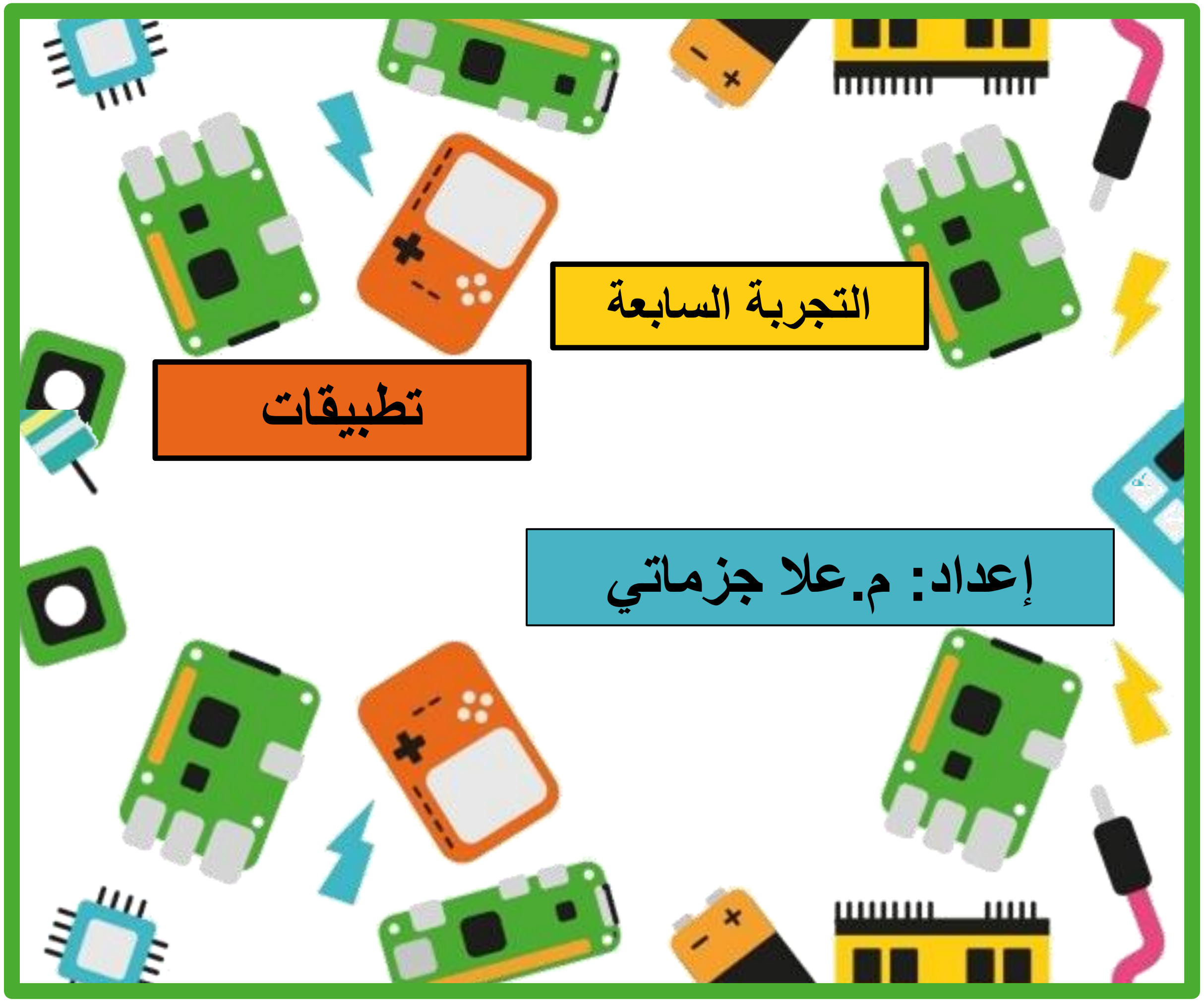
جامعة حلب
كلية الهندسة الإلكترونية والكهربائية

