**EXO14V21: A SMART CANE NAVIGATOR DEVICE FOR VISUALLY IMPAIRED**

**DEVELOPERS:**

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**INTRODUCTION**

The idea of this project is based on a well-known biblical story in which an obedient servant of God named “Moses”, parting the Red Sea to escape the pursuing Egyptian army. The power of God revealed across the world through Moses and through the help of empowered cane that God has given to him.

In our project we plan to develop a Smart Cane Navigator Device which can possible help people who are visually impaired. The possible sensors that we may use are the following including PIR Motion Sensor, HC-SR04 Ultrasonic Sensor and Light Sensor. With the motion sensor it detects movements, nearby people and objects. Ultrasonic sensors can detect the distance between a variety of objects, independent of their shape, color, or texture. They may also determine if an item is coming or retreating. And the last sensor is Light Sensor, which tells if it is dark or bright in a place.

The objective of this project is to create a smart blind stick that is equipped with a variety of sensors and buzzers. Smart stick that generates a buzzing sound when it identifies objects or walls from a distance of one or half meter. A blind person can use this Smart Stick to detect the presence of a barrier or a wall in front. The individual will then be alerted to an upcoming obstruction or barrier using PIR Motion Sensor. The light sensor will send notification to the user about the current light status of the location.

**ORANGEPI - TOOLS & ACCOUNTS REGISTERED**

**#***Username and password are depends on your configuration – below are only example of my configuration.*

**PUTTY**

Username: **mark006**

Password: **1234567890**

**VNC SERVER**

Password**: 1234567890**

**MYSQL DATABASE**

Username**: phpmyadmin**

Password: **1234567890**

**COMMANDS**

**How to run the project:**

Step 1 - Open 3 terminal emulator

Step 2 - Run the 3 program in different terminal using this command:

$ sudo python3 DISTANCE.py

$ sudo python3 PIR.py

$ sudo python3 LIGHT.py

Step 3 - Activate the virtual environment & run the server

$ cd sudo su

password:$ 1234567890

$ cd PROJECT-DJANGO/pyenv/

$ source venv/bin/activate

$ cd project

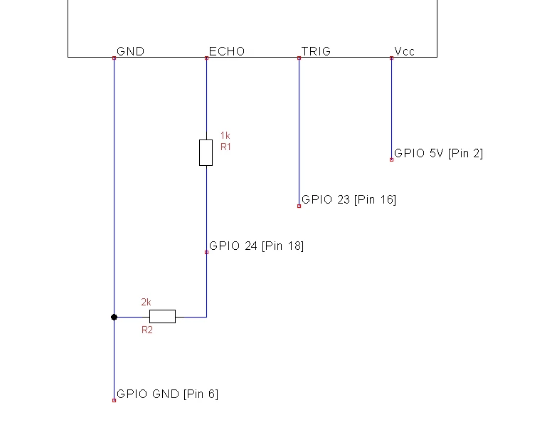
$ python3 manage.py runserver

Step 4 - Browse the Project App using Web Browser

127.0.0.1:8000

**SCHEMATIC DIAGRAM**

**ULTRASONIC SENSOR (HC-SR04) Interfacing Orangepi**



GPIO GND [Pin 39]

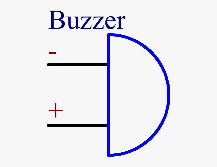
GPIO PC3 [Pin 24]

GPIO PA21 [Pin 26]

GPIO +5V [Pin 2]

GPIO GND [Pin 34]

GPIO PA12 [Pin 3]



**SOURCE CODE:**

# How to run this script:

# sudo python DISTANCE.py

from pyA20.gpio import gpio

from pyA20.gpio import port

import time

import MySQLdb as mdb

DBNAME = "dbname"

DBHOST = "localhost"

DBPASS = "1234567890"

DBUSER = "phpmyadmin"

