

## **Design and Development of Bluetooth Controlled Car Using Bluetooth Module HC-05**

Rohani Amrin<sup>1</sup>, Md. Manik Ahmed<sup>2</sup>, Ariful Islam<sup>3</sup>, Abdullah Al Zubaer<sup>4</sup>, Md. Mehedi Hasan Naim<sup>5</sup>

<sup>1</sup>Lecturer, Department of Information and Communication Technology, Rabindra Maitree University,

Kushtia, Bangladesh, [rohani.amrin20@gmail.com](mailto:rohani.amrin20@gmail.com)

<sup>2</sup>Lecturer, Department of Information and Communication Technology, Rabindra Maitree University,

Kushtia, Bangladesh, [kiron.pust.ice@gmail.com](mailto:kiron.pust.ice@gmail.com)

<sup>3</sup>Lecturer, Department of Biomedical Engineering, Islamic University, Kushtia, Bangladesh, [arif@bme.iu.ac.bd](mailto:arif@bme.iu.ac.bd)

<sup>4</sup>Lecturer, Department of Computer Science and Engineering, Rabindra Maitree University, Kushtia,

Bangladesh, [zubaerranacseiu@gmail.com](mailto:zubaerranacseiu@gmail.com)

<sup>5</sup>Lecturer, Department of Computer Science and Engineering, Rabindra Maitree University, Kushtia,

Bangladesh, [naim.cu11@gamil.com](mailto:naim.cu11@gamil.com)

**Abstract:** The line follower robot is a mobile electronic device which is programmed to follow visible and invisible lines drawn on a surface or floor. Generally, the lines or moving circuits are predefined and they can be visible or invisible like magnetic fields. The robot, following the predefined path, moves on the line as directed or programmed. The robot has an Infrared Ray (IR) sensor under the robot. The sensor detects the line. Then the signal is sent to the processor. As per the signal, the processor runs the robot over the line. This is mainly how a line follower robot works in combination with other apparatus. With a view to introducing an efficient line follower robot, we have tried to moderate and develop a line follower robot. In this paper, we have taken a line follower robot and tried to remove its existing problems and complications. Therefore, we have investigated the technical and mechanical issues and problems.

**Keywords-** Bluetooth controlled car, Arduino UNO, Module HC-05, Motor driver.

### **I Introduction**

Bluetooth controlled car is controlled by using Android mobile phone instead of any other method like buttons, gesture etc. Here only needs to touch button in android phone to control the car in forward, backward, left and right directions [1]. So here android phone is used as transmitting device and Bluetooth module placed in car is used as receiver. Android phone will transmit command using its in-built Bluetooth to car so that it can move in the required direction like moving forward reverse, turning left, turning right and stop.

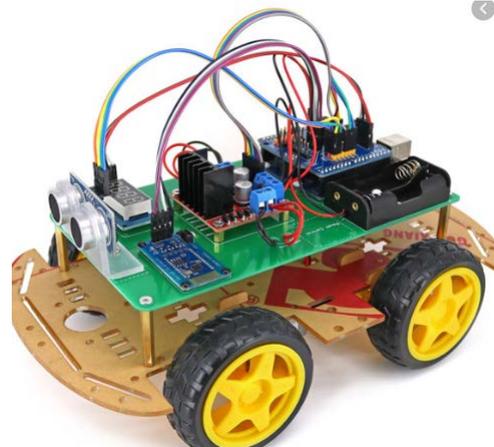


Figure 1. The designed Bluetooth controlled car.

## II How to operate Bluetooth module?

We can directly use the Bluetooth module after purchasing from market, because there is no need to change any setting of Bluetooth module. Default baud rate of new Bluetooth module is 9600 bps. You just need to connect rx and tx to controller or serial converter and give 5 volt dc regulated power supply to module. Bluetooth module has two modes one is master mode and second one is slave mode. User can set either mode by using some AT commands [3]. Even user can set module's setting by using AT command. Here is some commands uses are given. First of all user need to enter AT mode with 38400 bps baud rate by pressing EN button at Bluetooth module or by giving HIGH level at EN pin. Note: all commands should ends with `\r\n` (0x0d and 0x0a) or ENTER KEY from keyboard [5][7].

