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CSC 299

4/26/18

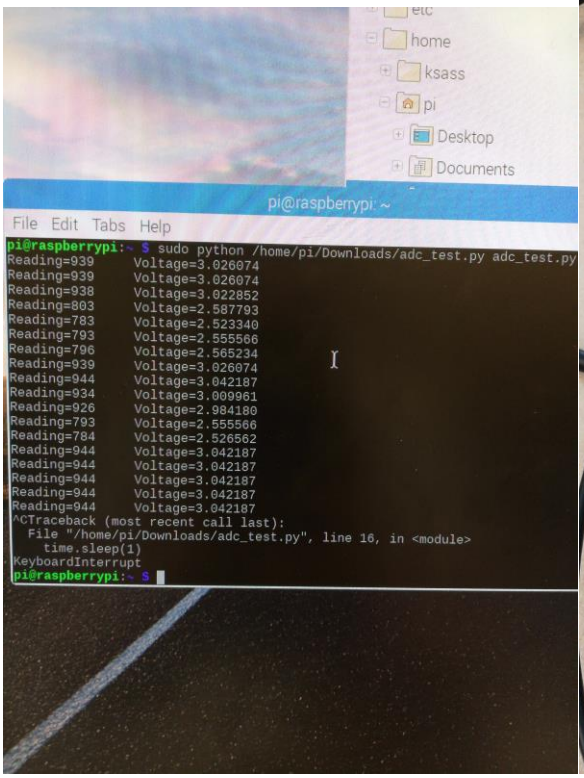
Lab 5

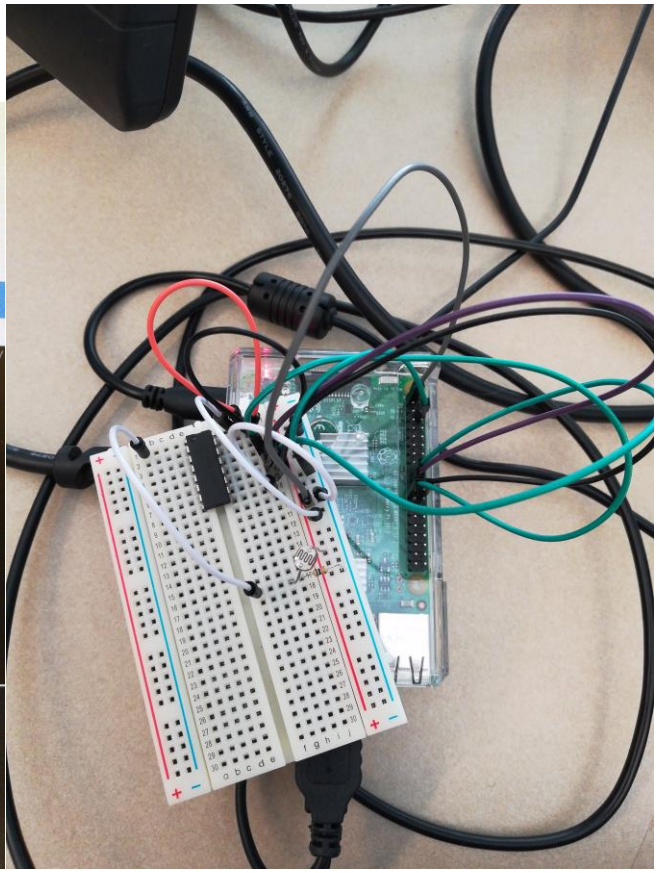
In this lab, we first learned how to secure our Raspberry Pi and prevent it from getting hacked through SSH by reconfiguring some settings. Next, we retried doing #3 and #4 from last week: Using Resistive Sensors with an ADC, and Measuring Temperature with an ADC, and we actually got them to work this time. After that, we learned how to measure distance using an ultrasonic rangefinder, a 270 ohm resistor, and a 470 ohm resistor, and using a voltage divider to lower the voltage from 5V to 3.2V. The rangefinder worked by sending out a pulse of ultrasound from one speaker, and the other listened for the echo, and dividing the time it took by 0.0000058. Next, we learned how to display the rangefinder sensor values to the screen by creating a GUI with python code. After that, we learned how to display messages on our alphanumeric LCD display using I2C and a level converter to bring down the 5V to 3.3V. We then combined the rangefinder code with the LCD code, edited some parts, and got the LCD to display what we wanted. Finally, we wrote a simple web server in Python and were able to control GPIO outputs using a web interface to turn on 3 LED's. We also were able to display our Pi's CPU Temperature on the web page after implementing some HTML and JavaScript files.