PROGRAMMING A RASPBERRY PI WITH PYTHON

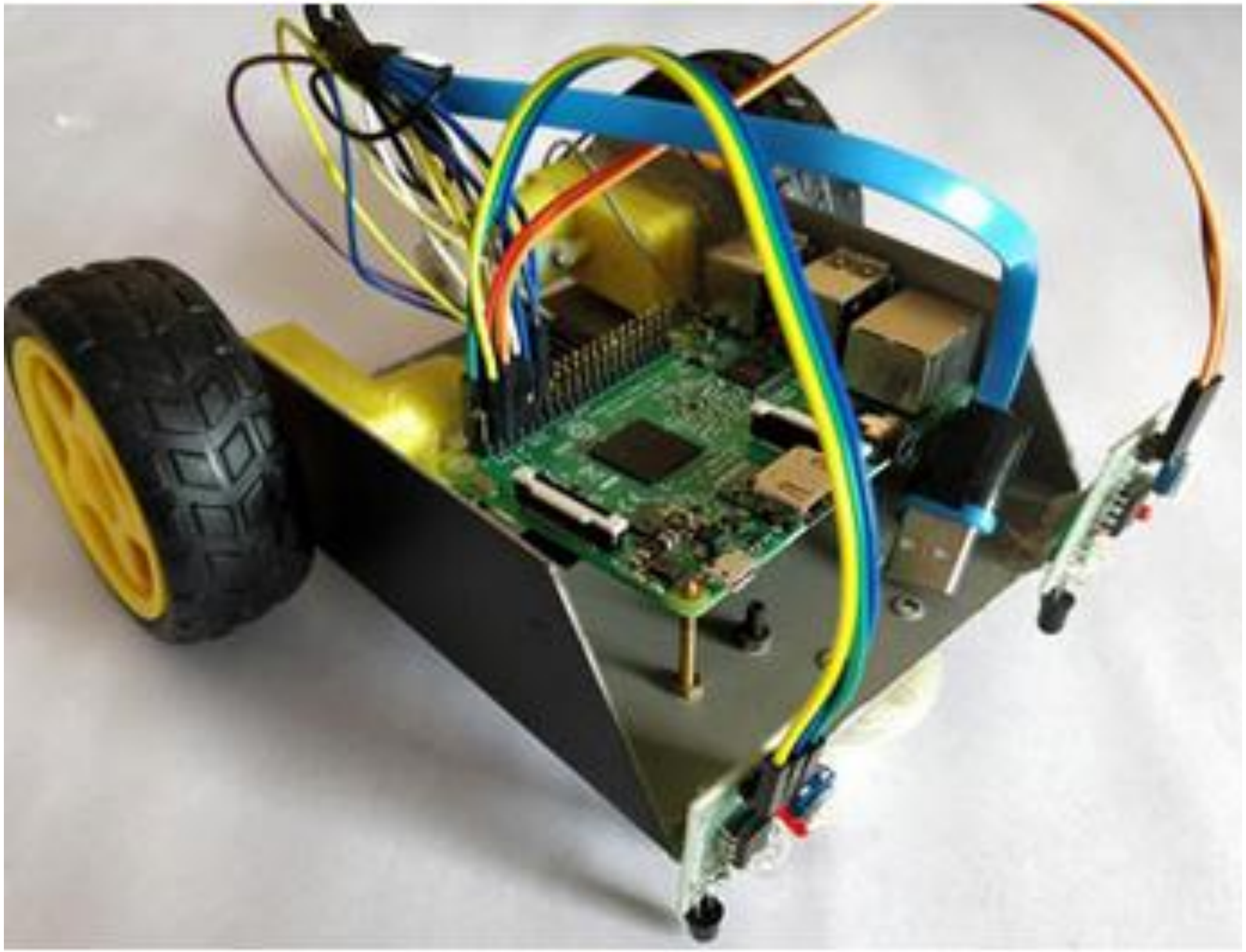


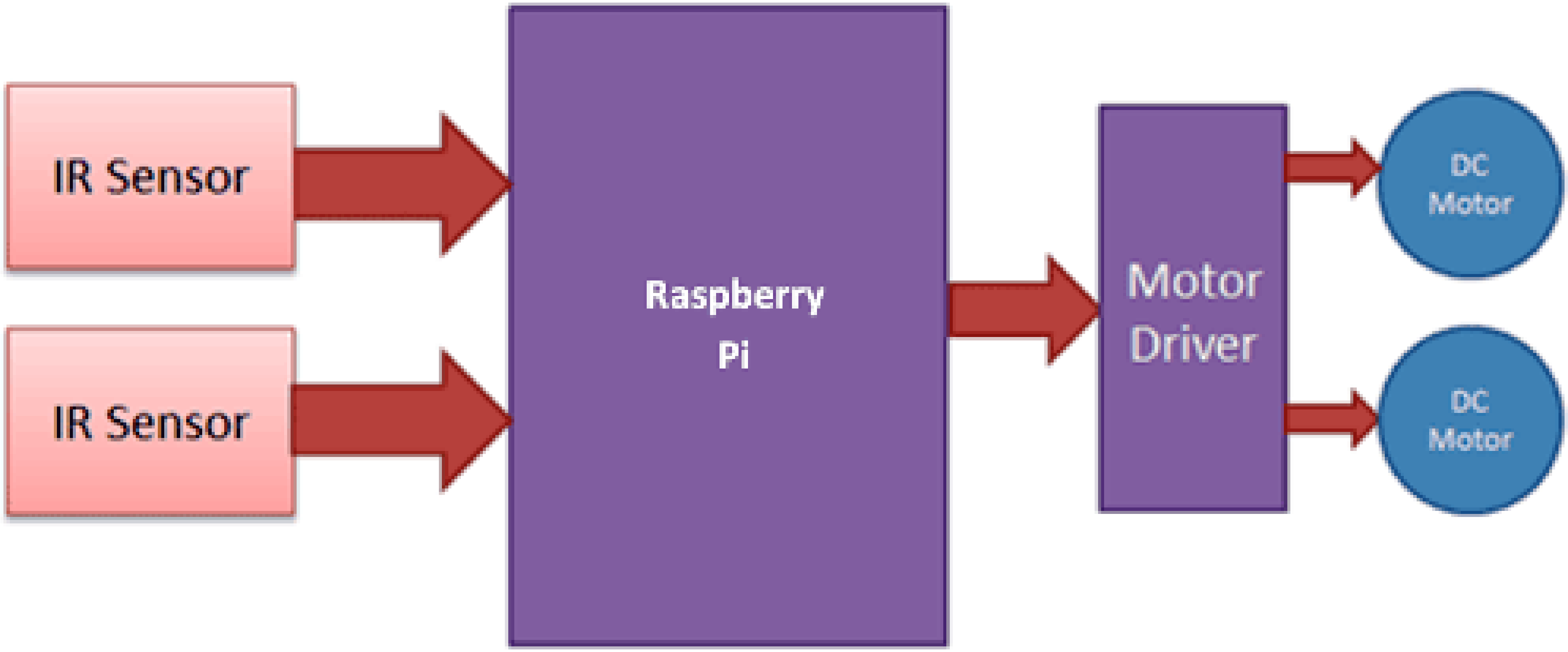
التجربة السابعة

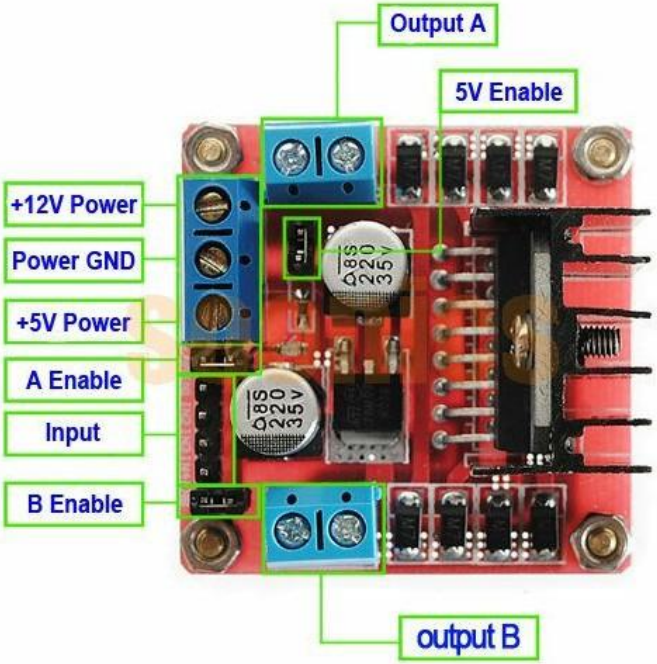
تطبيقات

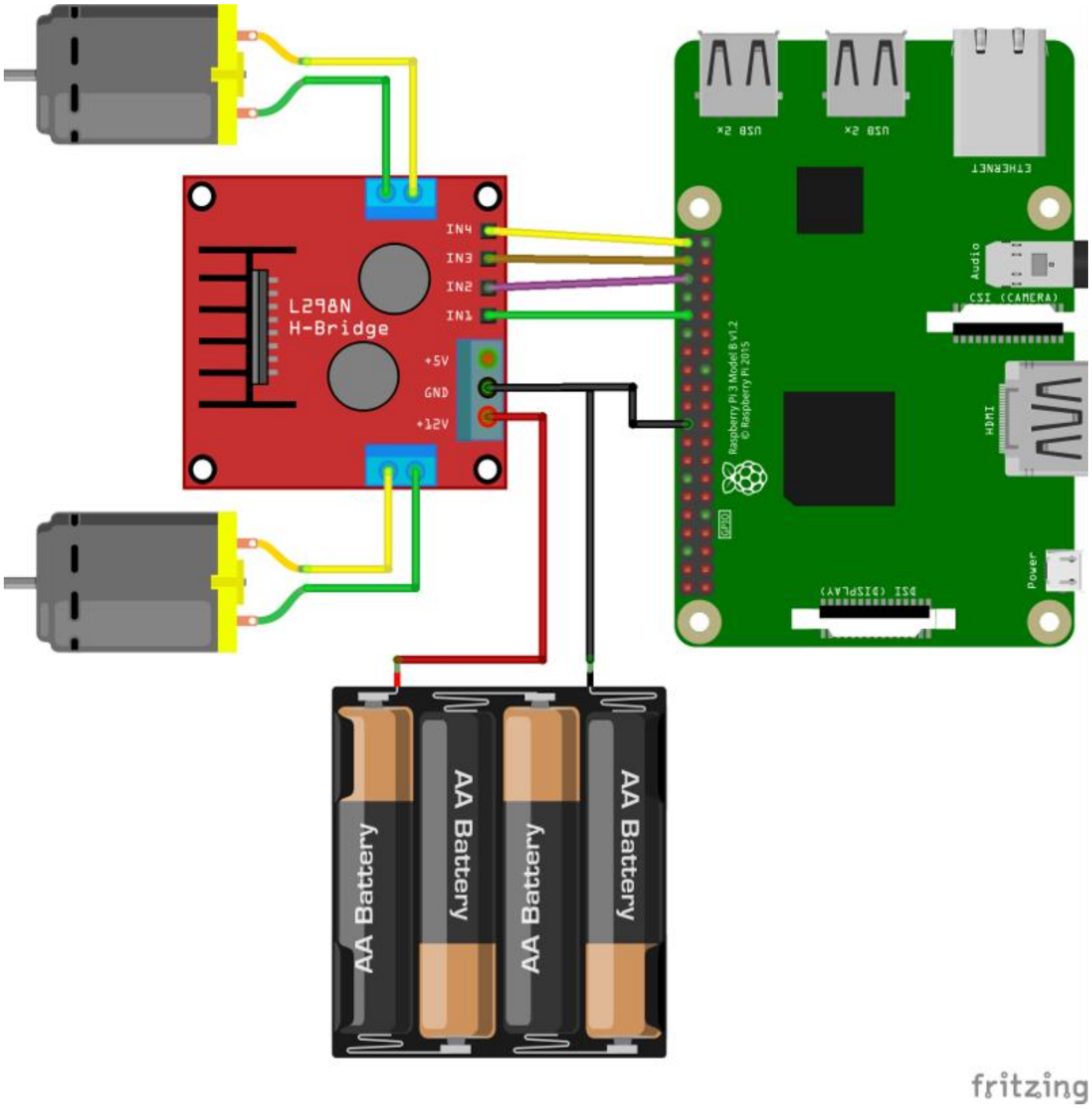
إعداد: م.علا جزماتي

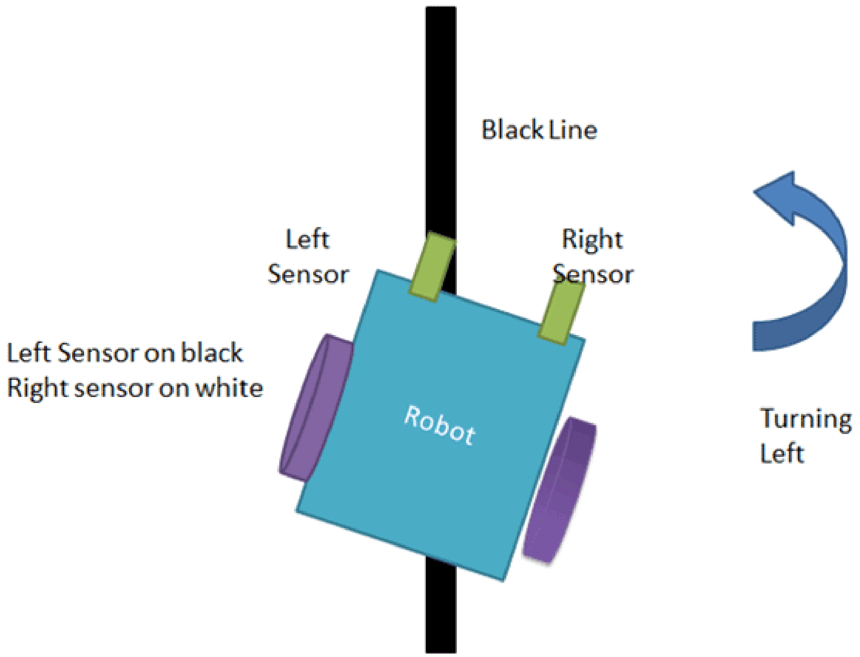
Line Follower Robot using Raspberry Pi

