Robot for War Field with Night Vision Wireless Camera by Android Application

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Abstract: This paper presents design to develop robotic vehicle with an android application for remote operation provided with wireless camera for the purpose of monitoring. Real time video with night vision capabilities can be wirelessly transmitted with this robot along with camera. This kind of robot can be helpful for spying purpose in war fields. Commands are sent to the receiver for controlling the movement of the robot either to move forward, backward & left or right at transmitting end. Two motors are interfaced to the microcontroller where they are used for the movement of the vehicle at the receiving end. Any smart-phone/Tablet with android OS , upon a GUI based touch screen operation is used to have Remote Operation. There is advantage of adequate range, when receiver end Bluetooth device fed to the microcontroller drives DC motors via motor driver IC for necessary work which could be obtained by making Android application device transmitter acting as a Remote control. For spying purpose and also to have even to have spying work in complete darkness infrared lighting is used and on the robot body a wireless camera is mounted.

Keywords: Bluetooth module, Camera, Gear, Microcontroller, Robot

I. INTRODUCTION

At present robot has been widely used in different fields like industries, militaries, research and development, academics and others. The aim is to design an intelligent spy robot that has capability to display the movement live on LCD, to detect if any obstacle on its path and stops there, where chunks of metal can be detected and is equipped with laser which is replica for a gun. On open source is built a android operating system which has made a huge impact providing many applications for robot to help people in their day to day life.[1].The main technology used here for serial communication with the robot is the Bluetooth technology. Blue tooth technology can be used to share data between two devices considering the range between two devices. The Bluetooth module HC-05 will be connected with the robot and the commands to the robot will be given through the android application [1].

II. LITERATURE SURVEY

The Literature survey includes the architecture of blue-tooth module HC-05 along with L293D motor driver IC [1].

A. Blue Tooth Module HC-05[1].As a world leader in short range wireless connectivity, Laird offers the widest range of Energy (BLE) modules for data and audio applications. Figure 1 shows an Blue tooth module HC-05. It has 6 pins. Wake-up, VCC, GND, TXD, RXD and state. The Blue tooth module has two devices i) Master device ii) Slave Device One device connects to the master and other device connects to the slave.[1].

HC-05 Specification
- Bluetooth Protocol: Bluetooth Specification v2.0 EDR.
- Frequency : 2.4GHz ISM band.
- Modulation: GFSK (Guassian Frequency Shift Keying).
- Emission power: ≤ 4dBm,Class 2.
- Sensitivity: ≤-84dBm at 0.1% BER.
- Speed: Asychoronous: 2.1 Mbps (Max) / 160 kbps, synchronous: 1Mbps/1 Mbps.
- Security: Authentication and Encryption.
- Profiles: Bluetooth serial port.
- Power Supply: 3.3 VDC 50mA.
- Working temperature:-20~75Centigrade.
- Dimension: 26.9mm x 23mm x 2.2mm

Connection of Bluetooth module to the Microcontroller

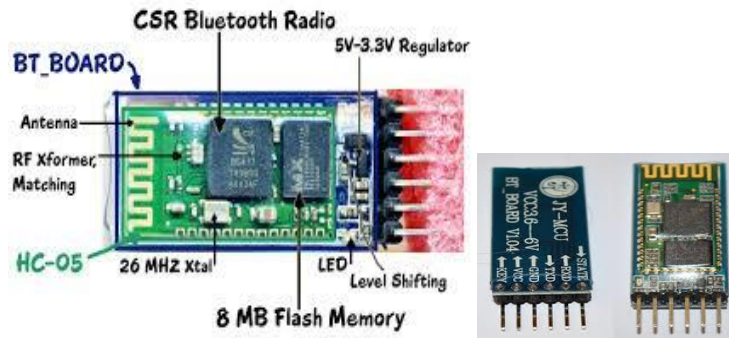VCC >>>> 5V
GND>>>>GND
TXD>>>>RXD
RXD>>>>TXD

