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Interfacing Accelerometer ADXL345 (GY-291) with Arduino UNO

Introduction:

GY-291 ADXL345 3-Axis Accelerometer & Acceleration sensor is a 3-dimensional accelerometer that measures acceleration in 3 dimensions X, Y and Z axis.



Specification

General Specifications

- Single tap/double tap detection
- Activity/inactivity monitoring
- Free-fall detection
- 10,000 g shock survival
- SPI (3- and 4-wire) and I2C digital interfaces
- Flexible interrupt modes mappable to either interrupt pin
- Measurement ranges selectable via serial command
- Bandwidth selectable via serial command

Technical Specifications

- Operating Voltage: 4V to 6V
- I/O Voltage Range: 1.7V to 3.6V
- Communication: SPI and I2C
- Operating Temperature: -40^oC to 85^oC
- Size: $3 \text{ mm} \times 5 \text{ mm} \times 1 \text{ mm}$



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Objective:

In this Tutorial the sensor will send the data about the reading of the acceleration of the sensor in 3-dimension (x, y & z). The Serial Monitor in Arduino IDE will continuously display the data.

Components Needed:

- Accelerometer ADXL345 (GY-291)
- Arduino UNO
- ➢ Few Jumper Wires
- ➢ Breadboard

Procedures:

1) Connect the jumper based on the given picture and the table below.

Terminal / Pin		
Arduino UNO	ADXL345 (GY-291) Sensor	
5V	VCC	
GND	GND	
A4	SDA	
A5	SCL	



Circuit connection for Arduino UNO



2) Download and install the needed Library from **Arduino IDE**. Open **the Library Manager** tab by following picture below.

💿 Acc	Accelerometer_Sensor Arduino 1.8.5		
File	dit	Sketch Tool Help	
	÷)	Verify/Compile Ctrl+R	
	-	Upload Ctrl+U	
Acc	ele	Upload Using Programmer Ctrl+Shift+U	
53	vo	Export compiled Binary Ctrl+Alt+S	A
54	ł		// 50000 000 00
55		Show Sketch Folder Ctrl+K	// Start the se
57		Include Library	A
58		Add File	Manage Libraries.
59		adxl.powerOn();	Add ZIP Library
60		-	Add .ZIF Library
61		<pre>adxl.setRangeSetting(2);</pre>	Arduino libraries
62			Bridge
63			FEPROM
64			E I

3) Search for ADXL345 in search bar and it will show result. Select Adafruit ADXL345 by Adafruit with the latest version of library and click Install.

6	💿 Library Manager	ſ
6	Type All Topic All ADXL345	
o	Accelerometer ADXL345 by Seeed Studio Arduino library to control Grove 3Axis Digital Accelerometer ADXL345. Arduino library to control Grove 3Axis Digital Accelerometer ADXL345. More info	
* 4 0 e 0 (Adafruit ADXL345 by Adafruit Unified driver for the ADXL345 Accelerometer Interview ADXL345 by Hideki Hamada Version 0.2.0 INSTALLED A acceleration sensor library for Arduino A acceleration sensor library for Arduino More info	
A	FaBo 201 3Axis ADXL345 by FaBo A library for FaBo 3AXIS 12C Brick ADXL345 is 3-Axis Digital Accelerometer sensor More info T Close	



4) Repeat step 2 & 3 to install Adafruit Unified Sensor Library. Select Adafruit Unified Sensor by Adfruit and Install the lastest version. Close the Library Manager.

S Library Manager
Type All Topic All Adafruit unified Sensor Clorary for the Adafruit LISSON Acceleronmeter. Designed and the Marken of the Adafruit LISSON Breakout, and is based on Adafruit's Unified Sensor Library. More info
Adafruit LSM303DLHC by Adafruit Unified sensor driver for Adafruit's LSM303 Breakout (Accelerometer + Magnetometer) Unified sensor driver for Adafruit's LSM303 Breakout (Accelerometer + Magnetometer) More info
Adafruit TSL2561 by Adafruit Unified sensor driver for Adafruit's TSL2561 breakouts Unified sensor driver for Adafruit's TSL2561 breakouts More info
Adafruit Unified Sensor by Adafruit Vers on 1.0.2 INSTALLED Required for all Adafruit Unified Sensor basic Libraries. A unified sensor abstraction layer used by many Adafruit sensor libraries. More info Select vers Install
Close

5) Still in Arduino IDE click on File > Examples > Adafruit ADXL345 > sensortest to open the program coding.





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6) Connect the Arduino UNO to PC click on Verify and Upload.

💿 ser	isortest Arduino 1.8.5
File E	dit Sketch Tools Help
Ø	🔊 🗈 🛃 🥵 🖉
ser	isortest
1	<pre>#include <wire.h></wire.h></pre>
2	<pre>#include <adafruit_sensor.h></adafruit_sensor.h></pre>
3	<pre>#include <adafruit_adxl345_u.h></adafruit_adxl345_u.h></pre>
4	
5	/* Assign a unique ID to this sensor at the same time
6	Adafruit_ADXL345_Unified accel = Adafruit_ADXL345_Uni:
7	
8	void displaySensorDetails(void)
9	{
10	sensor_t sensor;
11	accel.getSensor(&sensor);
12	Serial.println("
13	Serial.print ("Sensor: "); Serial.println(ser
14	Serial.print ("Driver Ver: "); Serial.println(ser
15	Serial.print ("Unique ID: "); Serial.println(ser
16	Serial.print ("Max Value: "); Serial.print(sensor
17	Serial.print ("Min Value: "); Serial.print(sensor
18	Serial.print ("Resolution: "); Serial.print(sens(+
	4

7) Done! Open the **Serial Monitor** tab to see the result when changing the sensor position.





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8) Result data showed in serial monitor tab based on sensor position.

💿 СОМ4		
	Send	
Sensor:	ADXL345	
Driver Ver:	1	
Unique ID:	12345	
Max Value:	-156.91 m/s^2	
Min Value:	156.91 m/s^2	
Resolution:	0.04 m/s^2	
		=
Data Rate:	100 Hz	
Range:	+/- 16 g	
X: -4.39 Y:	-4.47 Z: 8.24 m/s^2	
X: -4.51 Y:	-4.24 Z: 8.12 m/s^2	
X: -4.63 Y:	-4.43 Z: 8.28 m/s^2	
X: -4.35 Y:	-4.28 Z: 8.32 m/s^2	-
Autoscroll	No line ending ✔ 9600 baud ✔ Clear output	