

Lesson 15 Serial Communication

Note: please prepare your own USB adapter and the female-to-female Dupont line.

1. Working Principle

The path to the source code of the program is 5. MaxArm Hardware Basic Learning/Arduino Development/Serial Communication/Uart/Uart.ino

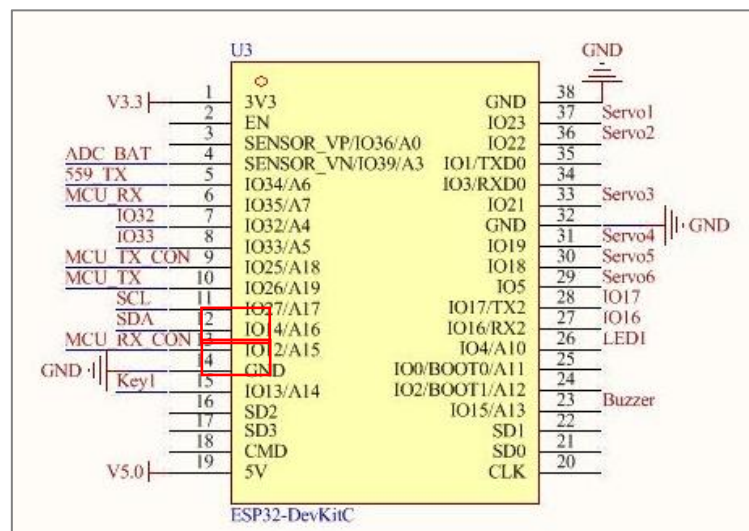
```

6 void setup() {
7   // put your setup code here, to run once:
8   uart.begin(115200,SERIAL_8N1,33,32); // Initialize serial port. The baud rate is 115200; rx:33; tx:32
9 }
10
11 void loop() {
12   // put your main code here, to run repeatedly:
13   uart.println("Hiwonder"); // The serial port prints "Hiwonder"
14   int len = uart.available(); // Return the received available bytes
15   if(len){ // Determine whether data is sent
16     byte buf[len]; // Define cache variables
17     for(int i=0; i<len; i++){
18       buf[i] = uart.read(); // Read the received data based on byte
19     }
20     uart.write(buf, len); // Send data based on byte
21   }
22   delay(1000); |
23 }

```

Among the pins, TXD is the output of the serial port, and RXD is the input of the serial port, i.e, the TXD of chip 1 should be connected to the RXD of chip 2. TTL communicate is used between them and the data can be sent according to the agreed data format.

The following image shows the pin information of ESP32 expansion board.



Firstly, import UART in machine. Then create the message to be sent, and initialize the serial 2, set the baud rate to 115200, and set the 32pin to TX, the 33pin to RX.

When communicating, the serial port will send a string of characters every second and the received data will be printed out in the form of bytes.

2. Preparation

2.1 Hardware

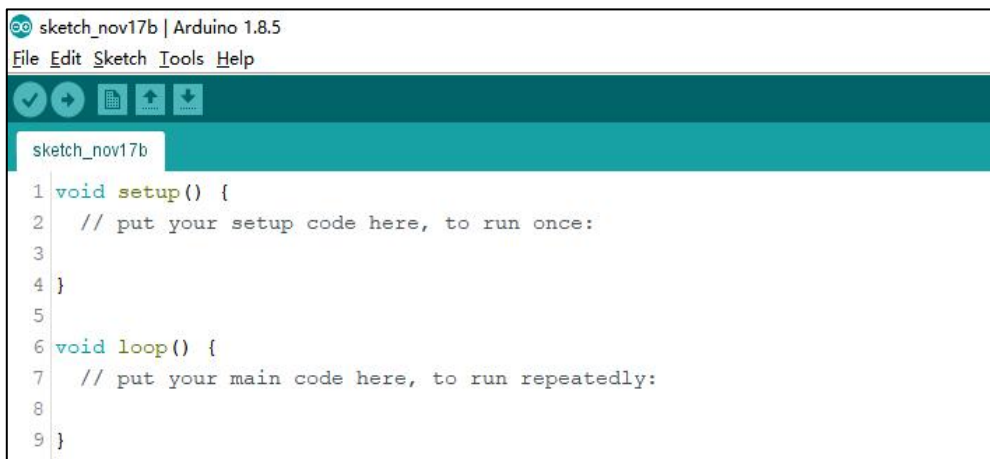
MaxArm robotic arm, power adapter , USB cable, USB adapter, four female-to-female dupond line.

