



YCHIOT high-precision positioning system
UWB development board works with Arduino
Version 1.2

Content

1	Hardware Connection	3
1.1	Deployment steps hardware connection- Arduino Nano.....	3
1.2	Hardware Connection- Arduino UNO R3	3
1.3	Hardware Connection - Mega 2560 R3.....	4
1.4	Arduino- Possible reasons for download failure	4
2	Software download and settings.....	5
2.1	Arduino IDE Introduction	5
2.2	Arduino IDE Preparation before development	6
3	Program download	8
3.1	Download to Arduino Uno development board	8
3.2	Download to Arduino Mega 2560 development board	12
3.3	Download to Arduino Due development board	14
4	Document Management Information Form.....	16

1 Hardware Connection

This document uses the Mini3 development board interface as an example, introduces the method of connecting with three mainstream Arduino development boards on the market, and provides the DEMO program code, which has strong portability. Mini3s / Mini3s Plus module interface is the same as Mini3.

1.1 Deployment steps hardware connection- Arduino Nano

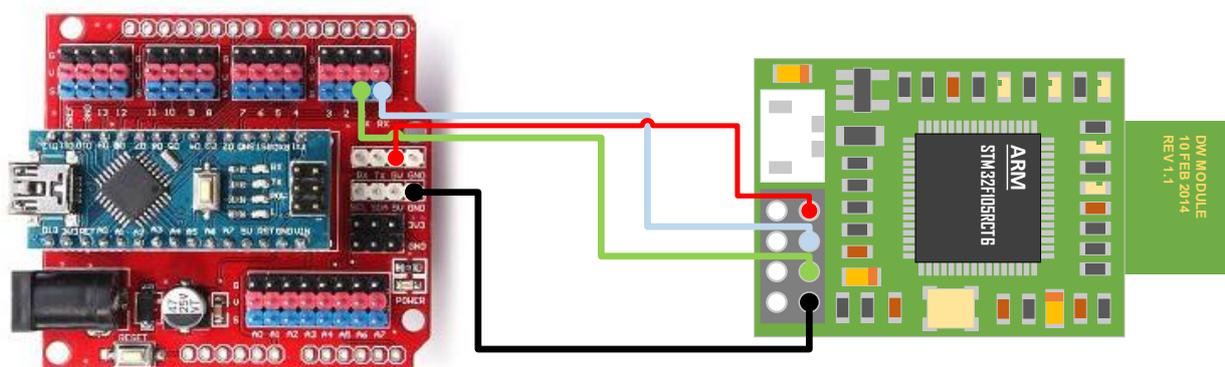


Figure 1.1 UWB Mini 3 module connected to Arduino Nano

1.2 Hardware Connection- Arduino UNO R3

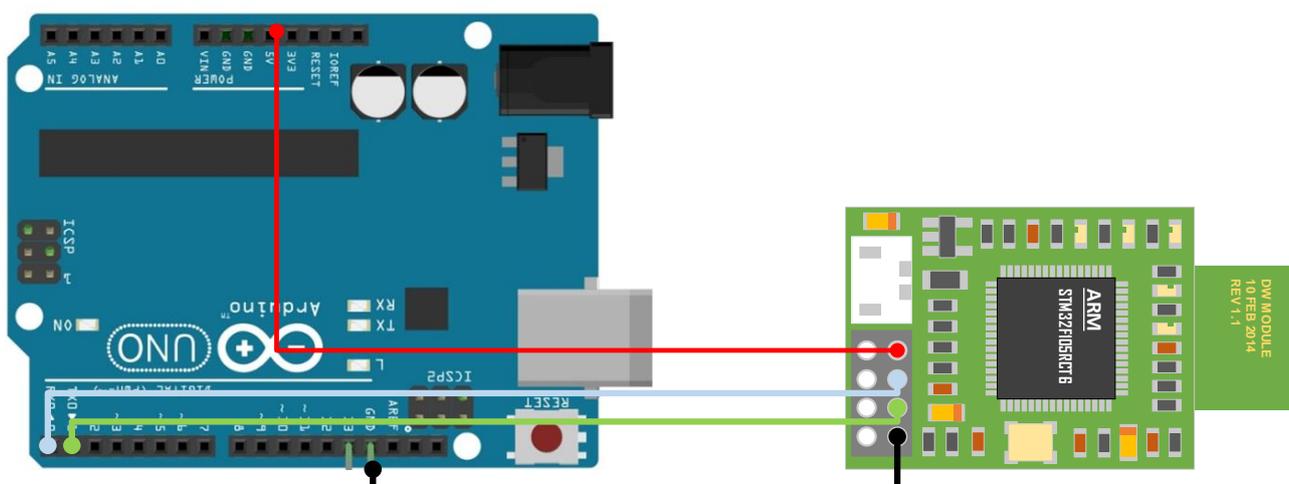


Figure 1.2 UWB Mini 3 module is connected to UNO R3

1.3 Hardware Connection - Mega 2560 R3

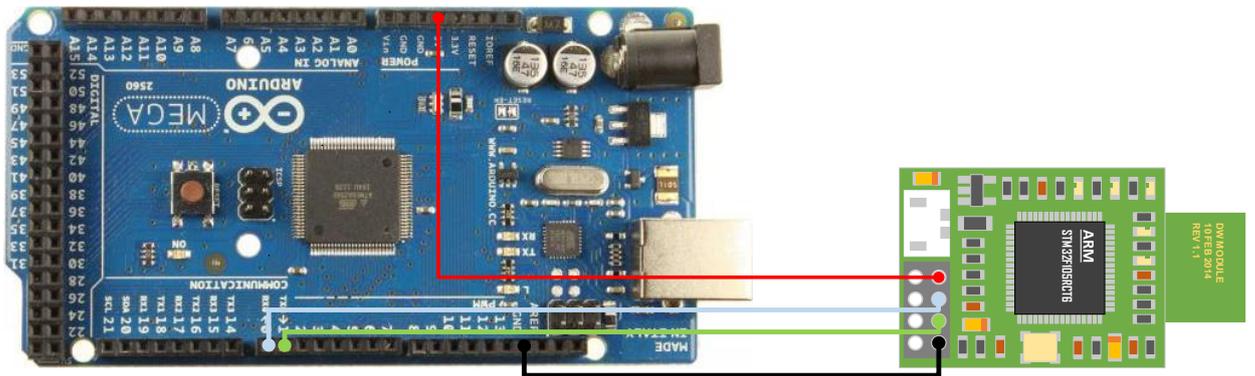


Figure 1.3 UWB Mini 3 module connected to UNO R3

1.4 Arduino- Possible reasons for download failure

When downloading programs to Arduino, the serial cable of UWB module cannot be connected to Arduino.

2 Software download and settings

2.1 Arduino IDE Introduction

Arduino IDE makes it easy to write code and upload code to the board. It runs on Windows, Mac OS X and Linux. The environment is written in Java, based on processing and other open source software. It is widely used in post-high school education (such as universities, colleges, research institutions) in the fields of engineering, Internet of Things, robotics, art and design. This software can be used on any Arduino board. Committed to creating the next generation of STEAM plans-integrating