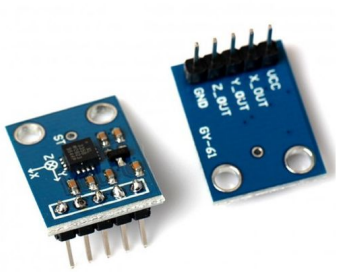
Accelerometer
(Measure Acceleration)

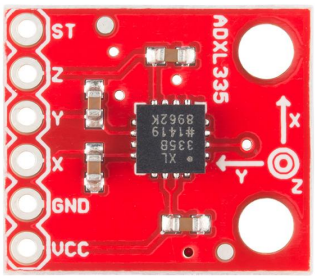
What is an Accelerometer?



Accelerometer sensor is the electromechanical device used to measure the **proper acceleration** of the object. The rate of change of velocity of the body with respect to time is called acceleration. According to relative theory, depending upon the relative object taken to measure acceleration, there are two types of acceleration. The proper acceleration, which is the physical acceleration of the body relative to inertia or the observer who is at rest relative to the object being measured.The coordinate acceleration depends upon the choice of coordinate system and choice of observers.

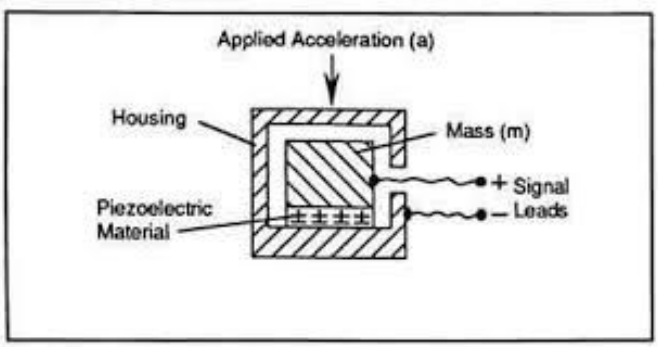
Scientific Facts and Applications

Accelerometer can be thought to act as a damped mass on a spring that displaces its mass to a spring such that the spring also accelerates with the same amount. The amount of displacement is the measure of the acceleration. This is the simple principle of operation of the accelerometer.

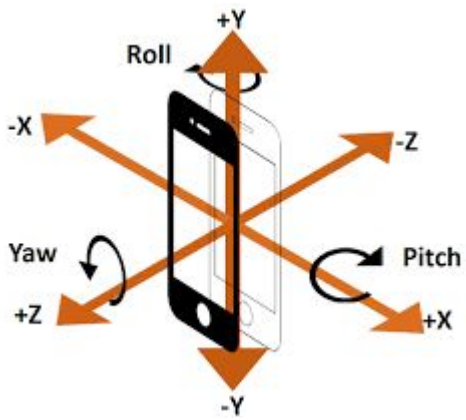


Applications:

Smartphones
There is an accelerometer in your smartphone. It is used along with gyroscope to measure the angle and orientation of the phone.



Aircrafts or Space Shuttles
Accelerometer plays a crucial role in onboard navigation of aircrafts and space shuttles in finding the position, orientation, and velocity without radio navigation.



Seismic Accelerometer
Strong motion sensors are **accelerometers**, and are designed to measure the large amplitude high-frequency **seismic** waves typical of large local earthquakes. These **seismic** waves result in the strong ground motion we feel during a large earthquake.

AN-039 Rev 1.0

Z2M Part Number: **EMS-00003-B**

Accelerometer
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ZERO2MAKER

Project

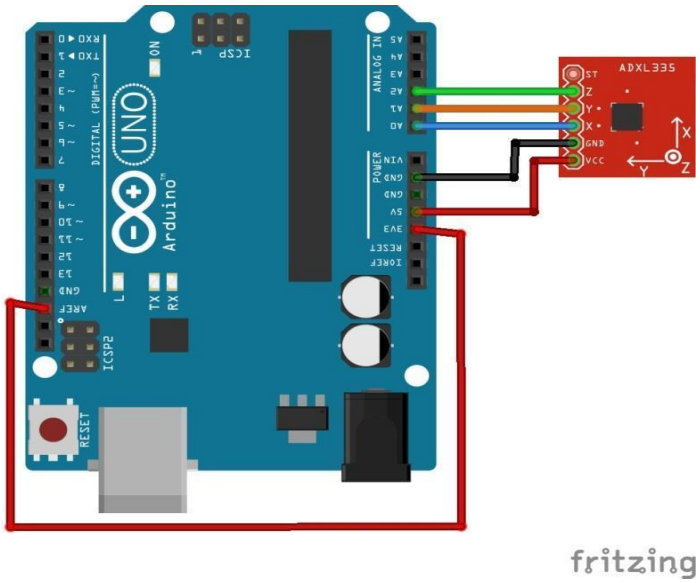
Use accelerometer to read the acceleration in X, Y, Z orientation.

Components Required

Component	Part No.	Qty
Arduino UNO	EMX-00001-A	1
ADXL335 MODULE	EMS-00003-A	1

Procedure

1. Connect the accelerometer to Arduino
   - VCC -> 3.3 V
   - GND -> GND
   - X_OUT -> Pin A0
   - Y_OUT -> Pin A1
   - Z_OUT -> Pin A2



Code

```
const int xInput = A0;
const int yInput = A1;
const int zInput = A2;
int RawMin = 0;
int RawMax = 1023;
const int sampleSize = 10;

void setup(){
  analogReference(EXTERNAL);
  Serial.begin(9600);
}

void loop(){
  /* Taking Input for x,y and z axis
respectively*/
  int xRaw = ReadAxis(xInput);
  int yRaw = ReadAxis(yInput);
  int zRaw = ReadAxis(zInput);
  long xScaled = map(xRaw, RawMin, RawMax,
-3000, 3000);
  long yScaled = map(yRaw, RawMin, RawMax,
-3000, 3000);
  long zScaled = map(zRaw, RawMin, RawMax,
-3000, 3000);
  float xAccel = xScaled / 1000.0;
  float yAccel = yScaled / 1000.0;
  float zAccel = zScaled / 1000.0;
  Serial.print("X, Y, Z :: ");
Serial.print(xRaw);
  Serial.print(", ");
  Serial.print(yRaw);
  Serial.print(", ");
  Serial.print(zRaw);
  Serial.print(" :: ");
  Serial.print(xAccel,0);
  Serial.print("G, ");
  Serial.print(yAccel,0);
  Serial.print("G, ");
  Serial.print(zAccel,0);
  Serial.println("G");
  delay(200);
}
```

Challenger Yourself

1. Create a platform that balances a ball automatically.