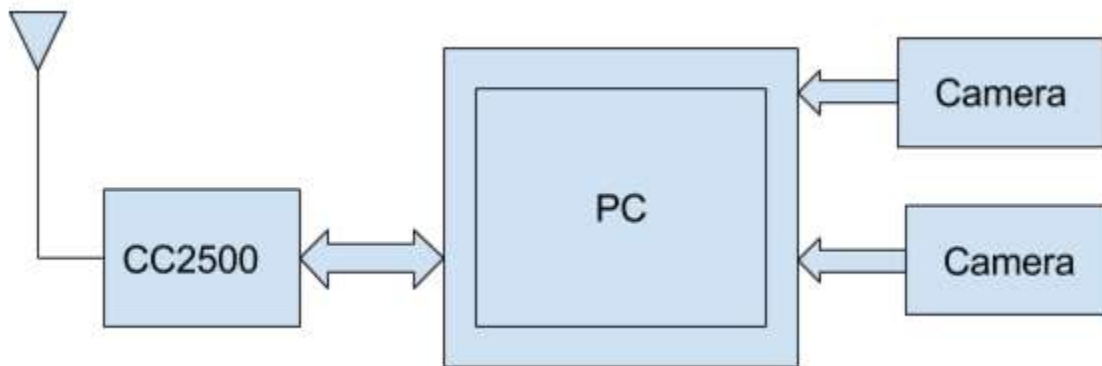
3. BLOCK DIAGRAM

Fig -2: Robot Side Block Diagram

Fig -3: PC Side Block Diagram

Flow of working

1. Camera is used to capture the surrounding environments color.
2. It is used to check surrounding color presence and will give input to the MATLAB, image processing.
3. µc code is used on particular led depending on camera input sensed and the image processed by the MATLAB.

4. In our project we are using RGB LEDs for output.
5. We will control robot motion through PC using CC2500.
6. CC2500 acts as half duplex communication module. We are using two CC2500. One is attached to the PC side and another attached to the Robot.
7. PC side CC2500 acts as transmitter and µc side CC2500 acts as a receiver.
8. MATLAB software is helped to create PC side GUI coding. We will give input with the help of PC side GUI through PC side CC2500.
9. µc side CC2500 will receive the signal from the PC side CC2500 and according to that on particular motor for particular time.
10. Camera is used to monitor surrounding activities that will display on PC side. Also we can control camera movement using PC GUI.

4. RESULTS

The movement of the robot is controlled wirelessly from Pc side. On detection of a color, the robot camouflages itself into that color. The color of the robot can also be changed manually.
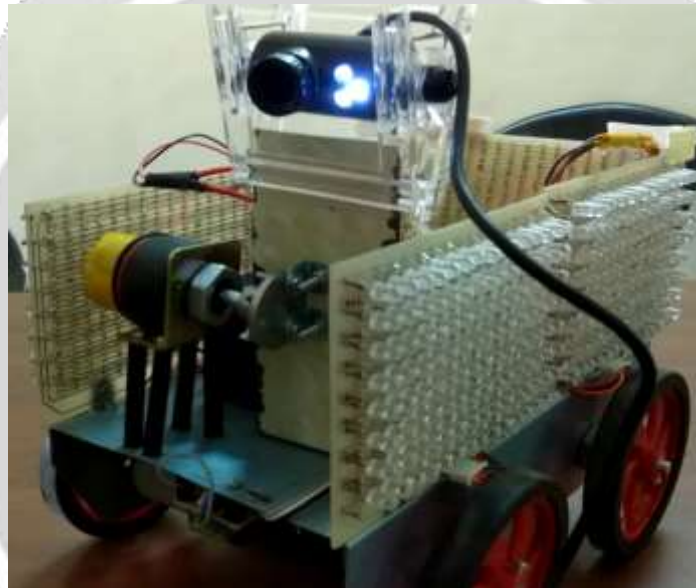

Fig -4: Front view of developed robot.

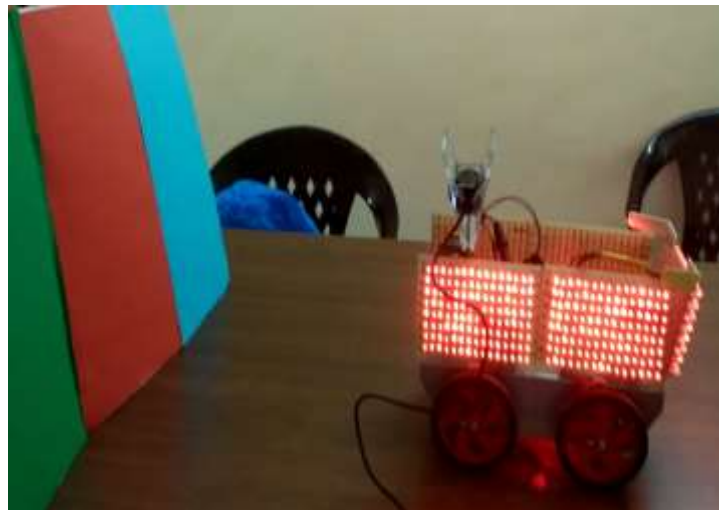
Fig -5: Top view of developed robot.

Fig -6: Red Color Detection
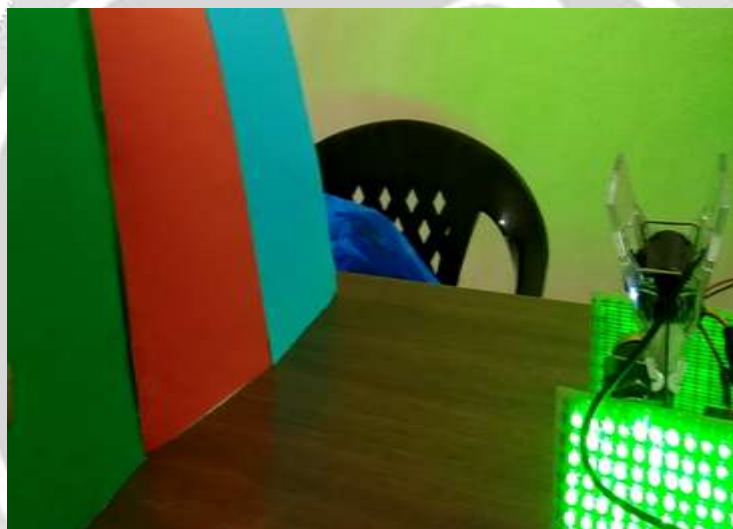

Fig -7: Green Color Detection

Fig -8: Blue Color Detection

4. CONCLUSION

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.

5. ACKNOWLEDGEMENT

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