science, technology, engineering, art and mathematics, while supporting the needs of teachers and students throughout the education process. Provide solutions for classrooms, toolkits, bundles and boards, and provide learning paths for individual and collaborative educational methods. The learner explores the program in a practical and constructive way when using the toolkit and exploring the creative abilities of each board. Whether you are a new teacher of electronics and want to introduce physical computing and computational thinking into your teaching plan, a university professor proficient in electronics, or a graduate researcher, there is an Arduino kit or board that suits you.

Version: ARDUINO 1.8.15

Download link: <https://www.arduino.cc/en/software>

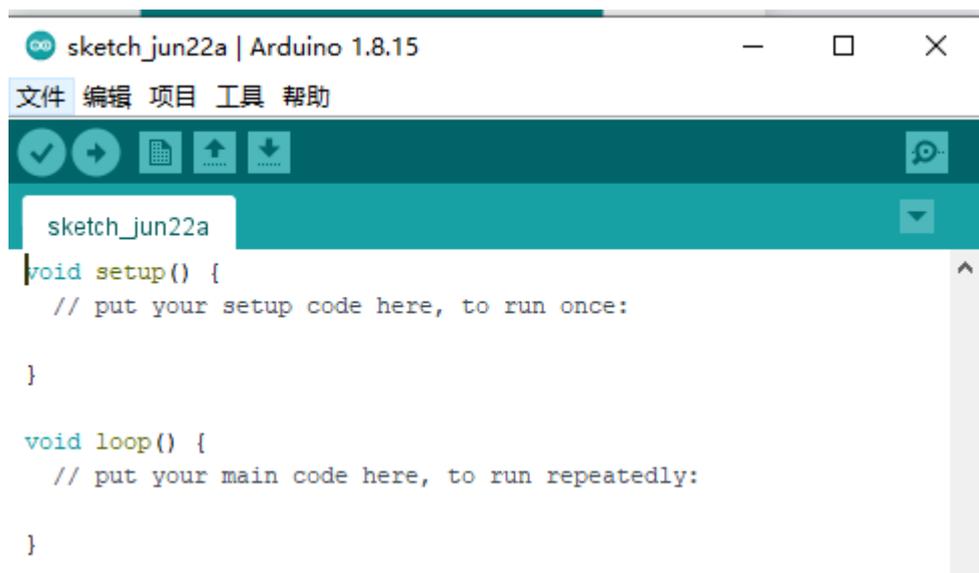


The screenshot shows the Arduino IDE 1.8.15 download page. On the left, there is a teal square icon with a white infinity symbol and a plus sign. To its right, the text reads "Arduino IDE 1.8.15". Below this, a paragraph states: "The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. This software can be used with any Arduino board." Another paragraph says: "Refer to the **Getting Started** page for Installation instructions." Below that, it says "SOURCE CODE" and "Active development of the Arduino software is **hosted by GitHub**. See the instructions for **building the code**. Latest release source code archives are available **here**. The archives are PGP-signed so they can be verified using **this** gpg key." On the right side, there is a teal box titled "DOWNLOAD OPTIONS". It lists: "Windows Win 7 and newer", "Windows ZIP file" (highlighted with a red box), "Windows app Win 8.1 or 10" with a "Get" button, "Linux 32 bits", "Linux 64 bits", "Linux ARM 32 bits", "Linux ARM 64 bits", "Mac OS X 10.10 or newer", and "Release Notes Checksums (sha512)".

2.2 Arduino IDE Preparation before development

Before development, because R&C UWB outputs a large amount of data, you need to adjust the serial port parameters of the development environment to adapt to the maximum receiving speed.

