AURDUINO & IOT COURSE

GESTURE CONTROL CAR(GCC)

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SUBMITTED TO:

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BATCH:2021

OBJECTIVE:

Wireless communication systems form the backbone of modern-day robotics control. The objective of this project is to enhanced the connection between human and robots.

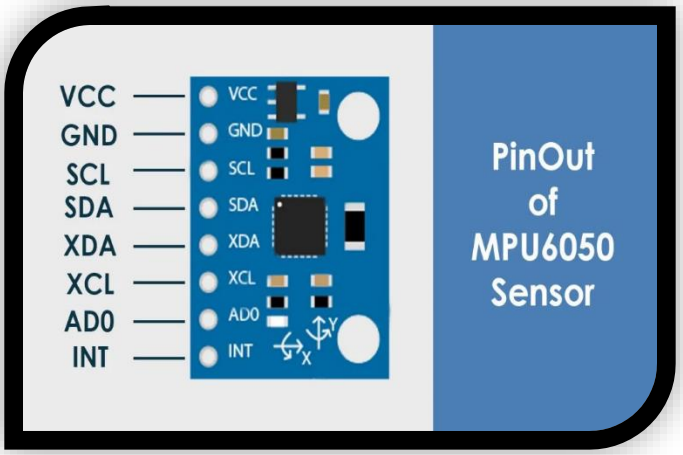
INTRODUCTION:

Gesture recognition technologies are much younger in the world of today .Several approaches have been developed for sensing gesture and controlling robots. Gloves based technique is a well-known means of recognizing hand gesture. It utilizes a sensor attached to gloves that directly measures hand movements.

A Gesture Controlled robot is a kind of robot which can be controlled by hand gestures and not the old-fashioned way by using buttons. The user just needs to wear a small transmitting device on his hand which includes a sensor which is an accelerometer in our case. Movement of the hand in a specific direction will transmit a command to the robot which will then move in a specific direction.

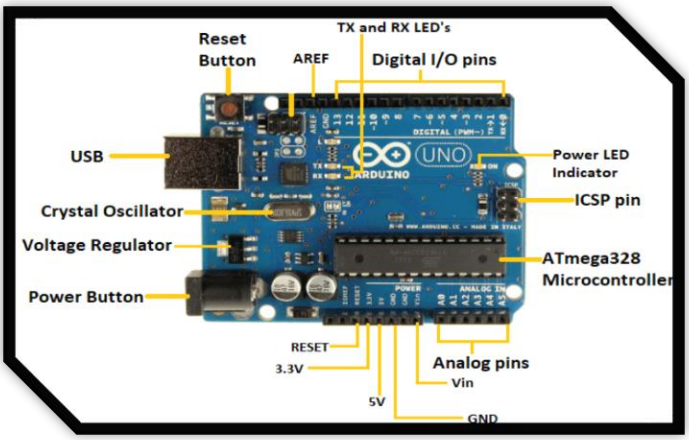
COMPONENTS AND THEIR FUNCTION:

1. Accelerometer(mpu6050):



MPU6050 is an IMU device that stands for Inertial Measurement Unit. It is a six-axis motion tracking device that calculates a three-axis accelerometer and three-axis gyroscope data. The biggest advantage of this board it comes with a digital motion processor. Digital Motion Processor or the DMP(Digital Matrix Processor) is an embedded processor that can reduce the host processor's computational load by acquiring and processing data from Accelerometer and Gyroscope. the MPU6050 chip is a highly applicable device in many systems. It is used in wide applications and is considered the most crucial parameter of the system. Without this sensor, we can not make most of the complicated processes in robotics and the embedded fields.

