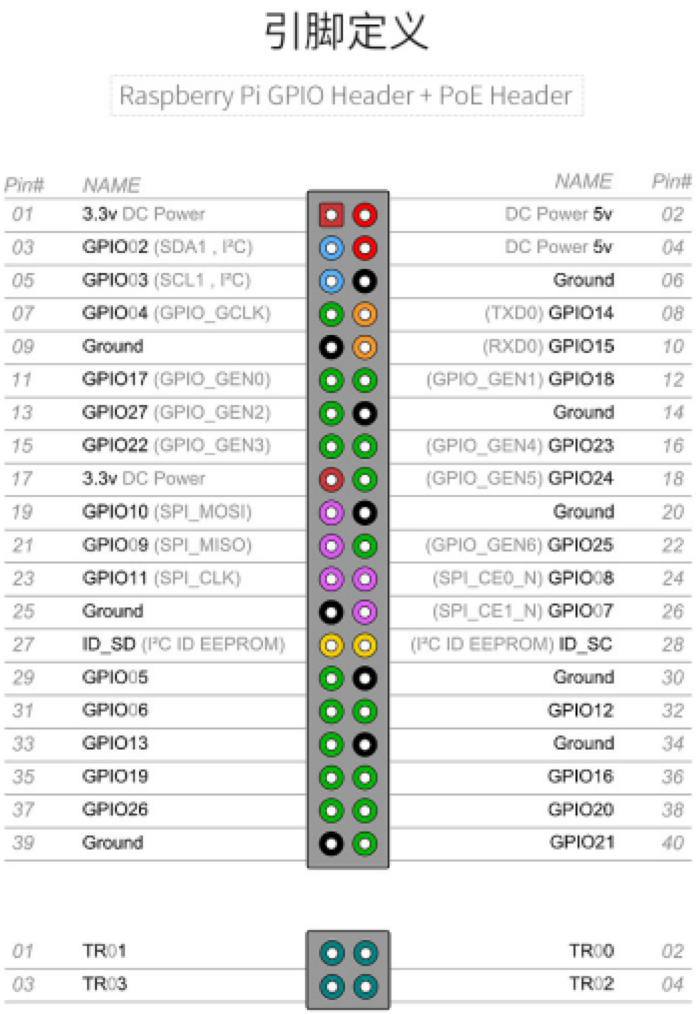
Serial port control servo

1.learning target

In this course, we mainly learn to use the Raspberry Pi 5 and the 16-channel servo drive module to realize serial port control of the servo.

2.Preparation before class

- In this example, the 16-channel servo drive module uses serial communication. Connect the TXD and RXD of the module to the IO15 and IO14 pins of the Raspberry Pi 5 board respectively. VCC and GND are connected to the 3.3V and GND of the Raspberry Pi respectively.