#pins that will connect hc-sr04 to the orange pi pcb

TRIG = port.PA21

ECHO = port.PC3

BUZZER = port.PA12

gpio.init()

print("Distance Measurement In Progress")

gpio.setcfg(TRIG, gpio.OUTPUT)

gpio.setcfg(ECHO, gpio.INPUT)

gpio.setcfg(BUZZER, gpio.OUTPUT)

gpio.output(TRIG, 0)

print("Waiting For Sensor To Settle")

try:

while True:

time.sleep(1)

gpio.output(TRIG, 1)

time.sleep(0.00001)

gpio.output(TRIG, 0)

while gpio.input(ECHO) == 0:

pulse\_start = time.time()

while gpio.input(ECHO) == 1:

pulse\_end = time.time()

pulse\_duration = pulse\_end - pulse\_start

distance = pulse\_duration \* 17150

distance = round(distance, 2)

print("Distance: " + str(distance) + "cm")

db = mdb.connect(DBHOST, DBUSER, DBPASS, DBNAME)

cur = db.cursor()

#Execute sql command

updatequery = "UPDATE sensors\_tb SET DATA =" + str(distance) + " WHERE SENSOR\_NAME = 'DISTANCE'"

cur.execute(updatequery)

db.commit()

db.close()

if distance < 10:

gpio.output(BUZZER, gpio.HIGH)

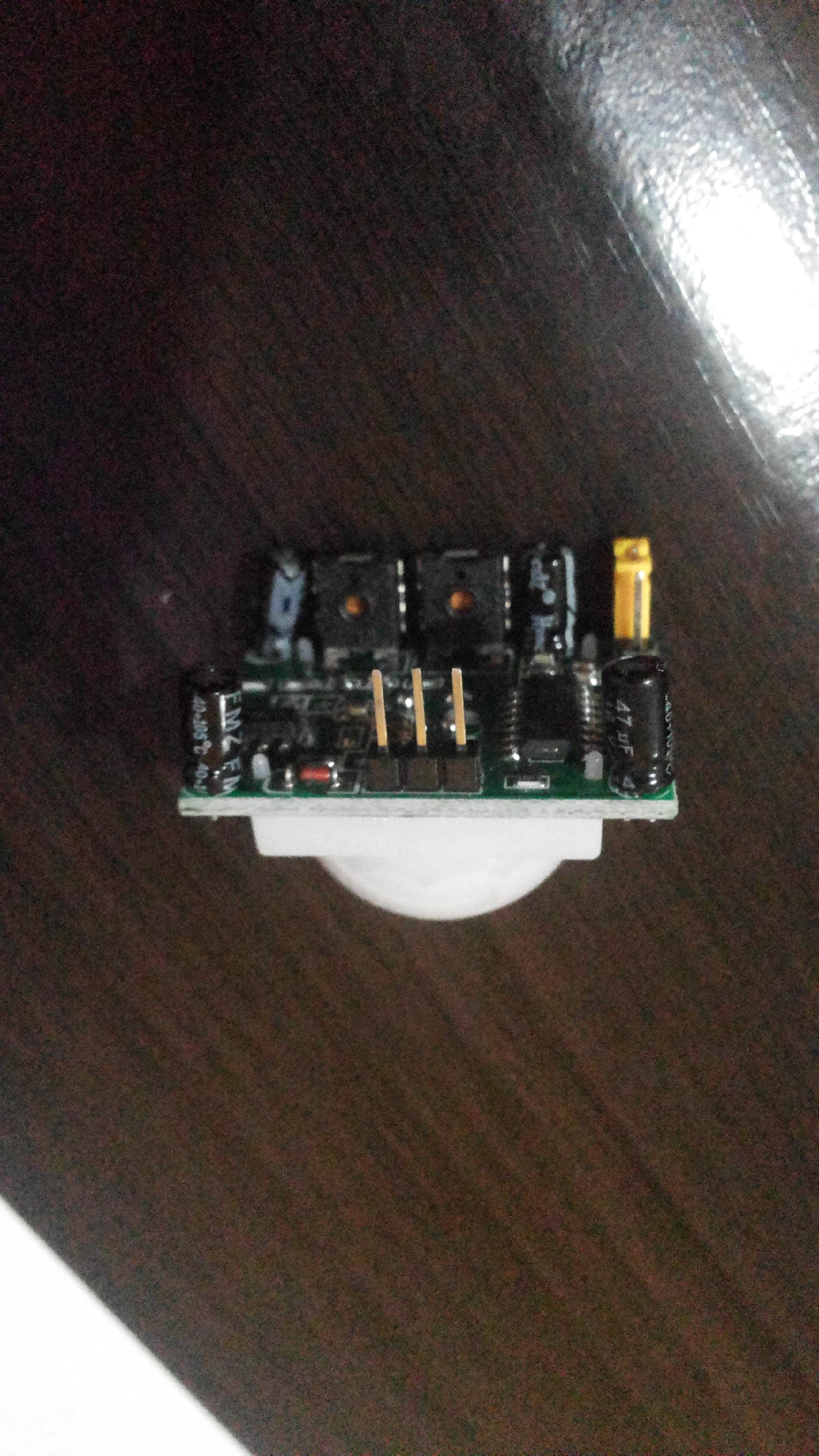
else:

