

## IIC control servo

### 1. Learning goals

In this course, we mainly learn to use Raspberry Pi and 16-channels servo debugging board to control the servo through IIC.

### 2. Preparation

Connect the SDA and SCL of the module to the GP20 and GP21 pins of the Pico board. VCC and GND are connected to 3.3V and GND of Raspberry Pi board respectively. As shown below.

**!Tip: Raspberry Pi needs to enable I2C service.**

| Raspberry Pi GPIO Header + PoE Header |                                    |  |                                    |      |
|---------------------------------------|------------------------------------|--|------------------------------------|------|
| Pin#                                  | NAME                               |  | NAME                               | Pin# |
| 01                                    | 3.3v DC Power                      |  | DC Power 5v                        | 02   |
| 03                                    | GPIO02 (SDA1 , I <sup>2</sup> C)   |  | DC Power 5v                        | 04   |
| 05                                    | GPIO03 (SCL1 , I <sup>2</sup> C)   |  | Ground                             | 06   |
| 07                                    | GPIO04 (GPIO_GCLK)                 |  | (TXD0) GPIO14                      | 08   |
| 09                                    | Ground                             |  | (RXD0) GPIO15                      | 10   |
| 11                                    | GPIO17 (GPIO_GEN0)                 |  | (GPIO_GEN1) GPIO18                 | 12   |
| 13                                    | GPIO27 (GPIO_GEN2)                 |  | Ground                             | 14   |
| 15                                    | GPIO22 (GPIO_GEN3)                 |  | (GPIO_GEN4) GPIO23                 | 16   |
| 17                                    | 3.3v DC Power                      |  | (GPIO_GEN5) GPIO24                 | 18   |
| 19                                    | GPIO10 (SPI_MOSI)                  |  | Ground                             | 20   |
| 21                                    | GPIO09 (SPI_MISO)                  |  | (GPIO_GEN6) GPIO25                 | 22   |
| 23                                    | GPIO11 (SPI_CLK)                   |  | (SPI_CE0_N) GPIO08                 | 24   |
| 25                                    | Ground                             |  | (SPI_CE1_N) GPIO07                 | 26   |
| 27                                    | ID_SD (I <sup>2</sup> C ID EEPROM) |  | (I <sup>2</sup> C ID EEPROM) ID_SC | 28   |
| 29                                    | GPIO05                             |  | Ground                             | 30   |
| 31                                    | GPIO06                             |  | GPIO12                             | 32   |
| 33                                    | GPIO13                             |  | Ground                             | 34   |
| 35                                    | GPIO19                             |  | GPIO16                             | 36   |
| 37                                    | GPIO26                             |  | GPIO20                             | 38   |
| 39                                    | Ground                             |  | GPIO21                             | 40   |
|                                       |                                    |  |                                    |      |
| 01                                    | TR01                               |  | TR00                               | 02   |
| 03                                    | TR03                               |  | TR02                               | 04   |

2.2 After the Raspberry Pi I2C is enabled, input command **lmusb** in the terminal to check whether the I2C is successfully started.

```

videobuf2_dma_contig    20480  1 bcm2835_codec
videobuf2_vmalloc       16384  1 bcm2835_v4l2
videobuf2_memops        16384  2 videobuf2_dma_contig,videobuf2_vmal
videobuf2_v4l2          24576  3 bcm2835_codec,bcm2835_v4l2,v4l2_mem
videobuf2_common        45056  4 bcm2835_codec,bcm2835_v4l2,v4l2_mem
videodev                200704  6 bcm2835_codec,v4l2_common,videobuf2
media                   36864  2 videodev,v4l2_mem2mem
argmon_mem              16384  0
uio_pdrv_genirq         16384  0
uio                     20480  1 uio_pdrv_genirq
fixed                   16384  0
i2c_dev                 16384  0
i2c_bcm2708             16384  0
snd_bcm2835             24576  2
snd_pcm                 102400  1 snd_bcm2835
snd_timer               32768  1 snd_pcm
snd                     73728  7 snd_timer,snd_bcm2835,snd_pcm
ip_tables               24576  0
x_tables                32768  1 ip_tables
ipv6                   450560  26
pi@raspberrypi:~/speech $

```

2.3 Download i2c-tools, the software can monitor the usage and faults of hardware devices.

Input command: **sudo apt-get install i2c-tools**

Input command: **i2cdetect -y -a 1** in the terminal.

Check if there is an IIC device: 0x52 or 0x29

### 3. About code

Please refer to **16CServo-iic.py**

```
Servo_ADD = 0x2D
```

IIC control servo function

```
def IICServo(servonum, angle):
    bus.write_byte_data(Servo_ADD, servonum, angle)
    time.sleep(0.1)
```

Set the servo S1 angle to 0

```
IICServo(1,0)
```

### 4. Running code

Input following command in the terminal to run the program.

```
python 16CServo-iic.py
```

### 5. Phenomenon

After the program is run successfully. The servo will rotate 0°, after 2s it will rotate 180°.