



ARDUINO 10DOF SENSOR MODULE HW-290

The **HW-290** is a 10DOF (Degrees of Freedom) sensor module that integrates multiple sensors into a single board, making it suitable for various applications such as robotics, drones, and motion tracking. It is commonly used with microcontrollers like Arduino, ESP32, or Raspberry Pi.

Key Features of HW-290:

1. **10 Degrees of Freedom:**
 - **3-Axis Gyroscope:** Measures angular velocity (rotation).
 - **3-Axis Accelerometer:** Measures acceleration (tilt and motion).
 - **3-Axis Magnetometer:** Measures magnetic field (compass functionality).
 - **Barometric Pressure Sensor:** Measures altitude and atmospheric pressure.
 - **Temperature Sensor:** Measures ambient temperature.
2. **Common Sensors Used:**
 - **MPU-6050** or similar: Gyroscope + Accelerometer.
 - **HMC5883L** or similar: Magnetometer.
 - **BMP180** or similar: Barometric pressure sensor.
3. **Communication Interface:**
 - I2C (Inter-Integrated Circuit) for easy connection to microcontrollers.
4. **Operating Voltage:**
 - Typically 3.3V or 5V, depending on the module.
5. **Compact Design:**
 - Small form factor, making it ideal for embedded projects.

Pinout of HW-290:

The module usually has the following pins:

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- **VCC:** Power supply (3.3V or 5V).
 - **GND:** Ground.
 - **SCL:** I2C clock line.
 - **SDA:** I2C data line.
 - **Other pins:** Some modules may have additional pins for interrupts or auxiliary I2C.
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Connecting HW-290 to Arduino:

1. Wiring:

- Connect **VCC** to Arduino's 3.3V or 5V pin (check module specifications).
- Connect **GND** to Arduino's GND.
- Connect **SCL** to Arduino's A5 (or SCL pin on boards with dedicated I2C pins).
- Connect **SDA** to Arduino's A4 (or SDA pin on boards with dedicated I2C pins).

2. Libraries:

- Use libraries like **Adafruit_Sensor**, **Adafruit_MPU6050**, **Adafruit_HMC5883**, and **Adafruit_BMP085** to interface with the sensors.
- Install these libraries via the Arduino IDE Library Manager.

3. Example Code:

Below is a basic example to read data from the sensors:

cpp

Copy

```
#include <Wire.h>
#include <Adafruit_Sensor.h>
#include <Adafruit_MPU6050.h>
#include <Adafruit_HMC5883_U.h>
#include <Adafruit_BMP085.h>

Adafruit_MPU6050 mpu;
Adafruit_HMC5883_Unified mag = Adafruit_HMC5883_Unified(12345);
```

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```
Adafruit_BMP085 bmp;

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

  // Initialize MPU6050
  if (!mpu.begin()) {
    Serial.println("Failed to initialize MPU6050!");
    while (1);
  }

  // Initialize HMC5883
  if (!mag.begin()) {
    Serial.println("Failed to initialize HMC5883!");
    while (1);
  }

  // Initialize BMP180
  if (!bmp.begin()) {
    Serial.println("Failed to initialize BMP180!");
    while (1);
  }
}

void loop() {
  // Read MPU6050 data
  sensors_event_t a, g, temp;
  mpu.getEvent(&a, &g, &temp);
  Serial.print("Acceleration: X=");
  Serial.print(a.acceleration.x);
  Serial.print(" Y=");
  Serial.print(a.acceleration.y);
  Serial.print(" Z=");
  Serial.println(a.acceleration.z);

  // Read HMC5883 data
  sensors_event_t event;
  mag.getEvent(&event);
  Serial.print("Magnetometer: X=");
  Serial.print(event.magnetic.x);
  Serial.print(" Y=");
  Serial.print(event.magnetic.y);
  Serial.print(" Z=");
  Serial.println(event.magnetic.z);

  // Read BMP180 data
  Serial.print("Temperature = ");
```

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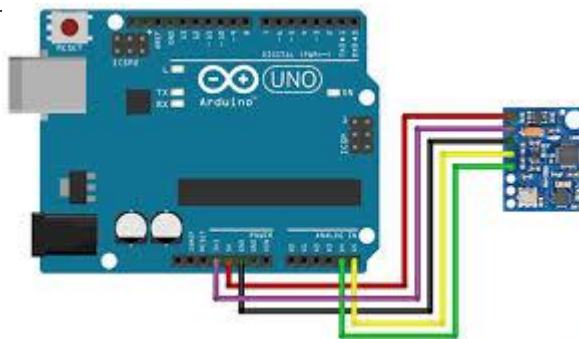
```
Serial.print(bmp.readTemperature());  
Serial.println(" *C");  
Serial.print("Pressure = ");  
Serial.print(bmp.readPressure());  
Serial.println(" Pa");  
  
delay(1000);  
}
```

Applications:

- **Drones and UAVs:** Stabilization and navigation.
- **Robotics:** Motion tracking and orientation.
- **Weather Stations:** Altitude and pressure measurements.
- **Virtual Reality:** Motion sensing.

Notes:

- Ensure proper
when
your



voltage levels
connecting to

- microcontroller.
- Calibration may be required for accurate magnetometer and gyroscope readings.
- Check the datasheets of the individual sensors for detailed specifications.