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MECH 100 INTRODUCTION TO MECHANICAL ENGINEERING
Spring 2018
Homework 14
Raspberry Pi Assignment

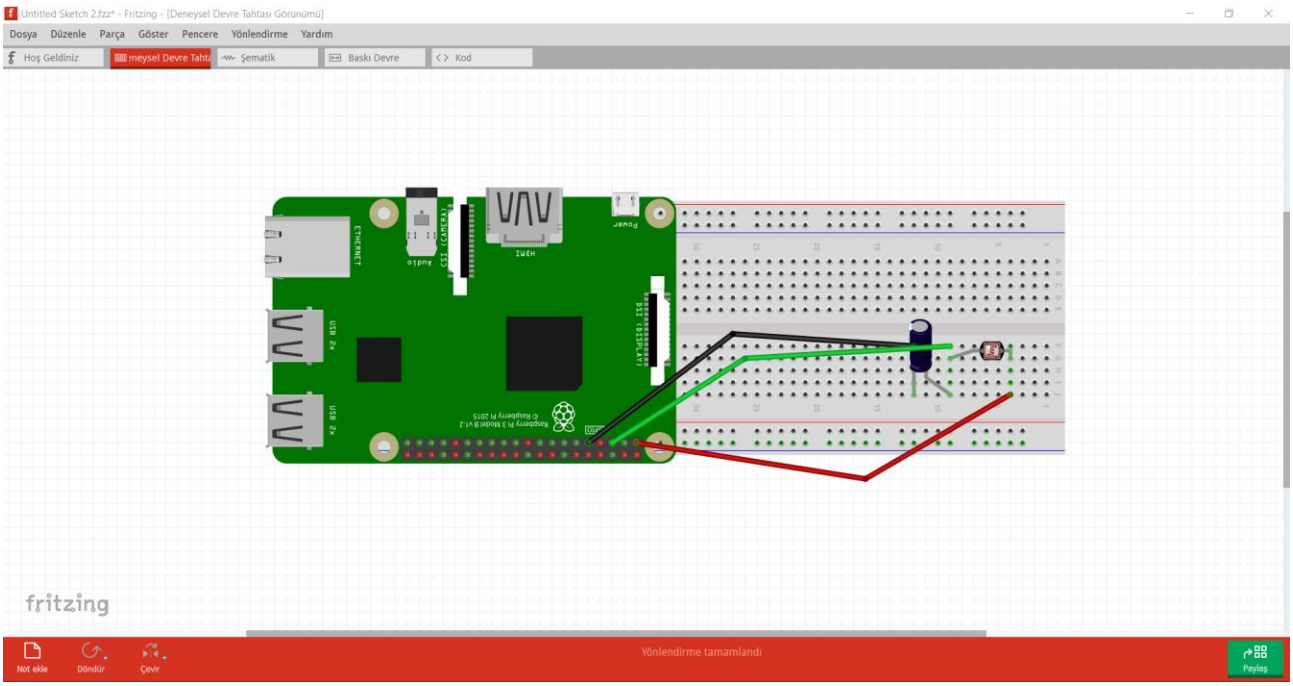
In this assignment, we decide to measurement light density with LDR and Raspberry Pi 3. We use one LDR, 1 microfarad capacitor and jumper cable.

