

## Android/GUI Controlled Bluetooth Spy Robot (SPY-BOT)

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### ABSTRACT

The robotic vehicle can be controlled by a PC or an android device. The GUI interface used to control the robot is developed in MATLAB, and the android app is developed using MIT appinventor 2. The robotic vehicle is equipped with an IP web camera for GUI interface and another wireless camera having night vision capability for remote monitoring/spying purposes. This system can be used in sensitive areas where humans cannot enter directly. The commands provided by android application/GUI interface are used to move the robot in front, back and left right directions. The vehicle consists of a Bluetooth receiver interfaced to a PIC microcontroller. On receiving command from the receiver, the PIC microcontroller operates on the movement of motor through a driver IC. The android device or laptop can operate the vehicle at a good Bluetooth communication range. The night vision camera mounted on robot allows for efficient spying even in darkest areas using infrared lighting.

**Keywords:** Android, Bluetooth, GUI, IP webcamera, Night vision

### I. INTRODUCTION

Spy robots operates very much like a human Spy. This type of robots can move around in their environment. Our system aims to build a simple low cost spy robot. The main advantage of our system is that its simplicity in circuit and user interface to control it. The SPY-BOT moves in required directions as per the commands obtained from the host.

The host can be a Bluetooth enabled PC or an android device. The camera used in this robot is having the ability to produce video output even if it is in a dark environment. The android app and GUI interface are designed in a user friendly manner. The simplicity of it makes easy to operate.

### II. BLOCK DIAGRAM

The PIC16F877A<sup>[1]</sup> microcontroller is the main component used in this circuit. The controlling device sends commands to the HC-05 Bluetooth module. And it will send characters serially to the serial communication pins<sup>[2]</sup> of PIC microcontroller. The serially obtained data is used for robot's motion in different directions. The output of the night vision camera can be viewed on an android device.

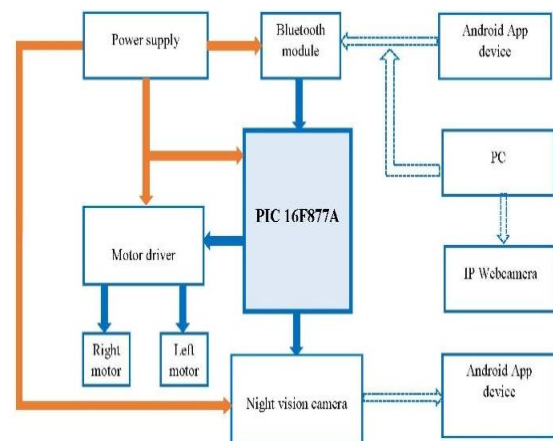


Fig 1 : Block diagram of the SPY-BOT

### III. PRINCIPLE OF OPERATION AND USER INTERFACE

The PIC microcontroller is programmed in such a way that it provides output for the motor driver IC as per the character obtained from the host. The movement will be as follows for each character.

Table 1 Robot Movement Directions

| Character received | Motion / operation |
|--------------------|--------------------|
| A                  | Front              |
| B                  | Back               |
| C                  | Left               |
| D                  | Right              |
| E                  | Stop               |
| 1                  | Camera ON          |
| 2                  | Camera OFF         |



Fig3: Screen shot of SPY-BOT application

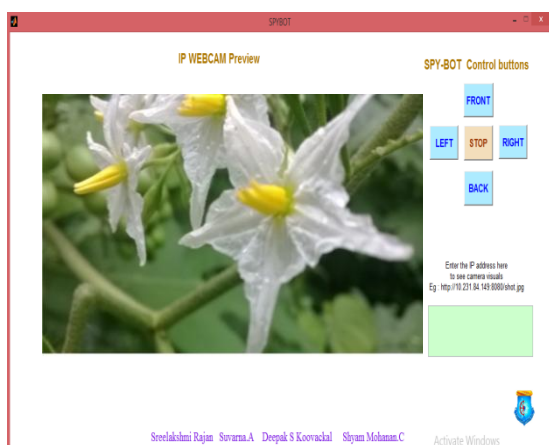


Fig3: Matlab Gui interface for controlling the robot

#### IV. CIRCUIT OPERATION

The Bluetooth module interfaced with the PIC microcontroller will receive characters as data from the host. TX<sup>[1]</sup> and RX<sup>[1]</sup> pins of PIC IC are connected to the Bluetooth module. The PIC microcontroller is programmed in such a way to produce outputs for the motor driving IC so as to make required motion by the motors. The L293D<sup>[3]</sup> will produce output as per the input obtained from the PIC microcontroller. And one of the output pins of PIC microcontroller is connected to the relay for the switching purpose of the night vision camera. If we are using an android device for the controlling purpose, we have to pair the HC-05 Bluetooth module with our smart phone. After pairing we have to open the SPY-BOT application in our smart phone and wait for a second to establish connection between the smart phone and HC-05 Bluetooth module. Once connection is made successfully we can start controlling the robot by touching on the buttons on your Smartphone's screen.