引脚定义

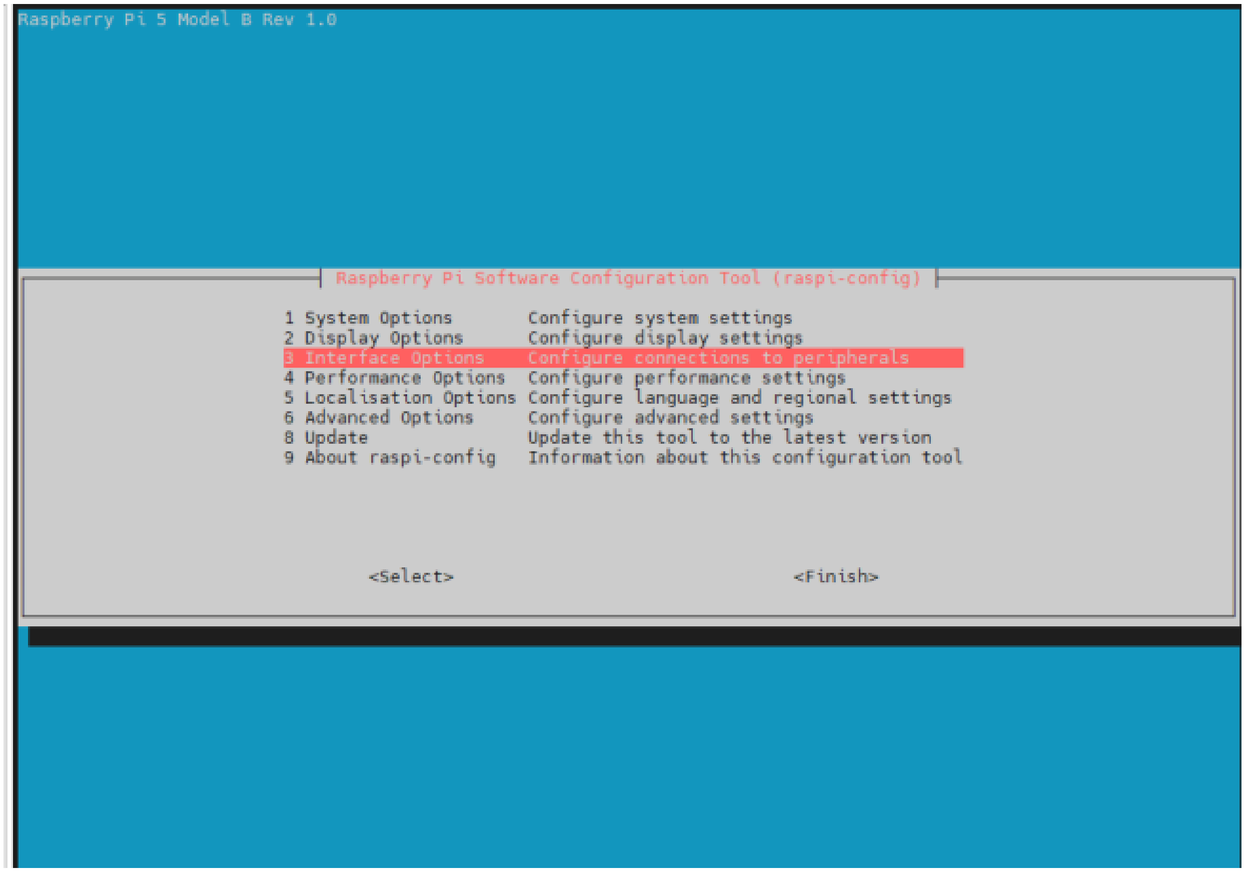
Raspberry Pi GPIO Header + PoE Header

Pin#	NAME	NAME	Pin#
01	3.3v DC Power	DC Power 5v	02
03	GPIO02 (SDA1 , I^{2}C)	DC Power 5v	04
05	GPIO03 (SCL1 , I^{2}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^{2}C ID EEPROM)	(I^{2}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

Pin#	NAME	NAME	Pin#
01	TR01	TR00	02
03	TR03	TR02	04

The Raspberry Pi needs to assign the ttyAMA0 port to the GPIO serial ports TXD0 and RXD0. The specific method is as follows.

Enter sudo raspi-config to enter the Raspberry Pi system configuration interface and select the third Interfacing Options:



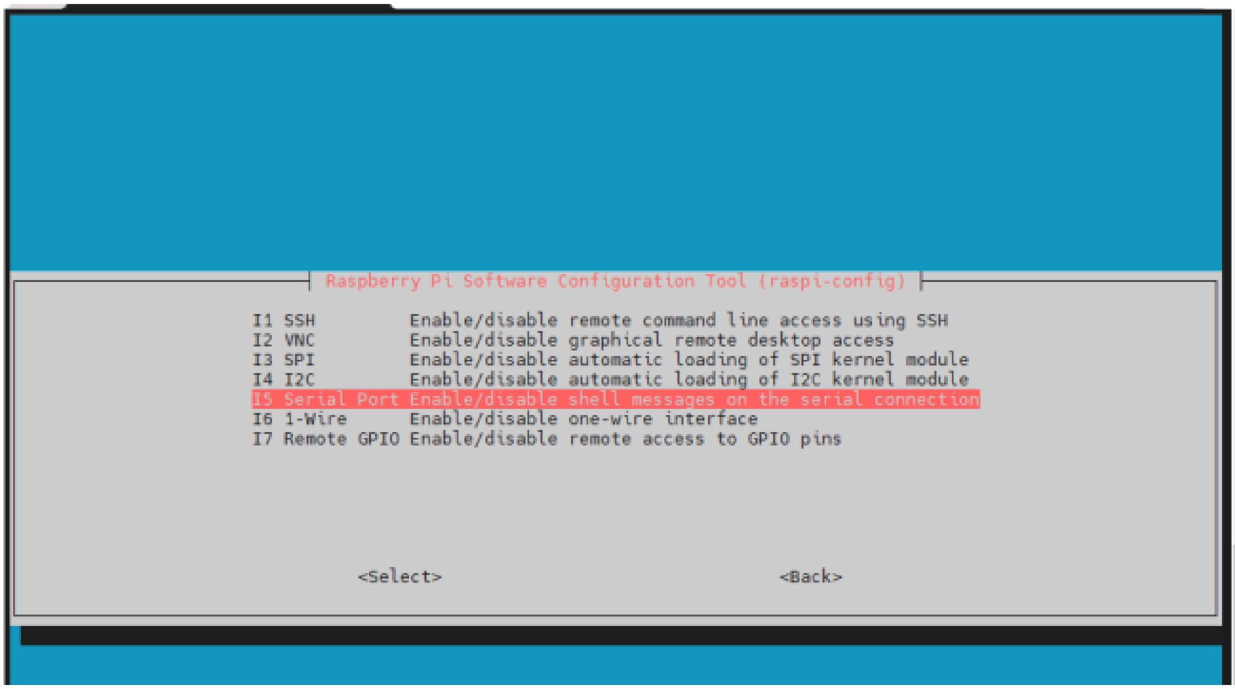
```
Raspberry Pi 5 Model B Rev 1.0

              Raspberry Pi Software Configuration Tool (raspi-config)

         1 System Options       Configure system settings
         2 Display Options      Configure display settings
         3 Interface Options    Configure connections to peripherals
         4 Performance Options  Configure performance settings
         5 Localisation Options Configure language and regional settings
         6 Advanced Options     Configure advanced settings
         8 Update               Update this tool to the latest version
         9 About raspi-config   Information about this configuration tool

                 <Select>                                <Finish>
```

