Key Switch Experiment

Introduction

The button is also called a light touch switch. In order to meet the operating force conditions when the use of pressure on the direction of the switch operation. If the switch is pressed, the circuit is connected; if the switch is released, the circuit is disconnected. Its internal structure relies on the force change of the metal shrapnel to achieve on-off. From the four-pin circuit diagram below, we can clearly find that under normal circumstances, the 1, 2, 3 and 4 pins of the key are connected; while we press the button, the four pins are connected to each other; while we release the button, the four pins are disconnected. The digital I/O can be used to achieve the effect of button control. The definition of the digital I/O port is the INPUT and OUTPUT interfaces. In the previous LED experiment, we only used the OUTPUT function of GPIO. Now we try to use the INPUT function of I/O in Arduino which means it needs to read the output value from an external device. We use a button and an LED to complete the experiment of INPUT and OUTPUT combination.

Experimental Purpose

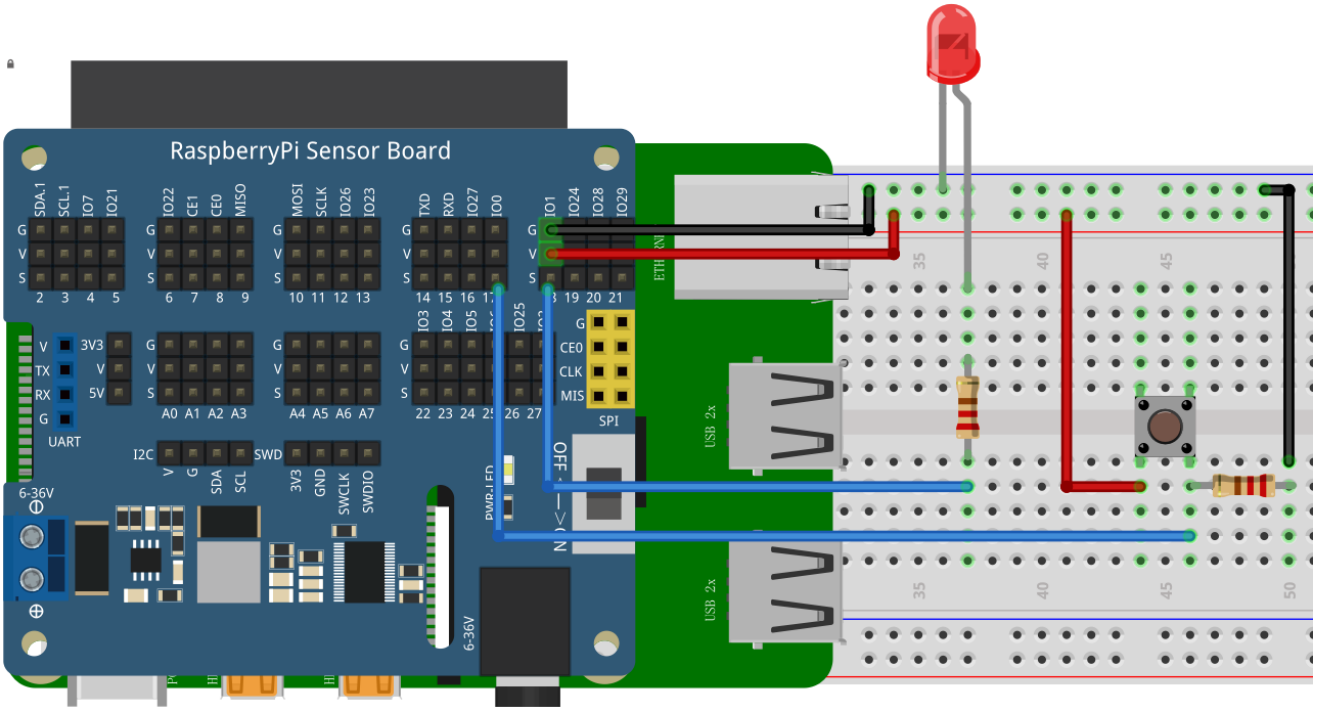
We connect the button to the IO0 interface and the red LED to the IO1 interface.