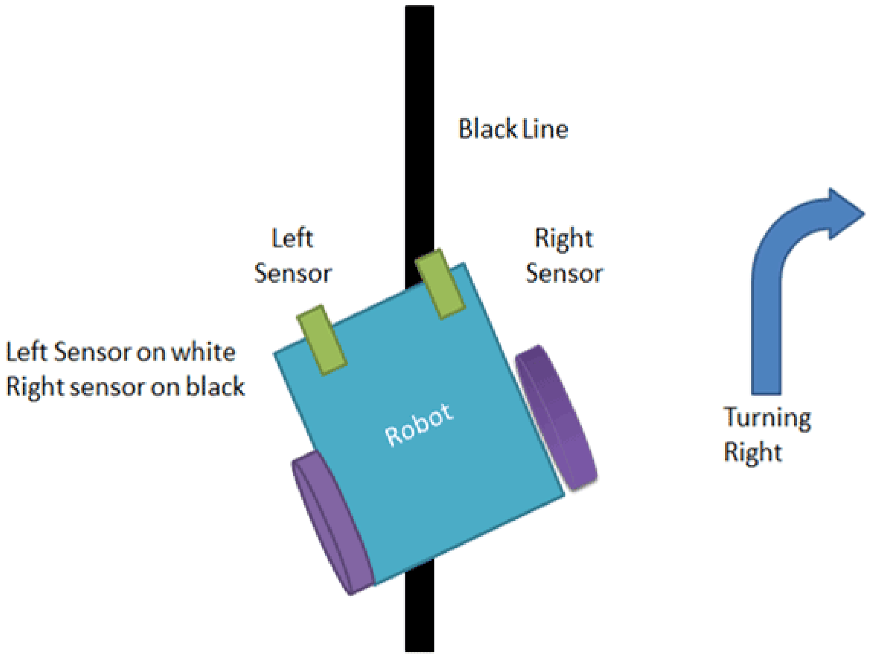


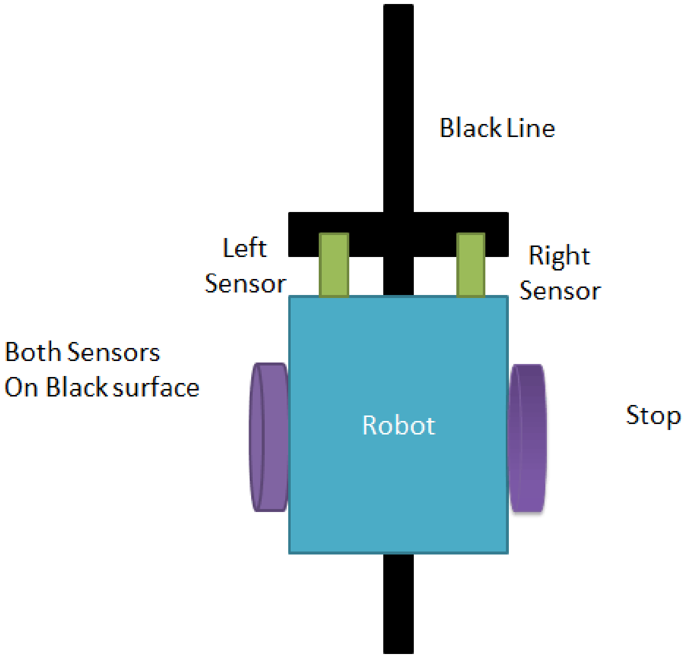

IR Sensor
IR Sensor
Raspberry Pi
Motor Driver
DC Motor
DC Motor

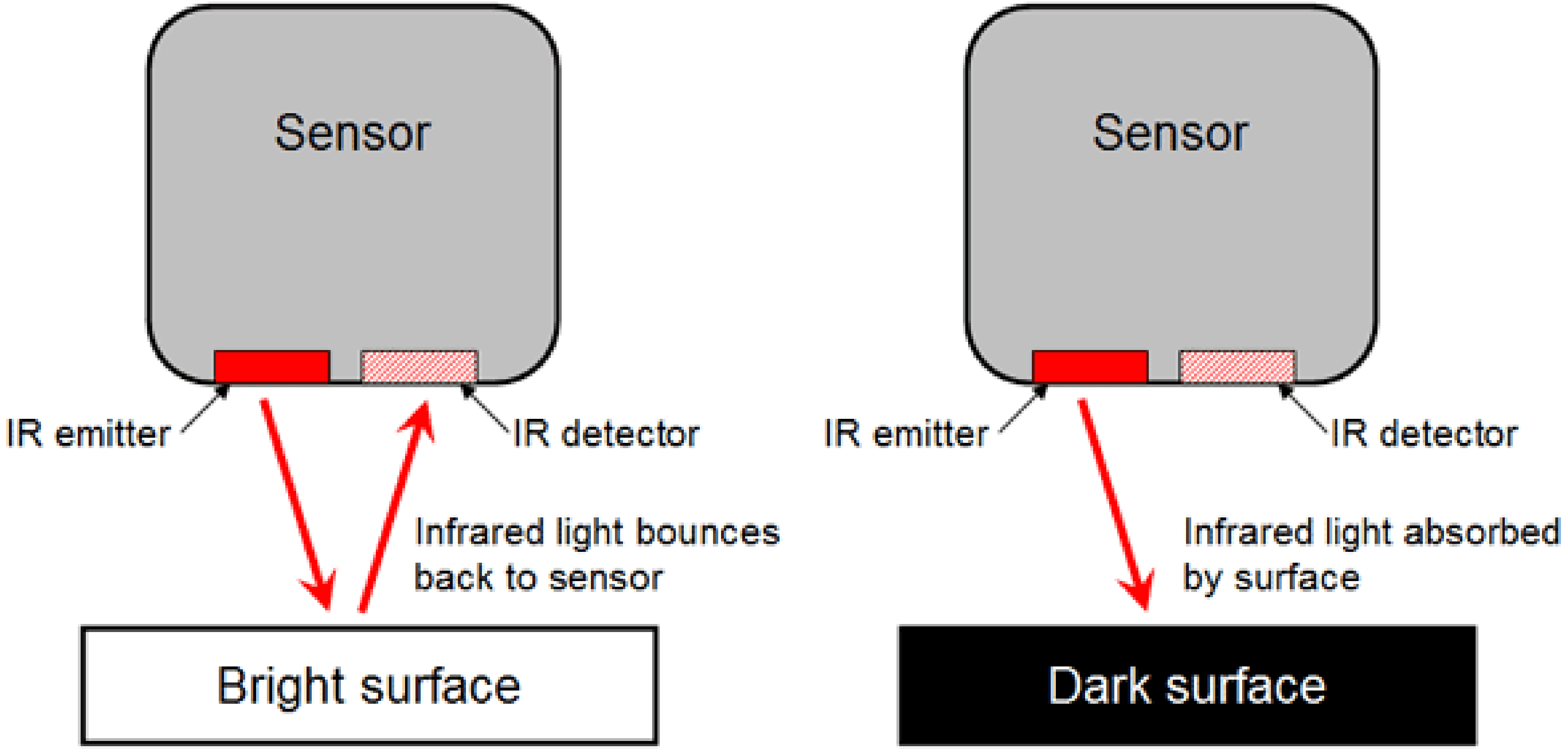

Output A
5V Enable
+12V Power
Power GND
+5V Power
A Enable
Input
B Enable
output B


L298N
H-Bridge
IN4
IN3
IN2
IN1
+5V
GND
+12V
