18.Analog_Joystick_Module

Introduction

In this lesson, we will read the output data of Joystick and print it to the screen.

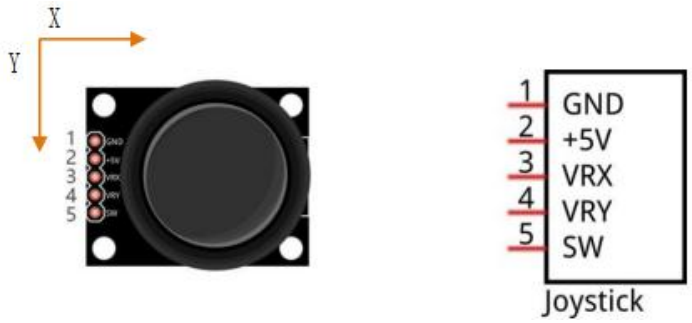
Hardware Required

- ✓ 1 * Raspberry Pi
- ✓ 1 * T-Extension Board
- ✓ 1 * Joystick Module
- ✓ 1 * 40-pin Cable
- ✓ 1 * PCF8591
- ✓ Several Jumper Wires
- ✓ 1 * Breadboard

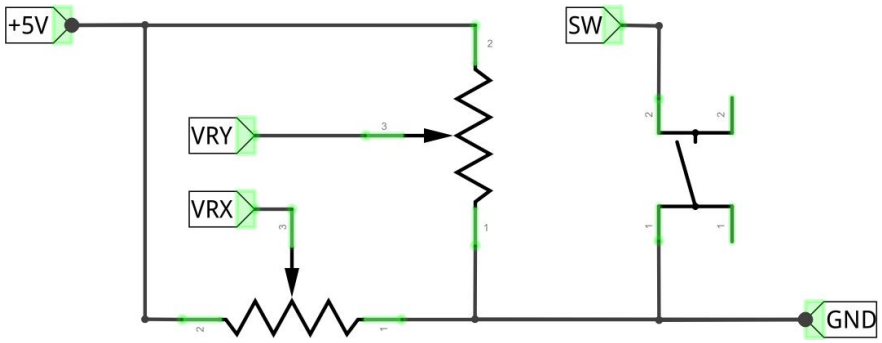
Principle

Analog Joystick Module

Joystick is a kind of sensor used with your fingers, which is widely used in gamepad and remote controller. It can shift in direction Y or direction X at the same time. And it can also be pressed in direction Z.



Two rotary potentiometers inside the joystick are set to detect the shift direction of finger, and a push button in vertical direction is set to detect the action of pressing.



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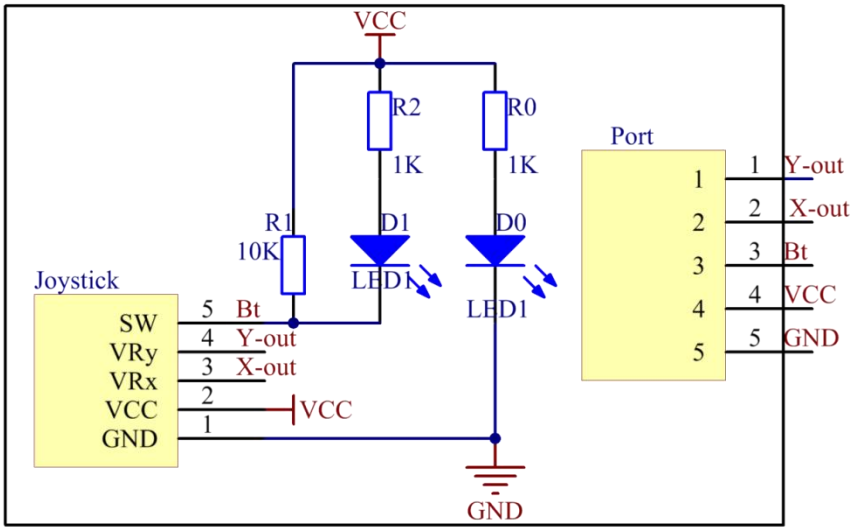
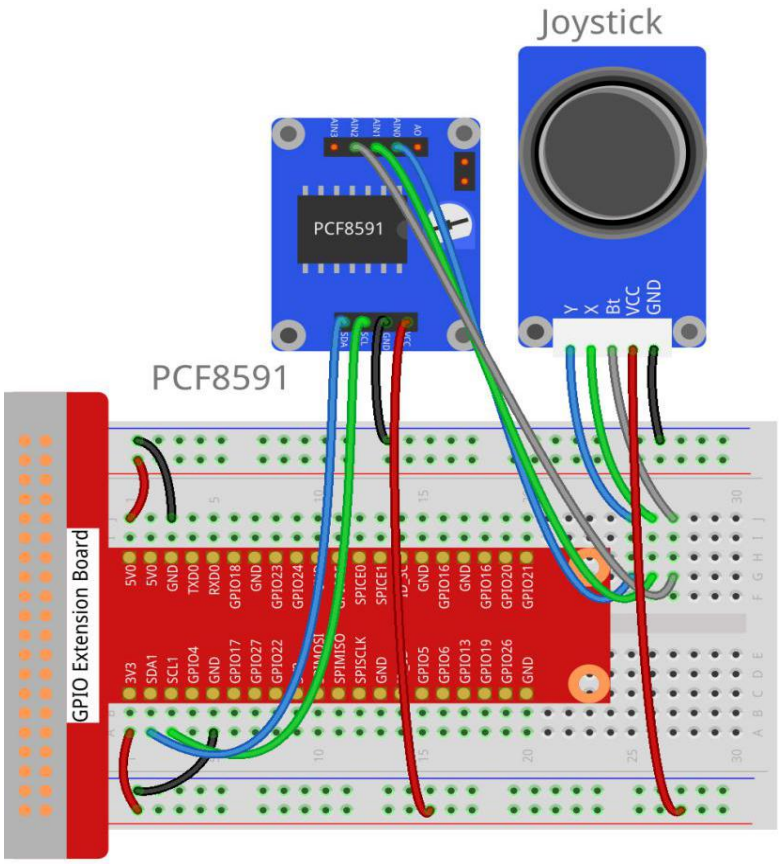
When read the data of joystick, there are some different between axis: data of X and Y axis is analog, which need to use ADC. Data of Z axis is digital, so you can directly use the GPIO to read, or you can also use ADC to read.

