REPORTS ON MECHATRONICS SYSTEM INTEGRATION

REPORT 4A

SERIAL COMMUNICATION

SECTION 1, SEMESTER 2, 23/24

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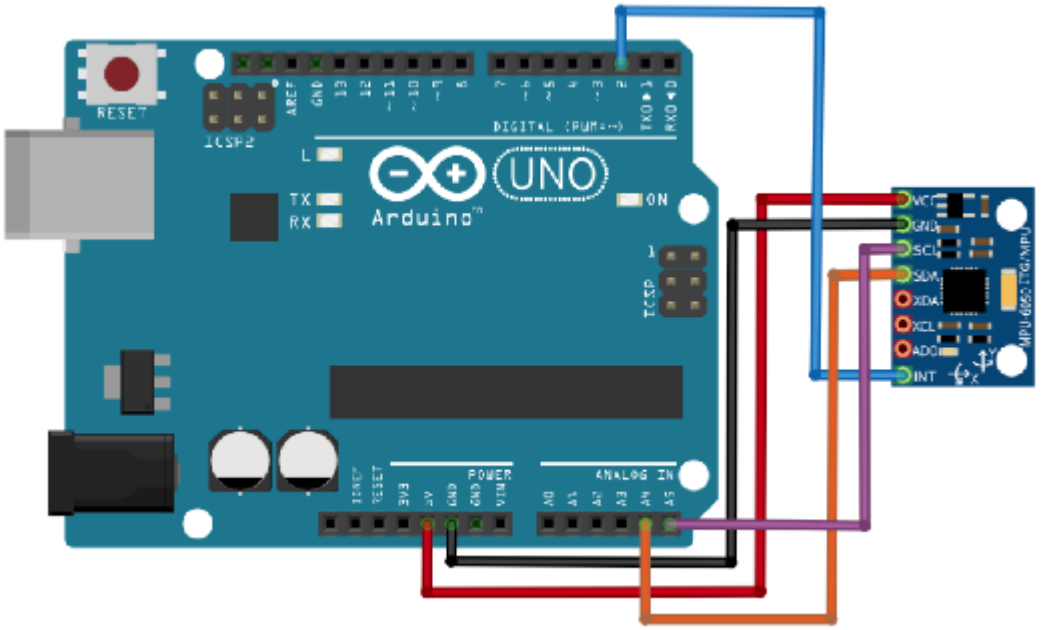
Introduction

The object of this experiment is to obtain a valuable source of information for a wide range of project and devices using the MPU6050 device that require motion and orientation data which has ability to combine accelerometer and gyroscope in order to produce those values..

Materials and Equipment

Arduino Board	X 1
MPU6050 sensor	X 1
Jumper Wires	X 5
LED	X 1
Breadboard	X 1
USB cable	X 1