gpio.output(BUZZER, gpio.LOW)

except KeyboardInterrupt:

gpio.output(BUZZER, gpio.LOW)

**MOTION SENSOR (PIR) Interfacing Orangepi**



R1 = 1k

Signal

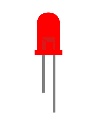
GND

GPIO PA11 [Pin 5]

GPIO GND [Pin 39]

GPIO PC2 [Pin 23]

GPIO +5V [Pin 2]



Power

**SOURCE CODE:**

# How to run this script:

# sudo python3 PIR.py

from pyA20.gpio import gpio

from pyA20.gpio import port

import time

import MySQLdb as mdb

DBNAME = "dbname"

DBHOST = "localhost"

DBPASS = "1234567890"

DBUSER = "phpmyadmin"

#pins that will connect PIR to the orange pi pcb

PIR = port.PC2

LED = port.PA11

gpio.init()

print("Detection In Progress")

gpio.setcfg(PIR, gpio.INPUT)

gpio.setcfg(LED, gpio.OUTPUT)

while True:

i=gpio.input(PIR)

if i==0:

status = "No intruders"

print(status, i)

gpio.output(LED, 0)

time.sleep(1)

elif i==1:

status = "Intruder detected!"

print(status, i)

gpio.output(LED, 1)

time.sleep(1)

db = mdb.connect(DBHOST, DBUSER, DBPASS, DBNAME)

cur = db.cursor()

