Voice control stepper motor

1. Learning target

1.1 In this course, we will learn how to use pins of the Raspberry Pi Pico board.

1.2 How to use sound sensor module, relay module, stepper motor and motor drive module to make voice control stepper motor device.

2. Preparation

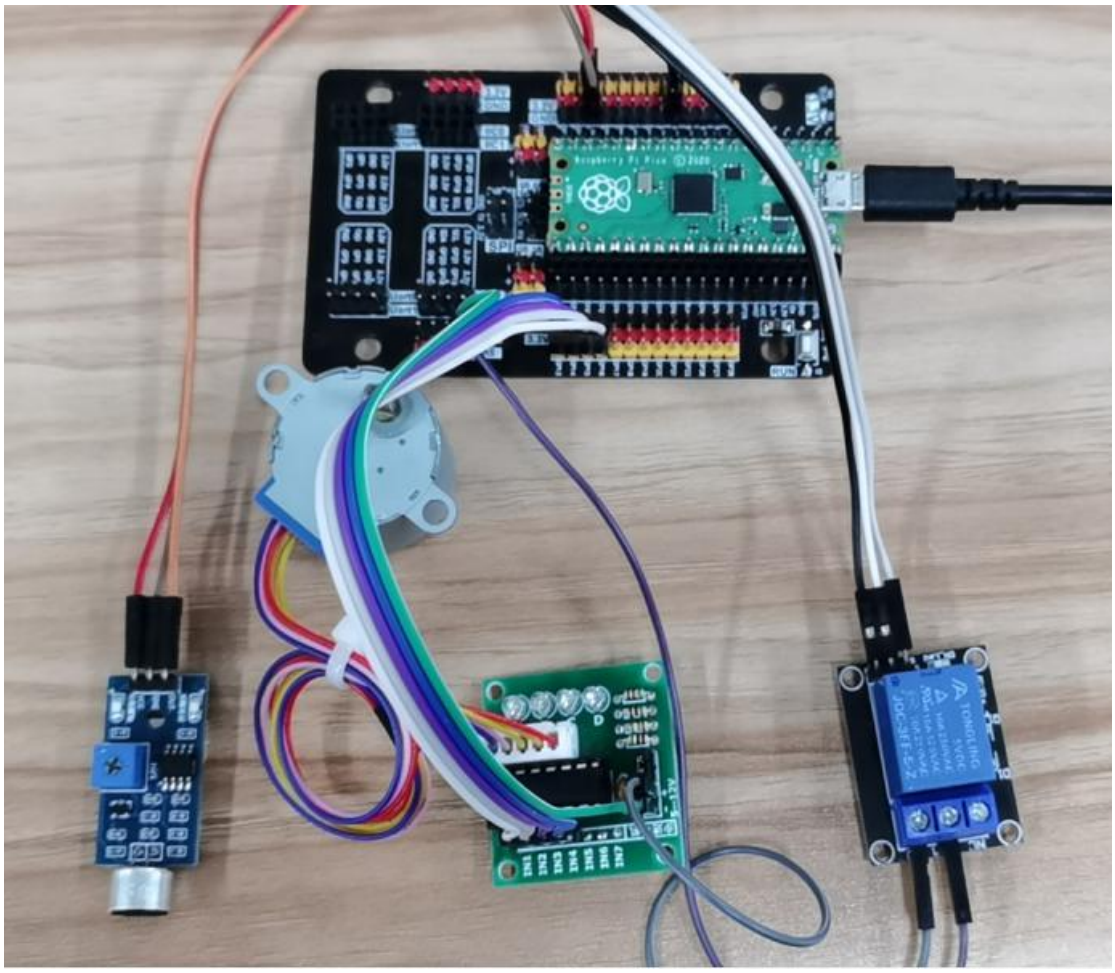
Raspberry Pi Pico board *1
Pico sensor expansion board *1
PC *1
USB data cable *1
Sound sensor module *1
Relay module *1
Stepper motor *1
Motor drive module *1
Female-to-male DuPont line *2
Male-to-male DuPont line *11