- 1) Unzip the downloaded compressed package, open arduino.exe, the initial interface is as follows



- 2) Move the mouse to the "File" tab in the upper left corner, select Open, open the provided demo folder, select the UWB.ino file and open it.



```

UWB | Arduino 1.8.15
文件 编辑 项目 工具 帮助

UWB $ trilateration.h uart.h

//实现功能：将UWB模块拿到的数据实时的拿出来，并进行三点或者四点定位

#include "uart.h"
#include "trilateration.h"

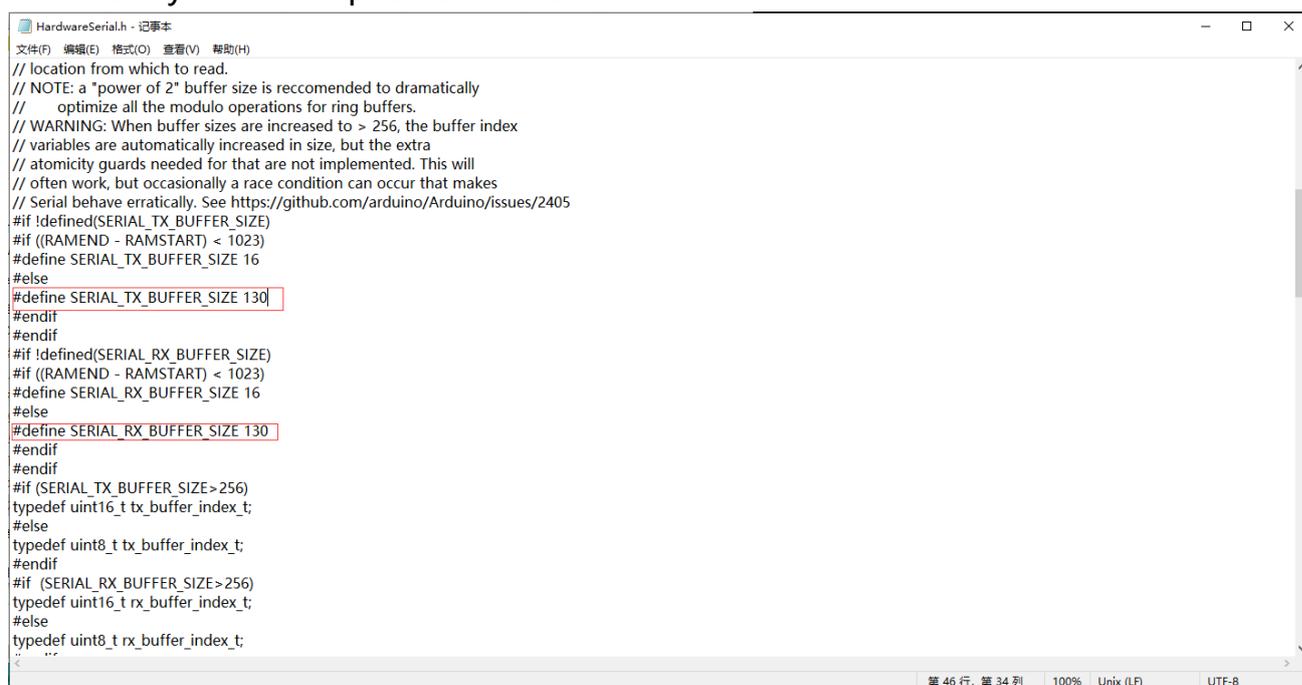
//#include "interrupt.h"

void setup(){
  //Serial1.begin(115200); //UWB模块对应的串口
  Serial.begin(115200);
  while(Serial.read()>=0){} //clearserialbuffer
}

void loop(void){
  decoding();
}

