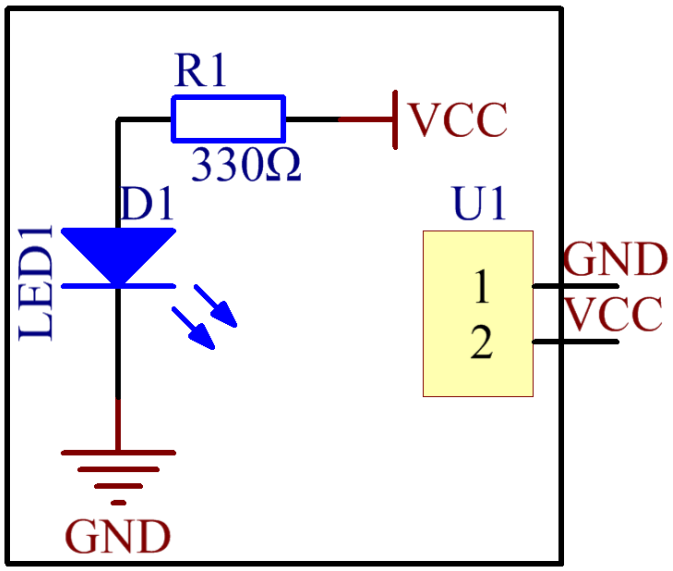
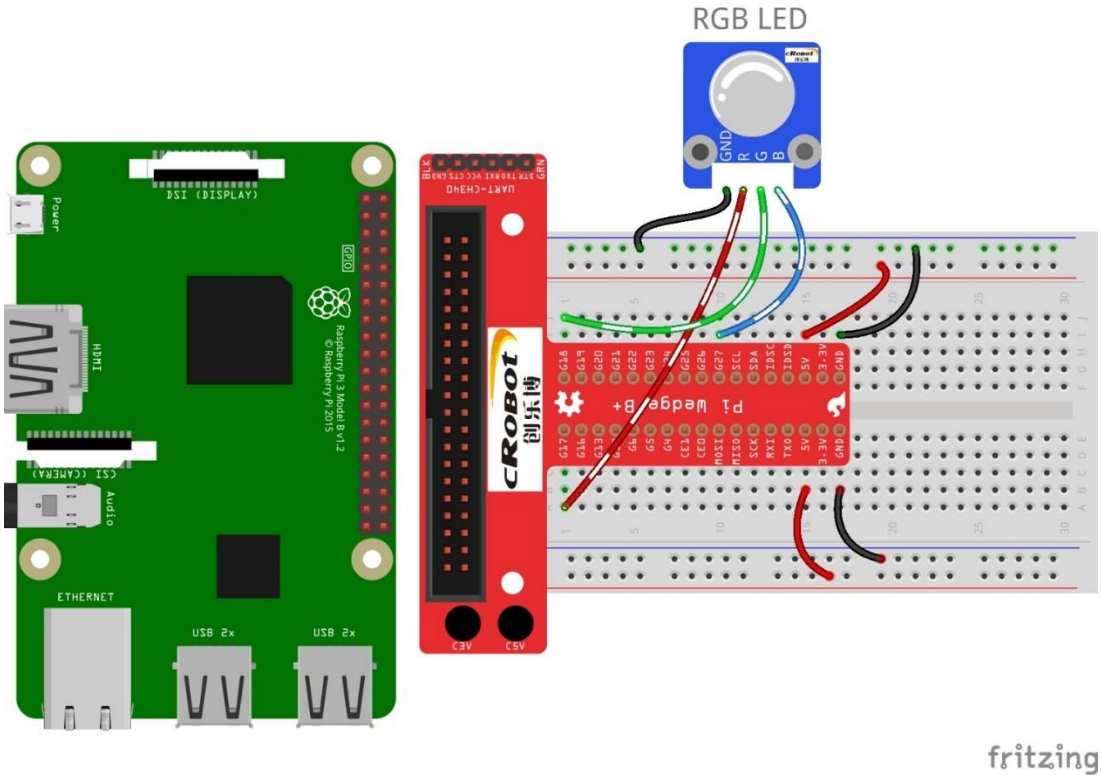
实验二：GPIO 接口 Python 编程