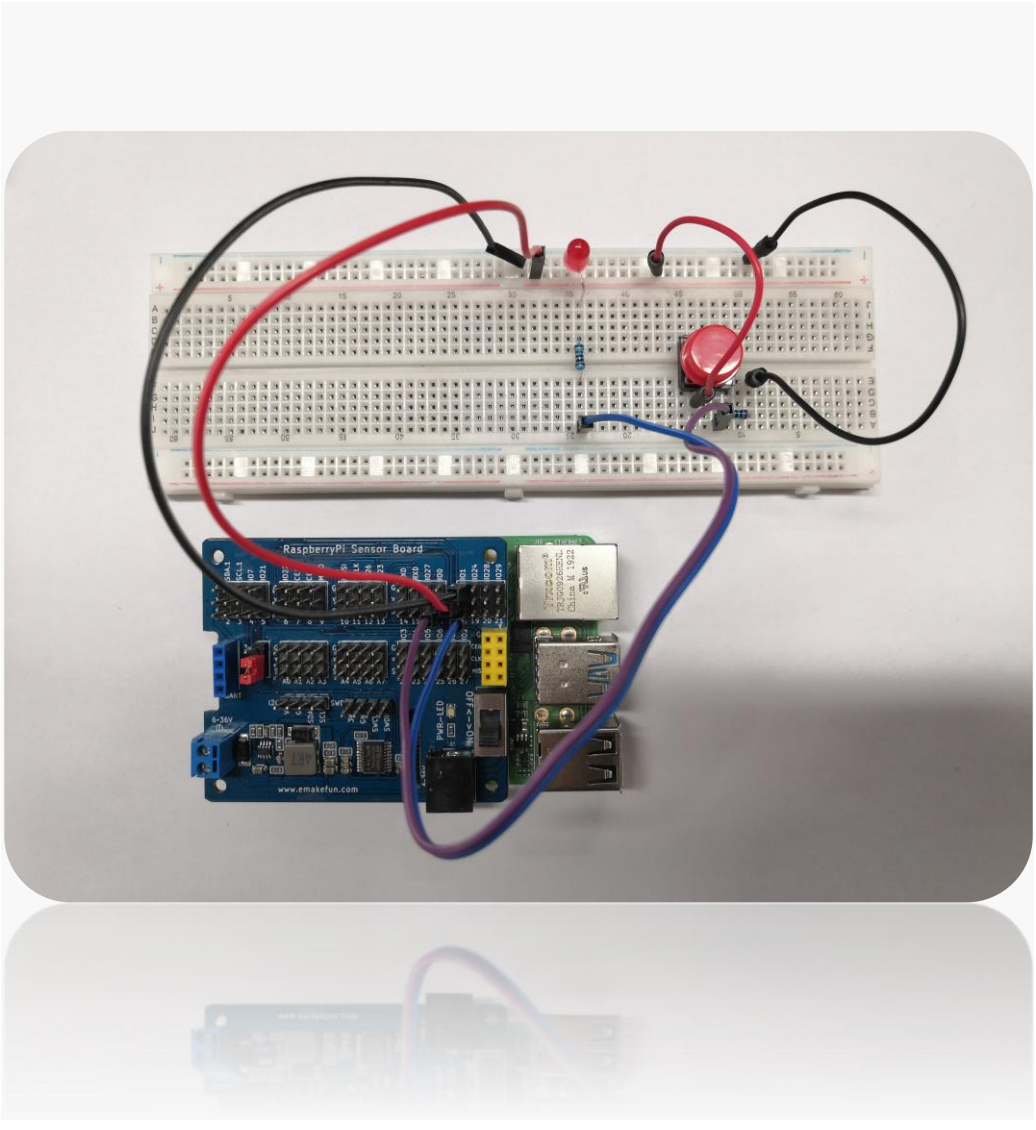
Component List

- Raspberry Pi main board
- Breadboard
- USB Data cable
- Key Switch * 1
- LED Module * 1
- Several jumper wires

Wiring

Raspberry Pi	Key Module Screen Printing	LED
IO0(wiringPi)/17(BCM)	OUT	
IO1(wiringPi)/18(BCM)		VCC
GND	GND（can without）	
+5V	VCC	GND


RaspberryPi Sensor Board
UART
I2C
SPI
USB 2x
USB 2x
6-36V
OFF
ON


RaspberryPi Sensor Board
www.emakefun.com

Experimental Purpose

Via analysis the circuit schematic diagram, we know that while the button is pressed, and the IO0 interface is low level voltage and the IO1 output pin is set to high level voltage, so that the light can be lit. While the button is released, and the IO0 interface is a high level voltage and the IO1 output pin is set to low level voltage, and then the light will go out at this time. The principle is the same as above.

