



**P.S.C.M.R.COLLEGE OF ENGINEERING AND TECHNOLOGY**

*APPROVED BY AICTE, NEW DELHI; AFFILIATED TO JNTU, KAKINADA*

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**Department of Electrical and Electronics Engineering**

**G-SENSOR**

**ROBOT CAR**

**Presented by**

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# **G -SENSOR ROBOT CAR**

**Abstract:** We are now living in the 21st century. Now, smart phone has become the most essential thing in our daily life. Android application based smart phones are becoming each time more powerful and equipped with several accessories that are useful for Robots. This project describes how to control a robot using mobile through Bluetooth communication, some features about Bluetooth technology, components of the mobile and robot. We present a review of robots controlled by mobile phone via moving the robot upward, backward, left and right side by the android application such as Arduino, Bluetooth. Bluetooth has changed how people use digital device at home or office, and has transferred traditional wired digital devices into wireless devices. Here we are using Bluetooth communication, interface microcontroller and android application. We are using Arduino software to interface the Bluetooth module with microcontroller. According to commands received from android the robot motion can be controlled. We derived simple solutions to provide a framework for building robots with very low cost but with high computation and sensing capabilities provided by the smart phone that is used as a control device.

## **Introduction:**

This paper represents android application based Bluetooth controlled robotic car. Here main motto of our project is to control the car with android application. Here we use mainly Arduino UNO (ATMEGA 328P), Bluetooth module (HC-05). We interface the Bluetooth module with the system so that we can easily control the system by smart phone application. This project is more necessary to the modern society in context of spying and surveillance. The project aims in designing a Robot that can be operated using Android mobile phone. The controlling of the Robot is done wirelessly through Android smart phone using the Bluetooth feature present in it. Here in the project the Android smart phone is used as a remote control for operating the Robot. The controlling device of the whole system is a Microcontroller. Bluetooth module, DC motors are interfaced to the Microcontroller. The data received by the Bluetooth module from Android smart phone is fed as input to the controller. The controller acts accordingly on the DC motors of the Robot. In achieving the task the controller is loaded with a program written using Embedded 'C' language. Related reference articles implementing wireless control of robots have been studied as mentioned in [1-12]. Still there exists requirement of a cost-effective automation system, which will be easy to implement. An example of such a cost-effective project has been proposed here.



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### Components:

#### Arduino UNO :

Microcontroller will act as the brain of the robot. The robot movement will be decided by the microcontroller. In this system we will be using microcontroller named Arduino UNO which contains ATMEGA 328P microcontroller chip (Figure 1). The microcontroller is programmed with the help of the Embedded C programming. Arduino has its own programming burnt in its Read Only Memory (ROM). C++ program is very easy to implement for programming the Arduino UNO.



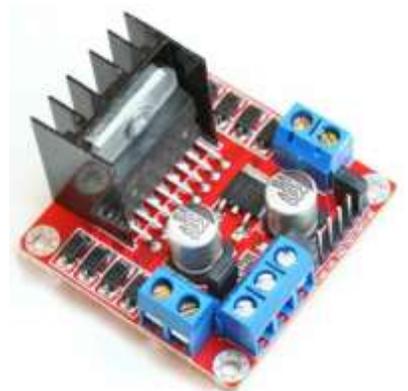
#### Bluetooth Module (HC-05) :

The Bluetooth module will act as an interface between Smartphone and microcontroller. We will be using HC-05 Bluetooth module for the system, which can be used as either receiver or transmitter. Generally our transmitter will be smart-phone and receiver will be Bluetooth module. Bluetooth module will give the commands given by smart-phone to the microcontroller.



#### L298N Driver:

The L298N is a dual H-Bridge motor driver which allows speed and direction control of two DC motors at the same time. The module can drive DC motors that have voltages between 5 and 35V, with a peak current up to 2A. L298N Dual H-Bridge Motor Driver Let's take a closer look at the pinout of L298N module and explain how it works. The module has two screw terminal blocks for the motor A and B, and another screw terminal block for the Ground pin, the VCC for motor and a 5V pin which can either be an input or output.





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### DC Gear Motors :

A gear motor is a specific type of electrical motor that is designed to produce high torque while maintaining a low horsepower, or low speed, motor output. Gear motors can be found in many different applications, and are probably used in many devices in your home. Gear motors are commonly used in devices such as can openers, garage door openers, washing machine time control knobs, and even electric alarm clocks. Common commercial applications of a gear motor include hospital beds, commercial jacks, and cranes. Regardless of what type of gear motor you're dealing with, they all work in the same manner.