```

- 3) Modify the serial port buff before downloading, open the Arduino software directory,arduino-1.8.15-windows\arduino-1.8.15\hardware\arduino\avr\cores\arduino right click to edit HardwareSerial.h and modify Circle the position and save



```

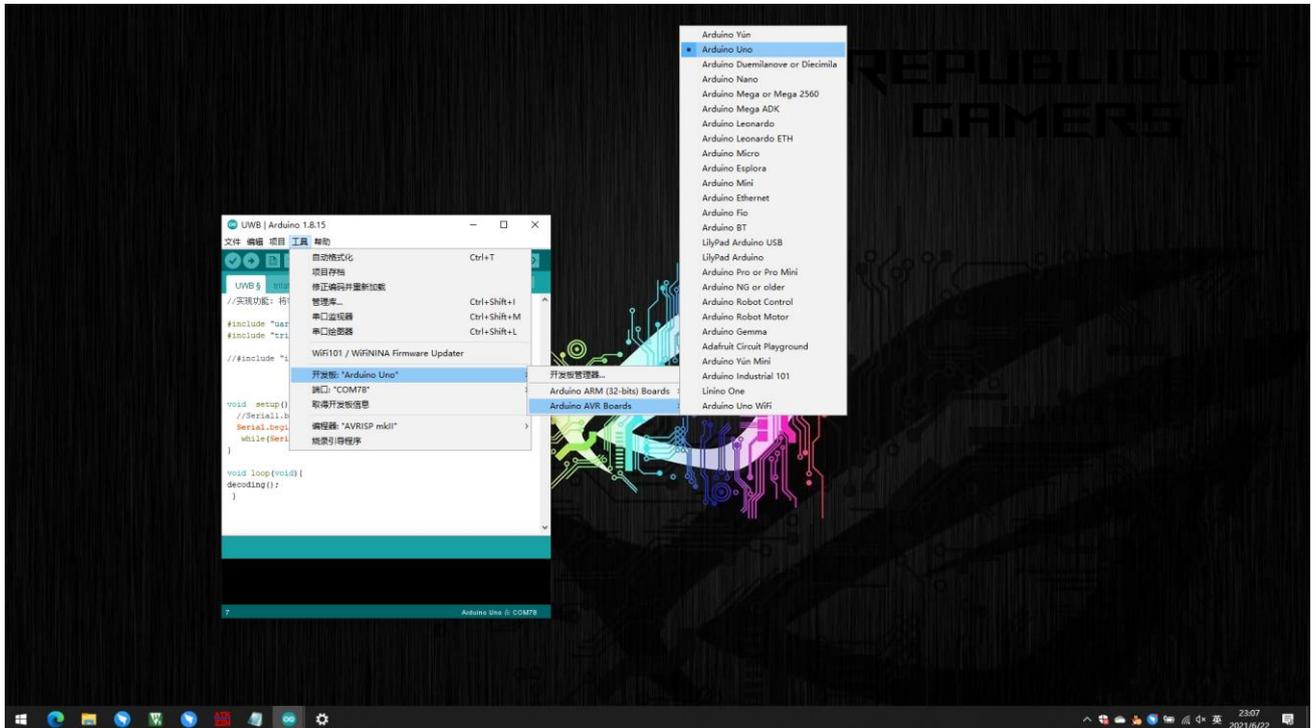
HardwareSerial.h - 记事本
文件(F) 编辑(E) 格式(O) 查看(V) 帮助(H)
// location from which to read.
// NOTE: a "power of 2" buffer size is recommended to dramatically
// optimize all the modulo operations for ring buffers.
// WARNING: When buffer sizes are increased to > 256, the buffer index
// variables are automatically increased in size, but the extra
// atomicity guards needed for that are not implemented. This will
// often work, but occasionally a race condition can occur that makes
// Serial behave erratically. See https://github.com/arduino/Arduino/issues/2405
#if !defined(SERIAL_TX_BUFFER_SIZE)
#if ((RAMEND - RAMSTART) < 1023)
#define SERIAL_TX_BUFFER_SIZE 16
#else
#define SERIAL_TX_BUFFER_SIZE 130
#endif
#endif
#if !defined(SERIAL_RX_BUFFER_SIZE)
#if ((RAMEND - RAMSTART) < 1023)
#define SERIAL_RX_BUFFER_SIZE 16
#else
#define SERIAL_RX_BUFFER_SIZE 130
#endif
#endif
#if (SERIAL_TX_BUFFER_SIZE > 256)
typedef uint16_t tx_buffer_index_t;
#else
typedef uint8_t tx_buffer_index_t;
#endif
#if (SERIAL_RX_BUFFER_SIZE > 256)
typedef uint16_t rx_buffer_index_t;
#else
typedef uint8_t rx_buffer_index_t;

