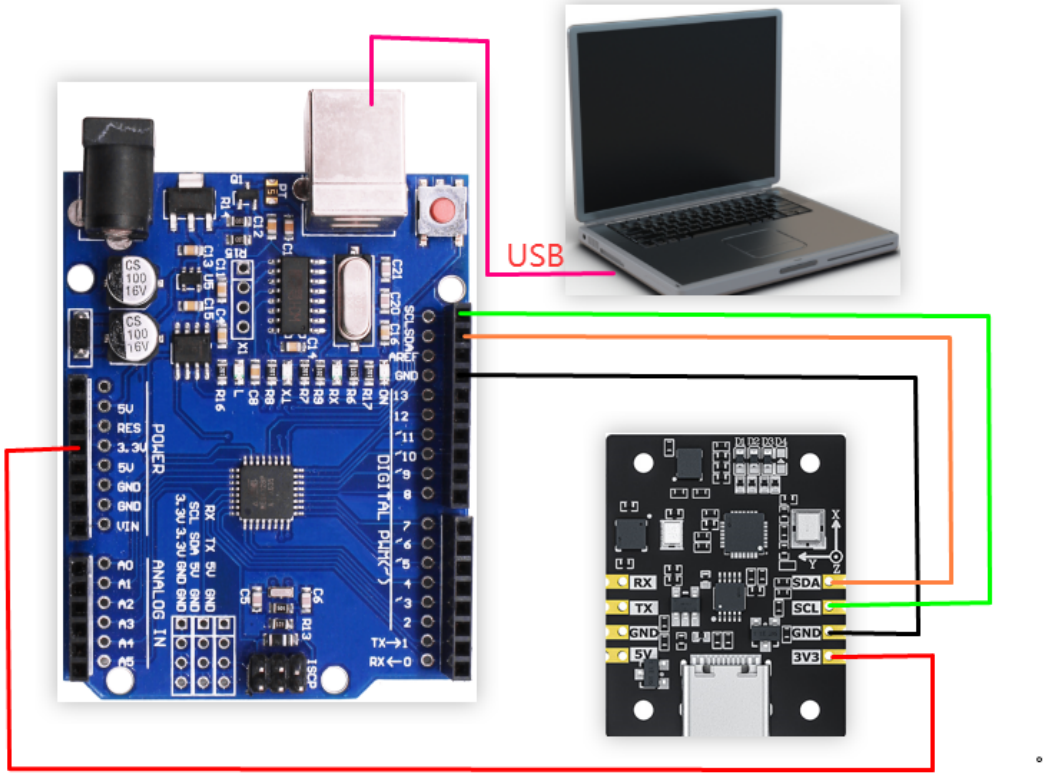
Arduino-IIC Data Reading

This example uses an Arduino Uno, a Windows computer, several DuPont wires, and an IMU attitude sensor.

1. Connecting the Device



IMU Attitude Sensor	Arduino
SDA	SDA
SCL	SCL
GND	GND
3V3	3V3

2. Key Code Analysis

Please refer to the source code in the documentation for the specific code.

```c
/**
 * @brief Read acceleration in g.
 *
 */
int IMU_I2C_ReadAccelerometer(float out[3])
{
    uint8_t register_data[6];
    if (read_register(IMU_FUNC_RAW_ACCEL, register_data, 6) != 0) {
        return -1;
    }
    if (out != NULL) {
        float ratio = 16.0f / 32767.0f;
        out[0] = to_int16(&register_data[0]) * ratio;
        out[1] = to_int16(&register_data[2]) * ratio;
        out[2] = to_int16(&register_data[4]) * ratio;
    }
    return 0;
}

/**
 * @brief Read angular velocity in rad/s.
 *
 */
int IMU_I2C_ReadGyroscope(float out[3])
{
    uint8_t register_data[6];
    if (read_register(IMU_FUNC_RAW_GYRO, register_data, 6) != 0) {
        return -1;
    }
    if (out != NULL) {
        float ratio = (2000.0f / 32767.0f) * (3.1415926f / 180.0f);
        out[0] = to_int16(&register_data[0]) * ratio;
        out[1] = to_int16(&register_data[2]) * ratio;
        out[2] = to_int16(&register_data[4]) * ratio;
    }
    return 0;
}

/**
 * @brief Read magnetic field strength in micro tesla.
 *
 */
int IMU_I2C_ReadMagnetometer(float out[3])
{
    uint8_t register_data[6];
    if (read_register(IMU_FUNC_RAW_MAG, register_data, 6) != 0) {
        return -1;
    }
    if (out != NULL) {
        float ratio = 800.0f / 32767.0f;
        out[0] = to_int16(&register_data[0]) * ratio;
        out[1] = to_int16(&register_data[2]) * ratio;
        out[2] = to_int16(&register_data[4]) * ratio;
    }
    return 0;
}
```

```
/**
 * @brief  Read quaternion (w, x, y, z).
 *
 */
int IMU_I2C_ReadQuaternion(float out[4])
{
    uint8_t register_data[16];
    if (read_register(IMU_FUNC_QUAT, register_data, 16) != 0) {
        return -1;
    }
    if (out != NULL) {
        out[0] = to_float(&register_data[0]);
        out[1] = to_float(&register_data[4]);
        out[2] = to_float(&register_data[8]);
        out[3] = to_float(&register_data[12]);
    }
    return 0;
}

/**
 * @brief Read Euler angles (rad).
 *
 */
int IMU_I2C_ReadEuler(float out[3])
{
    uint8_t register_data[12];
    if (read_register(IMU_FUNC_EULER, register_data, 12) != 0) {
        return -1;
    }
    if (out != NULL) {
        const float RAD2DEG = 57.2957795f;
        out[0] = to_float(&register_data[0]) * RAD2DEG;
        out[1] = to_float(&register_data[4]) * RAD2DEG;
        out[2] = to_float(&register_data[8]) * RAD2DEG;
    }
    return 0;
}
```