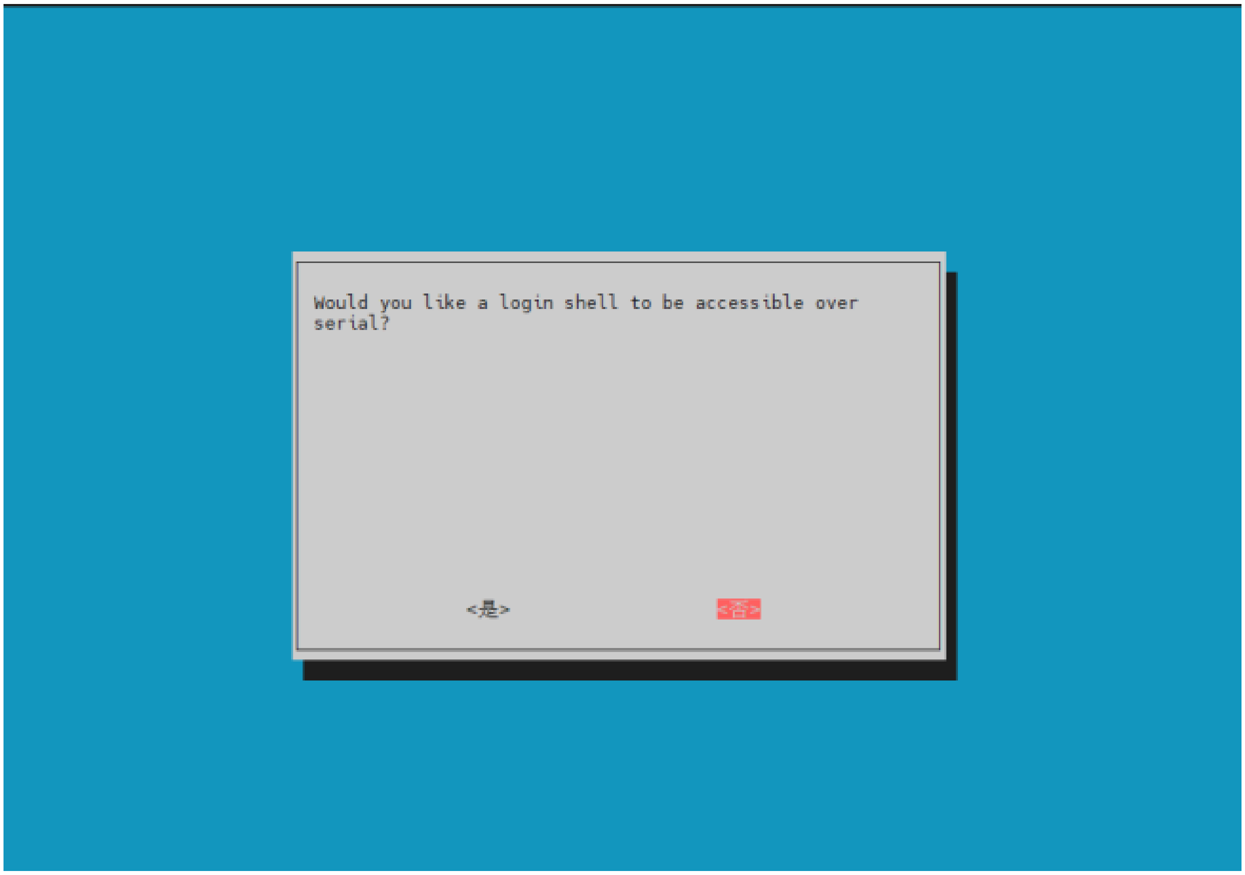
Enter the I5 Serial Port option



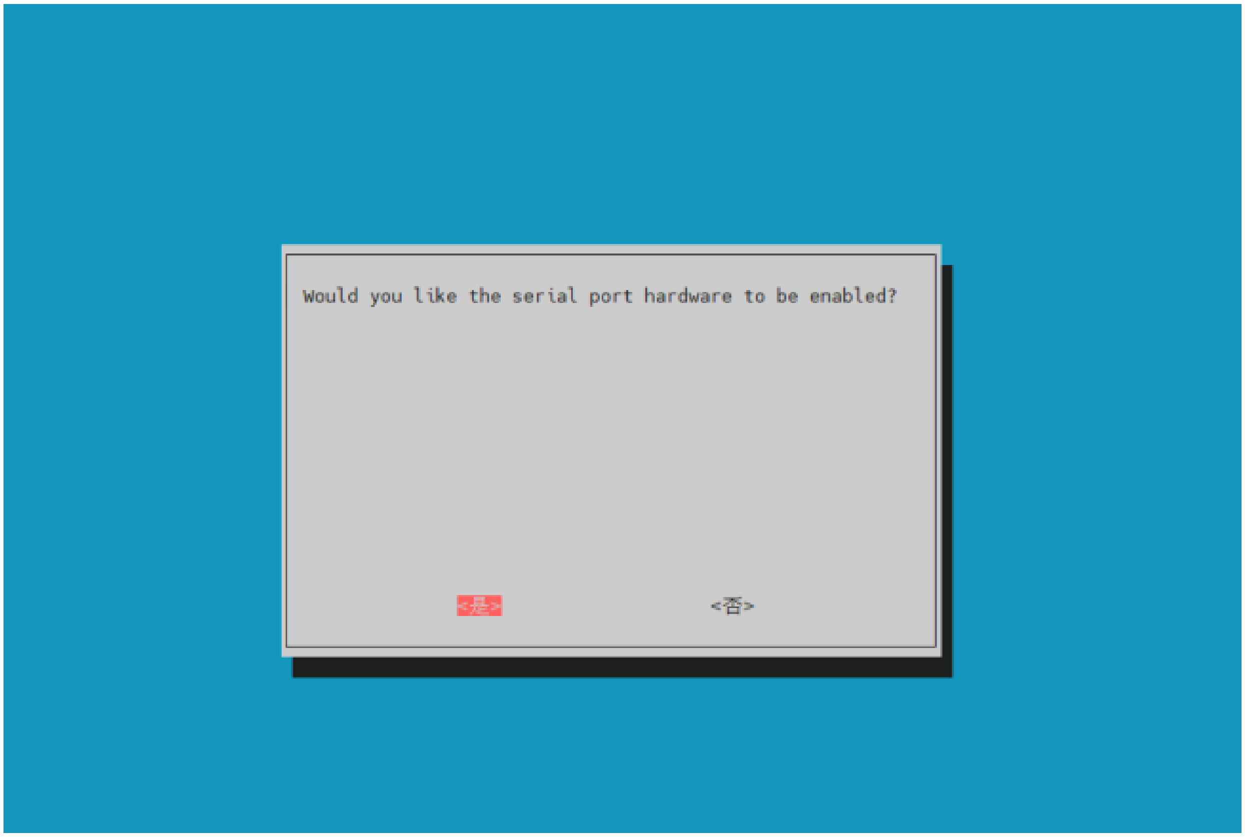
```
Raspberry Pi Software Configuration Tool (raspi-config)

I1 SSH         Enable/disable remote command line access using SSH
I2 VNC         Enable/disable graphical remote desktop access
I3 SPI         Enable/disable automatic loading of SPI kernel module
I4 I2C         Enable/disable automatic loading of I2C kernel module