2. Arduino uno(for robotic car):

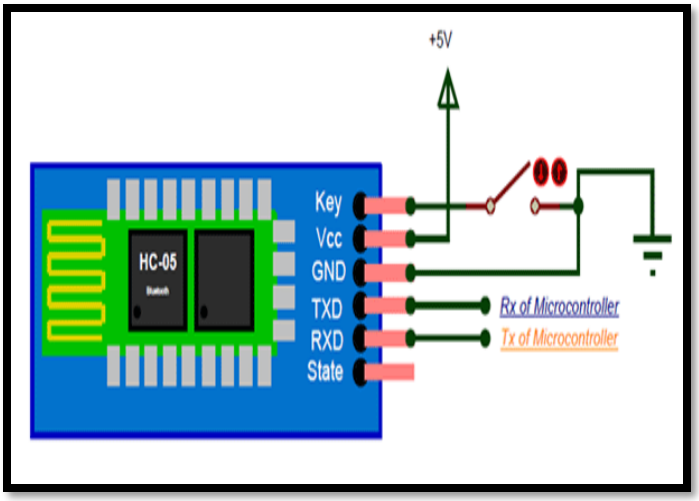


Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing. the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IoT applications, wearable, 3D printing, and embedded environments.

3. HC-05 Bluetooth module:

The HC-05 has two operating modes, one is the Data mode in which it can send and receive data from other Bluetooth devices and the other is the AT Command mode where the default device settings can be changed. We can operate the device in either of these two modes by using the key pin as explained in the pin description.

It is very easy to pair the HC-05 module with microcontrollers because it operates using the Serial Port Protocol (SPP). Simply power the module with +5V and connect the Rx pin of the module to the Tx of MCU and Tx pin of module to Rx of MCU as shown in the figure below



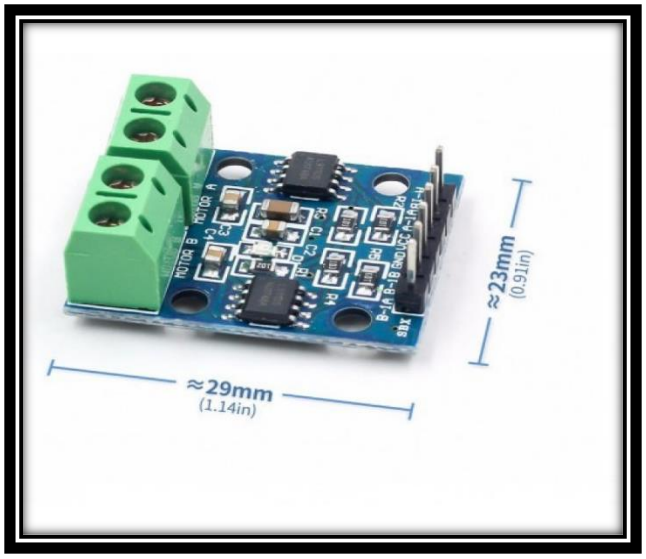
4. DC motor 12V

A DC motor is any motor within a class of electrical machines whereby direct current electrical power is converted into mechanical power. Most often, this type of motor relies on forces that magnetic fields produce. Regardless of the type, DC motors have some kind of internal mechanism, which is electronic or electromechanical. In both cases, the direction of current flow in part of the motor is changed periodically.

The speed of a DC motor is controlled using a variable supply voltage or by changing the strength of the current within its field windings. While smaller DC motors are commonly used in the making of appliances, tools, toys, and automobile mechanisms, such as electric car seats, larger DC motors are used in hoists, elevators, and electric vehicles.