实验目标：

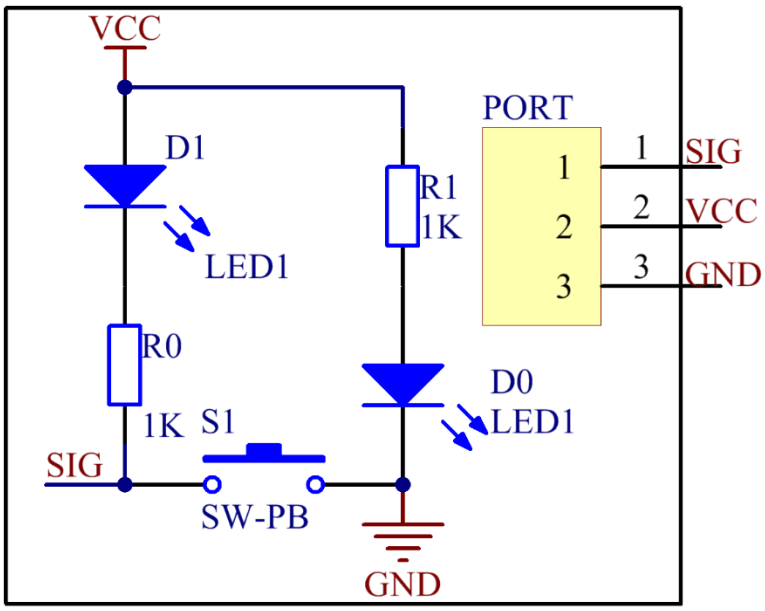
第一步：调通 LED 控制
第 2 步：屏幕按钮、物理按钮控制 LED 灯闪烁
第 2 步：屏幕按钮控制单次、连续超声波测距
pythonGPIO 编程，可参考网址：https://blog.csdn.net/qq_35893742/article/details/53463798
界面编程：Python 自带的 Tk 编程或 Qt 编程，百度