IMU_I2C_ReadAccelerometer(): Reads acceleration data (in g)

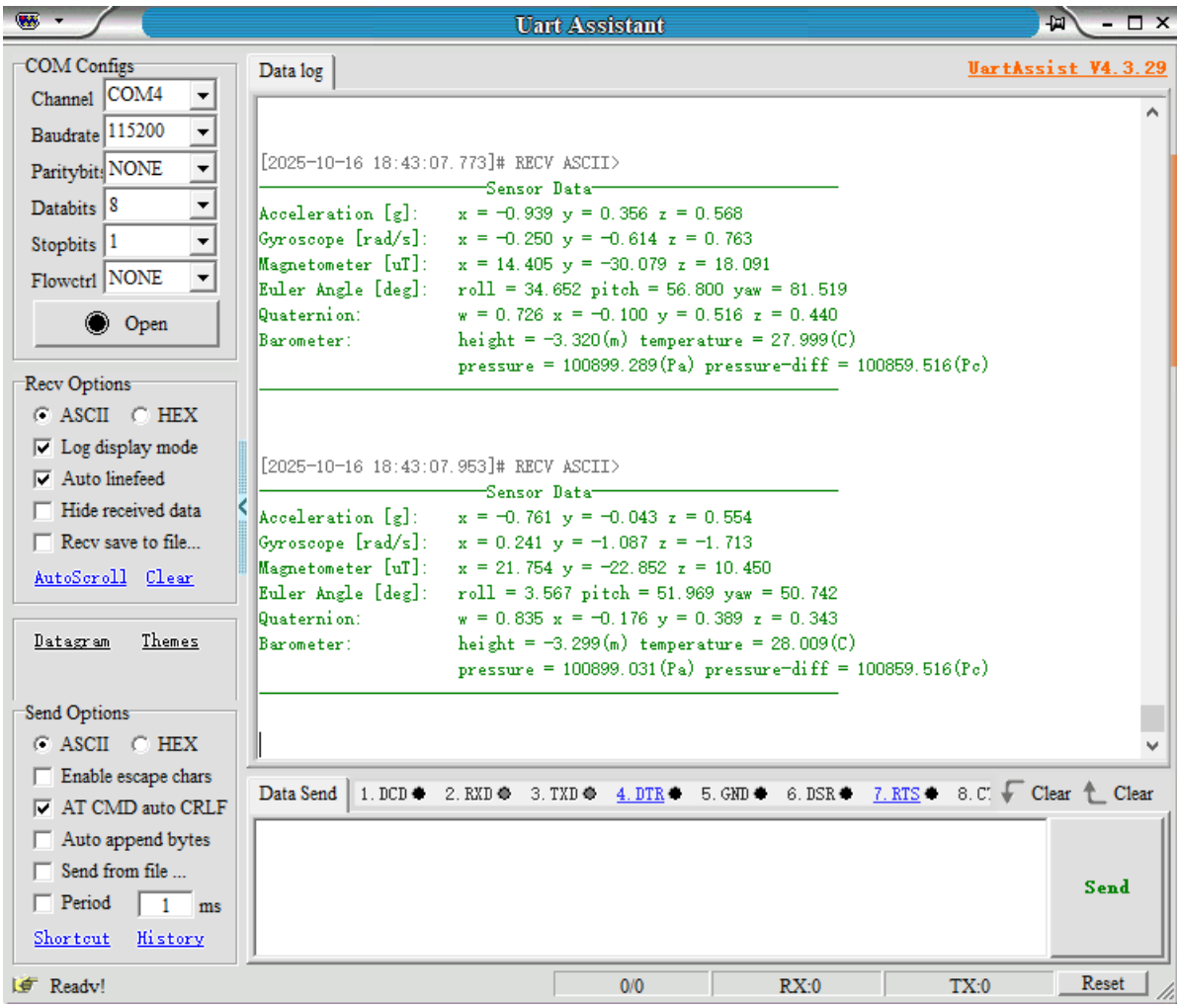
IMU_I2C_ReadGyroscope(): Reads angular velocity (in g) (rad/s)

IMU_I2C_ReadQuaternion(): Reads quaternions

IMU_I2C_ReadEuler(): Reads Euler angles (radians)

3. Reading IMU Data

After downloading the program into Arduino, open the serial port assistant (configuration parameters are shown in the image below). You will see the IMU module's data continuously printed. When we change the IMU module's orientation, the data will change.



Note: The above data is for a 10-axis IMU, 6-axis without magnetometer and barometer data, and 9-axis without barometer data.