



## **ARDUINO 10DOF SENSOR MODULE GY-89**

The **GY-89** is a 10-DOF (Degrees of Freedom) sensor module that combines multiple sensors into a single board. It is commonly used with microcontrollers like Arduino for projects involving motion sensing, orientation detection, and environmental monitoring. The module integrates the following sensors:

1. **MPU-6050** (or similar):
  - 3-axis Gyroscope
  - 3-axis Accelerometer
  - Temperature sensor
2. **HMC5883L** (or similar):
  - 3-axis Magnetometer (compass)
3. **BMP180** (or similar):
  - Barometric pressure sensor
  - Altitude calculation
  - Temperature sensor

### **Key Features:**

- **10-DOF:** Combines gyroscope, accelerometer, magnetometer, and barometric pressure sensor.
  - **I2C Communication:** Uses the I2C protocol for interfacing with microcontrollers like Arduino.
  - **Compact Design:** All sensors are integrated into a single module, making it easy to use in projects.
  - **Wide Applications:** Suitable for drones, robotics, navigation systems, and environmental monitoring.
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### **Pinout of GY-89:**

The GY-89 module typically has the following pins:

- **VCC:** Power supply (3.3V or 5V, depending on the module).
- **GND:** Ground.



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- **SCL:** I2C clock line.
  - **SDA:** I2C data line.
  - **Other pins:** Some modules may have additional pins for interrupts or alternative communication protocols.
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### **Wiring GY-89 to Arduino:**

Here's how to connect the GY-89 to an Arduino:

#### **GY-89 Pin Arduino Pin**

|     |             |
|-----|-------------|
| VCC | 3.3V or 5V  |
| GND | GND         |
| SCL | A5 (or SCL) |
| SDA | A4 (or SDA) |

**Note:** Ensure the voltage level of the GY-89 matches the Arduino's output (3.3V or 5V).

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### **Libraries for GY-89:**

To use the GY-89 with Arduino, you'll need libraries for each sensor:

1. **MPU-6050:** Use the MPU6050 library by Jeff Rowberg.
2. **HMC5883L:** Use the HMC5883L library.
3. **BMP180:** Use the Adafruit\_BMP085 library.

You can install these libraries via the Arduino IDE Library Manager.

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### **Example Code:**



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Below is an example sketch to read data from the GY-89 sensors:

```
cpp
Copy
#include <Wire.h>
#include <MPU6050.h>
#include <HMC5883L.h>
#include <Adafruit_BMP085.h>

MPU6050 mpu;
HMC5883L mag;
Adafruit_BMP085 bmp;

void setup() {
  Serial.begin(9600);

  // Initialize MPU6050
  mpu.initialize();
  if (!mpu.testConnection()) {
    Serial.println("MPU6050 connection failed");
  }

  // Initialize HMC5883L
  mag.initialize();
  if (!mag.testConnection()) {
    Serial.println("HMC5883L connection failed");
  }

  // Initialize BMP180
  if (!bmp.begin()) {
    Serial.println("BMP180 connection failed");
  }
}

void loop() {
  // Read MPU6050 data
  int16_t ax, ay, az;
  int16_t gx, gy, gz;
  mpu.getMotion6(&ax, &ay, &az, &gx, &gy, &gz);
  Serial.print("Accel: "); Serial.print(ax); Serial.print(", "); Serial.print(ay); Serial.print(", ");
  Serial.println(az);
  Serial.print("Gyro: "); Serial.print(gx); Serial.print(", "); Serial.print(gy); Serial.print(", ");
  Serial.println(gz);

  // Read HMC5883L data
```

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```
int16_t mx, my, mz;
mag.getHeading(&mx, &my, &mz);
Serial.print("Mag: "); Serial.print(mx); Serial.print(" "); Serial.print(my); Serial.print(" ");
Serial.println(mz);

// Read BMP180 data
float pressure = bmp.readPressure();
float altitude = bmp.readAltitude();
Serial.print("Pressure: "); Serial.print(pressure); Serial.print(" Pa, Altitude: "); Serial.print(altitude);
Serial.println(" m");

delay(1000);
}
```

### Applications:

- **Drones and Quadcopters:** For stabilization and navigation.
- **Robotics:** For orientation and motion tracking.
- **Weather Stations:** For altitude and pressure measurements.
- **Virtual Reality:** For motion tracking.

### Notes:

- Ensure proper calibration of the sensors for accurate readings.
- The GY-89 is a low-cost module, so performance may vary between units.
- Always refer to the datasheets of the individual sensors for detailed specifications.