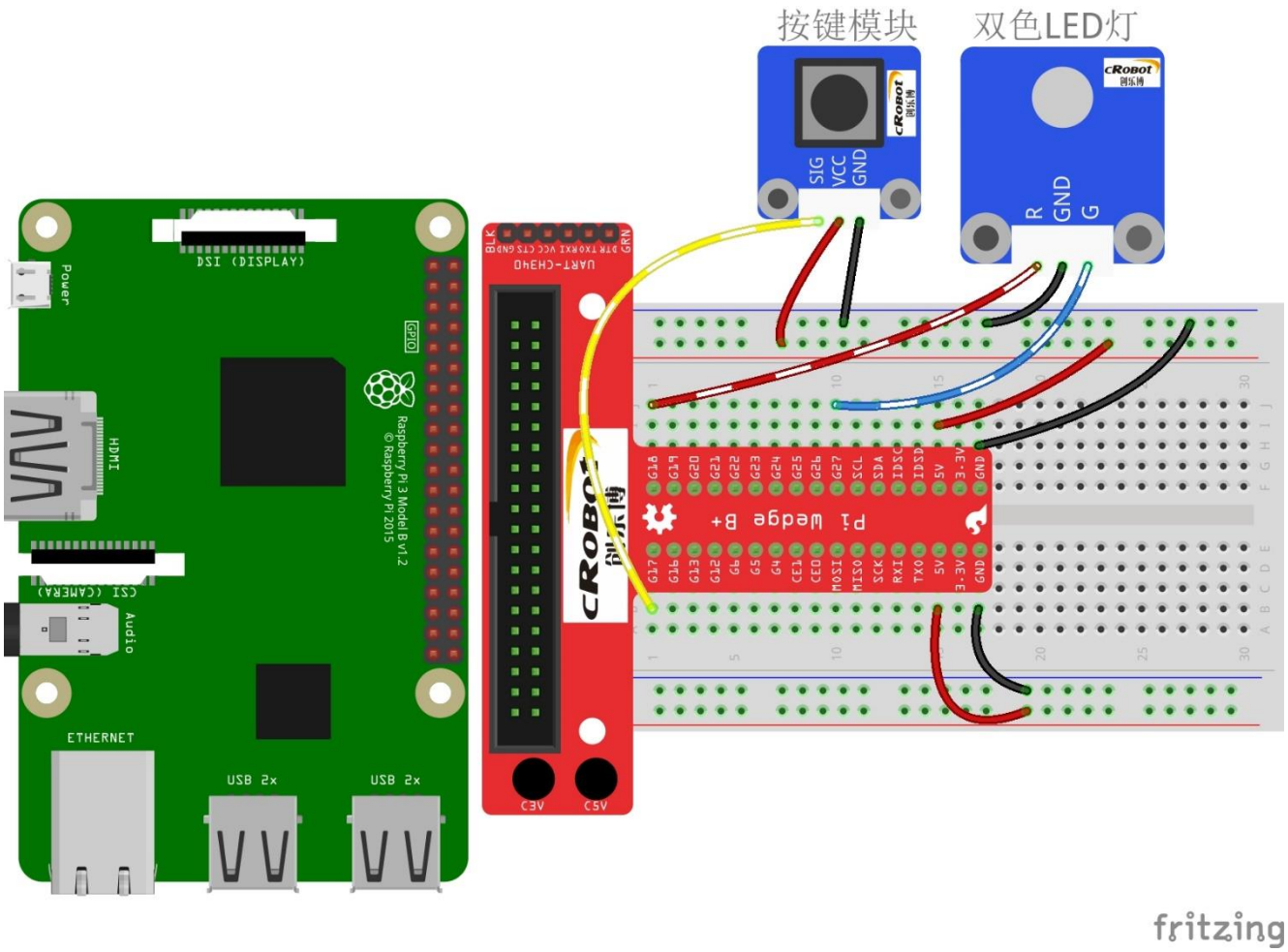
1. 7 色 LED 灯实验





2. 轻触按键控制 LED 灯实验

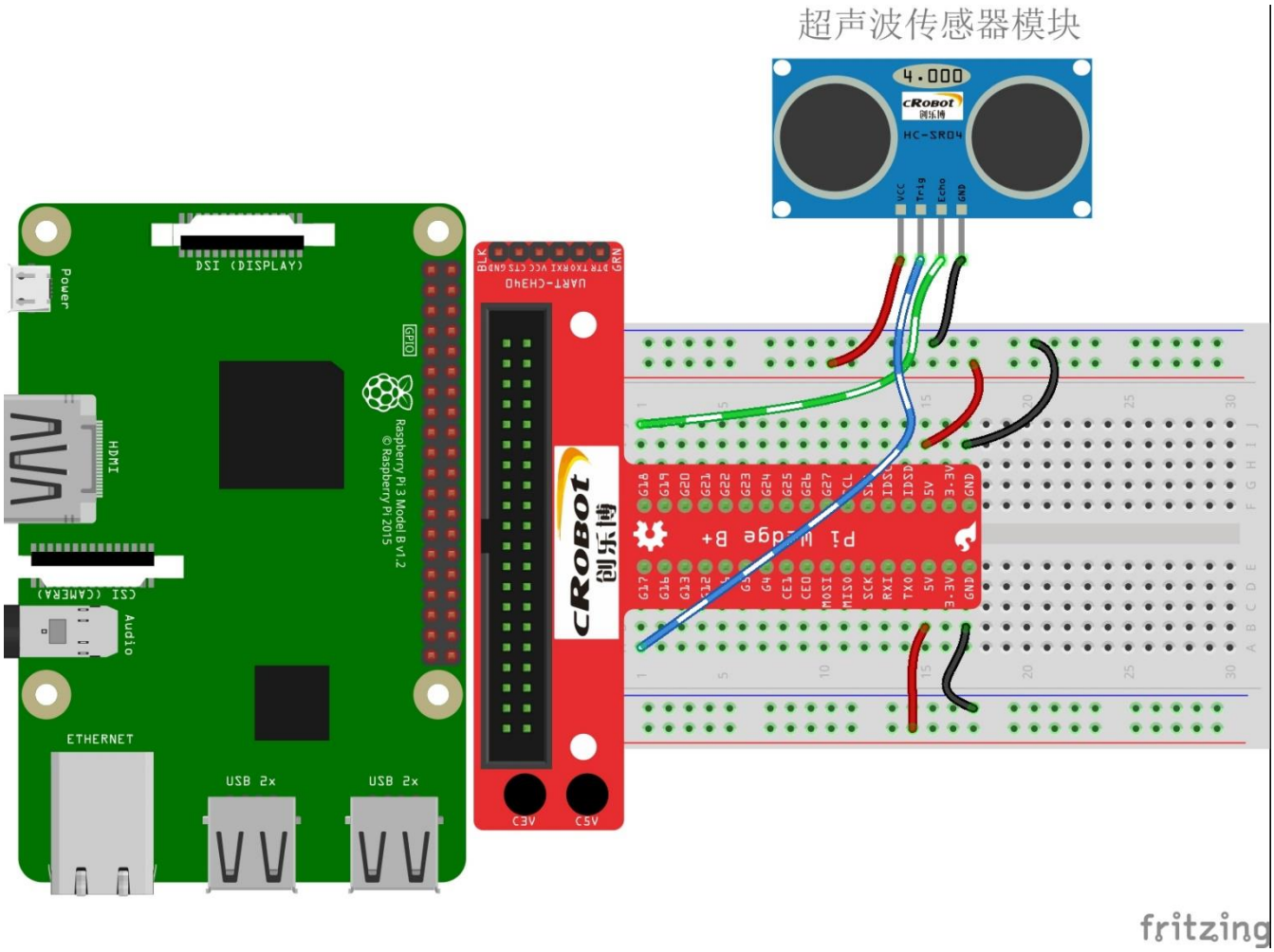





```
#!/usr/bin/env python
import RPi.GPIO as GPIO

BtnPin = 11
Gpin   = 12
Rpin   = 13

def setup():
    GPIO.setmode(GPIO.BOARD)        # Numbers GPIOs by physical location
    GPIO.setup(Gpin, GPIO.OUT)      # Set Green Led Pin mode to output
    GPIO.setup(Rpin, GPIO.OUT)      # Set Red Led Pin mode to output
    GPIO.setup(BtnPin, GPIO.IN, pull_up_down=GPIO.PUD_UP)    # Set BtnPin's mode is
input, and pull up to high level(3.3V)
    GPIO.add_event_detect(BtnPin, GPIO.BOTH, callback=detect, bouncetime=200)

def Led(x):
    if x == 0:
        GPIO.output(Rpin, 1)
        GPIO.output(Gpin, 0)
```

```
    if x == 1:
        GPIO.output(Rpin, 0)
        GPIO.output(Gpin, 1)

def Print(x):
    if x == 0:
        print '    **********'
        print '    *  Button Pressed!  *'
        print '    **********'

def detect(chn):
    Led(GPIO.input(BtnPin))
    Print(GPIO.input(BtnPin))

def loop():
    while True:
        pass

def destroy():
    GPIO.output(Gpin, GPIO.HIGH)       # Green led off
    GPIO.output(Rpin, GPIO.HIGH)       # Red led off