(LDR)1

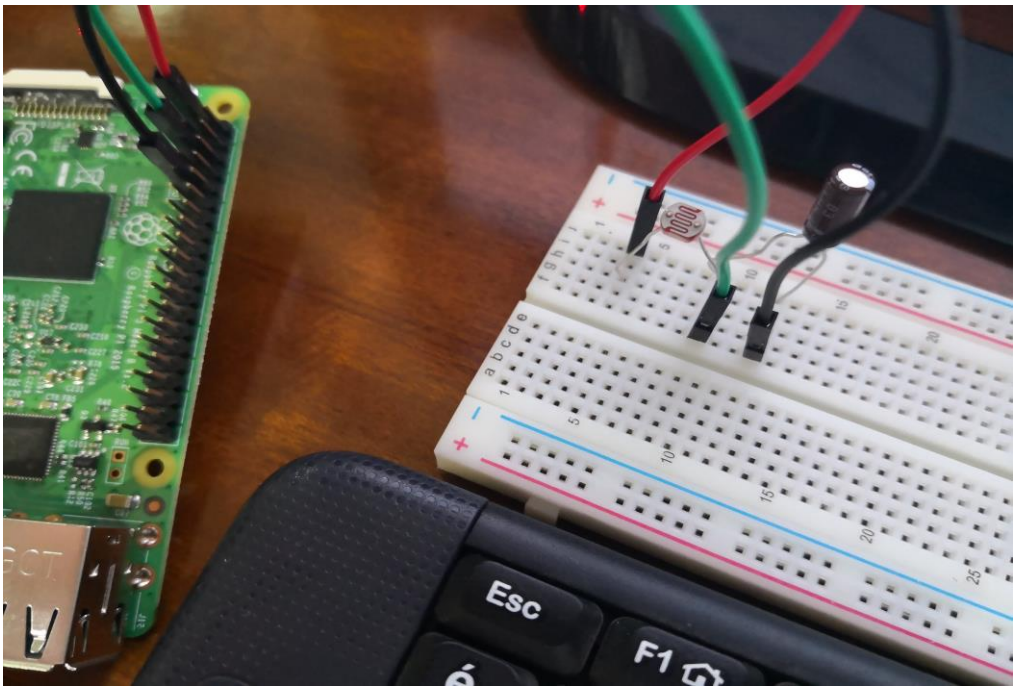
(1 microfarad capacitor)2

LDR is called photocell in daily life. LDR is a circuit element used to measure light density that has two points. The resistance between the two ends changes according to the amount of light falling on it.

LDR is working if it is connected analog enter. However, Raspberry Pi does not have analog enter,so we use a capacitor and setup a RC circuit to work the LDR. RC circuit means a circuit includes capacitor and resistor.



(Model of our RC circuit with Raspberry Pi on Fritzing)



(Real circuit)

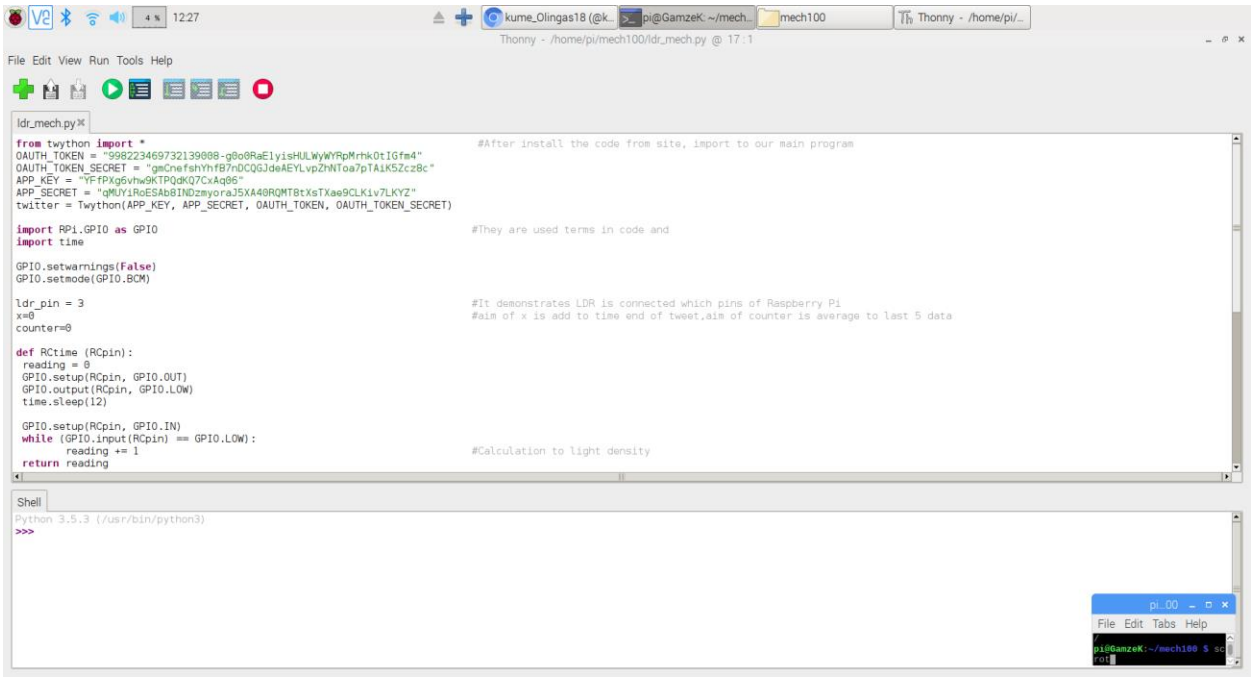
The task of the capacitors is to keep the charge. The current passing through the circuit charges the capacitor and causes the voltage to rise. Resistance reduces the current to the capacitor and get longer the charging time. There is a direct relationship between charging time and resistance. Since the resistance of LDR is connected to the direct light, the charging time of