```

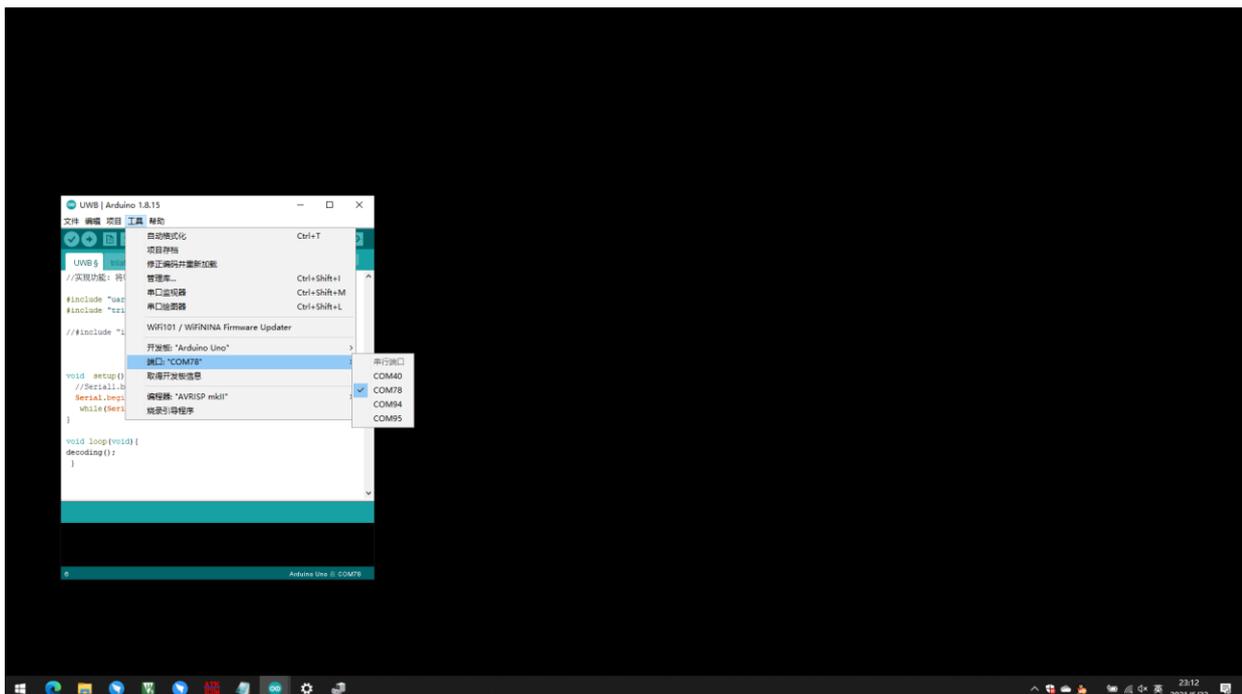
3 Program download

3.1 Download to Arduino Uno development board

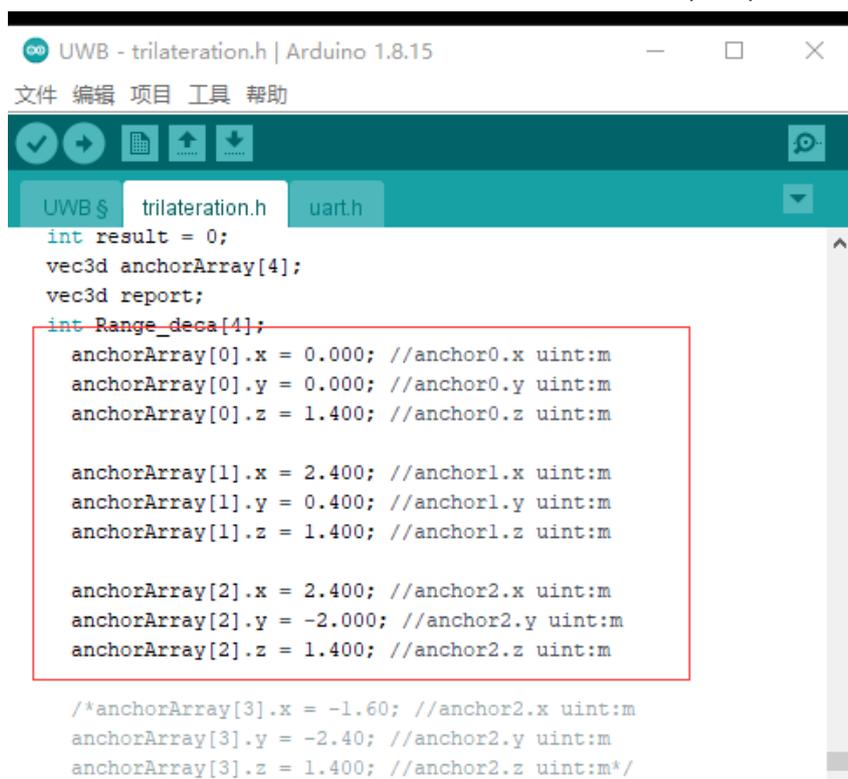
3.1.1 Select the downloaded development board, as shown in the figure below



3.1.2 Connect the computer to the Arduino Uno development board with a USB cable, select the corresponding serial port, if there is no port display, you need to download and install the CH340 serial driver



4) Change the coordinates to the actual coordinates of A0, A1, A2



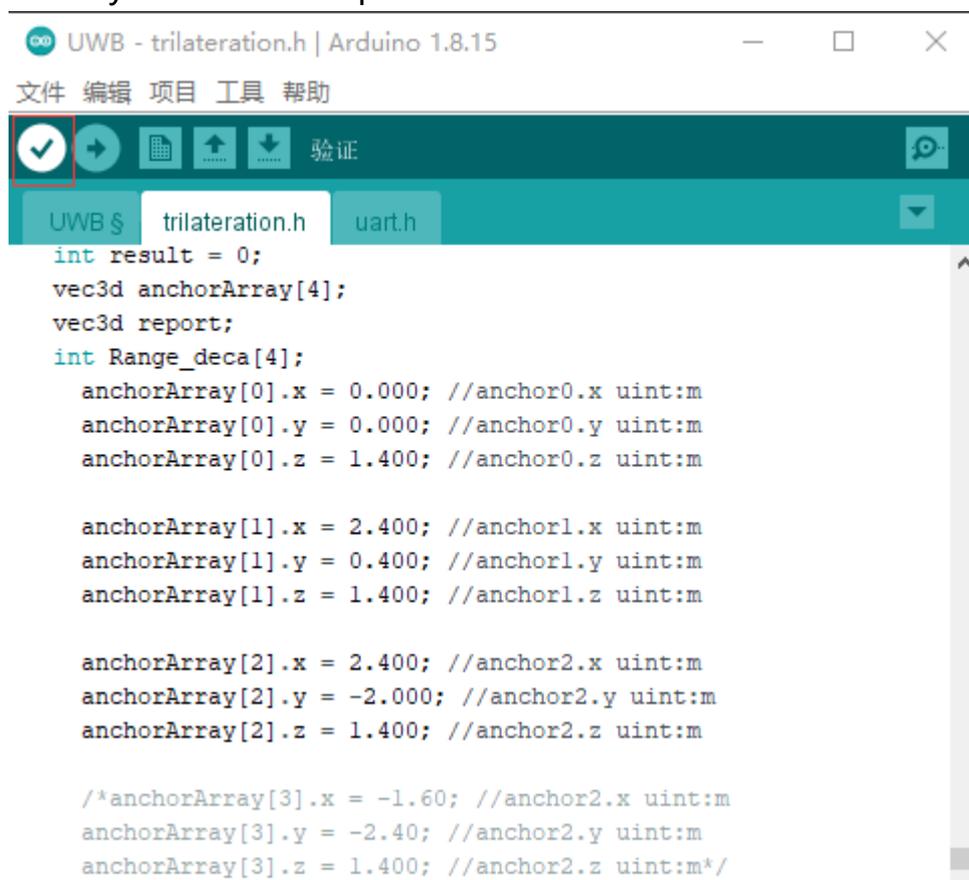
```
UWB - trilateration.h | Arduino 1.8.15
文件 编辑 项目 工具 帮助
UWB $ trilateration.h uart.h
int result = 0;
vec3d anchorArray[4];
vec3d report;
int Range_deca[4];
anchorArray[0].x = 0.000; //anchor0.x uint:m
anchorArray[0].y = 0.000; //anchor0.y uint:m
anchorArray[0].z = 1.400; //anchor0.z uint:m

anchorArray[1].x = 2.400; //anchor1.x uint:m
anchorArray[1].y = 0.400; //anchor1.y uint:m
anchorArray[1].z = 1.400; //anchor1.z uint:m

anchorArray[2].x = 2.400; //anchor2.x uint:m
anchorArray[2].y = -2.000; //anchor2.y uint:m
anchorArray[2].z = 1.400; //anchor2.z uint:m

/*anchorArray[3].x = -1.60; //anchor2.x uint:m
anchorArray[3].y = -2.40; //anchor2.y uint:m
anchorArray[3].z = 1.400; //anchor2.z uint:m*/
```

