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CSC 299

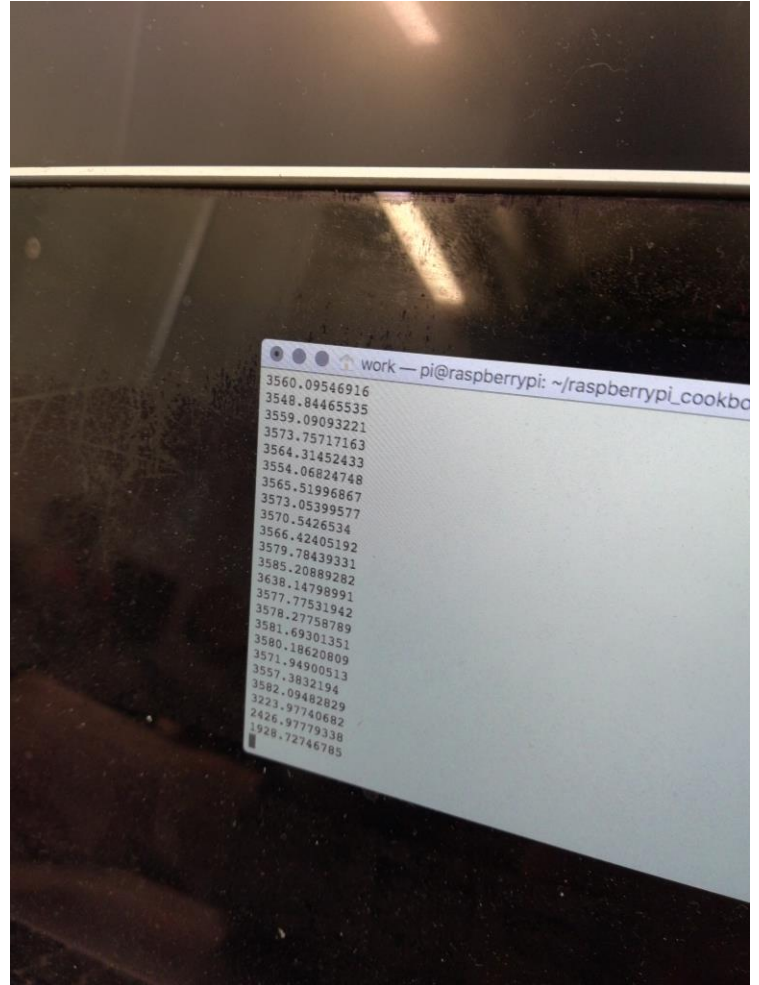
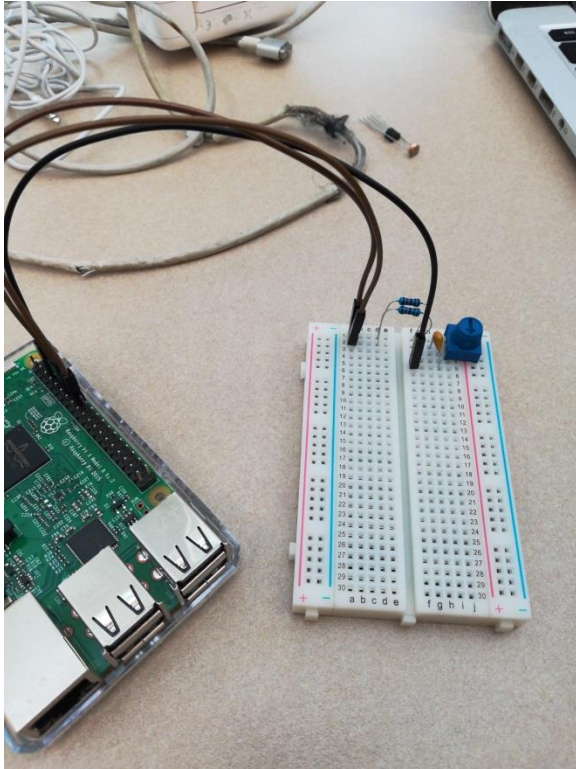
Lab 4