We had trouble figuring out how to connect the level converter for exercise 7. We looked up how the breadboard looks on the inside to better understand the flow of electricity in the breadboard. We also looked up how level converters work and figured out how to connect them. With some help from our fellow students in the lab who finished this part already, we put the

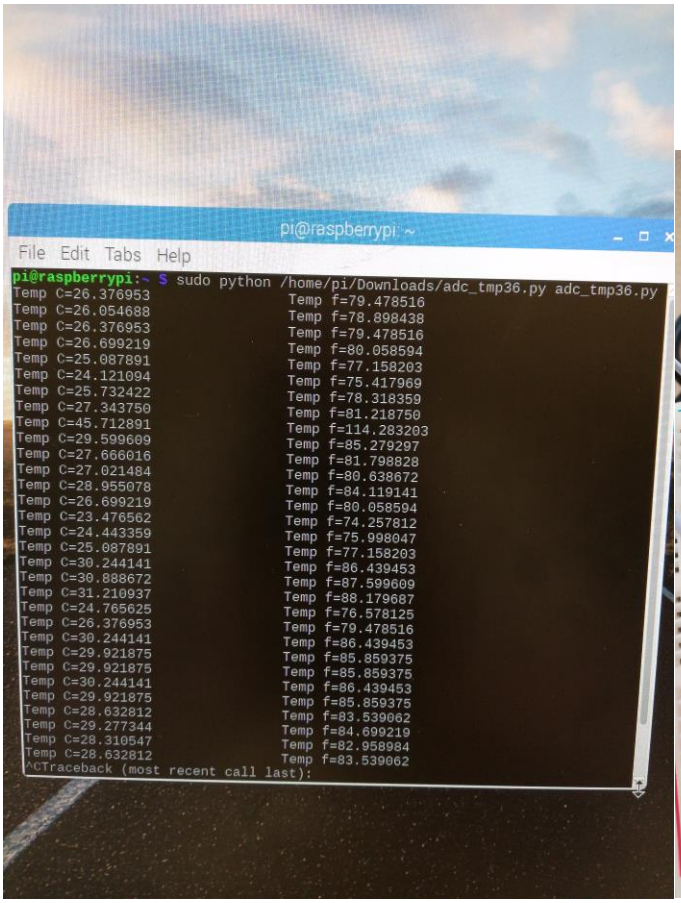
pieces together and got the circuit working. For exercise 8, we had trouble getting the code to work properly. Upon further inspection of the code provided, we found out that the code on the website did not match the code written in the book. Once we fixed the difference, the program worked.

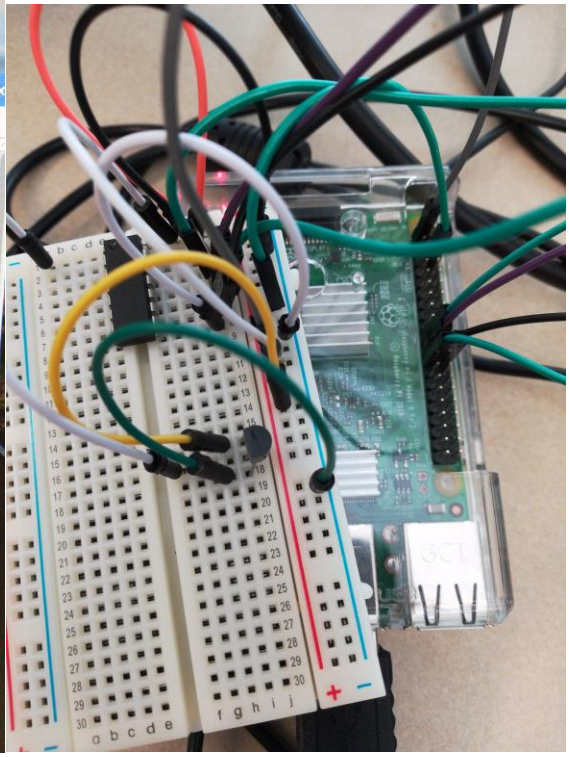
#3.