2.2 Software

Please refer to the material in folder “4.MaxArm Underlying Program/Arduino Development/Lesson 1 Set Development Environment” to connect ESP32 controller to Arduino Editor.

3. Program Download

- 1) Double click on  icon to open Arduino IDE.

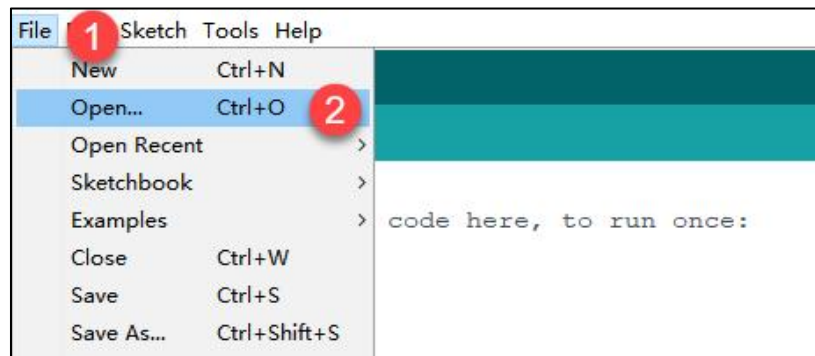


```
sketch_nov17b | Arduino 1.8.5
File Edit Sketch Tools Help

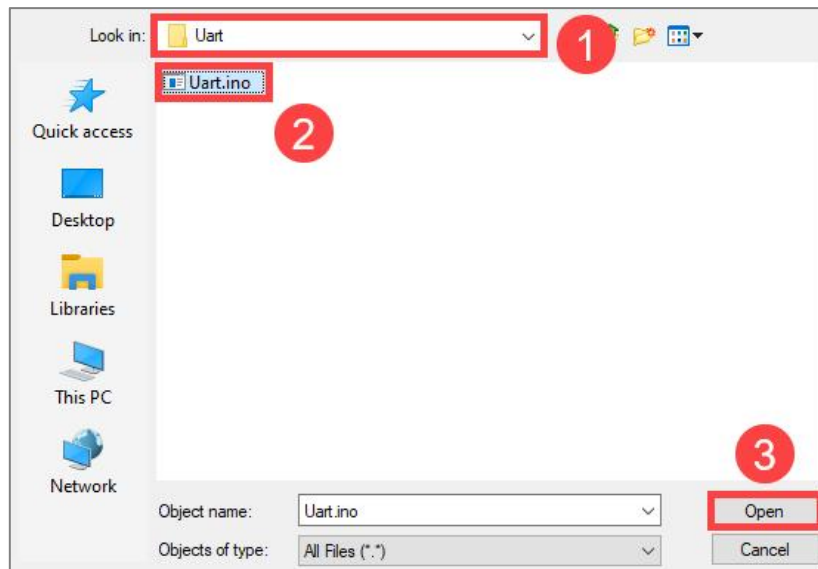
sketch_nov17b

1 void setup() {
2   // put your setup code here, to run once:
3
4 }
5
6 void loop() {
7   // put your main code here, to run repeatedly:
8
9 }
```