USB 2x
USB 2x
ETHERNET
Audio
CSI (CAMERA)
HDMI
Raspberry Pi 3 Model B v1.2
© Raspberry Pi 2015
GPIO
Power
DSI (DISPLAY)
AA Battery
AA Battery
AA Battery
AA Battery
fritzing


Black Line
Left Sensor
Right Sensor
Left Sensor on black
Right sensor on white
Robot
Turning Left


Black Line
Left Sensor
Right Sensor
Left Sensor on white
Right sensor on black
Robot
Turning Right

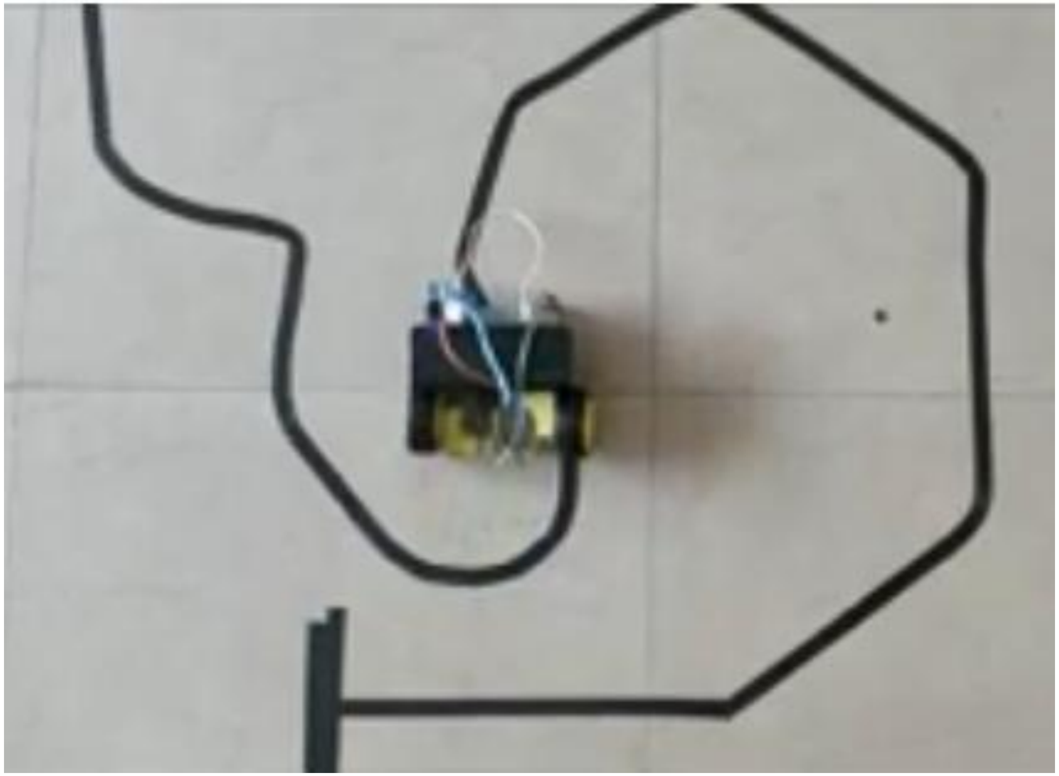

Black Line
Left Sensor
Right Sensor
Both Sensors
On Black surface
Robot
Stop


Sensor
Sensor
IR emitter
IR detector
IR emitter
IR detector
Infrared light bounces
back to sensor
Infrared light absorbed
by surface
Bright surface
Dark surface