In this lab, first we learned how to measure resistance on a Raspberry Pi using nothing more than a capacitor, a couple of resistors, and two GPIO pins. In this case, we were able to estimate the position of the knob on a small variable resistor (trimpot) by measuring its resistance from its slider contact to one end of the pot. We also learned how to measure light intensity with a Raspberry Pi and a photoresistor, by replacing the trimpot with a photoresistor. The photoresistor's resistance depends on the amount of ambient light. More ambient light decreases the resistance and less ambient light increases the resistance. Next, we learned how to measure an analog voltage, using a separate analog-to-digital converter chip, since the Pi GPIO connector has only digital inputs, and interfacing to the chip using the Raspberry Pi SPI interface. Next, we learned how to use a potential divider with one fixed resistor and the resistive sensor to convert the resistance of the sensor into a voltage that can be measured with the ADC with the light sensor project. Finally, we learned how to measure temperature using a TMP36 and an analog-to-digital converter.

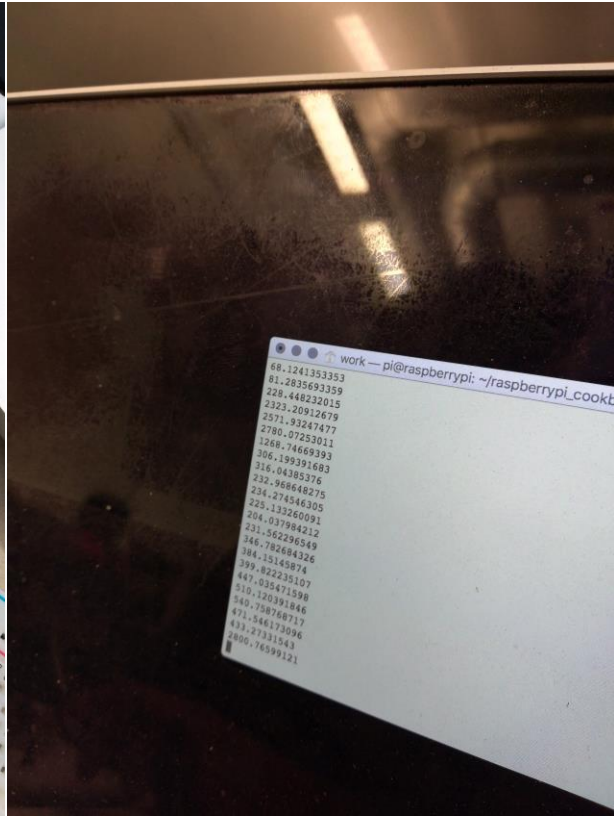
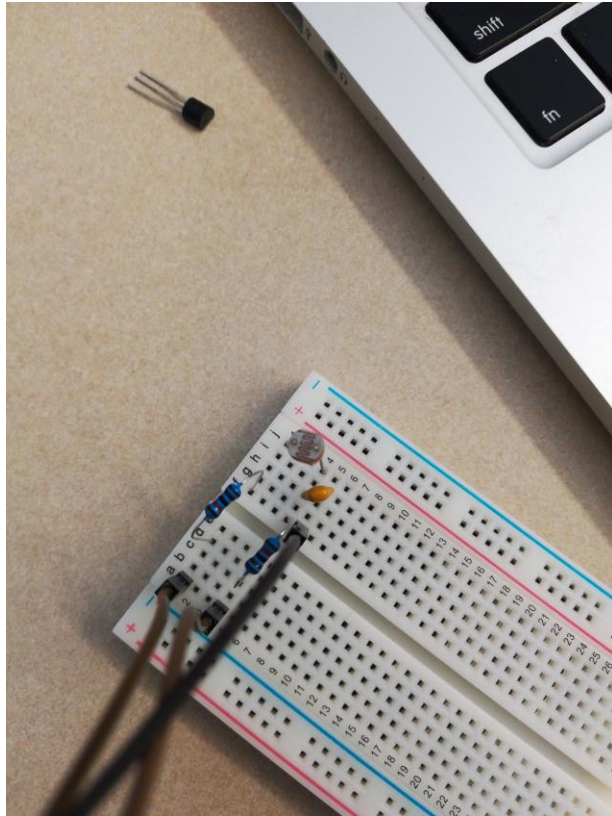
When we did recipe 13.5, we could only get `adc_test.py` to display two different values and nothing in between those two values. We double checked our circuits to ensure that we had everything connected properly. Later, we added a line of code to `adc_test.py` to slow down the SPI speed. This made 13.7(light sensor) a success for us. We could not get recipe 13.8 to work.