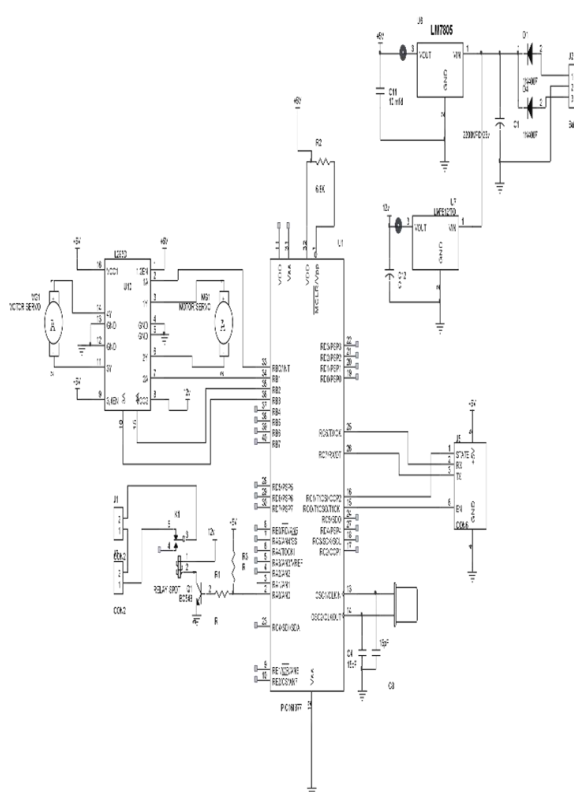


Fig3: Circuit diagram of SPY-BOT

The night vision camera in this project is also having a wireless connectivity. By using a Smartphone we can see the visuals in it. It is connected to the android Smartphone by using wifi as medium. Once the camera is turned on it produces a wifi hotspot. We have to connect to this hotspot using our phone's wifi. An application obtained from Google play store is used to interact with this camera. The wireless camera also supports voice transmission to smart phone and also it receives voice from the Smart phone. When the camera is in dark area the IR lights are turned on and produces night vision visuals on our smart phone.

#### V. ALGORITHM FOR SPY-BOT OPERATION

1. Start
2. Declare and define all functions and variables as per our requirement and Initialize the ports.
3. Call stop function initially to stop the robot.
4. Initialize UART and set baud rate.
5. Check if UART1\_Data\_Ready() is then go to step 6 else continue in this step.
6. Copy the data obtained serially to a variable uart\_rd.
7. Check if the character obtained in the variable uart\_rd is A then call front function to move the robot in front direction.

8. Check if the character obtained in the variable `uart_rd` is B then call back function to move the robot in back direction.
9. Check if the character obtained in the variable `uart_rd` is C then call left function to move the robot in left direction.
10. Check if the character obtained in the variable `uart_rd` is D then call right function to move the robot in right direction.
11. Check if the character obtained in the variable `uart_rd` is E then call stop function to stop the robot.
12. Check if the character obtained in the variable `uart_rd` is 1 then call camera on function to turn on the camera.
13. Check if the character obtained in the variable `uart_rd` is 1 then call camera off function to turn off the camera.
14. Go to step 6
15. stop

## **VI. CONCLUSION**

The robotic vehicle is equipped with a wireless camera having night vision capability for remote monitoring/spying purposes. The system is a simple one which makes it easy to design and maintain. The same hardware can be used for both GUI and android device to control the movement of the robot. Which makes it small in size of PCB. It can be used in environments like forests and other places where humans cannot possibly enter during the night. At the time of war where it can be used to collect information from the enemy and monitor that information at a far secure area, and safely make plans for the counter attack. The range of controlling is limited in Bluetooth range. By using a night vision camera with IP address the number of cameras used can be reduced to one.

## **REFERENCES**

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