

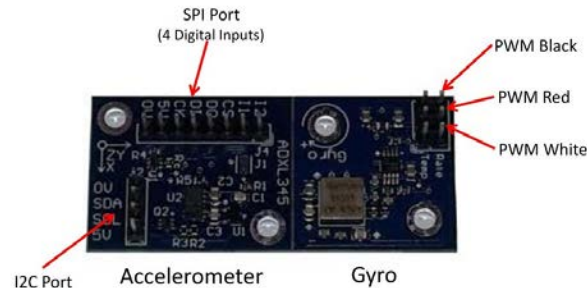
# Lab #7

## Using I2C to Read and Accelerometer Sensor

Ver 0.5

Background:

This lab we will be using an ADXL345 breakout board in I2C mode:



The ADXL345 is at address 0x1D (non-shifted, 7-bit address).

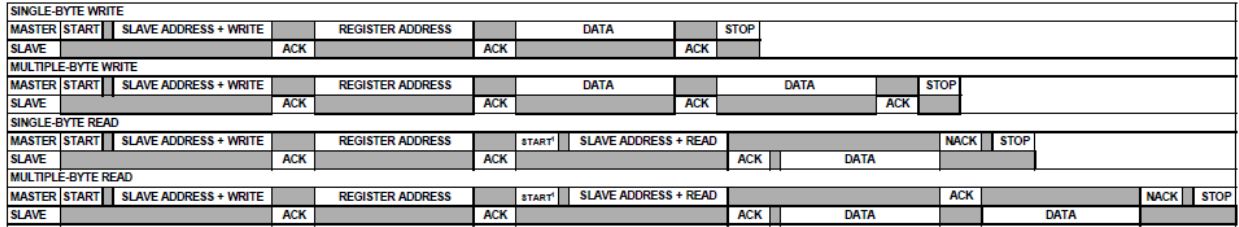
It has the following registers that are of interest for this experiment:

Register (Hex)	Name	Description
0x2D	POWER_CTL	Power-saving features control.
0x31	DATA_FORMAT	Data format control
0x32	DATA_X0	X-Axis Least Significant Byte
0x33	DATA_X1	X-Axis Most Significant Byte
0x34	DATA_Y0	Y-Axis Least Significant Byte
0x35	DATA_Y1	Y-Axis Most Significant Byte
0x36	DATA_Z0	Z-Axis Least Significant Byte
0x37	DATA_Z1	Z-Axis Most Significant Byte

Building on the I2C library we created for Lab #6, we will add the routine for reading a byte (function `i2c_read` from example 18\_4 in the textbook).

Since we need to READ two bytes of data for X, Y and Z acceleration, create a function that reads 2 bytes and puts them in the correct (MSB->LSB) order. Call this function `ic2_read2bytes`.

The Multiple-Byte Read packet diagram (below) should help you determine what functions need to be called from the new `i2c_read2bytes` function and in what order. Pay special attention to Read / Write bits, ACK and NACK bits and Stop bits (see function `i2c_read` function for how to generate ACK and NACK).



For the best results, it is suggested that you read the X, Y and Z values at the start of the program (and with the sensor flat on the desk) and store these values as offsets (nulling out the initial values of the accelerometer). These values can then be subtracted from subsequent values (read in a loop) showing acceleration.

Create a 3-column output to the terminal as show below:

```

PuTTY (inactive)
x = 1   y = 3   z = -1
x = 0   y = 1   z = -2
x = -1  y = 3   z = -4
x = 2   y = 1   z = 3
x = 2   y = 3   z = 0
x = 2   y = 1   z = -1
x = 1   y = 5   z = 1
x = 1   y = 1   z = -1
x = 0   y = 4   z = 1
x = 2   y = 0   z = -1
x = 1   y = 4   z = 2
x = 1   y = 1   z = 2
x = 1   y = 2   z = -1
x = 0   y = 3   z = 2
x = 10  y = 2   z = -2
x = 2   y = 2   z = 6
x = 4   y = 2   z = 1
x = 8   y = 1   z = -1
x = 6   y = -8  z = -28
x = 11  y = 0   z = 31
x = -3  y = -6  z = -10
x = -5  y = -9  z = 4
x = -11 y = -13 z = -4

```