Again, this only displayed two values. We tried to slow down the SPI speed for `adc_temp36.py` to no avail.

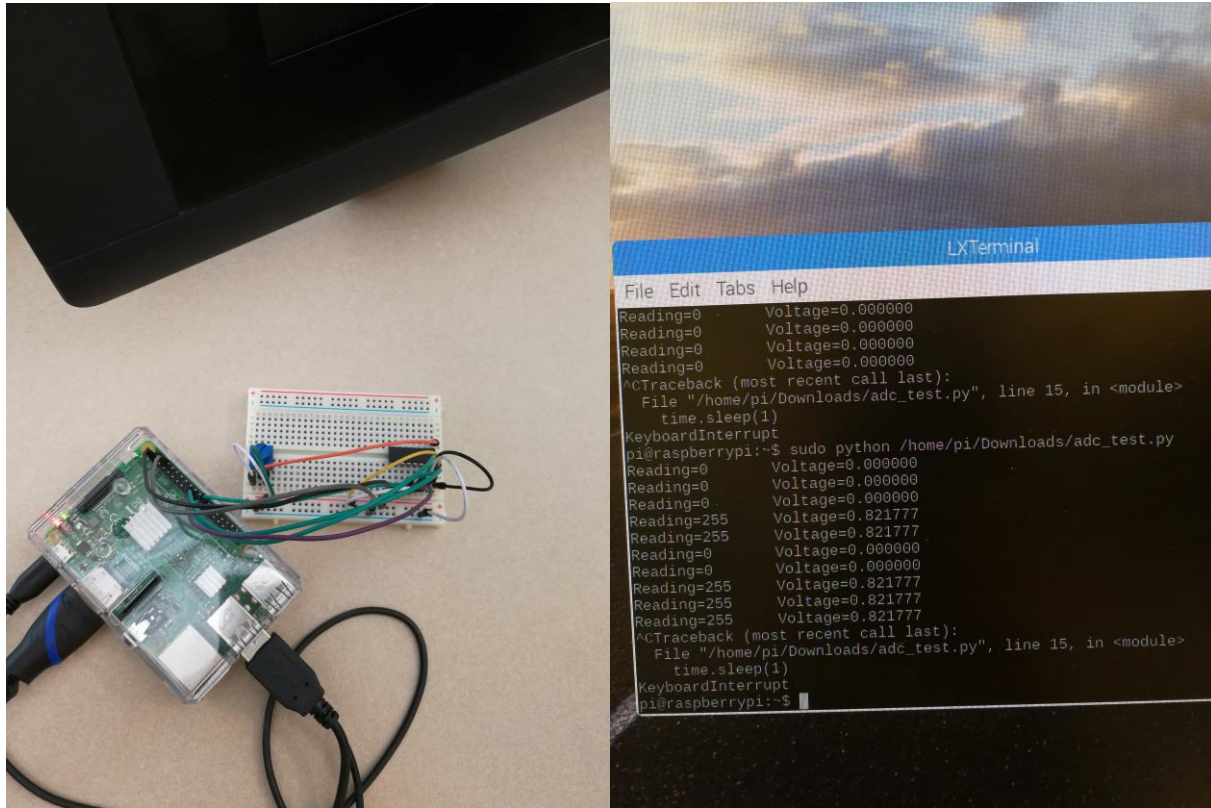
#4 Using Resistive Sensors:



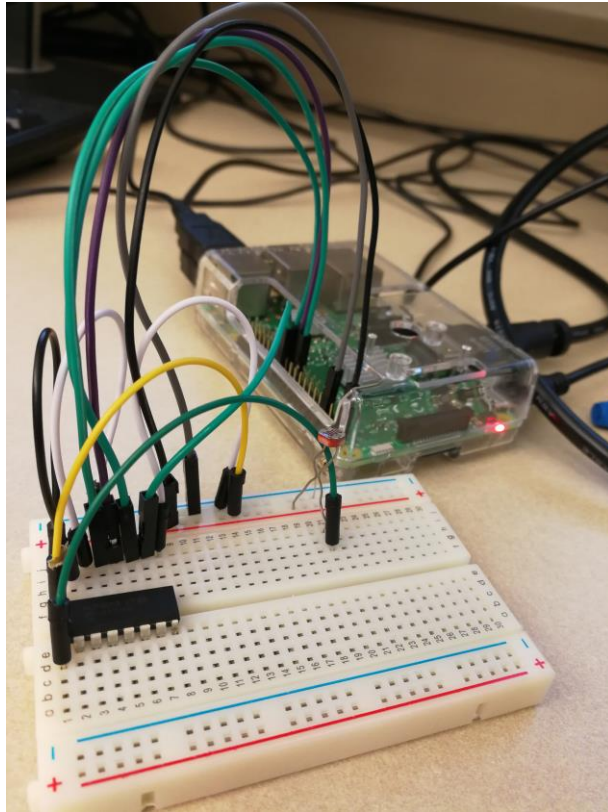
#5 Measuring Light Intensity:



#6 Measuring Voltage:



#7 Using Resistive Sensors with an ADC

A screenshot of a terminal window on a Raspberry Pi. The window shows a list of ADC readings and their corresponding voltage values. The readings are: 903, 903, 903, 903, 853, 642, 631, 752, 606, 748, 644, 636, 768, 529, 420, 402, 396, 307, 902. The voltage values are: 2.910059, 2.910059, 2.910059, 2.910059, 2.748926, 2.068945, 2.033496, 2.423437, 1.952930, 2.410547, 2.075391, 2.049609, 2.475900, 1.764785, 1.353515, 1.295508, 1.276172, 1.279395, 2.906836. The terminal also shows a traceback for a KeyboardInterrupt error in a file named "/home/pi/Downloads/adc_test.py", line 16, in <module>: time.sleep(1).

```
pi@raspberrypi: ~  
File Edit Tabs Help  
Reading=903 Voltage=2.910059  
Reading=903 Voltage=2.910059  
Reading=903 Voltage=2.910059  
Reading=903 Voltage=2.910059  
Reading=853 Voltage=2.748926  
Reading=642 Voltage=2.068945  
Reading=631 Voltage=2.033496  
Reading=752 Voltage=2.423437  
Reading=606 Voltage=1.952930  
Reading=748 Voltage=2.410547  
Reading=644 Voltage=2.075391  
Reading=636 Voltage=2.049609  
Reading=768 Voltage=2.475900  
Reading=529 Voltage=1.764785  
Reading=420 Voltage=1.353515  
Reading=402 Voltage=1.295508  
Reading=396 Voltage=1.276172  
Reading=307 Voltage=1.279395  
Reading=902 Voltage=2.906836  
^CTraceback (most recent call last):  
  File "/home/pi/Downloads/adc_test.py", line 16, in <module>  
    time.sleep(1)  
KeyboardInterrupt  
pi@raspberrypi: ~
```

#8 Measuring temperature with an ADC