#Execute sql command

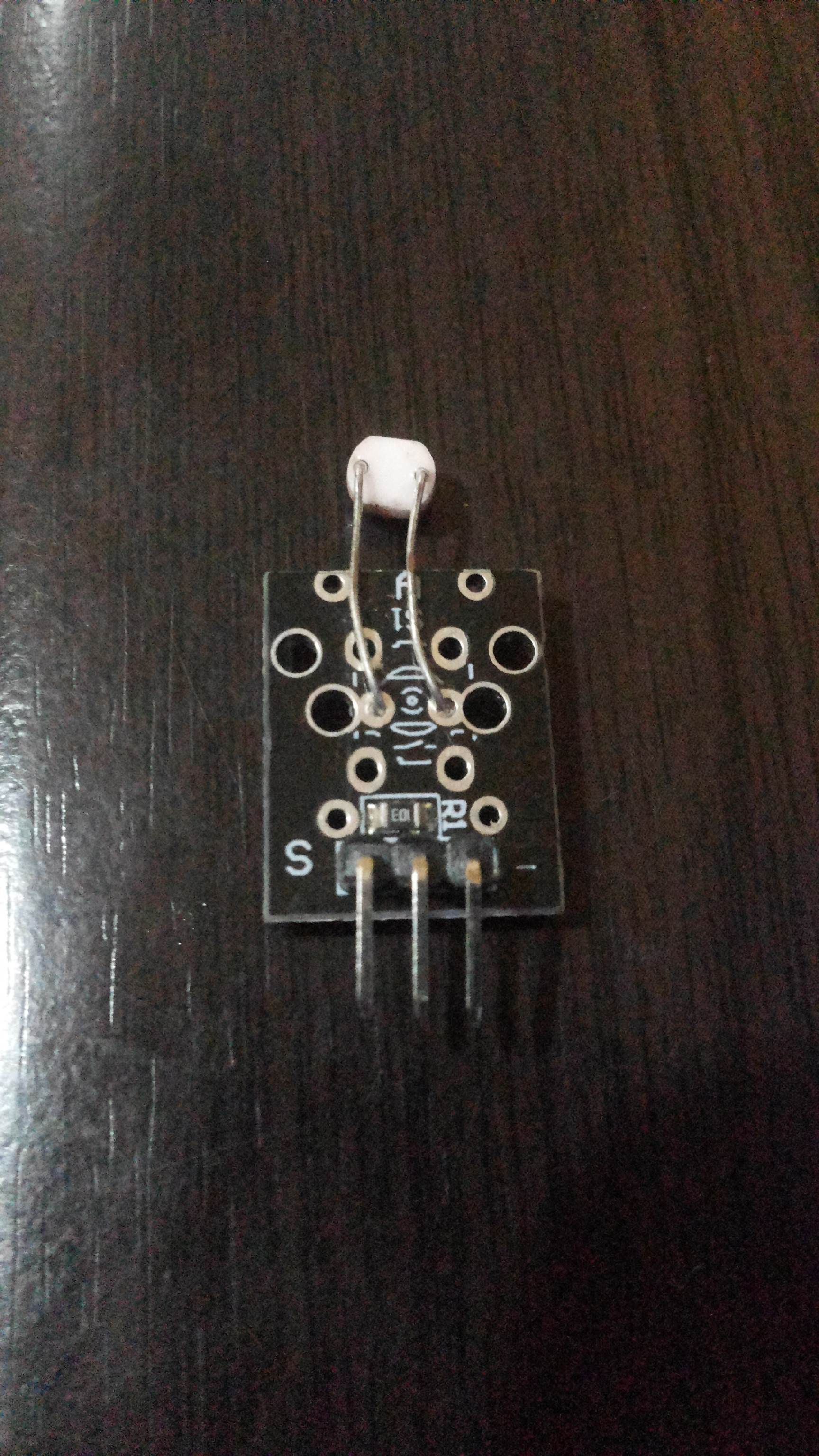
updatequery = "UPDATE sensors\_tb SET DATA='" + status + "' WHERE SENSOR\_NAME = 'MOTION'"

cur.execute(updatequery)

db.commit()

db.close()

**LIGHT SENSOR (LDR) INTERFACING ORANGEPI**



VCC

GND

GPIO GND [Pin 39]

GPIO +3.3v [Pin 1]

GPIO PC4 [Pin 16]

DIGITAL

**SOURCE CODE:**

# How to run this script:

# sudo python3 LIGHT.py

from pyA20.gpio import gpio

from pyA20.gpio import port

import time

import MySQLdb as mdb

DBNAME = "dbname"

DBHOST = "localhost"

DBPASS = "1234567890"

DBUSER = "phpmyadmin"

#pins that will connect hc-sr04 to the orange pi pcb

LIGHT = port.PC4

gpio.init()

print("In Progress")

gpio.setcfg(LIGHT, gpio.INPUT)

while True:

i = gpio.input(LIGHT)

if(i == 0):

status = "Light Detected!"

print(status)

time.sleep(0.5)

else:

status = "None"

print(status)

time.sleep(0.5)

db = mdb.connect(DBHOST, DBUSER, DBPASS, DBNAME)

cur = db.cursor()

#Execute sql command

updatequery = "UPDATE sensors\_tb SET DATA = '"+str(status)+"' WHERE SENSOR\_NAME = 'LIGHT'"