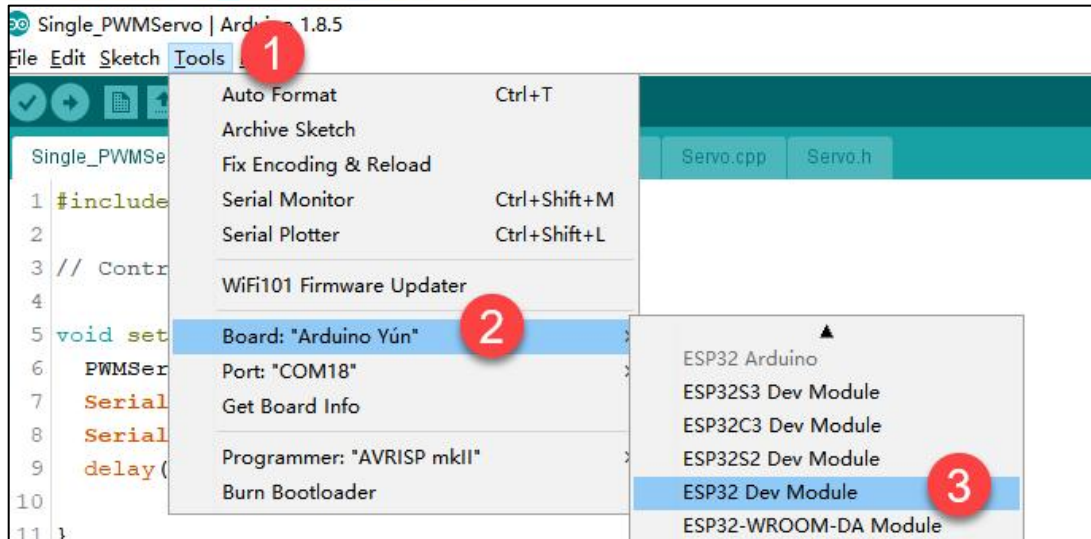
2) Click “File->Open” in turn.



3) Select the program “Uart.ino” in the folder “5.MaxArm Hardware Basic Learning/Arduino Development/Game Programs/Serial Communication/Uart”.

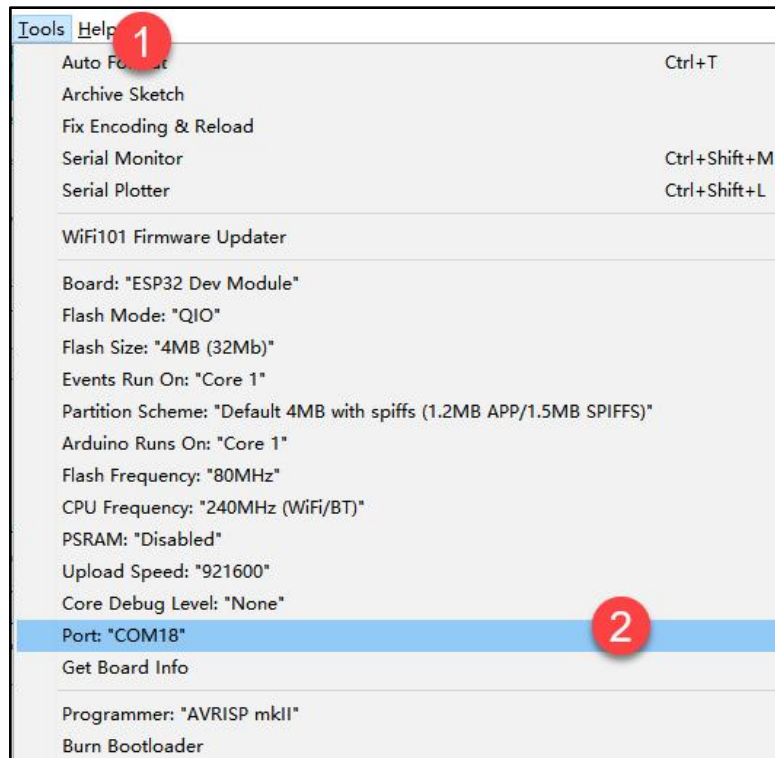


4) Check the board model. Click “Tools->Board” and select “ESP 32 Dev Module”. (If the model of development board has been configured when setting the development environment, you can skip this step.)