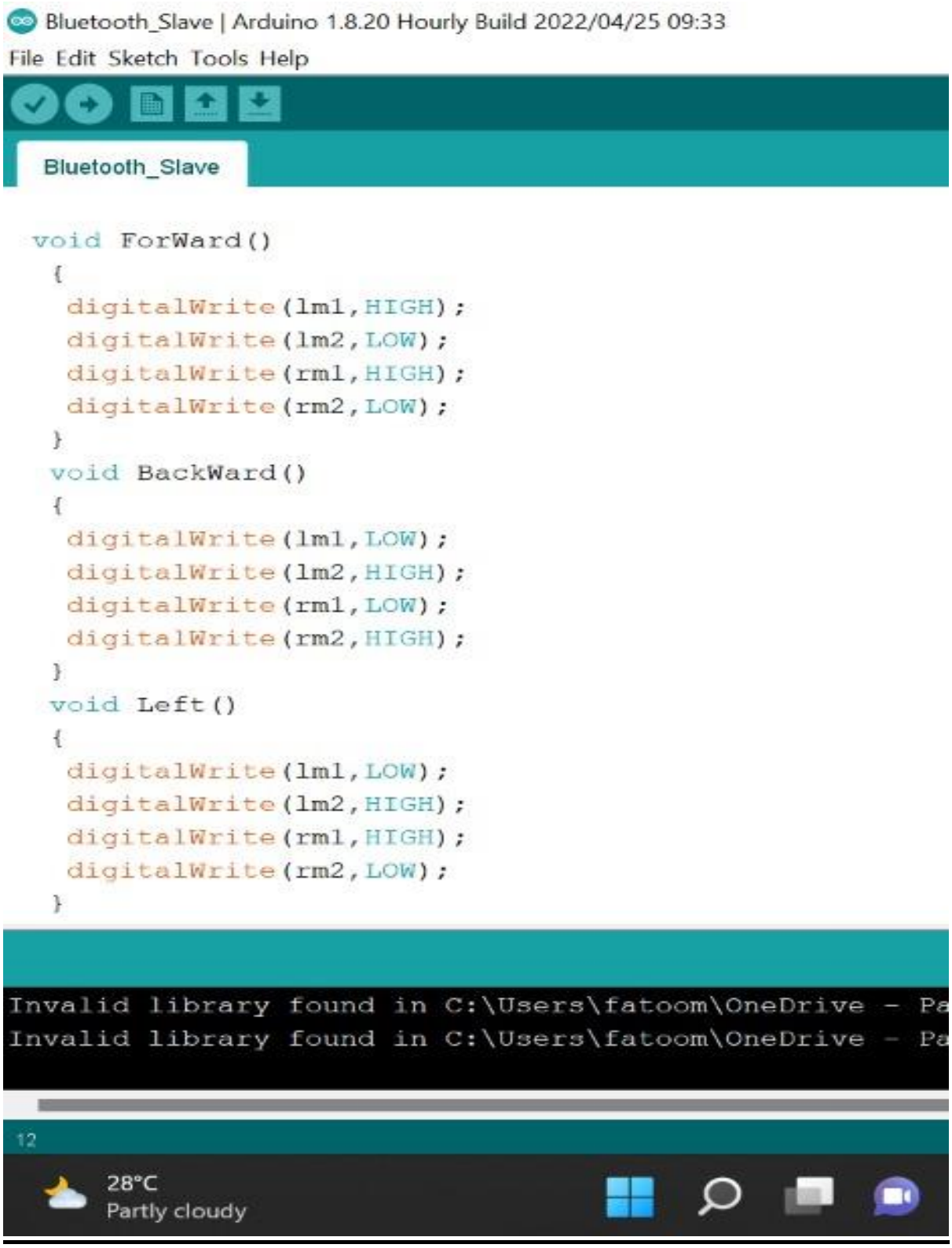
5. H-bridge motor(L298)

For controlling the rotation direction, we just need to inverse the direction of the current flow through the motor, and the most common method of doing that is by using an H-Bridge. An H-Bridge circuit contains four switching elements, transistors or MOSFETs, with the motor at the center forming an H-like configuration. By activating two particular switches at the same time we can change the direction of the current flow, thus change the rotation direction of the motor. So if we combine two methods, the PWM and the H-Bridge, we can have a complete control over the DC motor. There are many DC motor drivers that have these features and the L298 is one of them.



CODE:

Bluetooth slave code



Bluetooth_Slave | Arduino 1.8.20 Hourly Build 2022/04/25 09:33

File Edit Sketch Tools Help

Bluetooth_Slave

```
}
void Right()
{
 digitalWrite(lm1,HIGH);
 digitalWrite(lm2,LOW);
 digitalWrite(rm1,LOW);
 digitalWrite(rm2,HIGH);
}

  void sTOP()
{
 digitalWrite(lm1,LOW);
 digitalWrite(lm2,LOW);
 digitalWrite(rm1,LOW);
 digitalWrite(rm2,LOW);
}
void loop()
{

    //if (BTSerial.available())
    //Serial.write(BTSerial.read());
    if(BTSerial.read() == 'U')
```

```
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File Edit Sketch Tools Help

Bluetooth_Slave