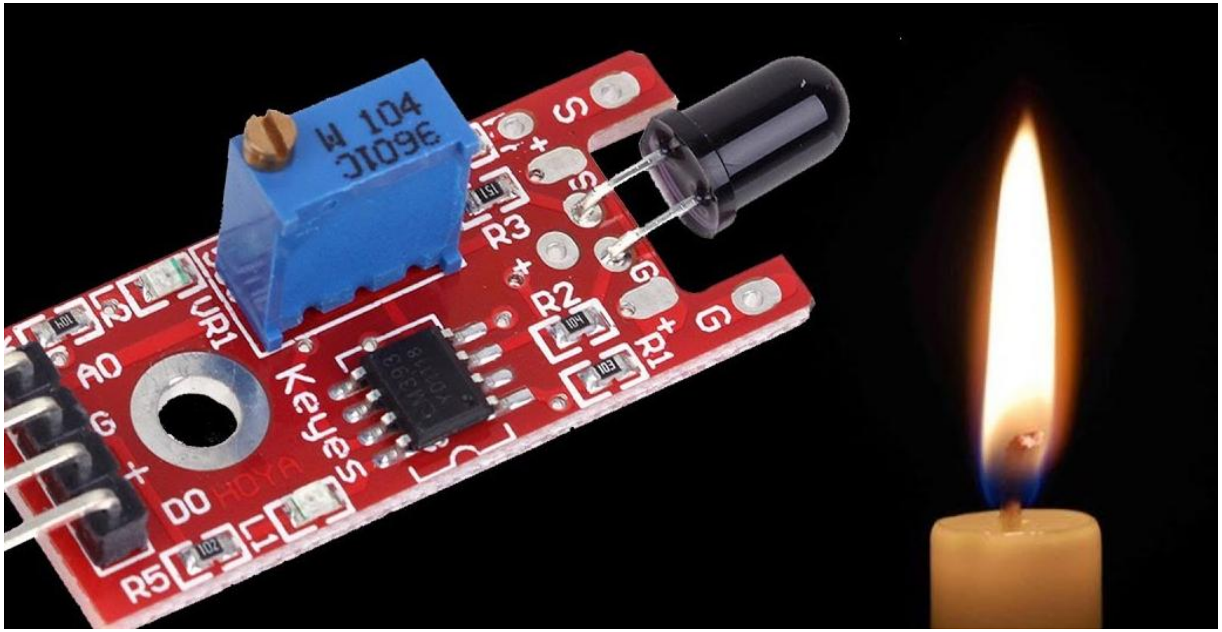
```
import RPi.GPIO as IO

import time

IO.setwarnings(False)

IO.setmode(IO.BCM)

IO.setup(2,IO.IN) #GPIO 2 -> Left IR out

IO.setup(3,IO.IN) #GPIO 3 -> Right IR out

IO.setup(4,IO.OUT) #GPIO 4 -> Motor 1 terminal A

IO.setup(14,IO.OUT) #GPIO 14 -> Motor 1 terminal B

IO.setup(17,IO.OUT) #GPIO 17 -> Motor Left terminal A

IO.setup(18,IO.OUT) #GPIO 18 -> Motor Left terminal B

while 1:

    if(IO.input(2)==True and IO.input(3)==True): #both while move forward
    IO.output(4,True) #1A+
    IO.output(14,False) #1B-
    IO.output(17,True) #2A+
    IO.output(18,False) #2B-
elif(IO.input(2)==False and IO.input(3)==True): #turn right
    IO.output(4,True) #1A+
    IO.output(14,True) #1B-
    IO.output(17,True) #2A+
    IO.output(18,False) #2B-
elif(IO.input(2)==True and IO.input(3)==False): #turn left
    IO.output(4,True) #1A+
    IO.output(14,False) #1B-
    IO.output(17,True) #2A+
    IO.output(18,True) #2B-
else:  #stay still
    IO.output(4,True) #1A+
    IO.output(14,True) #1B-
    IO.output(17,True) #2A+
    IO.output(18,True) #2B-
```

Homework1

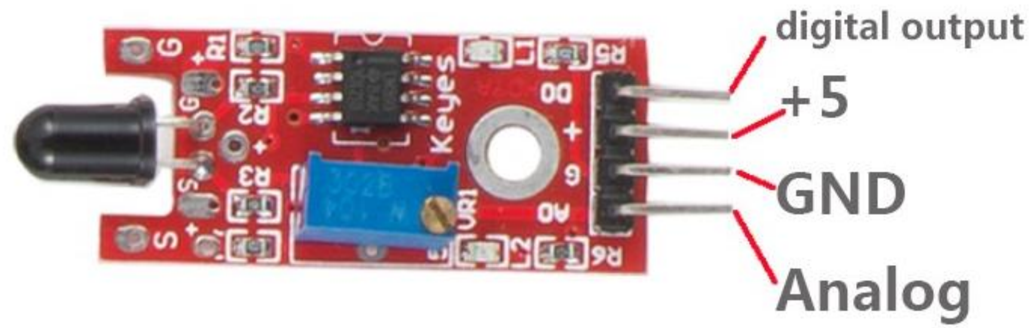
- Use PWM method in example 1 and test the code.