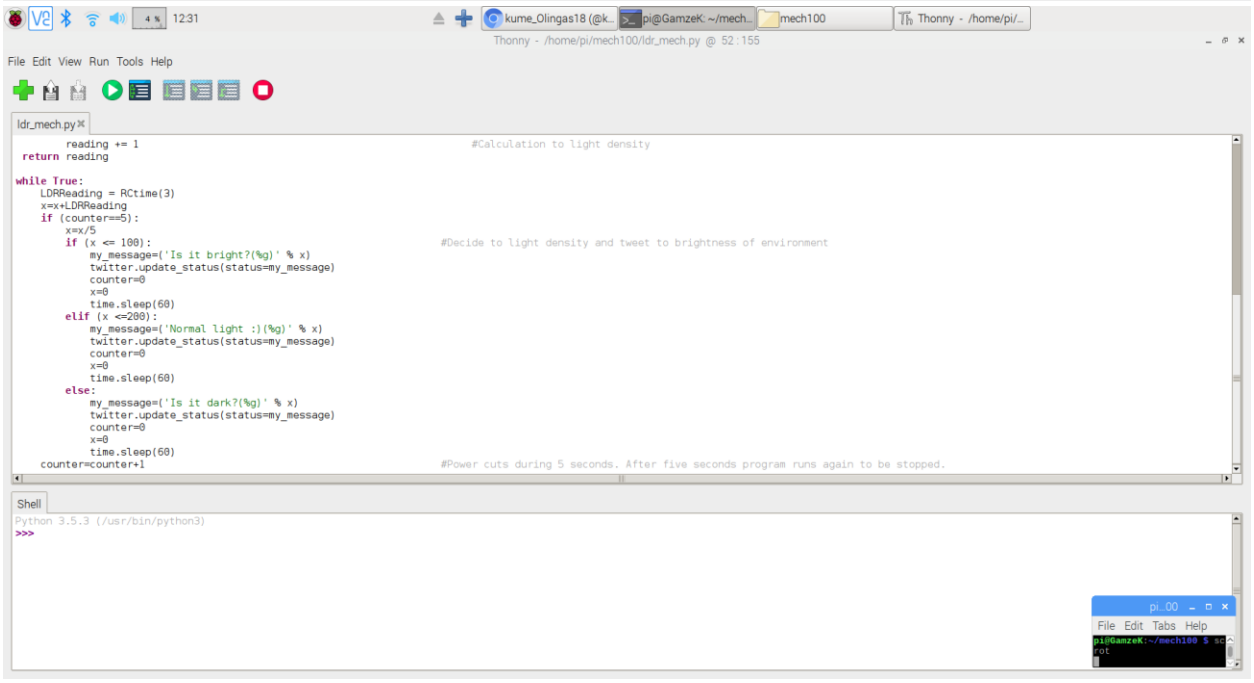
the capacitor is determined by the environment light. When the capacitor is charged to 1.8V, Raspberry Pi will perceive it as logical 1 and GPIO pin logical 1 level will tell us the light level. In our project, x and LDRReading variables in our code demonstrate the time. After the decide charging time of capacitor, it decide environment brightness. If time is smaller or equal than 100 seconds, it tweets 'Is it bright?'. If the time is greater than 100 but smaller than 200 seconds, it tweets 'Normal light :)'. If the time is greater or equal to 200 seconds, it tweets 'Is it dark?'. Additionally, each parts tweet to charging time.

