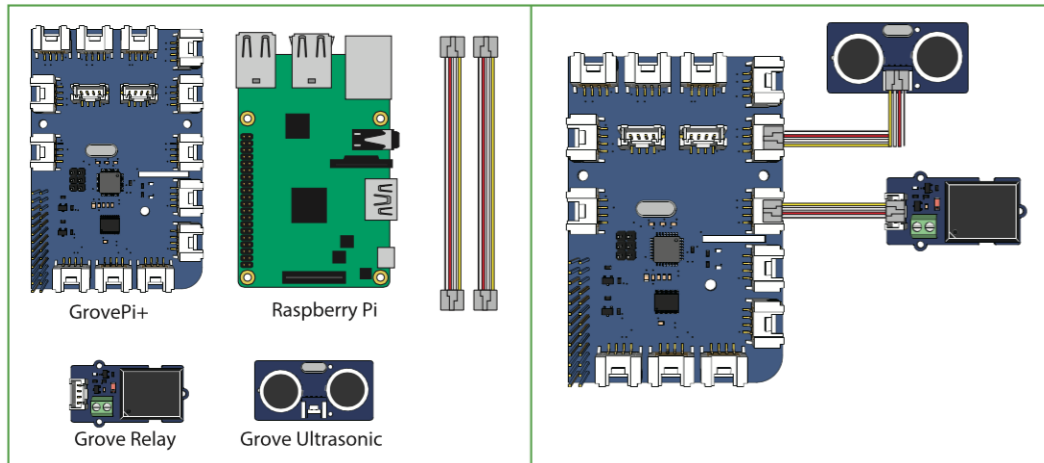


## Practical 4

### Step 1: Test Ultrasonic and Relay.

*\* Picture is for illustration ONLY, please follow the steps correctly.*



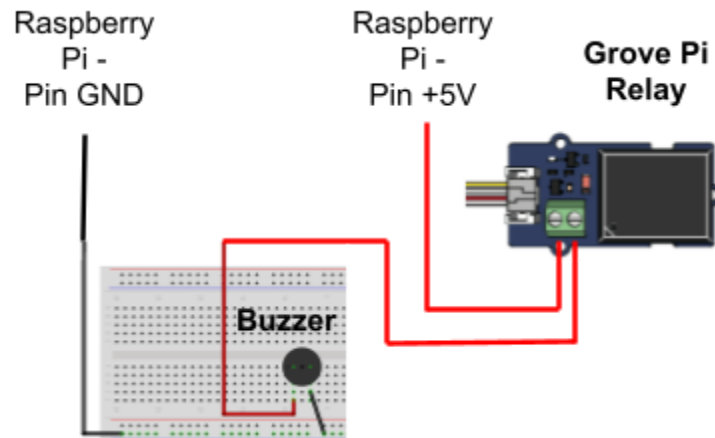
1. Connect a **Grove Relay** to port D2 and the **Grove Ultrasonic** to port D3.
2. In **Thonny Python (ID)**, click “New” to create a new python file and Save As “test04.py”. Type the following codes:
3. Type the following code:

```
test04.py ✕
1  from time import *
2  from grovepi import *
3
4  ultrasonic = 3
5  relay = 2
6
7  pinMode(ultrasonic, "INPUT")
8  pinMode(relay, "OUTPUT")
9
10 while True:
11     try:
12         sleep(0.5)
13         distance = ultrasonicRead(ultrasonic)
14         print(distance, 'cm')
15         if distance <= 10:
16             digitalWrite(relay, 1)
17         else:
18             digitalWrite(relay, 0)
19     except KeyboardInterrupt:
20         digitalWrite(relay, 0)
21         break
22     except TypeError:
23         print("Type Error occurs")
24     except IOError:
25         print("IO Error occurs")
26
```