C++ program

```
#include <wiringPi.h>
#include <stdio.h>
#define BtnPin       0
#define LEDpin       1

int main(void)
{
    if(wiringPiSetup() == -1){ //when initialize wiring failed,print messageto screen
        printf("setup wiringPi failed !");
        return 1;
    }
    pinMode(BtnPin, INPUT);
    pinMode(LEDpin, OUTPUT);
    while(1)
    {
        if(1 == digitalRead(BtnPin))
        {
            delay(20);
            if(1 == digitalRead(BtnPin))
            {
                digitalWrite(LEDpin, HIGH);
            }
        }
        else {
            digitalWrite(LEDpin, LOW);
        }
    }
    return 0;
}
```

Python program

```
import RPi.GPIO as GPIO
button = 17
led = 18

GPIO.setmode(GPIO.BCM)
GPIO.setup(led,GPIO.OUT)
GPIO.setup(button,GPIO.IN)


while True:

    if GPIO.input(button):

        GPIO.output(led,GPIO.HIGH)
    else:
        GPIO.output(led,GPIO.LOW)
GPIO.cleanup()
```

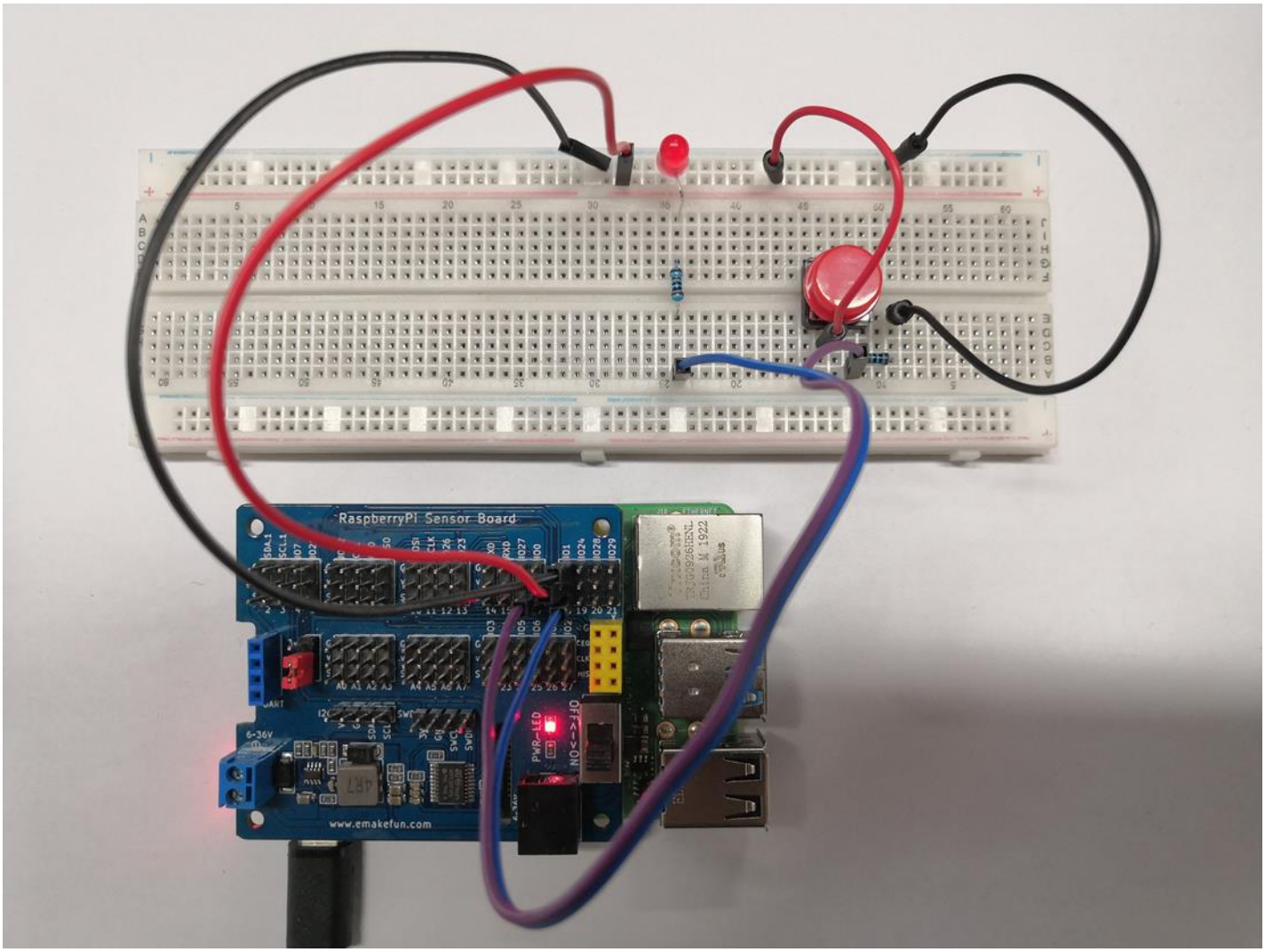
Run and compile these programs to complete this key switch experiment. The experimental principle of the LED module we use is very simple and it is extensively used in various circuits and electrical appliances. We can easily find it in various devices in real life. For instance, if we randomly press the buttons on the mobile phone, the backlight of the mobile phone will turn on, and if we click the elevator button, the indicator light on the elevator will light up and so on.