Interfacing Flame Sensor Module

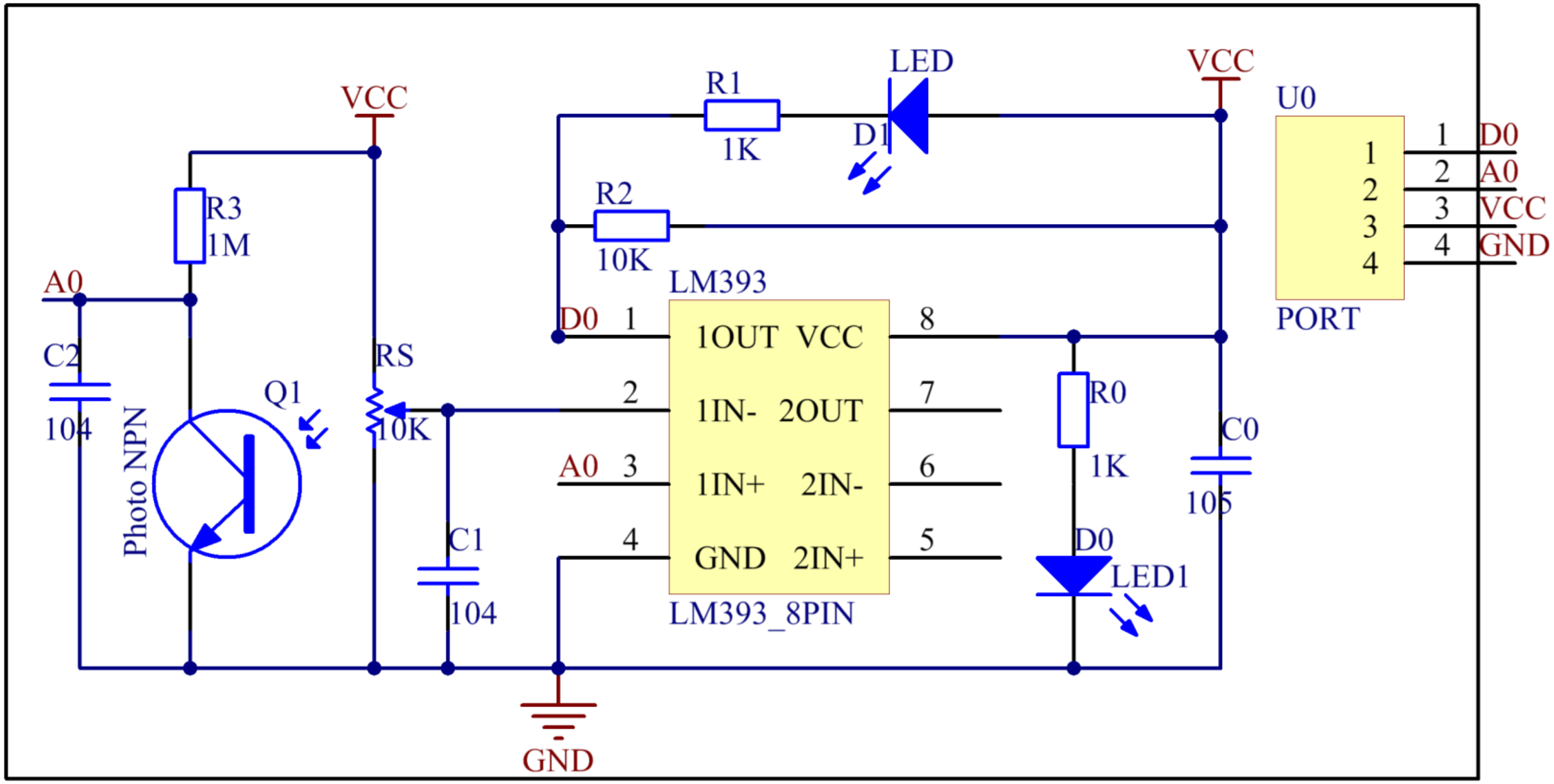


Flame Sensor

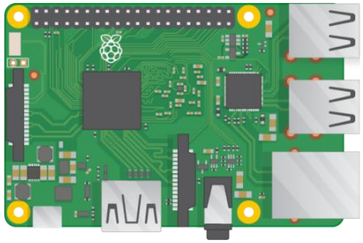


Introduction

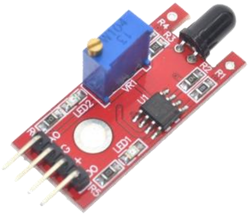
A flame sensor module performs detection by capturing infrared wavelengths from flame. It can be used to detect and warn of flames.



```python
import RPi.GPIO as io
import time
def setup():
    io.setmode(io.BOARD)
    io.setup(11,io.IN,pull_up_down=io.PUD_UP)
    io.setup(13,io.OUT)
    io.output(13,0)
def flame(x=None):
    print("flame is detected")
    io.output(13,1)
    time.sleep(5)
    io.output(13,0)
def loop():
    io.add_event_detect(11,io.FALLING,callback =flame)
    while 1:
        pass
if (__name__=='__main__'):
    setup()
    try:
        loop()
    except KeyboardInterrupt:
        io.cleanup()
```

