

Lesson Plan for Digital Geographies Meeting #2

Go back over everything

- Connect to Pi
 - `ssh [username]@[target_machine]`. In our case, this was `ssh pi@[pi_network_address]`. If that's gibberish to you, great! We'll go back over it next time.
- A few CLI things
 - `ls`
 - `cd`
 - `cp`
 - `mv`
 - `touch`
 - `nano`
 - `cat`
 - `sudo`
 - tab completion
 - history
 - * up arrow
 - * `ctrl r`
 - relative paths
 - * `~`
 - * `.`
 - * `..`
- a few Python things
 - variables
 - print
 - * `print ("text to print")`
 - input
 - * `[variable] = input("text to print")`

New Material

Lighting an LED

- hook up LED to breadboard and test
 - need:
 - * breadboard
 - * f-m jumper wires
 - * 1 RGB LED
 - * 1 470ohm resistor
 - explain rails on breadboard
 - long leg is -
 - plug in LED, bending legs so that each leg is on a different rail
 - plug in 470ohm resist to long leg and an unused short rail
 - use red or orange wire to connect another one of the legs to 5v pin
 - use dark wire to connect - leg to resistor
 - use same color to connect other end of resistor to GND pin in RPi
- explain GPIO numbering
- change LED to GPIO18
 - unplug red/orange wire from 5v pin and move to GPIO18
- open Python shell (`python3`)
 - Explain libraries
 - * `import RPi.GPIO`
 - set GPIO mode to broadcom so that we can refer to pins by their designation
 - * `GPIO.setmode(GPIO.BCM)`
 - set up pin as an output pin
 - * `GPIO.setup(18, GPIO.OUT)`

- turn on LED
 - * GPIO.output(18, True)
- turn it back off
 - * GPIO.output(18, False)
- let's automate this a bit more
 - make a new file called LED.py
 - add all of the previous code:
 - * import RPi.GPIO as GPIO
 - * GPIO.setmode(GPIO.BCM)
 - * GPIO.setup(18, GPIO.OUT)
 - * GPIO.output(14, True)
 - * GPIO.output(14, False)
 - we need to add more functionality
 - * import time
 - * time.sleep(1.5)
 - while loops
 - * while True:
 - * don't forget intent
 - talk about if, elif, and else

```
import RPi.GPIO as GPIO
import time

GPIO.setmode(GPIO.BCM)

GPIO.setup(14, GPIO.OUT)
GPIO.setup(15, GPIO.OUT)
GPIO.setup(18, GPIO.OUT)

while True:

    GPIO.output(14, True)
    time.sleep(0.5)
    GPIO.output(14, False)
    GPIO.output(15, True)
    time.sleep(0.5)
    GPIO.output(15, False)
    GPIO.output(18, True)
    time.sleep(0.5)
    GPIO.output(18, False)

GPIO.cleanup()
```

DHT Temp and Hum sensor

```
import RPi.GPIO as GPIO
import Adafruit_DHT
import time

sensor = Adafruit_DHT.AM2302
sensor_pin = 23

GPIO.setmode(GPIO.BCM)
```

```
GPIO.setup(23, GPIO.OUT)
```

```
while True:
```

```
    humidity, temperature = Adafruit_DHT.read_retry(sensor, sensor_pin)
    print('Temp: {0:0.1f} C Humidity: {1:0.1f} %'.format(temperature, humidity))
    time.sleep(2)
```

```
GPIO.cleanup()
```

Motion Sensor

- Wire up the motion sensor.
 - out to any GPIO (I used 14)
 - GND to ground
 - + to 5v
 - look under the white lens for pinouts
- turn both pots all the way counter-clockwise. The one on the left is the length of the signal sent (range is about 2.5sec counterclockwise to about 250 seconds clockwise).

```
from gpiozero import MotionSensor
```

```
pir = MotionSensor(14)
```

```
while True:
```

```
    pir.wait_for_motion()
    print("You moved")
    time.sleep(2.5)
    pir.wait_for_no_motion()
    print("Very still.")
    time.sleep(2.5)
```