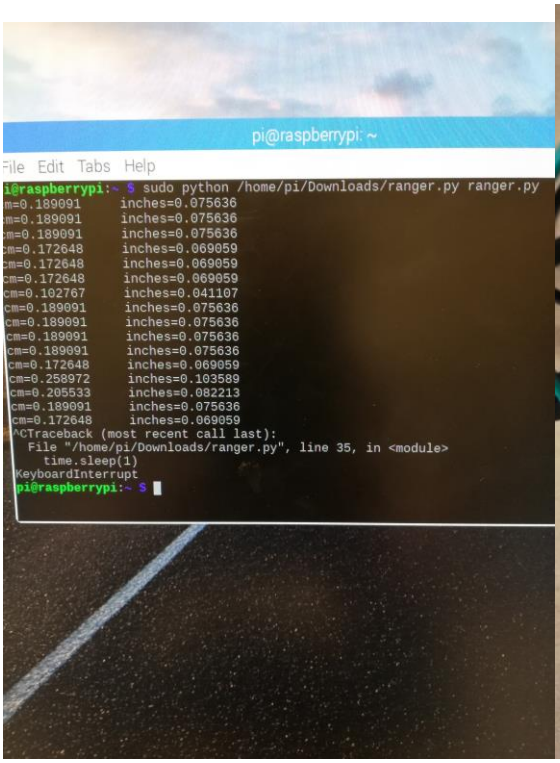


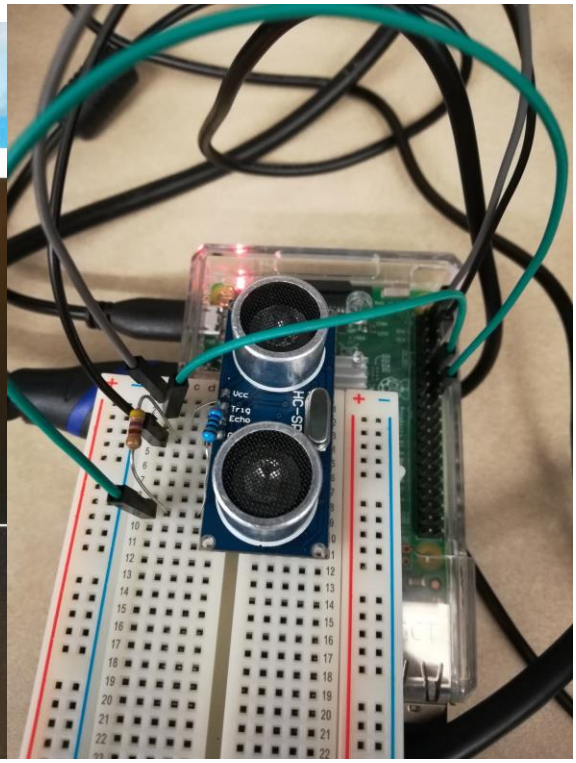
#4.


pi@raspberrypi: ~
File Edit Tabs Help
pi@raspberrypi:~ $ sudo python /home/pi/Downloads/adc_tmp36.py adc_tmp36.py
Temp C=26.376953 Temp f=79.478516
Temp C=26.054688 Temp f=78.898438
Temp C=26.376953 Temp f=79.478516
Temp C=26.699219 Temp f=80.058594
Temp C=25.087891 Temp f=77.158203
Temp C=24.121094 Temp f=75.417969
Temp C=25.732422 Temp f=78.318359
Temp C=27.343750 Temp f=81.218750
Temp C=45.712891 Temp f=114.283203
Temp C=29.599609 Temp f=85.279297
Temp C=27.666016 Temp f=81.798828
Temp C=27.021484 Temp f=80.638672
Temp C=28.955078 Temp f=84.119141
Temp C=26.699219 Temp f=80.058594
Temp C=23.476562 Temp f=74.257812
Temp C=24.443359 Temp f=75.998047
Temp C=25.087891 Temp f=77.158203
Temp C=30.244141 Temp f=86.439453
Temp C=30.888672 Temp f=87.599609
Temp C=31.210937 Temp f=88.179687
Temp C=24.765625 Temp f=76.578125
Temp C=26.376953 Temp f=79.478516
Temp C=30.244141 Temp f=86.439453
Temp C=29.921875 Temp f=85.859375
Temp C=29.921875 Temp f=85.859375
Temp C=30.244141 Temp f=86.439453
Temp C=29.921875 Temp f=85.859375
Temp C=28.632812 Temp f=83.539062
Temp C=29.277344 Temp f=84.699219
Temp C=28.310547 Temp f=82.958984
Temp C=28.632812 Temp f=83.539062
^CTraceback (most recent call last):