    GPIO.cleanup()                     # Release resource

if __name__ == '__main__':     # Program start from here
    setup()
    try:
        loop()
    except KeyboardInterrupt:  # When 'Ctrl+C' is pressed, the child program destroy() will
be  executed.
        destroy()
```

3. 超声波测距模块实验




```
import RPi.GPIO as GPIO
import time

TRIG = 11
ECHO = 12
```

```
def setup():
    GPIO.setmode(GPIO.BOARD)
    GPIO.setup(TRIG, GPIO.OUT)
    GPIO.setup(ECHO, GPIO.IN)

def distance():
    GPIO.output(TRIG, 0)
    time.sleep(0.000002)

    GPIO.output(TRIG, 1)
    time.sleep(0.00001)
    GPIO.output(TRIG, 0)



    while GPIO.input(ECHO) == 0:
        a = 0
    time1 = time.time()
    while GPIO.input(ECHO) == 1:
        a = 1
    time2 = time.time()

    during = time2 - time1
    return during * 340 / 2 * 100

def loop():
    while True:
        dis = distance()
        print dis, 'cm'
        print ''
        time.sleep(0.3)

def destroy():
    GPIO.cleanup()

if __name__ == "__main__":
    setup()
    try:
        loop()
    except KeyboardInterrupt:
        destroy()
```

4. Python UI 编程

（1） 通过图形界面上的按钮控制灯的开/关、不同频率闪烁

（2） 通过图形界面的按钮，单次和连续测量显示超声波传感器测得的距离