Our code basically measures the time from the GPIO3 pin to the logical 1. As the amount of light on the LDR increases, the resistance will decrease and the capacitor will charge faster, resulting in a shorter time measurement. After the measurement, Raspberry Pi sends averaged data via Twitter 1 minute for LDR. Data refreshes every 12 seconds. Raspberry Pi gets average of last 5 data and tweet it with installed Twython3. Twython helps us to tweet our data automatically. We enter our keys and access tokens of our Twitter account. Our Twitter account link is https://twitter.com/kume_Olingas18 . Our code and its screenshots is below:

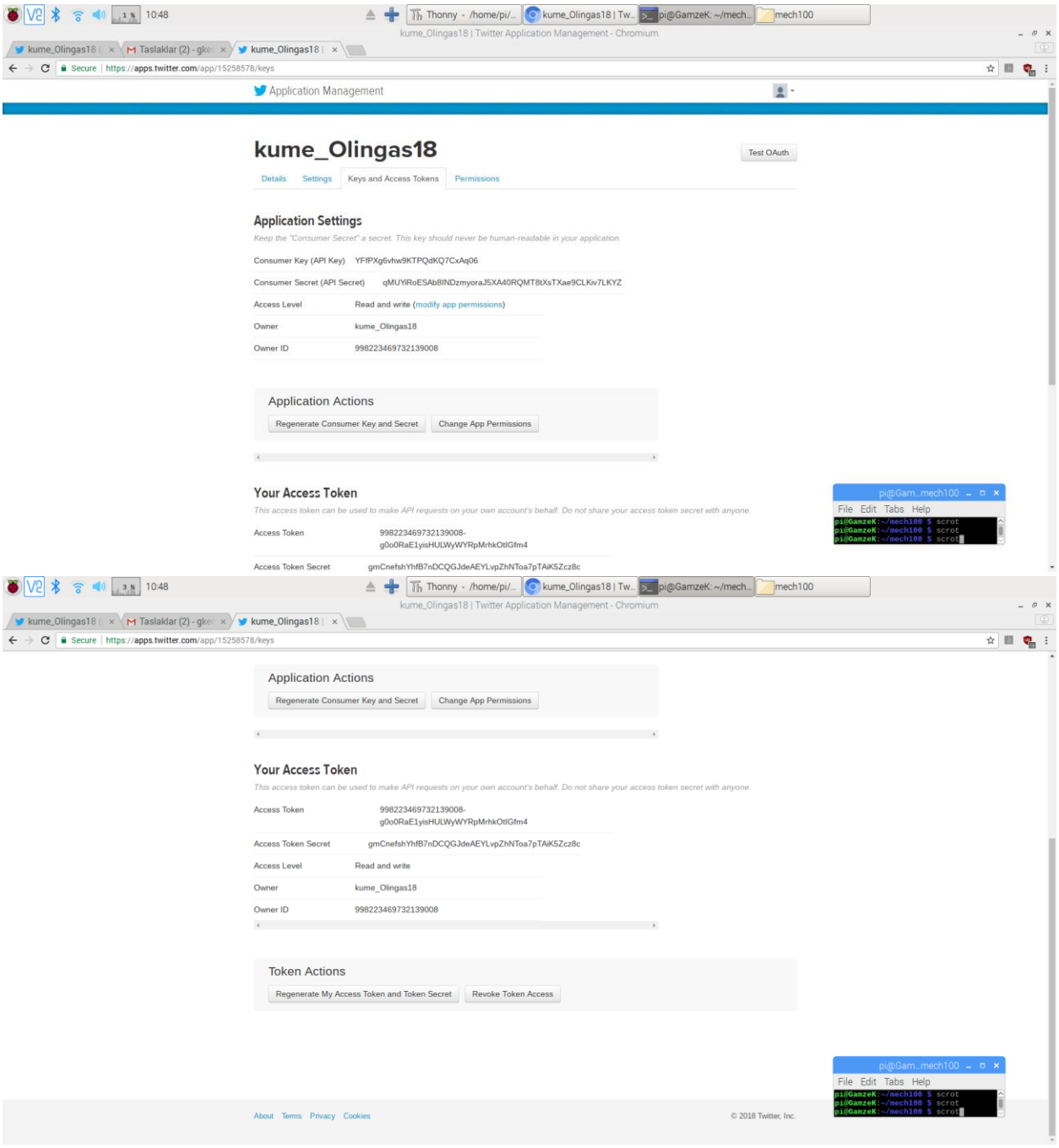
```
        from twython import *                                   #After install the code from site,
import to our main program
        OAUTH_TOKEN = "998223469732139008-g0o0RaE1yisHULWyWYRpMrhkOtIGfm4"
        OAUTH_TOKEN_SECRET =
"gmCnefshYhfB7nDCQGJdeAEYLvpZhNToa7pTAiK5Zcz8c"
        APP_KEY = "YFfPXg6vhw9KTPQdKQ7CxAq06"
        APP_SECRET = "qMUYiRoESAb8INDzmyoraJ5XA40RQMT8tXsTXae9CLKiv7LKYZ"
        twitter = Twython(APP_KEY, APP_SECRET, OAUTH_TOKEN,
OAUTH_TOKEN_SECRET)

        import RPi.GPIO as GPIO                                 #They are used terms in code
and
        import time

        GPIO.setwarnings(False)
        GPIO.setmode(GPIO.BCM)

        ldr_pin = 3                                             #It demonstrates LDR is connected
which pins of Raspberry Pi
        x=0                                                     #aim of x is add to time end of tweet,aim
of counter is average to last 5 data
        counter=0

        def RCtime (RCpin):