Schematic Diagram



Experimental Procedures

Step 1: Build the circuit.



For C Language Users

Step 2: Open the code file.

```
cd /home/pi/REXQualis_Raspberry_Pi_Complete_Starter_Kit/C/18.Analog_Joystick
```

Step 3: Compile the code.

```
gcc 18.Analog_Joystick.c -o Analog_Joystick.out -lwiringPi
```

Step 4: Run the executable file above.

```
sudo ./Analog_Joystick.out
```

After Program is executed, the terminal window will print out the data of 3 axes X, Y, Z. And shifting the Joystick or pressing it will make those data change.

Code

```
#include <stdio.h>
#include <wiringPi.h>
#include <pcf8591.h>      //use lib pcf8591

#define PCF             120
#define uchar      unsigned char

int AIN0 = PCF + 0;
int AIN1 = PCF + 1;
int AIN2 = PCF + 2;

//char *state[7] = {"home", "up", "down", "left", "right", "pressed"};

int direction(){
    int x, y, b;
    int tmp;
    x = analogRead(AIN1);
```

```
    y = analogRead(AIN0);
    b = analogRead(AIN2);
    if (y == 0)
        tmp = 1;      // up
    if (y == 255)
        tmp = 2;      // down

    if (x == 255)
        tmp = 3;      // left
    if (x == 0)
        tmp = 4;      // right

    if (y>=125 && b == 0)
        tmp = 5;      // button preesd
    if (x-125<15 && x-125>-15 && y-125<15 && y-125>-15 && b == 255)
        tmp = 0;      // home position

    return tmp;
}

int main (void)
{
    int tmp;
    int status = 0;
    wiringPiSetup ();
    // Setup pcf8591 on base pin 120, and address 0x48
    pcf8591Setup (PCF, 0x48);
    while(1) // loop forever
    {
```

```
        tmp = direction();
        if (tmp != status)
        {
            switch(tmp)
            {
                case 0: printf("home\n");break;
                case 1: printf("up\n");break;
                case 2: printf("down\n");break;
                case 3: printf("left\n");break;
                case 4: printf("right\n");break;
                case 5: printf("pressed\n");break;
            }
            status = tmp;
        }
    }
    return 0 ;
}
```

Code Explanation

```
int direction(){
    int x, y, b;
    int tmp;
    x = analogRead(AIN1);
    y = analogRead(AIN0);
    b = analogRead(AIN2);
    if (y == 0)
        tmp = 1;      // up
    if (y == 255)
        tmp = 2;      // down
```

```
    if (x == 255)
        tmp = 3;      // left
    if (x == 0)
        tmp = 4;      // right

    if (y>=125 && b == 0)
        tmp = 5;      // button preesd
    if (x-125<15 && x-125>-15 && y-125<15 && y-125>-15 && b == 255)
        tmp = 0;      // home position

    return tmp;
}
```

Configure Z_Pin to pull-up input mode. In while cycle of main function, use analogRead () to read the value of axis X and Y and use digitalRead () to read the value of axis Z, then print them out.

For Python Language Users

Step 2: Open the code file.

```
cd /home/pi/REXQualis_Raspberry_Pi_Complete_Starter_Kit/Python
```

Step 3: Run.

```
sudo python3 18.Analog_Joystick.py
```

After Program is executed, the terminal window will print out the data of 3 axes X, Y, Z. And shifting the Joystick or pressing it will make those data change.

Code

The code here is for Python3, if you need for Python2, please open the code with the suffix py2 in the attachment.

```
#!/usr/bin/env python3

import PCF8591 as ADC
```

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```
import time

def setup():
    ADC.setup(0x48)                    # Setup PCF8591
    global state

def direction():   #get joystick result
    state = ['home', 'up', 'down', 'left', 'right', 'pressed']
    i = 0
    if ADC.read(0) <= 30:
        i = 1          #up
    if ADC.read(0) >= 225:
        i = 2          #down

    if ADC.read(1) >= 225:
        i = 3          #left
    if ADC.read(1) <= 30:
        i = 4          #right

    if ADC.read(2) <= 30:
        i = 5          # Button pressed

    if ADC.read(0) - 125 < 15 and ADC.read(0) - 125 > -15 and ADC.read(1) - 125
< 15 and ADC.read(1) - 125 > -15 and ADC.read(2) == 255:
        i = 0

    return state[i]

def loop():
```

```
    status = ''
    while True:
        tmp = direction()
        if tmp != None and tmp != status:
            print (tmp)
            status = tmp


def destroy():
    pass


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()
```

Phenomenon Picture

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