5) Click the verify button to compile



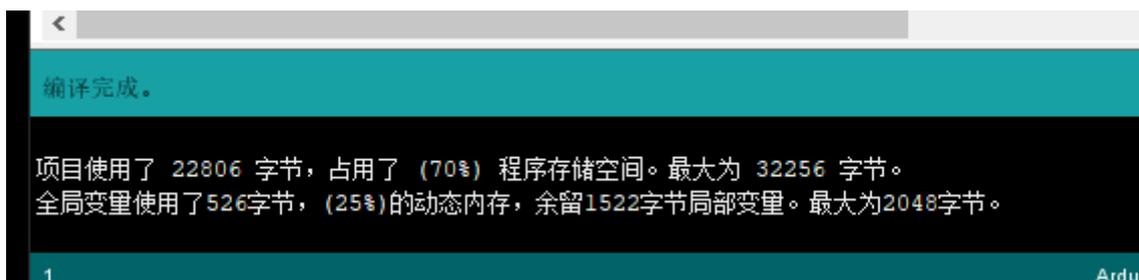
```
UWB - trilateration.h | Arduino 1.8.15
文件 编辑 项目 工具 帮助
UWB $ trilateration.h uart.h
int result = 0;
vec3d anchorArray[4];
vec3d report;
int Range_deca[4];
anchorArray[0].x = 0.000; //anchor0.x uint:m
anchorArray[0].y = 0.000; //anchor0.y uint:m
anchorArray[0].z = 1.400; //anchor0.z uint:m

anchorArray[1].x = 2.400; //anchor1.x uint:m
anchorArray[1].y = 0.400; //anchor1.y uint:m
anchorArray[1].z = 1.400; //anchor1.z uint:m

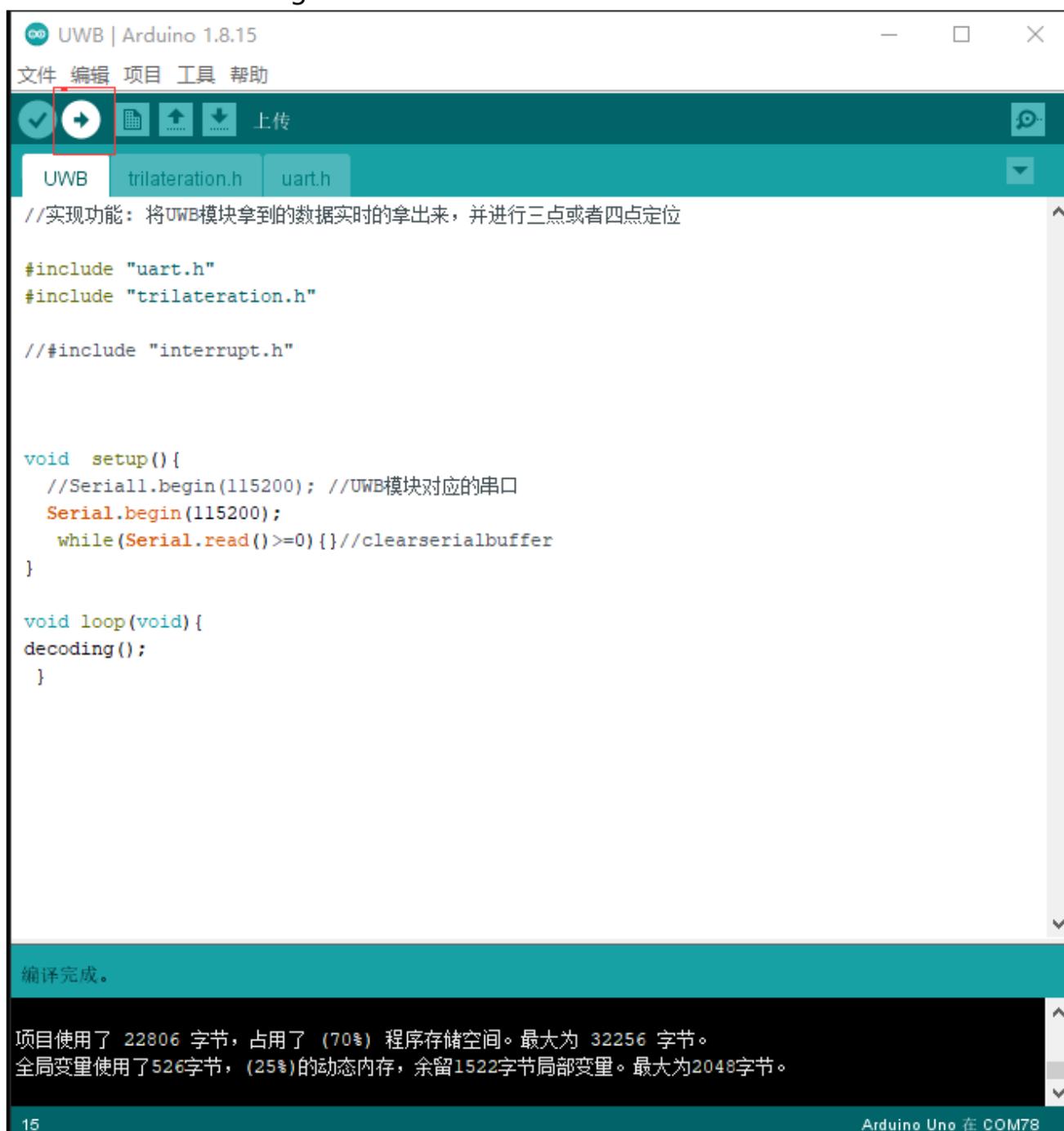
anchorArray[2].x = 2.400; //anchor2.x uint:m
anchorArray[2].y = -2.000; //anchor2.y uint:m
anchorArray[2].z = 1.400; //anchor2.z uint:m

/*anchorArray[3].x = -1.60; //anchor2.x uint:m
anchorArray[3].y = -2.40; //anchor2.y uint:m
anchorArray[3].z = 1.400; //anchor2.z uint:m*/
```