Fig 1. Bluetooth connection kit & Bluetooth images

Figure 1 shows the Bluetooth Connection kit and images of Bluetooth. The HC-05 acts as a serial port through which the data can be sent & received. With the help of using a serial terminal or a Bluetooth customized application on the computer or phone the controlling and monitoring aspect can be done. This module must be disconnected before uploading the code to the microcontroller & reconnected after the code has been successfully uploaded .The code allows to switch on & off an LED by sending a command to the microcontroller via Bluetooth. In order to have proper communication master device must be connected to the slave. Once the pairing is done between two devices, device will ask to enter the password.[1].The Password will be either 0000 or 1234.Enter the Password and both the devices will be connected to each other.[1].

B. Motor Driver IC
L293D is a dual H-bridge motor driver IC containing two inbuilt H-bridge driver circuits as shown in Fig 2. In the common mode of operation, two DC motors can be driven simultaneously ,both in forward and reverse direction. Between the four output pins two motors are connected.
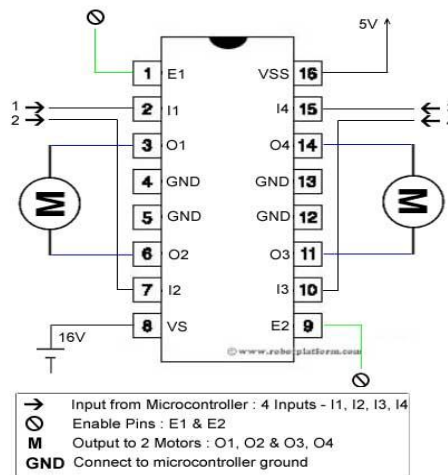

Fig 2: Pin Diagram of L293D

III.   CAMERA

Fig 3: Wireless Camera

Fig 3 shows the Wireless Camera whose Specifications are as:
- With Audio and IR 2.4GHz Wireless Camera.
- 1/3" Image Device: Color CMOS
- Resolution:380 TV Lines
- Minimum Illumination: 0 Lux
- Total Pixels : 512 x 582(PAL)/512 x 492(NTSC)
- Power Supply: DC 8V;DC 9V (battery, not supplied)
- Current Consumption:Max.70mA
- Operating Temperature: -10~50ºC
- Viewing Angle: 60º

IV. HARDWARE DESIGN

Fig 4 shows the Hardware design that involves three sections:
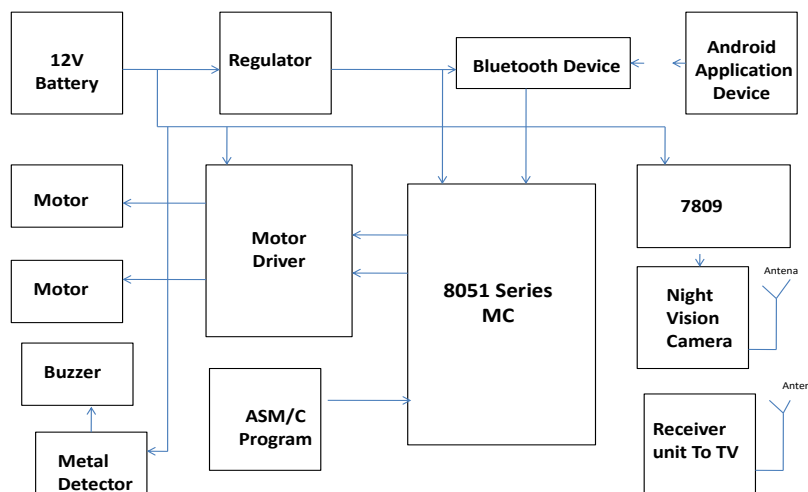

Fig 4: Block Diagram of War Field Spying Robot With Night Vision Wireless Camera.

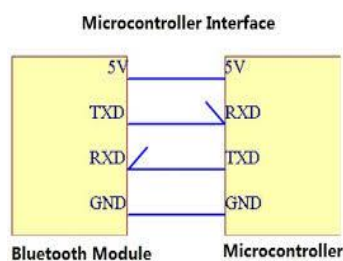i. Interfacing of Microcontroller with Bluetooth Module.