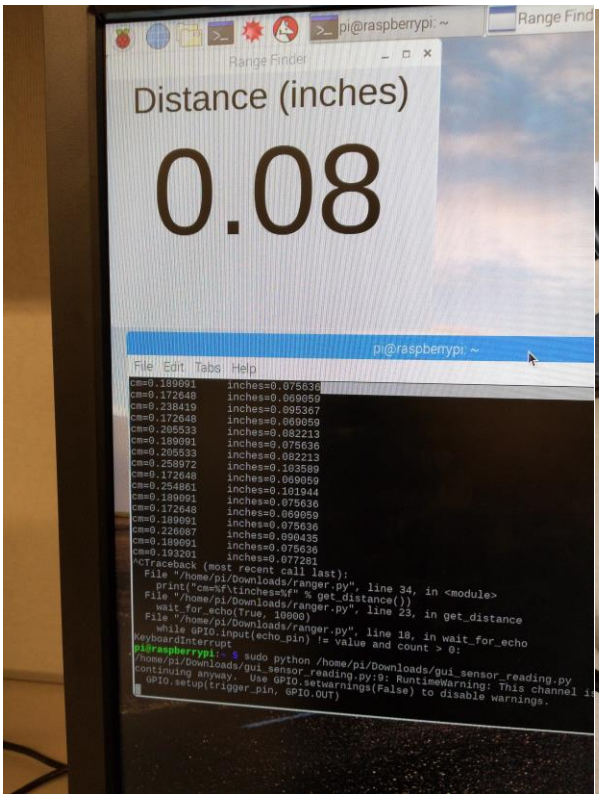


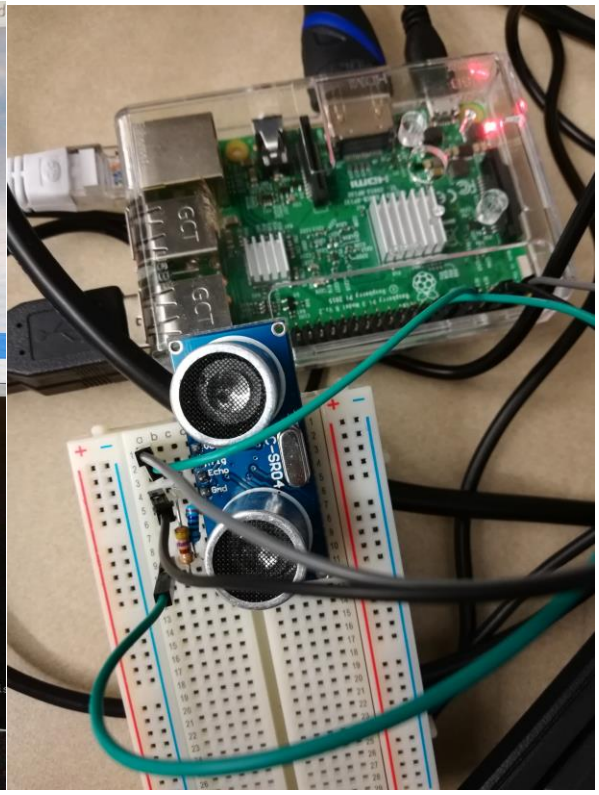
#5.


pi@raspberrypi: ~
File Edit Tabs Help
i@raspberrypi:~ $ sudo python /home/pi/Downloads/ranger.py ranger.py
m=0.189091 inches=0.075636
m=0.189091 inches=0.075636
m=0.189091 inches=0.075636
m=0.172648 inches=0.069059
m=0.172648 inches=0.069059
m=0.172648 inches=0.069059
m=0.102767 inches=0.041107
m=0.189091 inches=0.075636
m=0.189091 inches=0.075636
m=0.189091 inches=0.075636
m=0.189091 inches=0.075636
m=0.172648 inches=0.069059
m=0.258972 inches=0.103589
m=0.205533 inches=0.082213
m=0.189091 inches=0.075636
m=0.172648 inches=0.069059
^CTraceback (most recent call last):
File "/home/pi/Downloads/ranger.py", line 35, in <module>
time.sleep(1)
KeyboardInterrupt
pi@raspberrypi:~ $