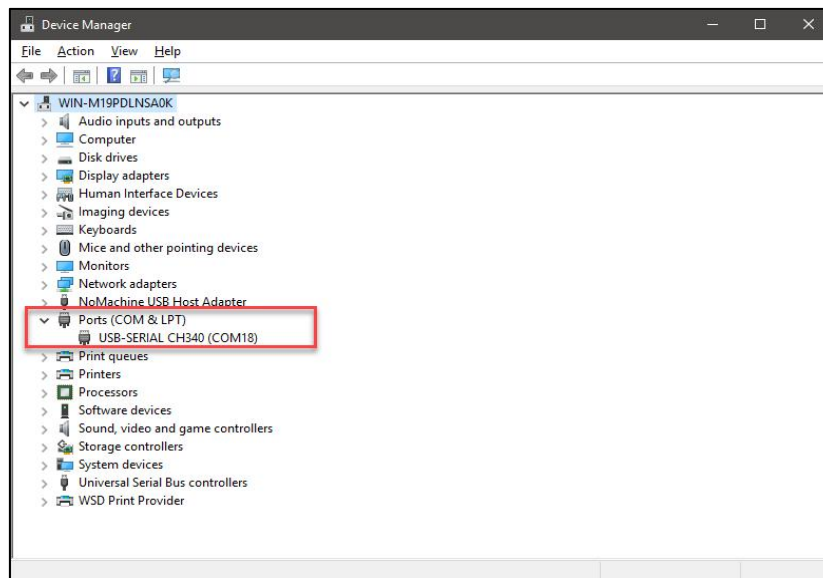


- 5) Select the corresponding port of ESP32 controller in “Tools->Port”. (Here take the port “COM5” as example. Please select the port based on your computer. If COM1 appears, please do not select because it is the system communication port but not the actual port of the development port.)







- 6) If you're not sure about the port number, please open the "This PC" and click "Properties->Device Manager" in turns to check the corresponding port number (the device is with CH340).



- 7) After selecting, confirm the board "ESP32 Dev Module" in the lower right corner and the port number "COM5" (it is an example here, please refer to the actual situation).

- 8) Then click on  icon to verify the program. If no error, the status area will display “Compiling->Compile complete” in turn. After compiling, the information such as the current used bytes, and occupied program storage space will be displayed.

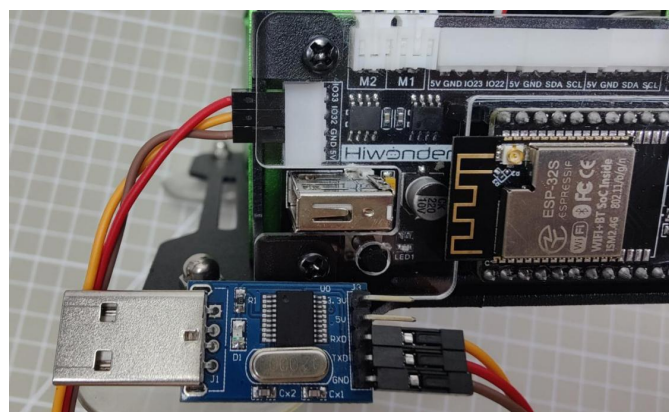
```
Done compiling.
Sketch uses 247733 bytes (18%) of program storage space. Maximum is 1310720 bytes.
Global variables use 16584 bytes (5%) of dynamic memory, leaving 311096 bytes for local variables. Maximum is 327680 bytes.
```

- 9) After compiling, click on  icon to upload the program to the development board. The status area will display “Compiling->Uploading->Complete” in turn. After uploading, the status area will stop printing the uploading information.

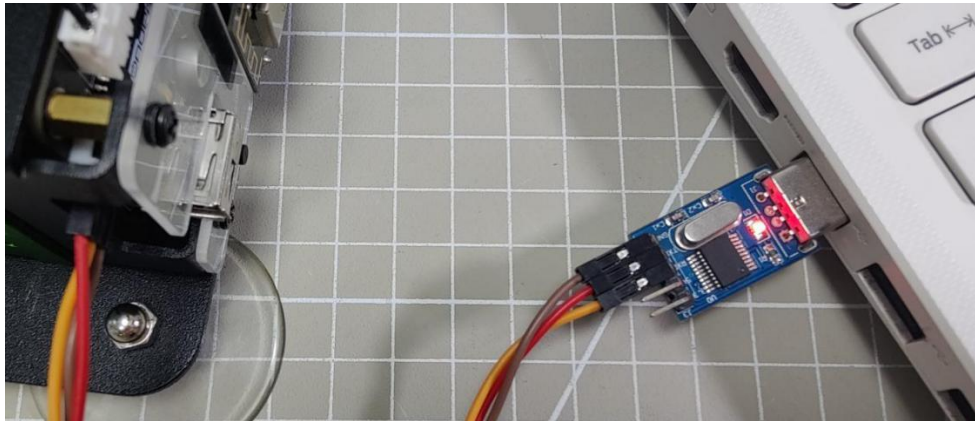
```
Done uploading
Leaving...
Hard resetting via RTS pin... 175%
```