### Battery:

A rechargeable battery, storage battery, secondary cell, or accumulator is a type of electrical battery which can be charged, discharged into a load, and recharged many times, as opposed to a disposable or primary battery, which is supplied fully charged and discarded after use. It is composed of one or more electrochemical cells. The term "accumulator" is used as it accumulates and stores energy through a reversible electrochemical reaction. Rechargeable batteries are produced in many different shapes and sizes, ranging from button cells to megawatt systems connected to stabilize an electrical distribution network. Several different combinations of electrode materials and electrolytes are used, including lead–acid, nickel–cadmium (NiCd), nickel–metal hydride (NiMH), lithium-ion (Li-ion), and lithium-ion polymer (Li-ion polymer).

### Principle :

we are going to Control the Robot Car through the G sensor of our mobile phone and you will be able to move the Robot just by tilting the Phone. We will also use Arduino and RemoteXY app for this G-Sensor Controlled Robot. RemoteXY app is used to create the interface in the Smart Phone for controlling the Robot. We will add the joystick in the interface so that Robot can also be controlled by Joystick as well as by tilting the phone. G-Sensor or Gravity sensor is basically Accelerometer in Smart phone which is used to control the screen orientation of the phone. Accelerometer senses the X,Y, Z directions of the Gravitational force and rotate the Screen according to alignment of the Phone. Now days, more sensitive and accurate Gyroscope sensor is used in mobiles for deciding the orientation of the Screen. In our Project, Robot car will move, according to the direction in which phone is being tilted, like when we tilt the phone forward, then car will move forward and we tilt it down then car will move backward. This is same like when we play some car games in Mobile, they also use G sensor to move the car accordingly.

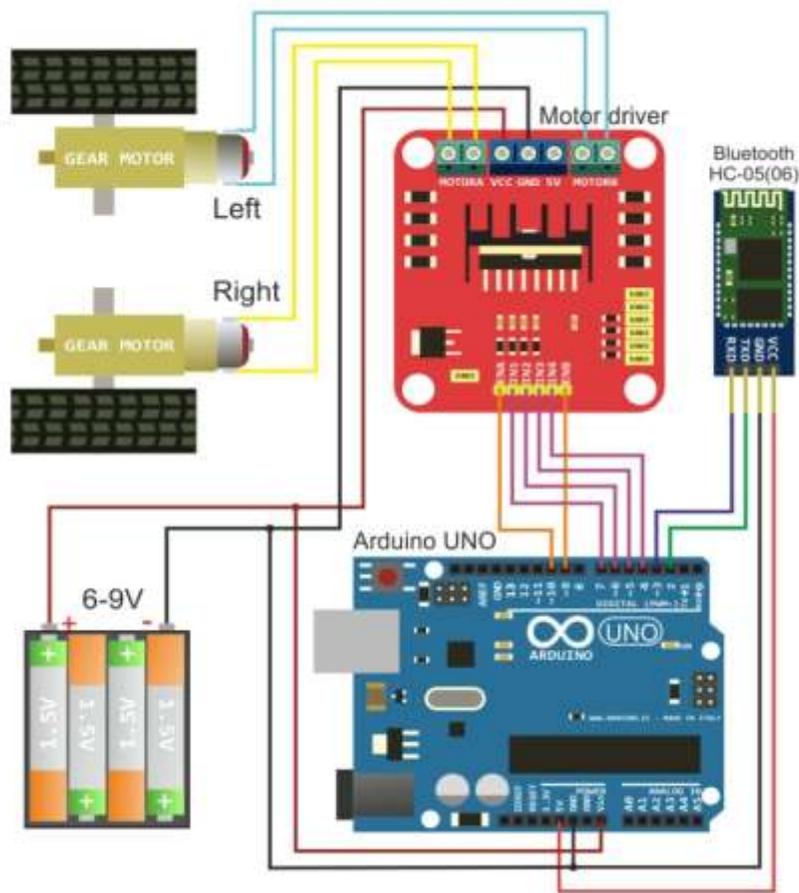


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### Circuit Diagram :