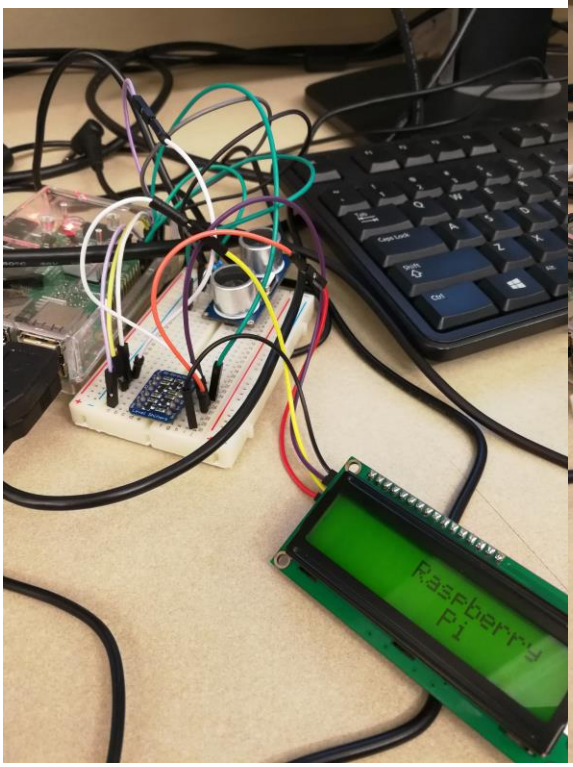


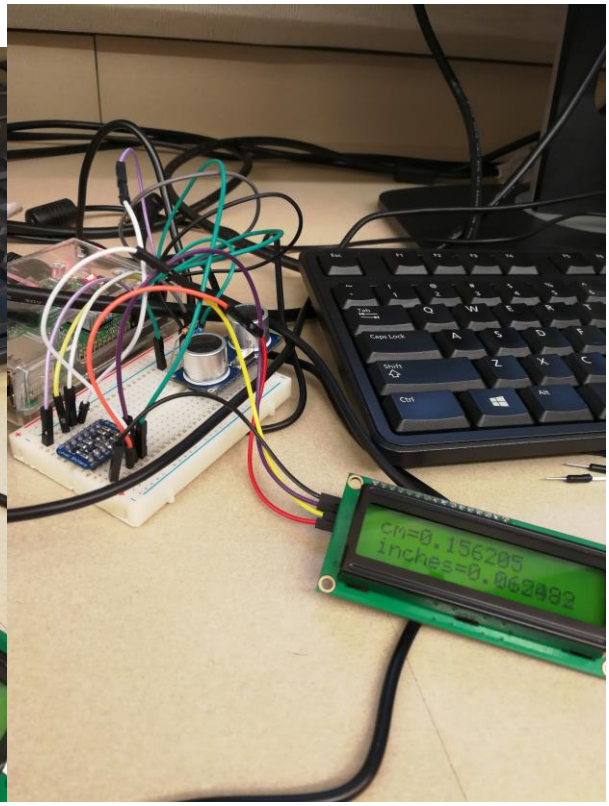
#6.