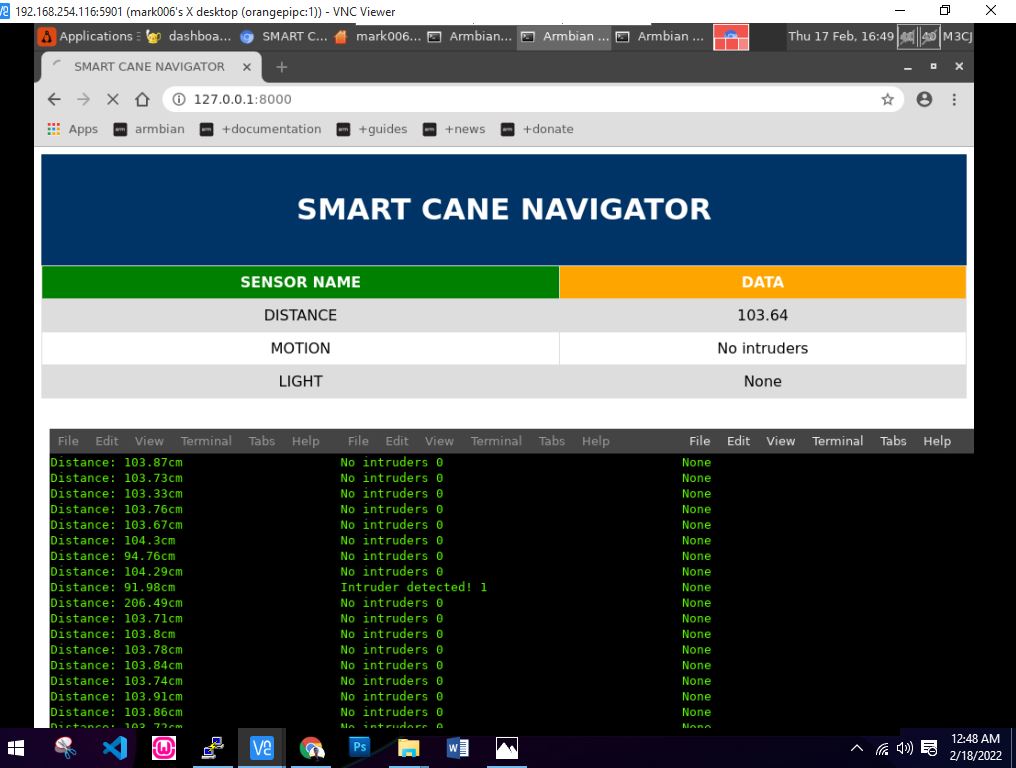
cur.execute(updatequery)

db.commit()

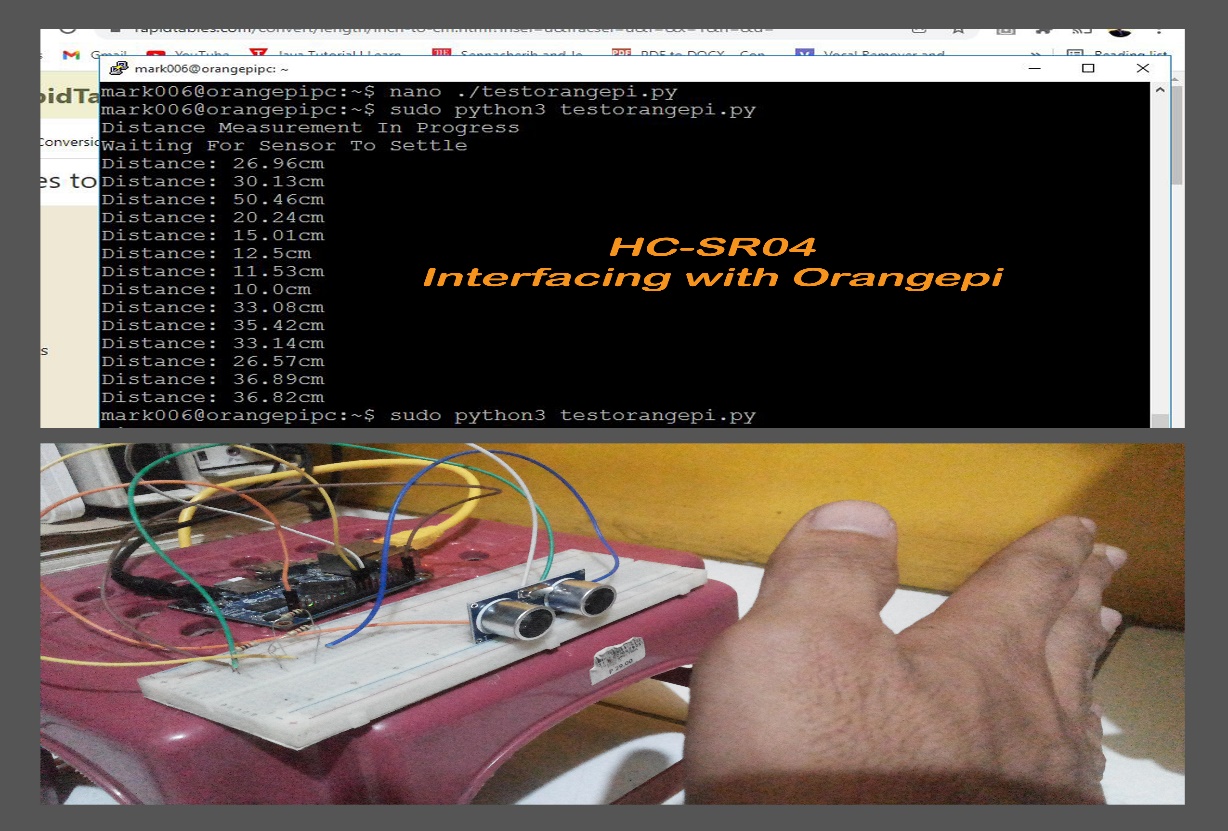
db.close()