```
    }
    if(BTSerial.read() == 'D')
    {
     ForWard();
     Serial.println('D');
    }
    if(BTSerial.read() == 'R')
    {
        Right();
        Serial.println('R');
    }
  if(BTSerial.read() == 'L')
    {
        Left();
        Serial.println('L');
    }
  if(BTSerial.read() == 'S')
    {
        sTOP();
        Serial.println('S');
    }
}
```

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File Edit Sketch Tools Help

Bluetooth_Slave

```
#include <SoftwareSerial.h>
SoftwareSerial BTSerial(10, 11); // RX | TX   TX//RX

int lm1=8; //left motor output 1
int lm2=9; //left motor output 2
int rm1=7;  //right motor output 1
int rm2=6;  //right motor output 2

void setup()
{
  // put your setup code here, to run once:
  Serial.begin(9600);
  pinMode(lm1, OUTPUT);
  pinMode(lm2, OUTPUT);
  pinMode(rm1, OUTPUT);
  pinMode(rm2, OUTPUT);
  BTSerial.begin(38400); // HC-05 default speed in AT command more
  sTOP();

}
```

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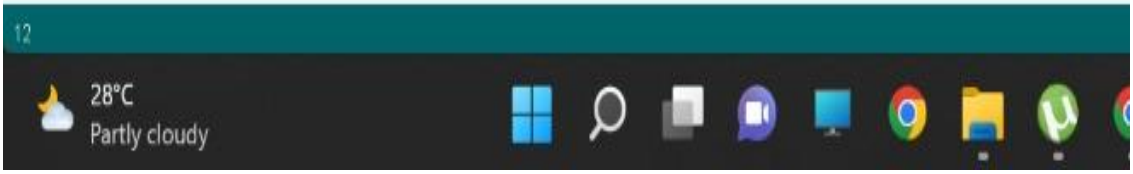

Bluetooth master code

Bluetooth_Master | Arduino 1.8.20 Hourly Build 2022/04/25 09:33

File Edit Sketch Tools Help

Bluetooth_Master

```
#include "Wire.h"
#include "I2Cdev.h"
#include "MPU6050.h"
MPU6050 mpu;
int16_t ax, ay, az;
int16_t gx, gy, gz;

struct MyData {
  byte X;
  byte Y;
};

MyData data;


#include <SoftwareSerial.h>
SoftwareSerial BTSerial(10, 11); // RX | TX   TX//RX



int value = 0;
void setup() {
```

```
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```

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Bluetooth_Master | Arduino 1.8.20 Hourly Build 2022/04/25 09:33

File Edit Sketch Tools Help

Bluetooth_Master

```
void setup() {
  // put your setup code here, to run once:
  Serial.begin(9600);
  Wire.begin();
  BTSerial.begin(38400);
  mpu.initialize();
}

void loop() {
   mpu.getMotion6(&ax, &ay, &az, &gx, &gy, &gz);
  data.X = map(ax, -17000, 17000, 0, 255 ); // X axis data
  data.Y = map(ay, -17000, 17000, 0, 255);  // Y axis data
  delay(500);
    if (BTSerial.available())
    Serial.write(BTSerial.read());



  // Keep reading from Arduino Serial Monitor and send to HC-05
  if (Serial.available())
    BTSerial.write(Serial.read());
```

```
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```

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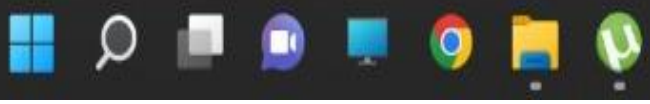

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File Edit Sketch Tools Help

Bluetooth_Master

```
if (data.Y < 80) { //gesture : left
    Serial.println('L');
    BTSerial.print('L');
    //digitalWrite(LED_BUILTIN, LOW);
    }
 if (data.Y > 145) {//gesture : right
  //digitalWrite(LED_BUILTIN, HIGH);
  Serial.println('R');
   BTSerial.print('R');
    }
 if (data.X > 155) {//gesture : up
  Serial.println('U');
  BTSerial.print('U');
    }
 if (data.X < 80) {//gesture : down
  Serial.println('D');
   BTSerial.print('D');
    }
 if (data.X > 100 && data.X < 170 && data.Y > 80 && data.Y < 130) {
    Serial.println('S');
    BTSerial.print('S');
```

```
Global variables use 568 bytes (27%) of dynamic memory, leaving 1480 bytes
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```

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