3. About wiring

Sound sensor module	Pico sensor expansion board
OUT	GP10
VCC	3.3V
GND	GND

Relay module	Pico sensor expansion board
+	3.3V
S	GP4
-	GND
COM	5V
NO	**+ (Motor drive module)**

motor drive module	Pico sensor expansion board
-	GND
IN1	GP16
IN2	GP15
IN3	GP14
IN4	GP13
+	**NO(Relay module)**



4. About code

Thonny programming

About how to using ThonnyIDE, please check the tutorials in【2.Development environment】.

```
from machine import Pin
import utime
import _thread

# Onboard LED light initialization
led = Pin(25, Pin.OUT)

# Sound sensor module pin initialization
sound = Pin(10, Pin.IN)

# Pin initialization
in1 = Pin(16, Pin.OUT)
in2 = Pin(15, Pin.OUT)
in3 = Pin(14, Pin.OUT)
in4 = Pin(13, Pin.OUT)

# Relay pin initialization
```

```
relay = Pin(4, Pin.OUT)

delay = 1

# The number of revolutions required for a lap
ROUND_VALUE = 509

# The sequence value of a four-phase eight-beat stepper motor.
STEP_VALUE = [
    [0, 0, 0, 1],
    [0, 0, 1, 1],
    [0, 0, 1, 0],
    [0, 1, 1, 0],
    [0, 1, 0, 0],
    [1, 1, 0, 0],
    [1, 0, 0, 0],
    [1, 0, 0, 1],
]

# Open on board LED
def led_on():
    led.value(1)

# Close on board LED
def led_off():
    led.value(0)

# Read the state of the sound module, return True if the sound exceeds the threshold, and return
False if it does not exceed the threshold
def sound_state():
    if sound.value() == 0:
        return True
    return False

# Pin output low level
def reset():
    in1(0)
    in2(0)
    in3(0)
    in4(0)

def step_run(count):
    direction = -1        # Clockwise
    if count < 0:
```

```
            direction = 1    # Counterclockwise
            count = -count
        for x in range(count):
            for bit in STEP_VALUE[::direction]:
                in1(bit[0])
                in2(bit[1])
                in3(bit[2])
                in4(bit[3])
                utime.sleep_ms(delay)
        reset()

#If a positive integer is clockwise, negative integer is counterclockwise
def step_angle(a):
        step_run(int(ROUND_VALUE * a / 360))

# The relay is opened, COM and NO are connected on the relay, and COM and NC are disconnected.
def relay_on():
        relay(1)

# The relay is closed, the COM and NO on the relay are disconnected, and the COM and NC are
connected.
def relay_off():
        relay(0)

# Run stepper motor
def task_1():
        while True:
            step_run(1)



def main():
        _thread.start_new_thread(task_1, ())
        time_point = utime.ticks_ms()

        motor_state = False
        # Loop, detect sound module
        while True:
            if sound_state() == True:
                # Sound filtering for 300 milliseconds to avoid repeated detection
                if utime.ticks_ms() - time_point >= 300:
                    print("get sound")
                    time_point = utime.ticks_ms()
                    motor_state = not motor_state
```

```
            if motor_state:
                # Open the relay switch
                relay_on()
                led_on()
            else:
                # Close the relay switch
                relay_off()
                led_off()

try:
    main()
except KeyboardInterrupt:
    _thread.exit()
```

5. Phenomenon

Click the green run button  of Thonny IDE to start running the program. Click the red stop button  to stop the program. When the program is running, blow into the sound sensor module. When the sound intensity exceeds the threshold, the relay module will turn on the switch and the stepper motor will start to rotate.

If the sound sensor receives a sound exceeding the threshold again, the relay module will close the switch and the stepper motor will stop rotating.