I5 Serial Port Enable/disable shell messages on the serial connection
I6 1-Wire      Enable/disable one-wire interface
I7 Remote GPIO Enable/disable remote access to GPIO pins
```

Select to turn off the serial port login function and turn on the hardware serial port debugging function.

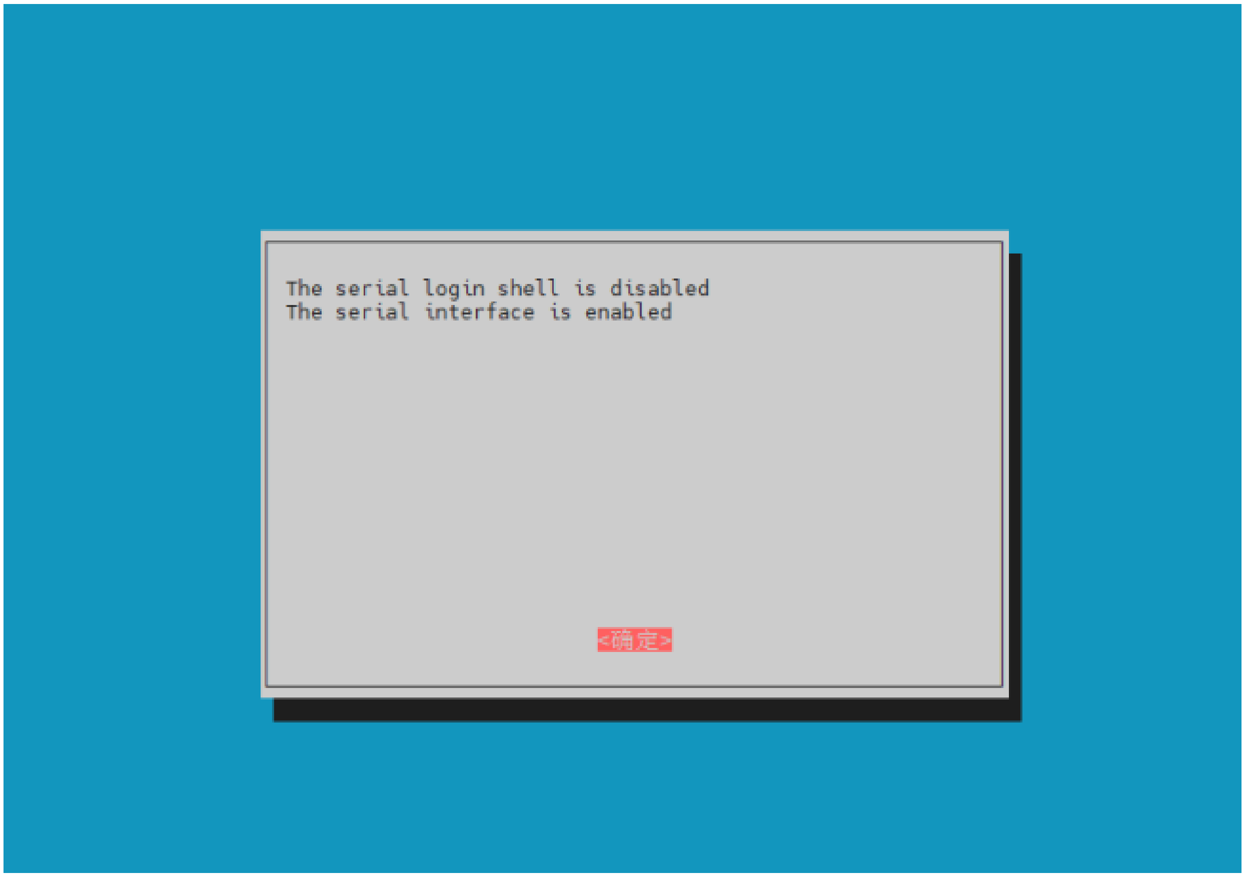


```
Would you like a login shell to be accessible over
serial?
```



```
Would you like the serial port hardware to be enabled?
```