Electrical wiring and all modules machines represented in the following figure

### Procedure :

First of all, we will interface the L298N motor controller with the Arduino. Connect the ENA and ENB pin of the motor controller to the Arduino pin 12 and 11 respectively. These two pins are for the PWM control of the motor. Using these pins, we can increase or decrease the speed of car. Then connect the IN1, IN2, IN3 and IN4 to the Arduino pins 10, 9, 8 and 7 respectively. These pins will rotate the motors in both directions (clockwise and anti-clockwise). To power the motor, connect the positive and negative of the battery to the 12V and the ground of the motor controller. Then connect the 5V and the ground from the motor controller to the Arduino Vin and the ground. Then we will connect the Bluetooth module HC-06 with the Arduino. If you have HC-05, then it will work too. Connect the VCC and the ground of the Bluetooth module to the 5V and the ground of the Arduino. Then connect the TX pin of Bluetooth Module to the pin 2 of Arduino and the RX pin to the pin 3 of Arduino.



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### Coding :

```
////////////////////////////////////
```

```
// RemoteXY include library //
```

```
////////////////////////////////////
```

```
/* RemoteXY select connection mode and include library */
```

```
#define REMOTEXY_MODE__SOFTWARESERIAL
```

```
#include <SoftwareSerial.h>
```

```
#include <RemoteXY.h>
```

```
/* RemoteXY connection settings */
```

```
#define REMOTEXY_SERIAL_RX 2
```

```
#define REMOTEXY_SERIAL_TX 3
```

```
#define REMOTEXY_SERIAL_SPEED 9600
```

```
/* RemoteXY configurate */
```

```
unsigned char RemoteXY_CONF[] =
```

```
{ 3,0,23,0,1,5,5,15,41,11
```

```
,43,43,1,2,0,6,5,27,11,5
```

```
,79,78,0,79,70,70,0 };
```

```
/* this structure defines all the variables of your control interface */
```

```
struct {
```

```
/* input variable */
```

```
signed char joystick_1_x; /* =-100..100 x-coordinate joystick position */
```

```
signed char joystick_1_y; /* =-100..100 y-coordinate joystick position */
```



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```
unsigned char switch_1; /* =1 if switch ON and =0 if OFF */
```

```
/* other variable */
```

```
unsigned char connect_flag; /* =1 if wire connected, else =0 */
```

```
} RemoteXY;
```

```
////////////////////////////////////
```

```
//      END RemoteXY include      //
```

```
////////////////////////////////////
```

```
/* defined the right motor control pins */
```

```
#define PIN_MOTOR_RIGHT_UP 7
```

```
#define PIN_MOTOR_RIGHT_DN 6
```

```
#define PIN_MOTOR_RIGHT_SPEED 10
```

```
/* defined the left motor control pins */
```

```
#define PIN_MOTOR_LEFT_UP 5
```

```
#define PIN_MOTOR_LEFT_DN 4
```

```
#define PIN_MOTOR_LEFT_SPEED 9
```

```
/* defined the LED pin */
```

```
#define PIN_LED 13
```

```
/* defined two arrays with a list of pins for each motor */
```

```
unsigned char RightMotor[3] =
```

```
{ PIN_MOTOR_RIGHT_UP, PIN_MOTOR_RIGHT_DN, PIN_MOTOR_RIGHT_SPEED};
```

```
unsigned char LeftMotor[3] =
```

```
{ PIN_MOTOR_LEFT_UP, PIN_MOTOR_LEFT_DN, PIN_MOTOR_LEFT_SPEED};
```



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/\*

speed control of the motor

motor - pointer to an array of pins

v - motor speed can be set from -100 to 100

\*/

