Data Logger (and using cool sensors!)

A lab report by John Q. Student.

In The Report

Include your responses to the bold questions on your own fork of [this lab report template](https://github.com/FAR-Lab/IDD-Fa18-Lab2). Include snippets of code that explain what you did. Deliverables are due next Tuesday. Post your lab reports as README.md pages on your GitHub, and post a link to that on your main class hub page.

For this lab, we will be experimenting with a variety of sensors, sending the data to the Arduino serial monitor, writing data to the EEPROM of the Arduino, and then playing the data back.

Part A. Writing to the Serial Monitor

****a. Based on the readings from the serial monitor, what is the range of the analog values being read?****

It goes from 0 to 1023.

****b. How many bits of resolution does the analog to digital converter (ADC) on the Arduino have?****

The max resolution for the arduino uno is 10 bits.

Part B. RGB LED

****How might you use this with only the parts in your kit? Show us your solution.****

https://youtu.be/H6Dw22ZLrv8

Part C. Voltage Varying Sensors

1. FSR, Flex Sensor, Photo cell, Softpot

****a. What voltage values do you see from your force sensor?****
I see voltage values at 1023 when I squeeze the sensor and then they fall down around 341 when I release the sensor.

****b. What kind of relationship does the voltage have as a function of the force applied? (e.g., linear?)****

The relationship appears to be a logistic function.

****c. Can you change the LED fading code values so that you get the full range of output voltages from the LED when using your FSR?****

https://youtu.be/yZyLKso-rGw
I squeeze the FSR to change the resistance and therefore get the full range of output voltages from the LED.

****d. What resistance do you need to have in series to get a reasonable range of voltages from each sensor?****

flex sensor - full range is ~25K to ~100K for the flex sensor - pullup resistor not specified
photo cell - 10K pulldown resistor
softpot - 10K resistor in series

****e. What kind of relationship does the resistance have as a function of stimulus? (e.g., linear?)****
Resistance has a logistic relationship as a function of simulus based on looking at the serial plotter.

2. Accelerometer

****a. Include your accelerometer read-out code in your write-up.****

See attached

Optional. Graphic Display

****Take a picture of your screen working insert it here!****

Here's a video

https://youtu.be/FA18p_VQGNc

Part D. Logging values to the EEPROM and reading them back

1. Reading and writing values to the Arduino EEPROM

****a. Does it matter what actions are assigned to which state? Why?****

Yes, it matters which actions are assigned to which states because the potentiometer is physically changing the resistance and you want to make sure the resistance isn't so high that when the LED ligh is supposed to be on it doesn't turn on.

****b. Why is the code here all in the setup() functions and not in the loop() functions?****

Because we want to create the three different states and then manually rotate through them with the potentiometer, not automatically loop through them with the code.

****c. How many byte-sized data samples can you store on the Atmega328?****

You can store 32KB of data on the 8-bit ATmega328.

****d. How would you get analog data from the Arduino analog pins to be byte-sized? How about analog data from the I2C devices?****

I would use EEPROM.put(address, data) and make sure that the data was either a float or a custom struct data type first.

****e. Alternately, how would we store the data if it were bigger than a byte? (hint: take a look at the**

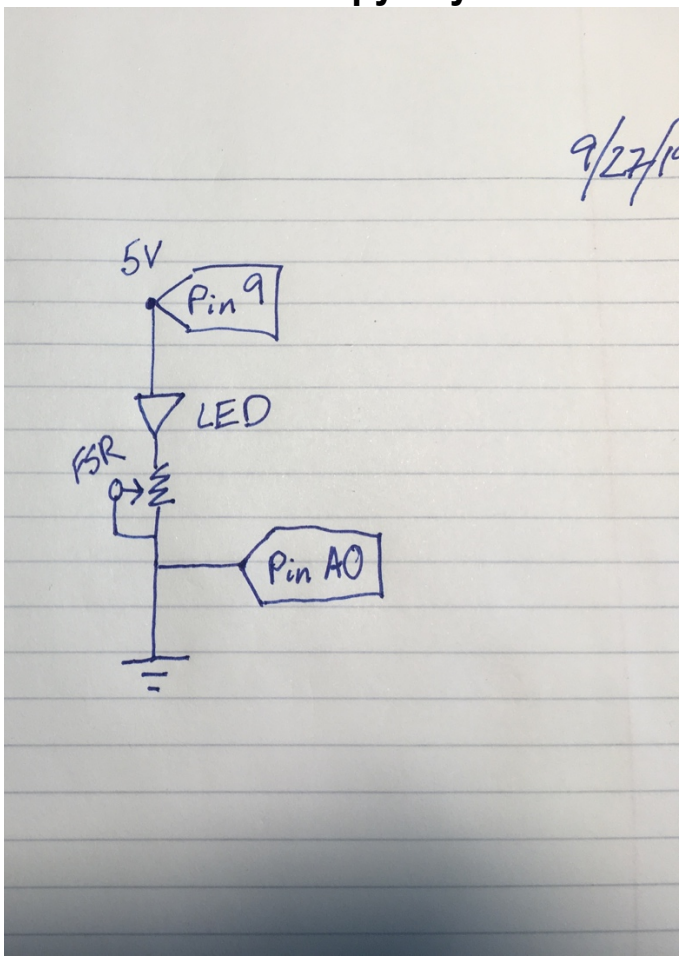
[**EEPROMPut**](https://www.arduino.cc/en/Reference/EEPROMPut) **example)****

****Upload your modified code that takes in analog values from your sensors and prints them back out to the Arduino Serial Monitor.****

See lpm36_EEPROM_accelermoter_display

2. Design your logger

****a. Insert here a copy of your final state diagram.****



3. Create your data logger!

****a. Record and upload a short demo video of your logger in action.****
https://youtu.be/0SXhmFzeeiY