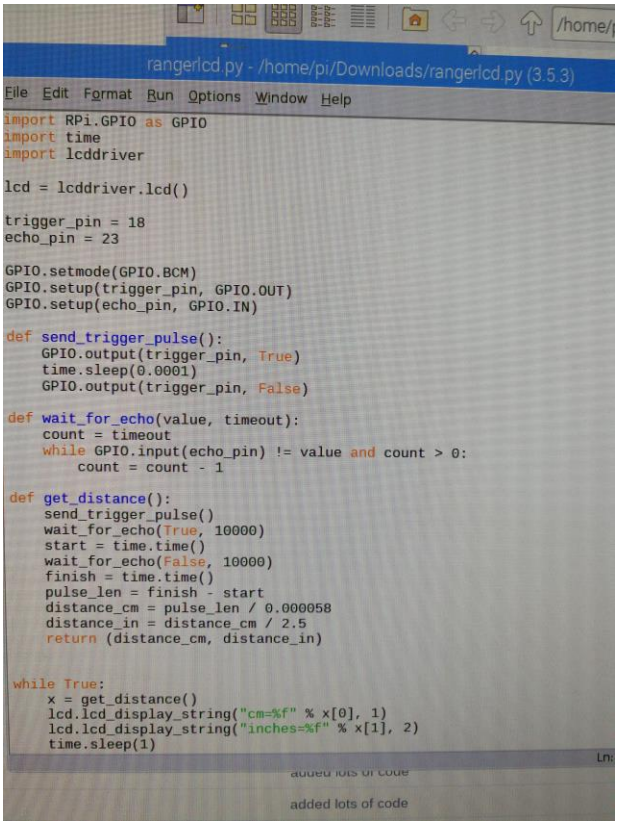

Range Finder
Distance (inches)
0.08
pi@raspberrypi: ~
File Edit Tabs Help



#7.







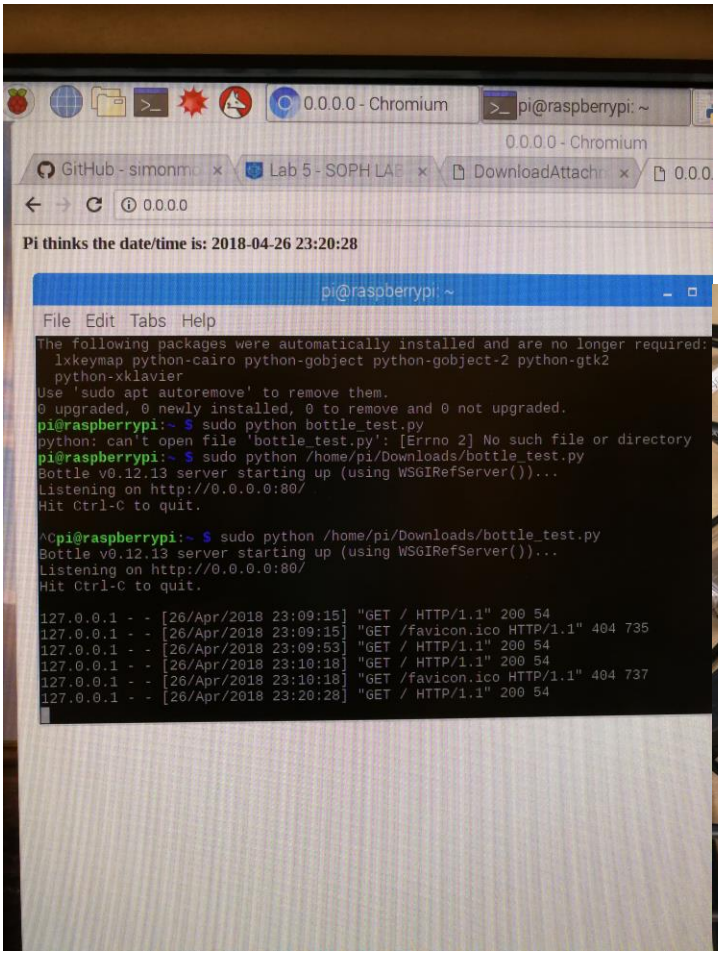
rangerlcd.py - /home/pi/Downloads/rangerlcd.py (3.5.3)

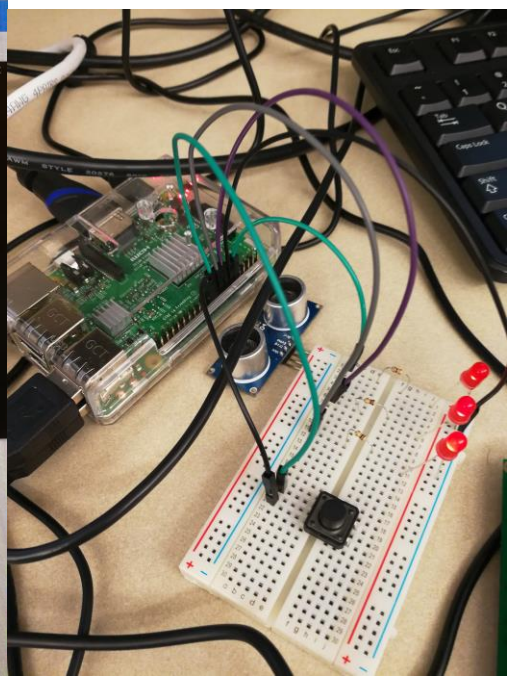
File Edit Format Run Options Window Help