After completion, the following interface will appear, press OK



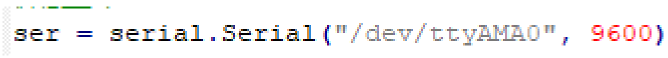
```
The serial login shell is disabled
The serial interface is enabled
```

Exit the raspi-config settings and restart the Raspberry Pi according to the prompts.

3. Run the program

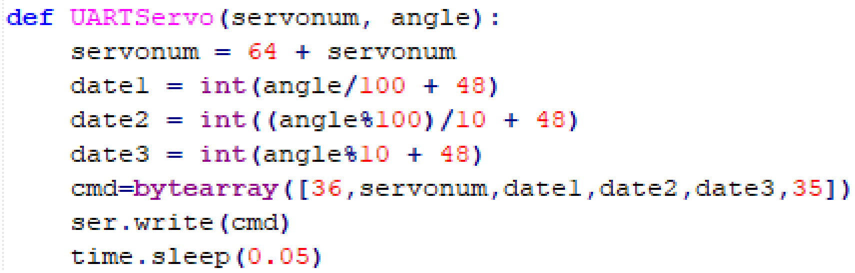
Please refer to the source code file for the program of this course. （**16CServo-uart.py**）

Configure serial port



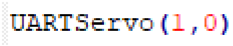
```
ser = serial.Serial("/dev/ttyAMA0", 9600)
```

The serial port controls the servo function. According to the protocol, 36 and 35 are the header and tail of the data packet respectively.



```
def UARTServo(servonum, angle):
    servonum = 64 + servonum
    date1 = int(angle/100 + 48)
    date2 = int((angle%100)/10 + 48)
    date3 = int(angle%10 + 48)
    cmd=bytearray([36,servonum,date1,date2,date3,35])
    ser.write(cmd)
    time.sleep(0.05)
```

Set servo S1 to 0 degrees



```
UARTServo(1,0)
```

Enter python 16CServo-uart.py in the Raspberry Pi 5 terminal to run the program.

4.Experimental phenomena

After the program is run, the servo S1 first turns to 0 degrees, and then turns to 180 degrees after 2 seconds.