         reading = 0
         GPIO.setup(RCpin, GPIO.OUT)
         GPIO.output(RCpin, GPIO.LOW)
```

```
        time.sleep(12)

        GPIO.setup(RCpin, GPIO.IN)
        while (GPIO.input(RCpin) == GPIO.LOW):
                reading += 1                                    #Calculation to light density
        return reading

       while True:
          LDRReading = RCtime(3)
          x=x+LDRReading
          if (counter==5):
             x=x/5
             if (x <= 100):                                     #Decide to light density and tweet to
brightness of environment
                my_message=('Is it bright?(%g)' % x)
                twitter.update_status(status=my_message)
                counter=0
                x=0
                time.sleep(60)
             elif (x <=200):
                my_message=('Normal light :)(%g)' % x)
                twitter.update_status(status=my_message)
                counter=0
                x=0
                time.sleep(60)
             else:
                my_message=('Is it dark?(%g)' % x)
                twitter.update_status(status=my_message)
                counter=0
                x=0
                time.sleep(60)
          counter=counter+1                                     #Power cuts during 5 seconds. After
five seconds program runs again to be stopped.
```





(Our code screenshots)



(Our tweet account information)

Reference

1. https://www.cytron.io/p-sn-ldr-s
2. https://www.robomart.com/01-microfarad-50v-electrolytic-capacitor
3. https://twython.readthedocs.io/en/latest/usage/install.html
4. http://maker.robotistan.com/etiket/raspberry-pi-dersleri/