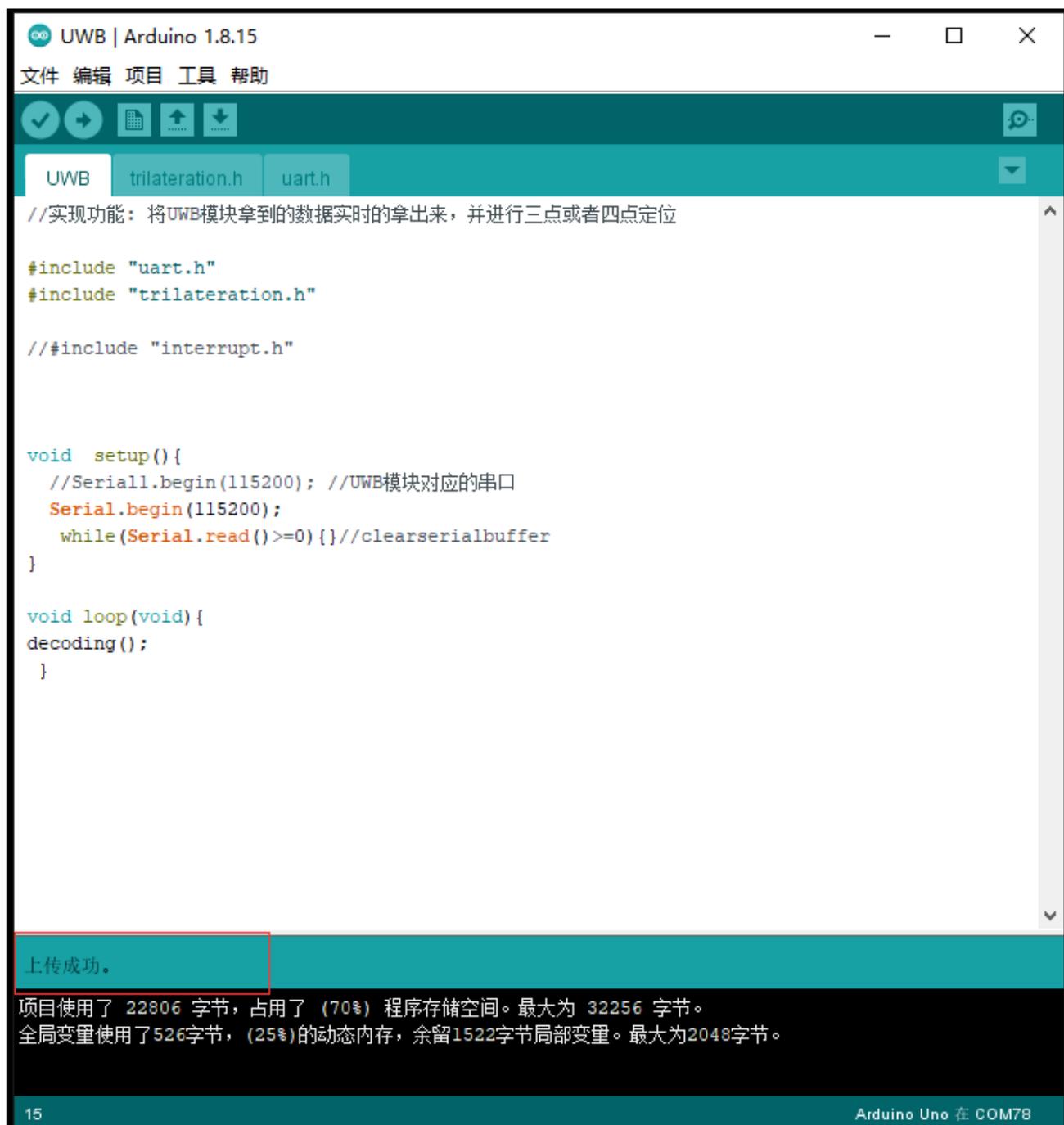
6) Compilation is complete, if there is no error, the next step will be downloaded



- 7) Click the upload button, unplug the RXD and TXD pins of the development board before downloading