4. Run the code

**Task 1: Modify the hardware circuit to allow relay contact with the buzzer (if no buzzer, use LED).**

**\* Clue: refer to the following diagram**



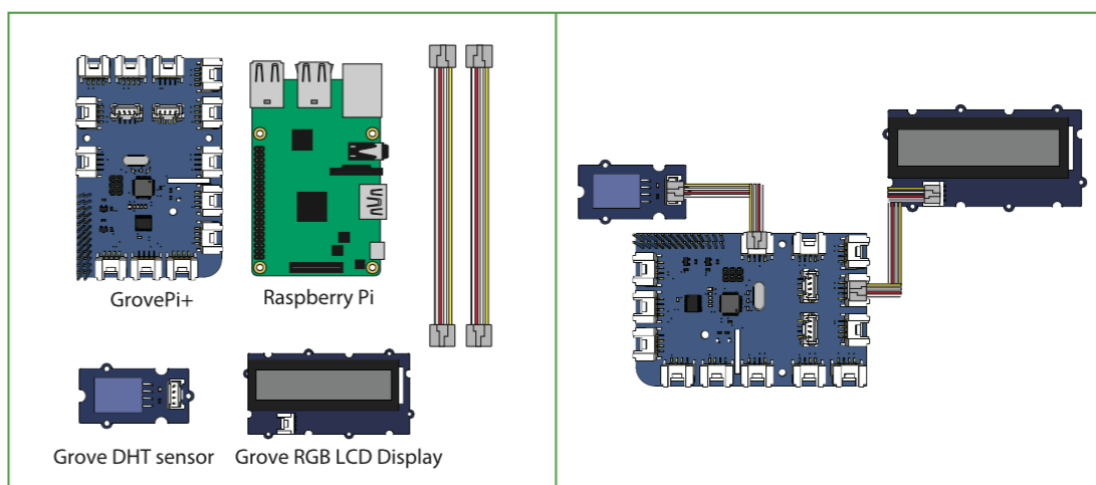
**Task 2: Adding relay and LEDs on the constructed hardware circuit to allow relay to control Red and Green Lights (either one side is selected)**

**\* Clue: refer to how relay works, and you may need another relay to do it.**

**Extra Challenge: Car reverse sensor using ultrasonic device**

**Step 2: Test RGB LCD Display and DHT (Digital Humidity and Temperature)**

***\* Picture is for illustration ONLY, please follow the steps correctly.***



1. Connect a Grove DHT to port D7 and the Grove RGB LCD Display to any of the I2C ports.

2. In **Thonny Python (ID)**, click “New” to create a new python file and Save As “test05.py”. Type the following codes:
3. Type the following code:

```
test05.py ✕
1 from time import *
2 from grovepi import *
3 from grove_rgb_lcd import *
4
5 dhtsensor = 7
6
7 pinMode(dhtsensor, "INPUT")
8
9 while True:
10     try:
11         sleep(0.5)
12         [temp, hum] = dht(dhtsensor, 0)
13         print("Temp = ", temp, '\u00b0C', " Hum = ", hum, " %")
14         t = str(temp)
15         h = str(hum)
16         setRGB(0, 255, 0)
17         setText("Temp = " + t + '\337' + "C Hum = " + h + " %")
18     except KeyboardInterrupt:
19         setText("Program Exited")
20         break
21     except TypeError:
22         print("Type Error occurs")
23     except IOError:
24         print("IO Error occurs")
25
```

4. Run the code

\* If your Grove RGB LCD only able to display ½ row of characters (malfunction)  
(8 characters per row), try to indicate the value as “T: 26.3C      H:62.7%”

**Task 1: Test your temperature and humidity sensor by facing it with a few breaths.**

The value of temperature and humidity will increase

**Task 2: Adjust the LCD backlight and add two LED lights to indicate the temperature and humidity values in alarming levels.**

Adjust the LCD backlight by using setRGB([R], [G], [B])

Let's say led1 is for temperature and led2 is for humidity,

When the temperature is in alarming level, digitalWrite the led1 to high or 1; Otherwise, low or 0

When the humidity is in alarming level, digitalWrite the led2 to high or 1; Otherwise, low or 0