Java program

```
import java.util.concurrent.Callable;

import com.pi4j.io.gpio.GpioController;
import com.pi4j.io.gpio.GpioFactory;
import com.pi4j.io.gpio.GpioPinDigitalInput;
import com.pi4j.io.gpio.GpioPinDigitalOutput;
import com.pi4j.io.gpio.PinPullResistance;
import com.pi4j.io.gpio.PinState;
import com.pi4j.io.gpio.RaspiPin;
import com.pi4j.io.gpio.trigger.GpioCallbackTrigger;
```

```
import com.pi4j.io.gpio.trigger.GpioPulseStateTrigger;
import com.pi4j.io.gpio.trigger.GpioSetStateTrigger;
import com.pi4j.io.gpio.trigger.GpioSyncStateTrigger;

public class Button {

    public static void main(String[] args) throws InterruptedException {

        // create gpio controller
        final GpioController gpio = GpioFactory.getInstance();

        // provision gpio pin #02 as an input pin with its internal pull down resistor enabled
        final GpioPinDigitalInput myButton =
gpio.provisionDigitalInputPin(RaspiPin.GPIO_00,
                                              PinPullResistance.PULL_DOWN);
        // setup gpio pins #01 as an output pins and make sure they are all LOW at startup
        GpioPinDigitalOutput myLed[] = {
            gpio.provisionDigitalOutputPin(RaspiPin.GPIO_01, "LED #1", PinState.LOW),
          };

        // create a gpio control trigger on the input pin ; when the input goes LOW, also
set gpio pin #01 to LOW
        myButton.addTrigger(new GpioSetStateTrigger(PinState.LOW, myLed[0],
PinState.LOW));

        // create a gpio control trigger on the input pin ; when the input goes HIGH, also
set gpio pin #01 to HIGH
        myButton.addTrigger(new GpioSetStateTrigger(PinState.HIGH, myLed[0],
PinState.HIGH));

        // keep program running until user aborts (CTRL-C)
        for (;;) {
            Thread.sleep(500);
        }

        // stop all GPIO activity/threads by shutting down the GPIO controller
        // (this method will forcefully shutdown all GPIO monitoring threads and scheduled
tasks)
        // gpio.shutdown();   <--- implement this method call if you wish to terminate the
Pi4J GPIO controller
    }
}
```

Experimental Effect



The LED light is on when the button is pressed and it goes out when the button is released.