Fig 5: Microcontroller Interface with Bluetooth

Fig 5 shows the connection between the two devices which takes place as follows[1].
- One of the pin Tx is connected to pin Rx of the arduino board while the pin Rx of Bluetooth module is connected to the Tx pin of arduino board.GND and Power supply pins are connected to the respective pins of each other.
- For proper communication master must be connected to slave. Once pairing is done the device will ask to enter the password.
- After the password (0000 or 1234) is entered both devices will be connected to each other.

V. ANDROID APPLICATION

Millions of users are using android applications today. Millions of creators and inventors have been provided the opportunity to design their own android application through MIT app inventor forum.The following are the procedures and steps to create the android application.[1]

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1. Select the ai2.appinventor.mit.edu website and create an account on it.
2. There are two sections
    i) Designer   ii) Blocks
3. Next step is to select from the Layout option the horizontal arrangement.
4. Select the block of List Picker and upload image in that from the properties section. The required Bluetooth connection from the list will be picked by the help of List Picker.
5. Select the button option next to design the remote control.
6. The tabular Arrangement is selected and then one by one five buttons are placed which will act as forward, reverse, right ,left and stop buttons.
7. At the bottom to control the speed of the robot a slider is placed.
8. Select Bluetooth Client from the block connectivity.
9. Select the clock option also.
10. Create two more buttons for rotating the camera left or right.
11. Next step is the blocks designing.
12. Connecting programmed blocks with each other is made by Block designing.
13. Select the block of list picker before picking and adjust the block of Bluetooth client. Next select the list picker after picking option.
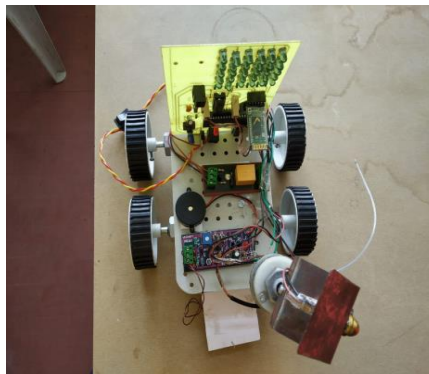14. Select the block of clock and adjust the Bluetooth client with it.

Figure 6:Model of the Work

VI.   APPLICATIONS

Tracking locations of terrorist organizations and then plan attack at suitable time. Making a surveillance of any disaster affected area where human beings can't do surveillance along border. It can be employed for security systems and also used to detect the landmine(bombs). This can be used for collecting information and for monitoring that information from the enemy terrain at a far secure area and safely devise of plan for the counter attack,Search & Rescue Operation,Maneuvering in hazardous environment,able to upgrade with the 360 degree left and right direction by using PIC Program .Instead of DC Motors which driver the CCD camera, stepper motors can also be used.

VII.   FUTURE ENHANCEMENT

More miniature in size a robot can be made. One of the limitations of this robot is the range of the robot. The Bluetooth module used here has a limited range and thus this robot cannot be operated over far distances ,Wi-Fi & Zigbee modules can also be used to increase the range. The robot may also consist of gas sensors to detect the poisonous gases in the environment .Robot may also include a bomb disposal kit in order to diffuse bombs in the war field. The Operation system is the spy robot with wireless remote control .The CCD camera can modify range more than 100ft.The Wireless camera can be able to upgrade with the 360 degree left and right direction by using PIC Program .Instead of DC Motors which drive the CCD camera, stepper motors can also be used.

VIII.   CONCLUSION

The main motive of the war spying robot is to make it user friendly. Movement, capturing image & wirelessly transmitting them, thus giving the soldiers an intimation about the dangers and situations in the war field is obtained easily by the spy robot. For short distance, surveillance robot is used thus ensuring the security of the region. This helps the forces to view the things accurately that are currently happening in the surrounding area and to plan ahead accordingly.

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