After it if you send AT to module then module will respond with OK

AT → Test Command

AT+ROLE=0 → Slave Mode select

AT+ROLE=1 → Master Mode select

AT+NAME=xyz → Set Bluetooth Name

AT+PSWD=xyz → Set Password

AT+UART=<value1>,<value2>,<value3> → set Baud rate

Eg. AT+UART=9600,0,0

Pin Description of accelerometer

STATE → Open

Rx → Serial receiving pin

Tx → Serial transmitting pin

GND → ground

Vcc → +5volt dc

EN → to enter in AT mode

## III Working Explanation

In this project we have used a toy car for demonstration. Here we have selected a RF toy car

with moving left right steering feature. After buying this car we have replaced its RF circuit with our Arduino circuit. This car have two dc motors at its front and rear side. Front side motor is used for giving direction to car means turning left or right side (like real car steering feature). And rear side motor is used for driving the car in forward and backward direction. A Bluetooth module is used to receive command from android phone and Arduino UNO is used for controlling the whole system.

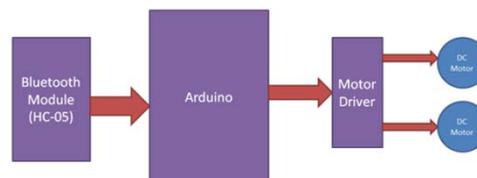


Figure 2. Block Diagram for Bluetooth controlled car.

Bluetooth controlled car moves according to button touched in the android Bluetooth mobile app. To run this project first we need to download Bluetooth app form Google play store. We can use any Bluetooth app that supporting or can send data. Here are some apps' name that might work correctly.

- Bluetooth Spp pro
- Bluetooth controller

After installing app you need to open it and then search Bluetooth device and select desired Bluetooth device. And then configure keys [6]. Here in this project we have used Bluetooth controller app.

- Download and install Bluetooth Controller
- Turned ON mobile Bluetooth
- Now open Bluetooth controller app
- Press scan
- Select desired Bluetooth device

Now set keys by pressing set buttons on screen. To set keys we need to press 'set button' and set key according to picture given below:

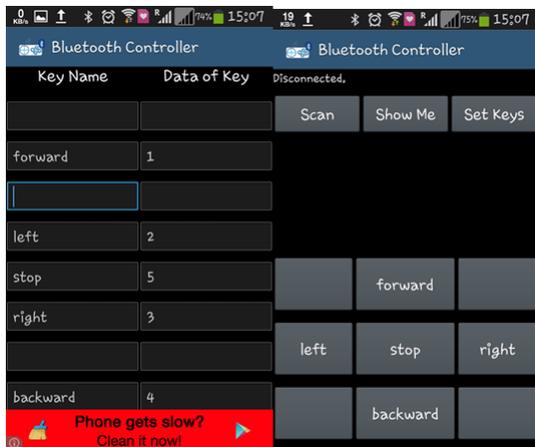
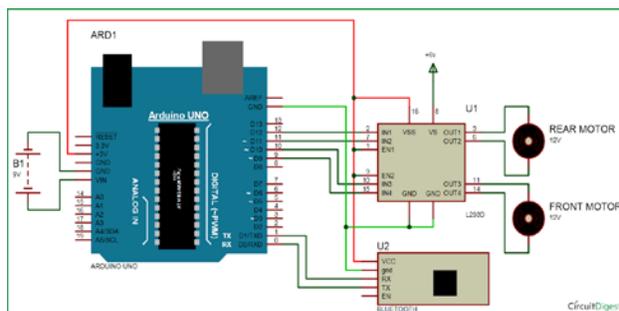


Figure 3. After setting keys press ok.

When we touch forward button in Bluetooth controller app then car start moving in forward direction and moving continues forward until next command comes. When we touch backward button in Bluetooth controller app then car start moving in reverse direction and moving continues reverse until next command comes. When we touch left button in Bluetooth controller app then car start moving in left direction and moving continues left until next command comes. In this condition front side motor turns front side wheels in left direction and rear motor runs in forward direction. When we touch right button in Bluetooth controller app then car start moving in right direction and moving continues right until next command comes. In this condition front side motor turns front side wheels in right direction and rear motor runs in forward direction. And by touching stop button we can stop the car.