4. Project Outcome

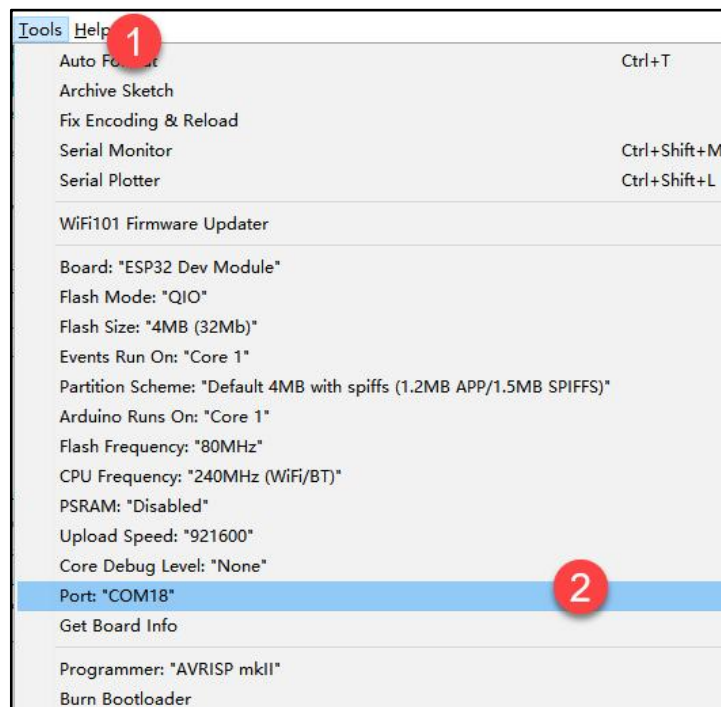
- 1) Connect the TXD, RXD and GND of USB adapter to IO32, IO33 and GND ports with Dupont wire.



- 2) Connect the USB adapter to computer.



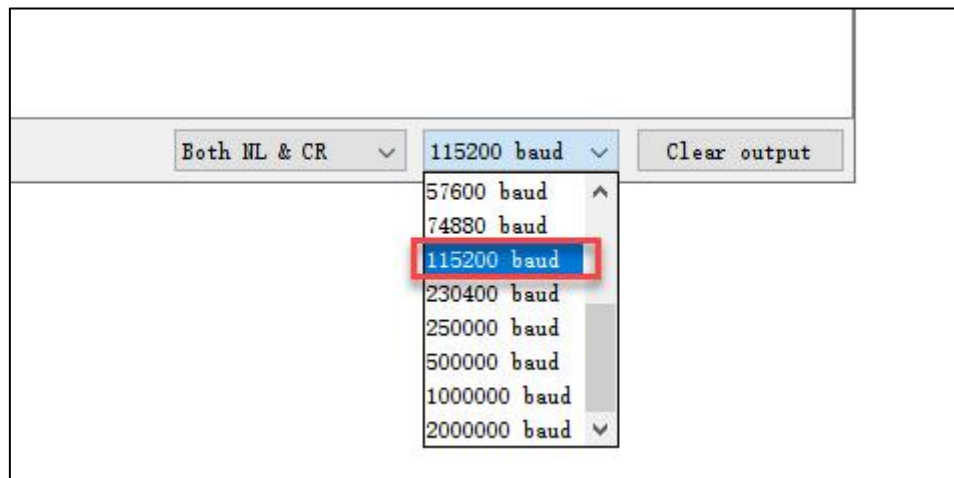
- 3) Select the corresponding port of ESP32 controller in "Tools->Port". (Here take the port "COM8" as example. Please select the port based on your computer. If COM1 appears, please do not select because it is the system communication port but not the actual port of the development port.)



- 4) Open the serial monitor.



- 5) Select the baud rate “115200”. (If select a wrong baud rate, the serial monitor will print the garbled message, as shown in the figure below.



- 6) After setting the baud rate, the serial monitor will print “Hiwonder”.

