SENSORS AND ACTUATORS

ACCELEROMETER

Laboratory Guide

IDENTIFICATION

Weekday	Date	Hour	Group	Students
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INTRODUCTION

An accelerometer is a sensor that allows one to measure the acceleration of a body. It is used, for example, to trigger the airbag in a car when a collision occurs or to adjust the orientation of the screen image in smartphone.

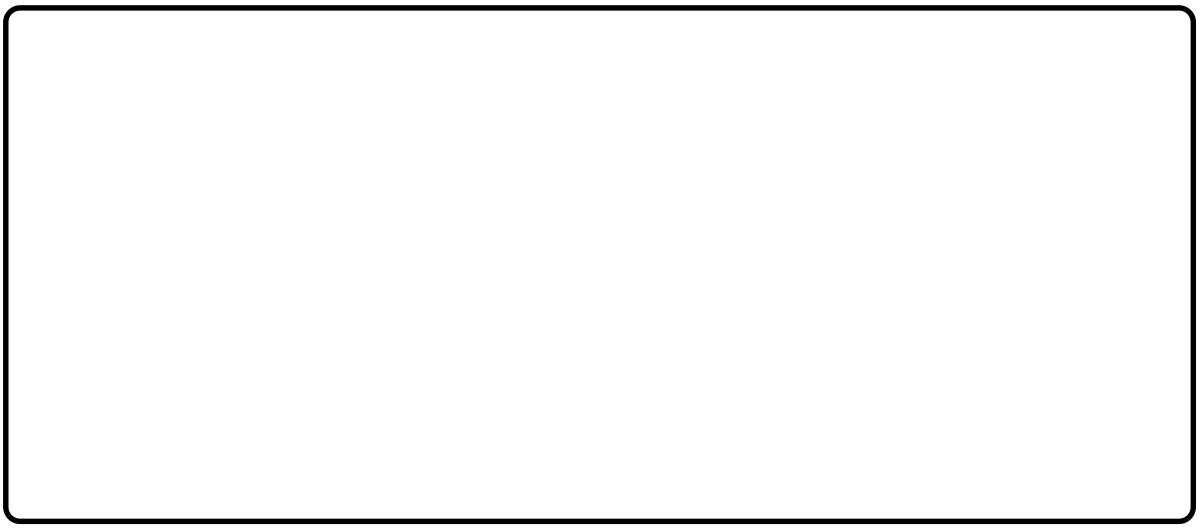
There are several physical phenomena that can be used to measure acceleration. One of the most common in low cost accelerometers is the use of a test mass coupled to a spring which causes the plate of a capacitor to move when accelerated. The change in distance between capacitor plates leads to a change in its capacitance which is then used to measure acceleration. The manufacture of this type of sensor using MEMS technology allows one to have very small and low-cost sensors that can measure simultaneously the acceleration in 3 perpendicular axes.

Recommended reading: Book Sensors and Actuators by Francisco Alegria, chapter 2 and section 3.4.

EXECUTION

1) Connecting the accelerometer

Connect the supplied accelerometer to the Arduino microcontroller. Draw a schematic with the connections made.



2) Software Application

Using the Arduino IDE create an application that acquires the electrical signals from the accelerometer and shows them in the Arduino IDE Serial Plotter (only in Arduino IDE 1.6.6 and above).

3) Crash Detection

Use the accelerometer to detect a simulated crash (like the Airbag in a car) and light up the LED in the Arduino board when that happens. Describe the code developed.

MATERIAL

- 1 accelerometer ADXL330 mounted on a PCB.
- Arduino Uno