```
void Wheel (unsigned char * motor, int v)
```

```
{
```

```
    if (v>100) v=100;
```

```
    if (v<-100) v=-100;
```

```
    if (v>0) {
```

```
        digitalWrite(motor[0], HIGH);
```

```
        digitalWrite(motor[1], LOW);
```

```
        analogWrite(motor[2], v*2.55);
```

```
    }
```

```
    else if (v<0) {
```

```
        digitalWrite(motor[0], LOW);
```

```
        digitalWrite(motor[1], HIGH);
```

```
        analogWrite(motor[2], (-v)*2.55);
```

```
    }
```

```
    else {
```

```
        digitalWrite(motor[0], LOW);
```

```
        digitalWrite(motor[1], LOW);
```

```
        analogWrite(motor[2], 0);
```



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```
    }
}
void setup()
{
    /* initialization pins */
    pinMode (PIN_MOTOR_RIGHT_UP, OUTPUT);
    pinMode (PIN_MOTOR_RIGHT_DN, OUTPUT);
    pinMode (PIN_MOTOR_LEFT_UP, OUTPUT);
    pinMode (PIN_MOTOR_LEFT_DN, OUTPUT);
    pinMode (PIN_LED, OUTPUT);

    /* initialization module RemoteXY */
    RemoteXY_Init ();
}
void loop()
{
    /* event handler module RemoteXY */
    RemoteXY_Handler ();

    /* manage LED pin */
    digitalWrite (PIN_LED, (RemoteXY.switch_1==0)?LOW:HIGH);

    /* manage the right motor */
    Wheel (RightMotor, RemoteXY.joystick_1_y - RemoteXY.joystick_1_x);

    /* manage the left motor */
    Wheel (LeftMotor, RemoteXY.joystick_1_y + RemoteXY.joystick_1_x);
}
```



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### Applications :

#### Minning :

In minning purpose we have seen hilly areas, now a days governement try to increase places, so they decrease hills. In their blast the hills with bombs, all bombs aren't blast successfully,some are failed blast, then humans check the bombs sometimes bombs blasted and that time humans are died due to bomb, now we are use this car to check the bomb are blast or failed.

#### Cleaning :

In cleaning purpose we have seen highway roads, they are always cleanly why because vehicles are cleaned the road with the help of bruses, the brushes are attached under the vehicle, as same as we attached brushes to car and this is used to cleaning housesband, high diameter water pipes.

#### Spy :

In spy purpose, we are use this car to record the occasional videos, and we drive the car with see the live.

#### Outer space :

In outer space, some astronauts went to the other planet, then they are use this car check the outer surroundings of Rocket. And they are enter on the planet

#### Military :

In military purpose, we have well number of soldiers(Army).and when they are went to the fight to other countr, some soldiers died due to shoot outs,bullets, bombs and landmans. That we use this car, we are attached the weapons to the car and we are saw a live to shoot a target successfully, soldier is safe now.

#### Industries :

In industry purpose, we are use many purposes. For example: two persons busy with thier works in the distance between 30meters. Then we exchange the file urgently, when that time we use this car to exchange the files successfully. We have save the time



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### Security :

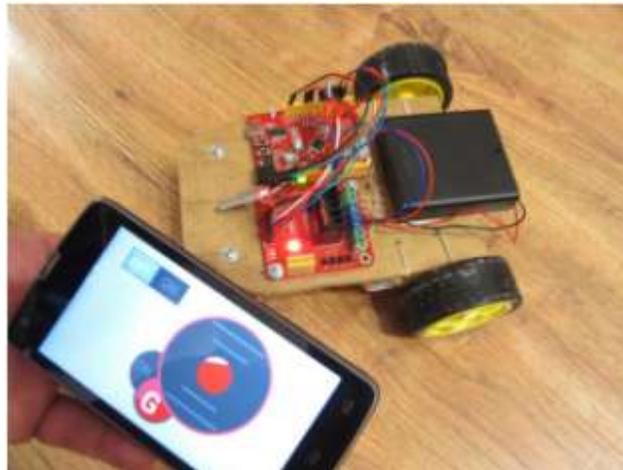
In security purpose, when we are busy with our work when someone is coming to home, we are in the 5th room of the house and we can find the person who was come to house with this car

### Restaurants :

In Restaurant purpose, this car supply the menu cards, food, cool drinks, tissues and bills with the help of attached arm.

### Children toys :

Now a days, all childrens are playing games in android smartphones, when they see this car, they want to drive this car and decrease the effect of smart phone.





### Electrical cars :

In electrical car purpose, now a days some car companies launch beautiful and useful electrical cars. And they are high cost. so normal people difficult to bought that. So we. Are modifued this to car big size car using this advanced components and this is low cost. Everyone bought this quickly



### Conclusion :

This is indeed a cost-effective and efficient project. The novelty lies in the fact that it is a cost-effective project with a simple and easy to use interface compared to existing ones. Also the Bluetooth RC Controller application is more user friendly. The robot is small in size so it can be used in spying purpose. With few additions and modifications, this robot can be used in army for detecting and disposing hidden land mines. The robot can be used for surveillance. In future we can interface sensors to this robot so that it can monitor some parameters and we can improve the efficiency using Internet of Things (IoT) technology. We can also add wireless camera, in order to incorporate other security features.

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