Experimental setup



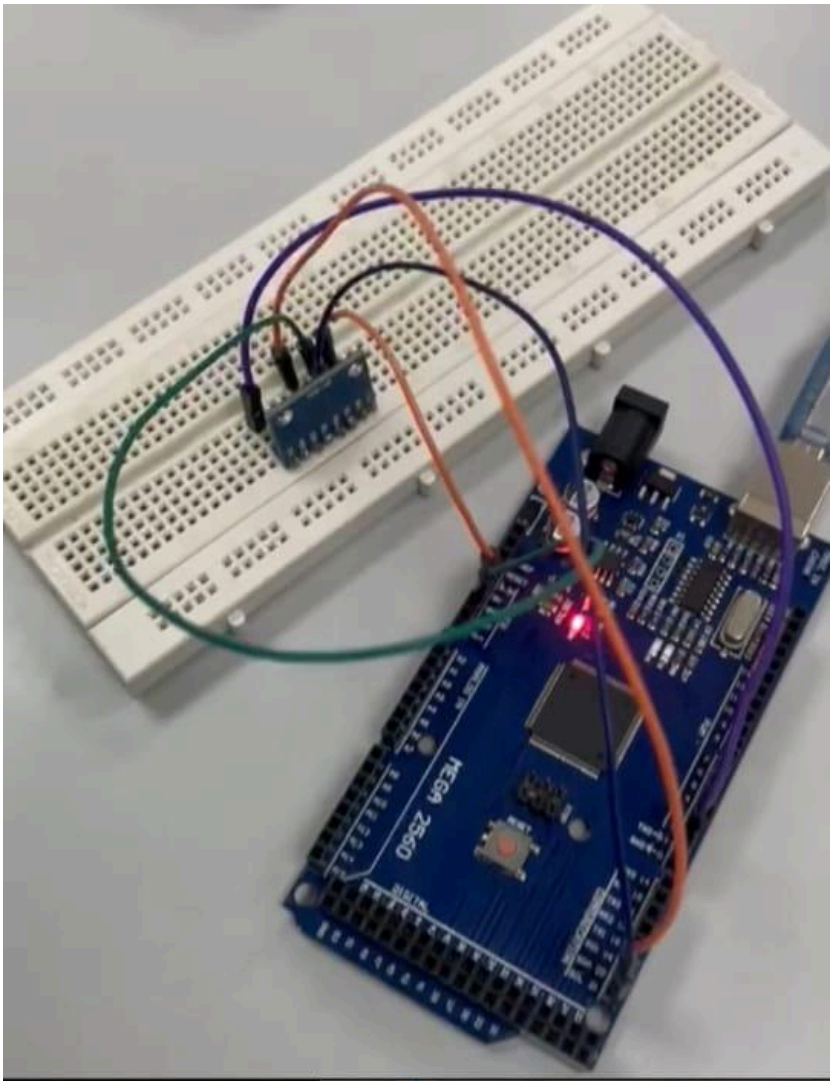
Methodology/Procedures

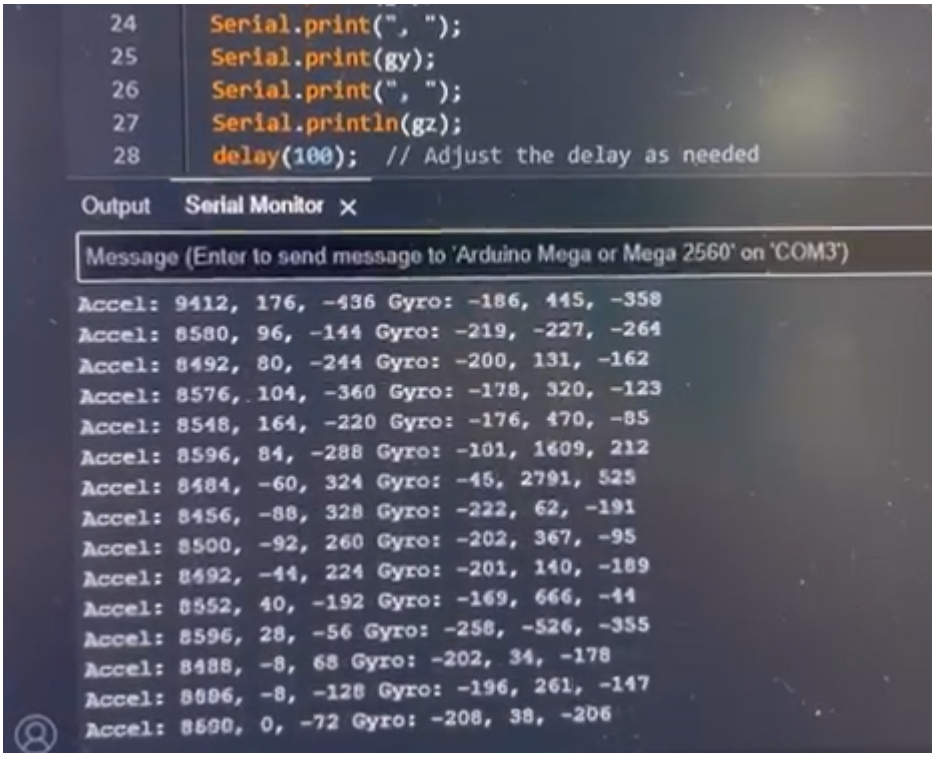
1. Connect the MPU6050 sensor to the Arduino board using the appropriate pins. The MPU6050 typically uses I2C communication, so connect the SDA and SCL pins of the MPU6050 to the corresponding pins on the Arduino (usually A4 and A5 for most Arduino boards).

2. Connect the power supply and ground of the MPU6050 to the Arduino's 5V and GND pins.
3. Ensure that the Arduino board is connected to your PC via USB.

Result

The result of this experiment was acquired by constructing a basic circuit using a MPU6050 sensor to detect the motion of the object where it was attached to the MPU6050 sensor to automatically measure the acceleration and the gyration of the object where it connected to whenever the object is moving. Once the object start to move, the sensor will detect and show the value recorded through the serial communication