**USER INTERFACE**

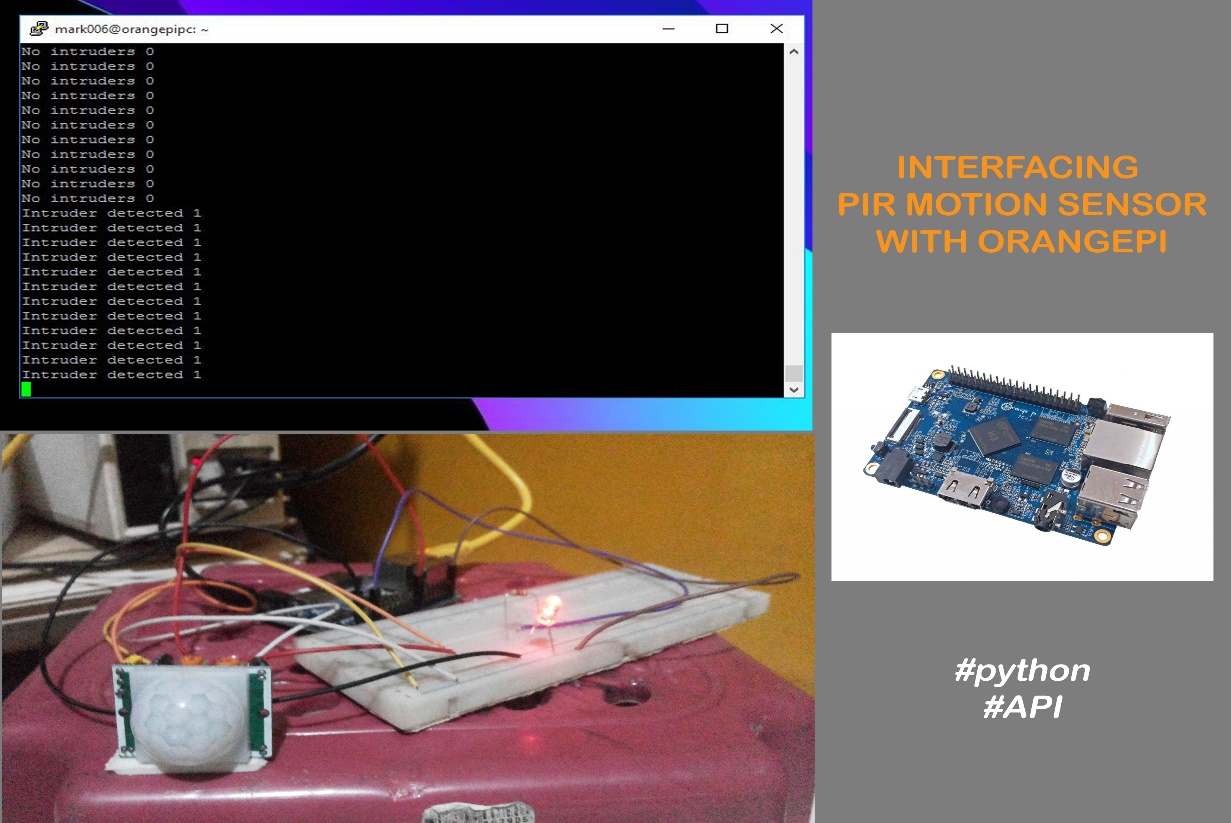
**I. Dashboard**

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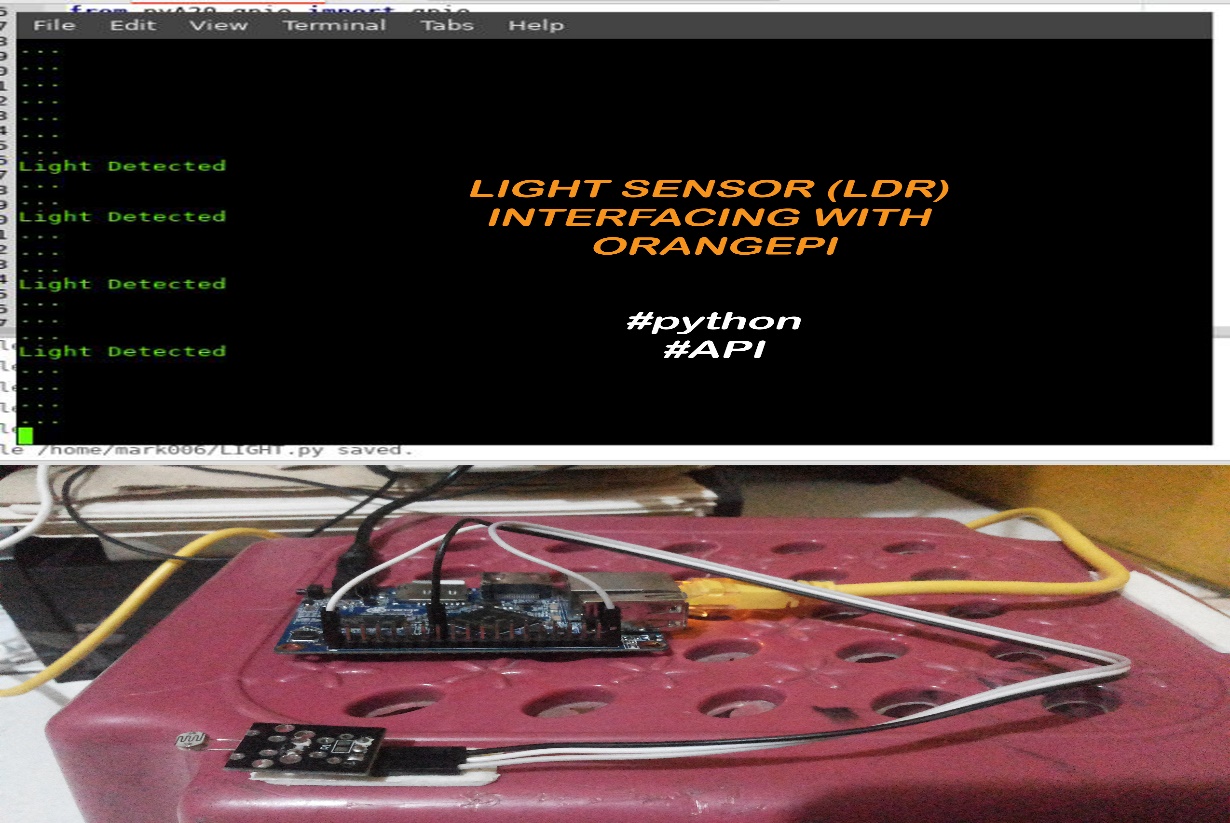
**II. Ultrasonic Sensor**

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**III. Motion Sensor**

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**IV. Light Sensor**

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