#### IV Circuit Diagram and Explanation



Circuit diagram for bluetooth controlled car is shown in above figure. A motor driver is connected to arduino to run the car. Motor driver's input pins 2, 7, 10 and 15 are connected to arduino's digital pin number 12, 11, 10 and 9 respectively. Here we have used two DC motors to driver car in which one motor is connected at output pin of motor driver 3 and 6 and

another motor is connected at 11 and 14. A 6 volt battery is also used to power the motor driver for driving motors. Bluetooth module's rx and tx pins are directly connected at tx and rx of arduino. And vcc and ground pin of Bluetooth module is connected at +5 volt and gnd of arduino. And a 9 volt battery is used for power the circuit at arduino's Vin pin.

#### V Program Explanation

In program first of all we have defined output pins for motors.

```
#define m1 11 //rear motor
#define m12 12
#define m21 10 //front motor
#define m22 9
```

And then in setup, we gave directions to pin.

```
void setup ()
{
  Serial.begin (9600);
  pinMode (m11, OUTPUT);
  pinMode (m12, OUTPUT);
  pinMode (m21, OUTPUT);
  pinMode (m22, OUTPUT);
}
```

After this we read input by using serial communication form Bluetooth module and perform the operation accordingly.

```
void loop ()
{
  While (Serial. available ())
  {
    Char ch = Serial. read ();
    str [i++] = ch;
    if (str [i-1] == '1')
```

```

{
Serial.println (“Forward”);

Forward ();

i=0;

}

else if (str [i-1] == ’2’)

{

Serial.println (“Left”);

Right ();

i=0;

}

else if ( str [i-1] == ’3’)

{

Serial.println (“Right”);

Left ();

i=0;

}

```

Then we have created functions for different directions of car. There are five conditions for this Bluetooth controlled car which are used to give the directions:

Touched button in Bluetooth controller app	Output for front side motor to give direction		Output for rear side motor to move forward or reverse direction		Direction
	M11	M12	M21	M22	
Stop	0	0	0	0	Stop
Forward	0	0	0	1	Forward
Backward	0	0	1	0	Backward
Right	1	0	0	1	Right
Left	0	1	0	1	Left

### Conclusion

We have come up with the finding that the Line follower robot works successfully to track on the

black line. Above the white surface there are some black lines in different directions. The robot is still good enough to sense the lines and follows the track. Also the robot is capable to carry some load likely 500g-600g. Further development and practically implementation of the line follower robot is under our consideration.

### Acknowledgement

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### References

[1] <https://www.electronicshub.org/arduino-line-follower-robot/>.

[2] [https://www.instructables.com/id/Line-Follower-Robot-Using-Arduino-2/?fbclid=IwAR3LfJ2hOQKIkz8D29iBob9j20022oFPH\\_Y543OECTrsCA5dv3NnFpebiE](https://www.instructables.com/id/Line-Follower-Robot-Using-Arduino-2/?fbclid=IwAR3LfJ2hOQKIkz8D29iBob9j20022oFPH_Y543OECTrsCA5dv3NnFpebiE).

[3] <https://www.instructables.com/id/Line-Follower-Robot-Using-Arduino-2/?fbclid=IwAR2ESoyxI8Wb85qAbzYKI0hoqi80GhbyXqpszwMXOIyoL3toDpOeZEdQe5o>.

[4] [https://www.researchgate.net/publication/224132741\\_A\\_line\\_follower\\_robot\\_from\\_design\\_to\\_implementation\\_Technical\\_issues\\_and\\_problems](https://www.researchgate.net/publication/224132741_A_line_follower_robot_from_design_to_implementation_Technical_issues_and_problems).

[5] Robotic Competition Rolls site:<http://www.tjrc.in/roles.asp> in date 2009/05/15.

[6] A.kahe “AVR microcontroller”, Nas Publication, 2017.

[7] Aziz, A.R.A., Designing and Constructing an Automatic Steering Vehicle (AGV), in Dept of Electrical Engineering. 2004, University Tenaga Nasional: Malaysia. p. 50.

[8] Bong, D.M.K., Automatic Guided Vehicle System (AGV), in Dept of Electrical .

[9] Osman, J.H.S., Computer Controlled Systems. 2nd Edition ed. 2005: Universiti Teknologi Malaysia.