



## 6 DOF Sensor-MPU6050 (SKU:SEN0142)



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## Introduction

At the beginning, the inertial measurement unit is an electronic device that measures and reports on a craft's velocity, orientation, and gravitational forces, using a combination of accelerometers, gyroscopes, and magnetometers. Now IMUs are commonly used in the Human-computer interaction (HCI), navigational purposes and balancing technology used in the Segway Personal Transporter as we all know.

The MPU-6000/MPU-6050 family of parts are the world's first and only 6-axis MotionTracking devices designed for the low power, low cost, and high performance requirements of smartphones, tablets and wearable sensors.

The MPU-6000/6050 devices combine a 3-axis gyroscope and a 3-axis accelerometer on the same silicon die together with an onboard Digital Motion Processor (DMP) capable of processing complex 9-axis MotionFusion algorithms. The parts' integrated 9-axis MotionFusion algorithms access

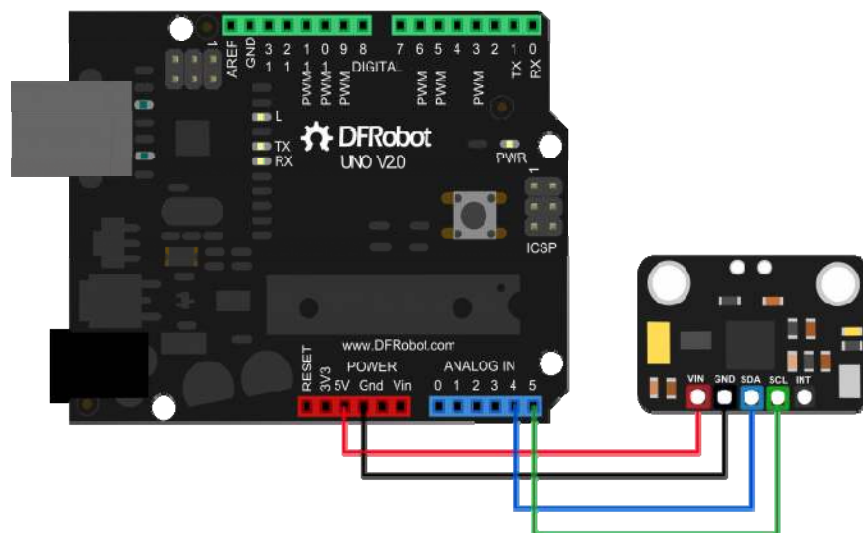
external magnetometers or other sensors through an auxiliary master I2C bus, allowing the devices to gather a full set of sensor data without intervention from the system processor.

The 6 Dof sensor breakout integrate with the MPU6050 sensor and the low noise 3.3v regulator and pull-up resistors for the I2C bus. So it's available to directly hook up the sensor with the Arduino processors for your robotics, HCI and wearable projects. With the Arduino library from i2cdevlib it's easy for you to drive this sensor and get the pitch, roll, yaw, quaternion, euler data.

## Specification

- Working voltage: 3~5v
- I2C Digital-output of 6 or 9-axis MotionFusion data in rotation matrix, quaternion, Euler Angle, or raw data format
- Tri-Axis angular rate sensor (gyro) with a sensitivity up to 131 LSBs/dps and a full-scale range of  $\pm 250$ ,  $\pm 500$ ,  $\pm 1000$ , and  $\pm 2000$ dps
- Tri-Axis accelerometer with a programmable full scale range of  $\pm 2g$ ,  $\pm 4g$ ,  $\pm 8g$  and  $\pm 16g$
- Digital Motion Processing (DMP) engine offloads complex MotionFusion, sensor timing synchronization and gesture detection
- Embedded algorithms for run-time bias and compass calibration. No user intervention required
- Dimensions: 14 x 21mm

## Connection Diagram



## Sample Code

Please download the [libraries](#) for the all the IMU sensors first!

```
/*
 # Product: 6 DOF Sensor-MPU6050
 # SKU    : SEN0142
 # Description:
 # To read accel/gyro data from 6 DOF Sensor
*/

#include "Wire.h"
#include "I2Cdev.h"
#include "MPU6050.h"
MPU6050 accelgyro;
int16_t ax, ay, az; // define accel as ax,ay,az
int16_t gx, gy, gz; // define gyro as gx,gy,gz

#define LED_PIN 13
bool blinkState = false;

void setup() {
  Wire.begin(); // join I2C bus
  Serial.begin(38400); // initialize serial communication
  Serial.println("Initializing I2C devices...");
  accelgyro.initialize();

  // verify connection
  Serial.println("Testing device connections...");
  Serial.println(accelgyro.testConnection() ? "MPU6050 connection successful"
  : "MPU6050 connection failed");

  pinMode(LED_PIN, OUTPUT); // configure LED pin
```

```
}

void loop() {
    accelgyro.getMotion6(&ax, &ay, &az, &gx, &gy, &gz); // read measurements from device

    // display tab-separated accel/gyro x/y/z values
    Serial.print("a/g:\t");
    Serial.print(ax);
    Serial.print("\t");
    Serial.print(ay);
    Serial.print("\t");
    Serial.print(az);
    Serial.print("\t");
    Serial.print(gx);
    Serial.print("\t");
    Serial.print(gy);
    Serial.print("\t");
    Serial.println(gz);

    // blink LED to indicate activity
    blinkState = !blinkState;
    digitalWrite(LED_PIN, blinkState);
}
}
```