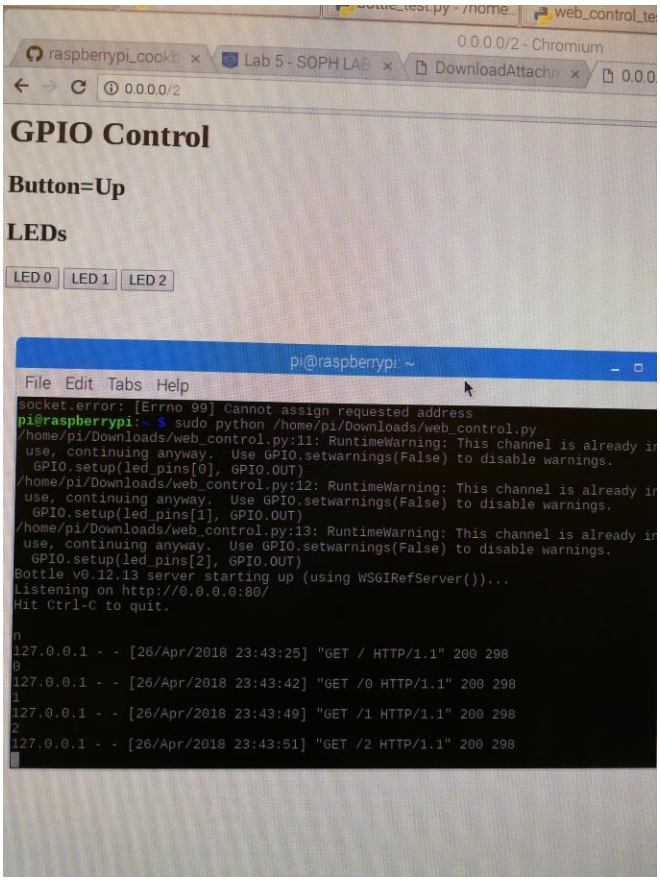
```
import RPi.GPIO as GPIO
import time
import lcddriver

lcd = lcddriver.lcd()

trigger_pin = 18
echo_pin = 23

GPIO.setmode(GPIO.BCM)
GPIO.setup(trigger_pin, GPIO.OUT)
GPIO.setup(echo_pin, GPIO.IN)

def send_trigger_pulse():
    GPIO.output(trigger_pin, True)
    time.sleep(0.0001)
    GPIO.output(trigger_pin, False)

def wait_for_echo(value, timeout):
    count = timeout
    while GPIO.input(echo_pin) != value and count > 0:
        count = count - 1

def get_distance():
    send_trigger_pulse()
    wait_for_echo(True, 10000)
    start = time.time()
    wait_for_echo(False, 10000)
    finish = time.time()
    pulse_len = finish - start
    distance_cm = pulse_len / 0.000058
    distance_in = distance_cm / 2.5
    return (distance_cm, distance_in)


while True:
    x = get_distance()
    lcd.lcd_display_string("cm=%f" % x[0], 1)
    lcd.lcd_display_string("inches=%f" % x[1], 2)
    time.sleep(1)
```