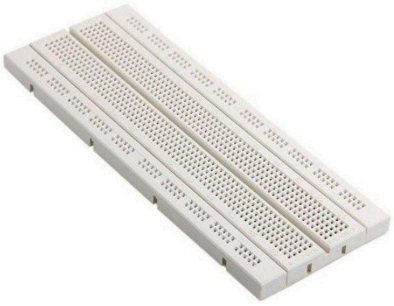



24 Serial.print(", ");
25 Serial.print(gy);
26 Serial.print(", ");
27 Serial.println(gz);
28 delay(100); // Adjust the delay as needed
Output Serial Monitor
Message (Enter to send message to 'Arduino Mega or Mega 2560' on 'COM3')
Accel: 9412, 176, -436 Gyro: -186, 445, -358
Accel: 8580, 96, -144 Gyro: -219, -227, -264
Accel: 8492, 80, -244 Gyro: -200, 131, -162
Accel: 8576, 104, -360 Gyro: -178, 320, -123
Accel: 8548, 164, -220 Gyro: -176, 470, -85
Accel: 8596, 84, -288 Gyro: -101, 1609, 212
Accel: 8484, -60, 324 Gyro: -45, 2791, 525
Accel: 8456, -88, 328 Gyro: -222, 62, -191
Accel: 8500, -92, 260 Gyro: -202, 367, -95
Accel: 8492, -44, 224 Gyro: -201, 140, -189
Accel: 8552, 40, -192 Gyro: -169, 666, -44
Accel: 8596, 28, -56 Gyro: -258, -526, -355
Accel: 8488, -8, 68 Gyro: -202, 34, -178
Accel: 8606, -8, -128 Gyro: -196, 261, -147
Accel: 8600, 0, -72 Gyro: -208, 38, -206

Discussion

Hardware Discussion

1) Breadboard



Breadboard is used to connect components with arduino through wire connection.

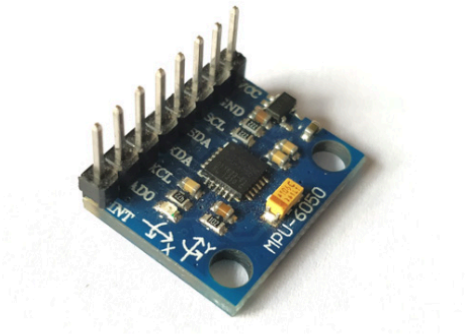
2) Arduino Mega 2560

Microcontroller used for our experiment is Arduino Mega 2560.

3) Male to male jumper wires

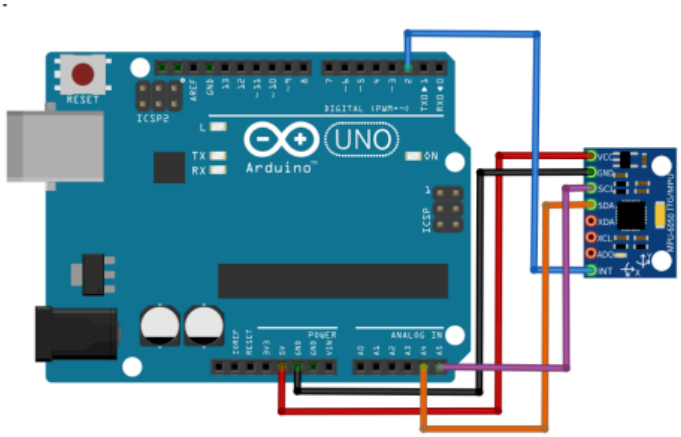
Male to male jumper wires are used to connect all of the components on the breadboard with Arduino Mega.

4) **MPU6050 sensor**



To measure the acceleration and the gyration of an object using the accelerometer and gyroscope.

Electrical Discussion



Male to male jumper is used to connect the MPU6050 sensor to Arduino Mega using a breadboard. VCC of the sensor is connected to 5V port on the arduino. The ground pin of the sensor is connected to the ground port of arduino. For SCL and SDA pin of the sensor, instead of connecting it to the analog port, we changed it to the communication port of the arduino since the analog port are unable to read the input produced from the sensor. So, SCL pin of the sensor is connected to SCL port of the communication port while SDA pin is

connected to SDA port of the communication port on the Arduino Mega. XDA, XCL and ADO pin of the sensor is ignored and are not connected to any port since this experiment is not using them. And lastly, INT pin of the MPU6050 sensor is connected to one of the PWM port of the arduino which is port number 2

Software Discussion

Attached below is the coding of the project. The software part of this mechatronic system project involves programming an Arduino Uno to interface with the PMU6050 sensor. There two codes from different of type computer languages which is arduino and python

Arduino code

```
#include <Wire.h>
#include <MPU6050.h>
MPU6050 mpu;
void setup() {
 Serial.begin(9600);
 Wire.begin();
 mpu.initialize();
}
void loop()
 {
 mpu.getMotion6(&ax, &ay, &az, &gx, &gy, &gz);
 Serial.print("Accel: ");
 Serial.print(ax);
 Serial.print(", ");
 Serial.print(ay);
Serial.print(", ");
 Serial.print(az);
 Serial.print(" Gyro: ");
 Serial.print(gx);
 Serial.print(", ");
 Serial.print(gy);
```

```
 Serial.print(", ");
 Serial.println(gz);
 delay(100);
}
```

Python Code

```
import serial
ser = serial.Serial('COM4', 9600)
while True:
 data = ser.readline().decode('utf-8').strip()
 print(data)
```

Conclusion

In conclusion, the MPU6050 sensor is a very useful and commonly used electronic component used to detect motion and the movement of the object it is attached to. With the right python and arduino coding and connection, this tiny electronic component is able to detect and measure the acceleration and the gyration of a certain moving machine or object this sensor is attached to. Once the machine is in motion, the MPU6050 sensor will automatically read and display the value recorded through the serial communication of the software.