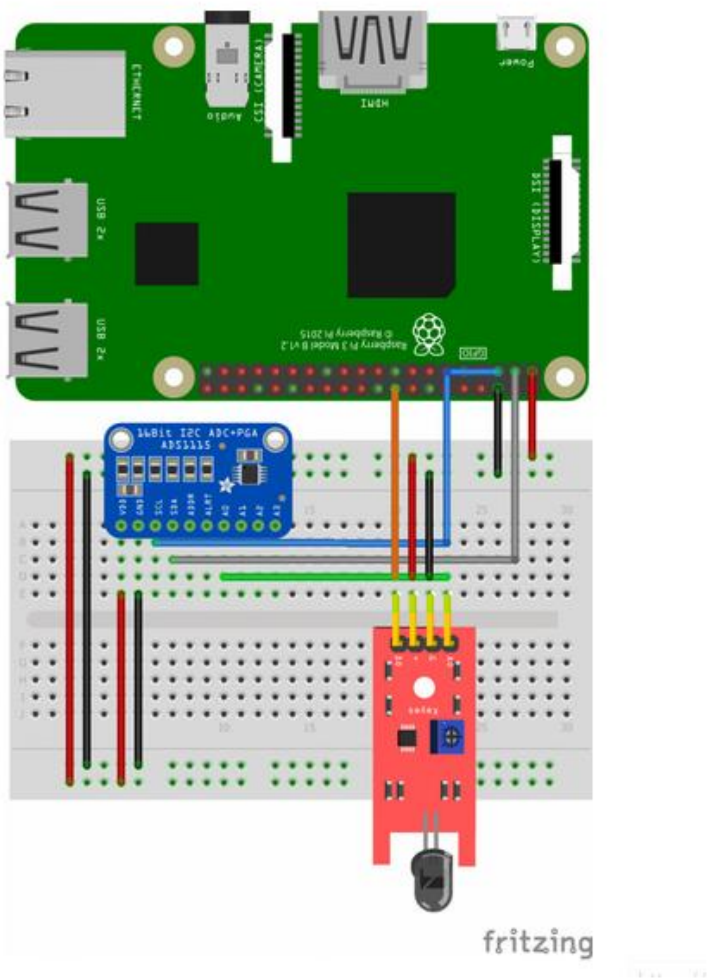


+



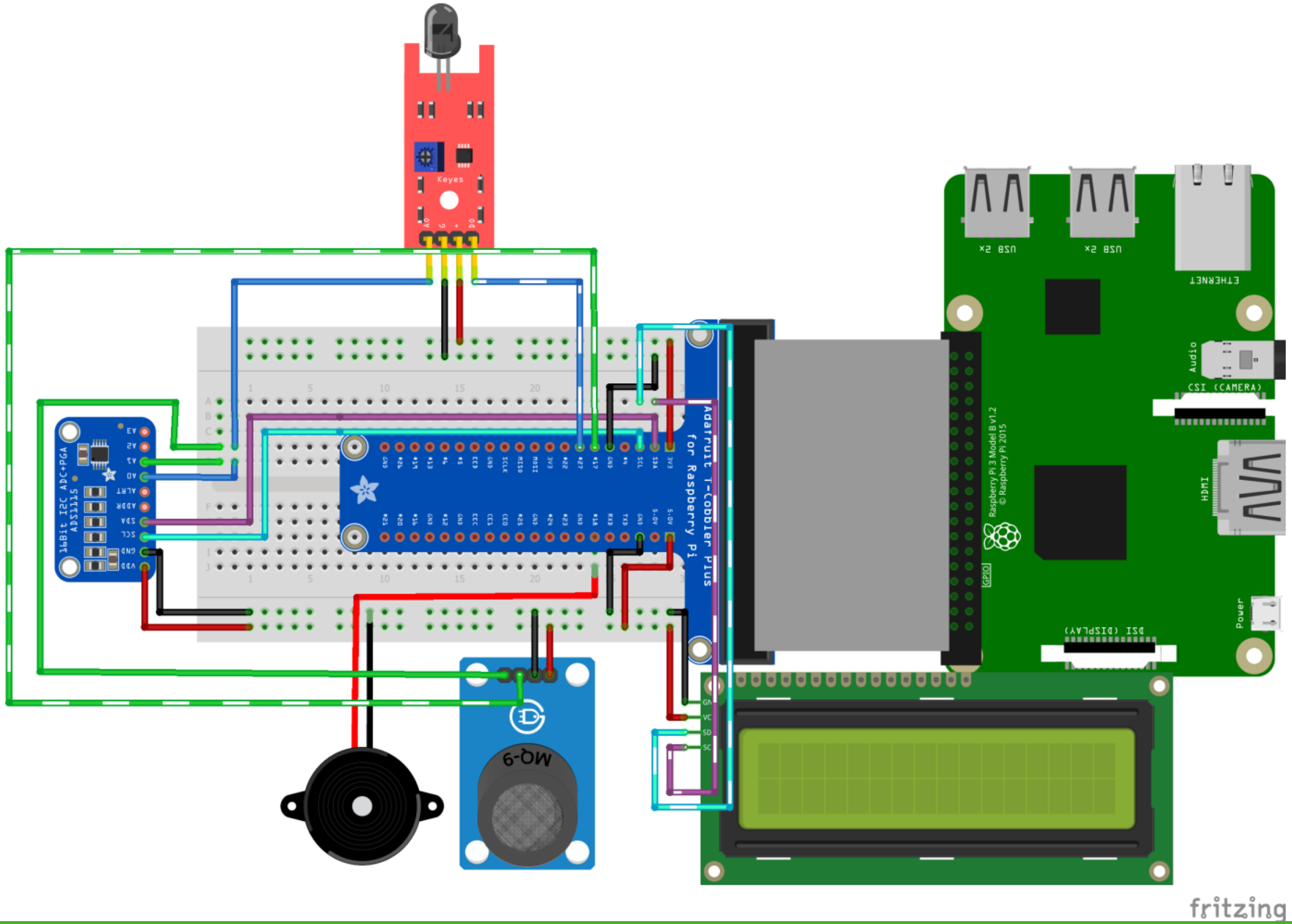
Note:

سنقوم بتجريب المثال مع مبدل تشابهي رقمي Adafruit_ADS1015 باستخدام القياسات من القطب التشابهي لحساس اللهب.



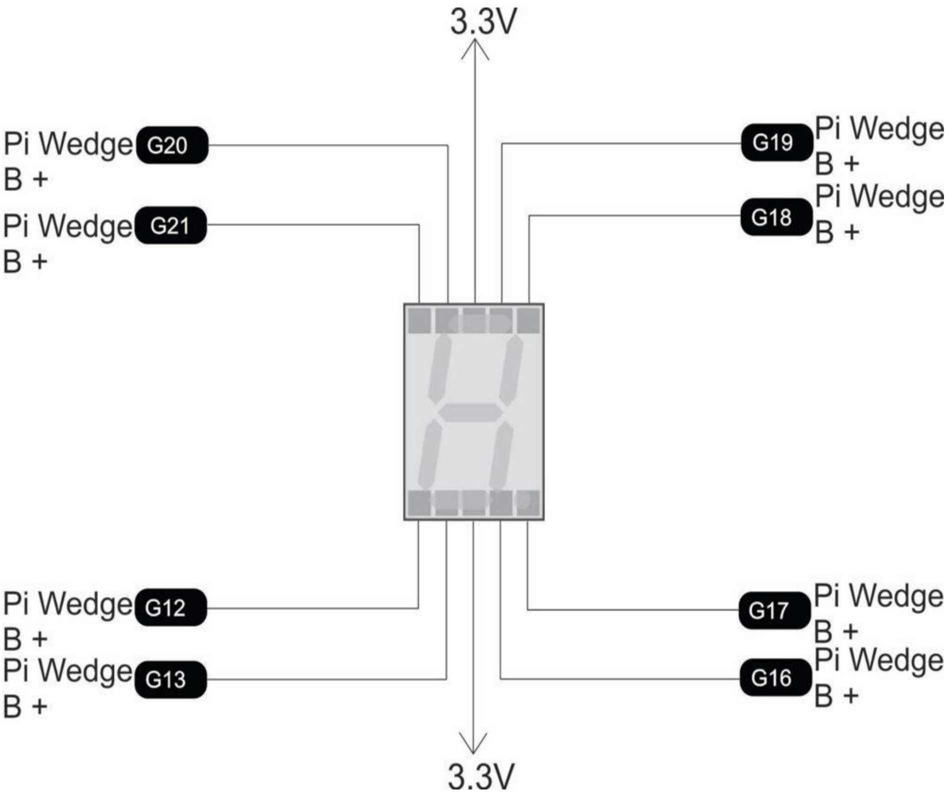
يمكن تطوير التطبيق السابق بإضافة حساسات أخرى:

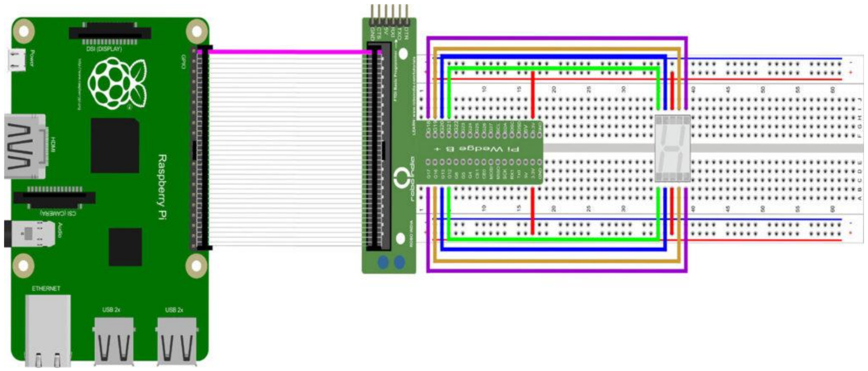
Raspberry pi fire and gas detector



Homework2

Controlling a seven-segment display from the Raspberry Pi





Thank You