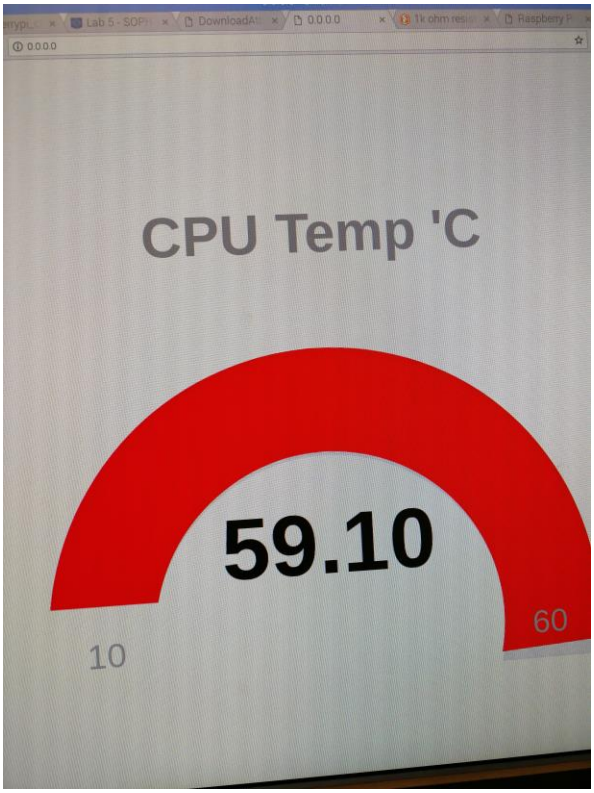
added lots of code

#8.


0.0.0.0 - Chromium
pi@raspberrypi: ~
0.0.0.0 - Chromium
GitHub - simonm
Lab 5 - SOPH LAB
DownloadAttachm
0.0.0.0
Pi thinks the date/time is: 2018-04-26 23:20:28
pi@raspberrypi: ~
File Edit Tabs Help
The following packages were automatically installed and are no longer required:
lxkeymap python-cairo python-gobject python-gobject-2 python-gtk2
python-xklavier
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
pi@raspberrypi:~ $ sudo python bottle_test.py
python: can't open file 'bottle_test.py': [Errno 2] No such file or directory
pi@raspberrypi:~ $ sudo python /home/pi/Downloads/bottle_test.py
Bottle v0.12.13 server starting up (using WSGIRefServer())...
Listening on http://0.0.0.0:80/
Hit Ctrl-C to quit.
^Cpi@raspberrypi:~ $ sudo python /home/pi/Downloads/bottle_test.py
Bottle v0.12.13 server starting up (using WSGIRefServer())...
Listening on http://0.0.0.0:80/
Hit Ctrl-C to quit.
127.0.0.1 - - [26/Apr/2018 23:09:15] "GET / HTTP/1.1" 200 54
127.0.0.1 - - [26/Apr/2018 23:09:15] "GET /favicon.ico HTTP/1.1" 404 735
127.0.0.1 - - [26/Apr/2018 23:09:53] "GET / HTTP/1.1" 200 54
127.0.0.1 - - [26/Apr/2018 23:10:18] "GET / HTTP/1.1" 200 54
127.0.0.1 - - [26/Apr/2018 23:10:18] "GET /favicon.ico HTTP/1.1" 404 737
127.0.0.1 - - [26/Apr/2018 23:20:28] "GET / HTTP/1.1" 200 54




0.0.0.0/2 - Chromium
0.0.0.0/2
GPIO Control
Button=Up
LEDs
LED 0
LED 1
LED 2
pi@raspberrypi: ~
File Edit Tabs Help
socket.error: [Errno 99] Cannot assign requested address
pi@raspberrypi:~ $ sudo python /home/pi/Downloads/web_control.py
/home/pi/Downloads/web_control.py:11: RuntimeWarning: This channel is already in use, continuing anyway. Use GPIO.setwarnings(False) to disable warnings.
GPIO.setup(led_pins[0], GPIO.OUT)
/home/pi/Downloads/web_control.py:12: RuntimeWarning: This channel is already in use, continuing anyway. Use GPIO.setwarnings(False) to disable warnings.
GPIO.setup(led_pins[1], GPIO.OUT)
/home/pi/Downloads/web_control.py:13: RuntimeWarning: This channel is already in use, continuing anyway. Use GPIO.setwarnings(False) to disable warnings.
GPIO.setup(led_pins[2], GPIO.OUT)
Bottle v0.12.13 server starting up (using WSGIRefServer())...
Listening on http://0.0.0.0:80/
Hit Ctrl-C to quit.
n
127.0.0.1 - - [26/Apr/2018 23:43:25] "GET / HTTP/1.1" 200 298
0
127.0.0.1 - - [26/Apr/2018 23:43:42] "GET /0 HTTP/1.1" 200 298
1
127.0.0.1 - - [26/Apr/2018 23:43:49] "GET /1 HTTP/1.1" 200 298
2
127.0.0.1 - - [26/Apr/2018 23:43:51] "GET /2 HTTP/1.1" 200 298


CPU Temp 'C
59.10
10
60