- 8) It shows that the upload is successful, that is, the download is successful



```
UWB | Arduino 1.8.15
文件 编辑 项目 工具 帮助

UWB trilateration.h uart.h

//实现功能：将UWB模块拿到的数据实时的拿出来，并进行三点或者四点定位

#include "uart.h"
#include "trilateration.h"

//#include "interrupt.h"

void setup(){
  //Serial1.begin(115200); //UWB模块对应的串口
  Serial.begin(115200);
  while(Serial.read()>=0){} //clearserialbuffer
}

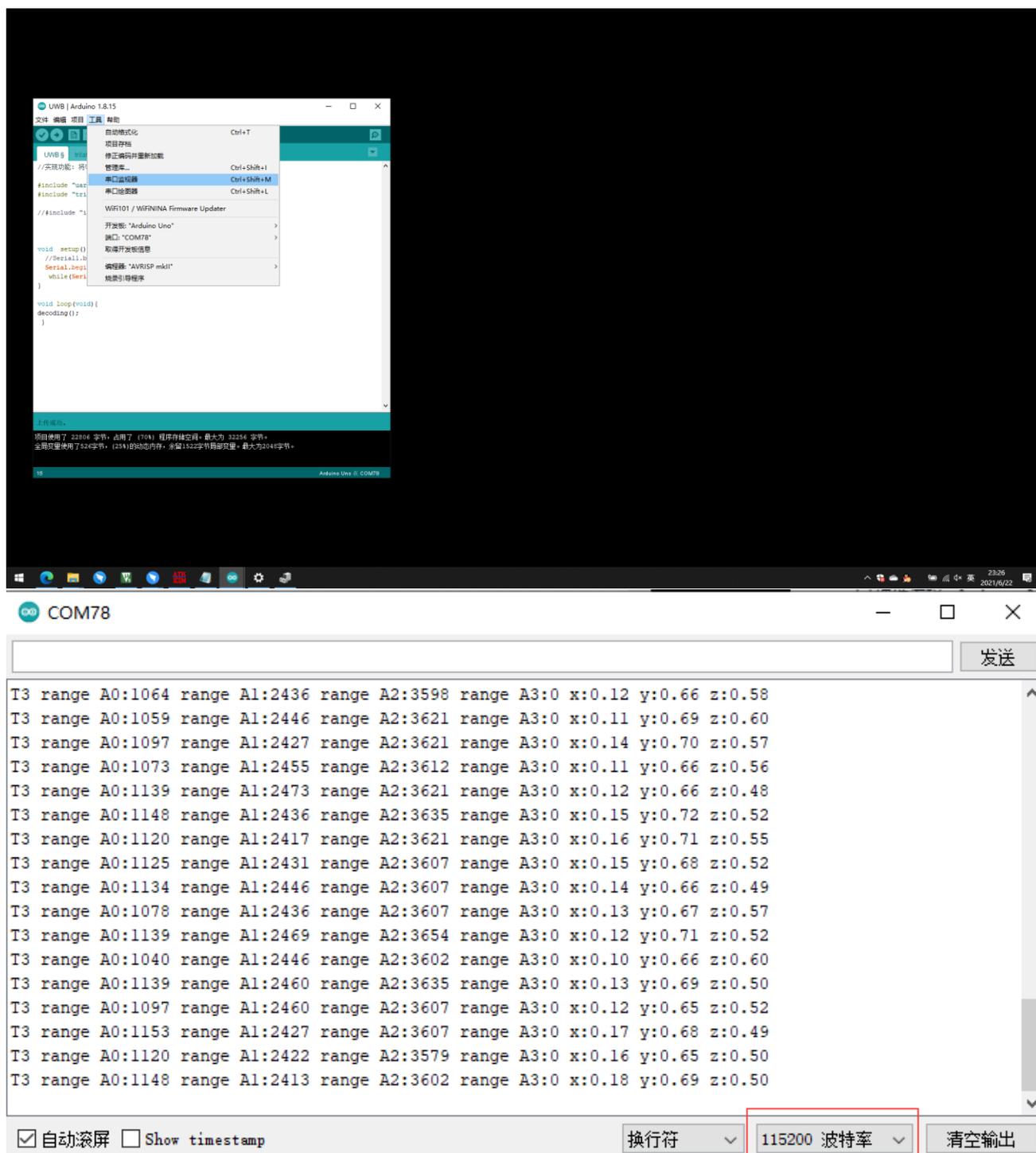
void loop(void){
  decoding();
}
```

上传成功。

项目使用了 22806 字节，占用了 (70%) 程序存储空间。最大为 32256 字节。
全局变量使用了526字节，(25%)的动态内存，余留1522字节局部变量。最大为2048字节。

15 Arduino Uno 在 COM78

- 9) Connect the TXD of any base station to RX0 on the development board, open the serial monitor, and select 115200 for the baud rate



3.2 Download to Arduino Mega 2560 development board

The steps are the same as 3.1, the 9th point is modified to connect the TXD of any base station to RX1 on the development board

The code needs to be changed in three places, as shown below



```
UWB | Arduino 1.8.15
文件 编辑 项目 工具 帮助

UWB trilateration.h uart.h

//实现功能：将UWB模块拿到的数据实时的拿出来，并进行三点或者四点定位

#include "uart.h"
#include "trilateration.h"

//#include "interrupt.h"

void setup() {
  Serial1.begin(115200); //UWB模块对应的串口
  Serial.begin(115200);
  while(Serial.read()>=0){} //clearserialbuffer
}

void loop(void) {
  decoding();
}
```

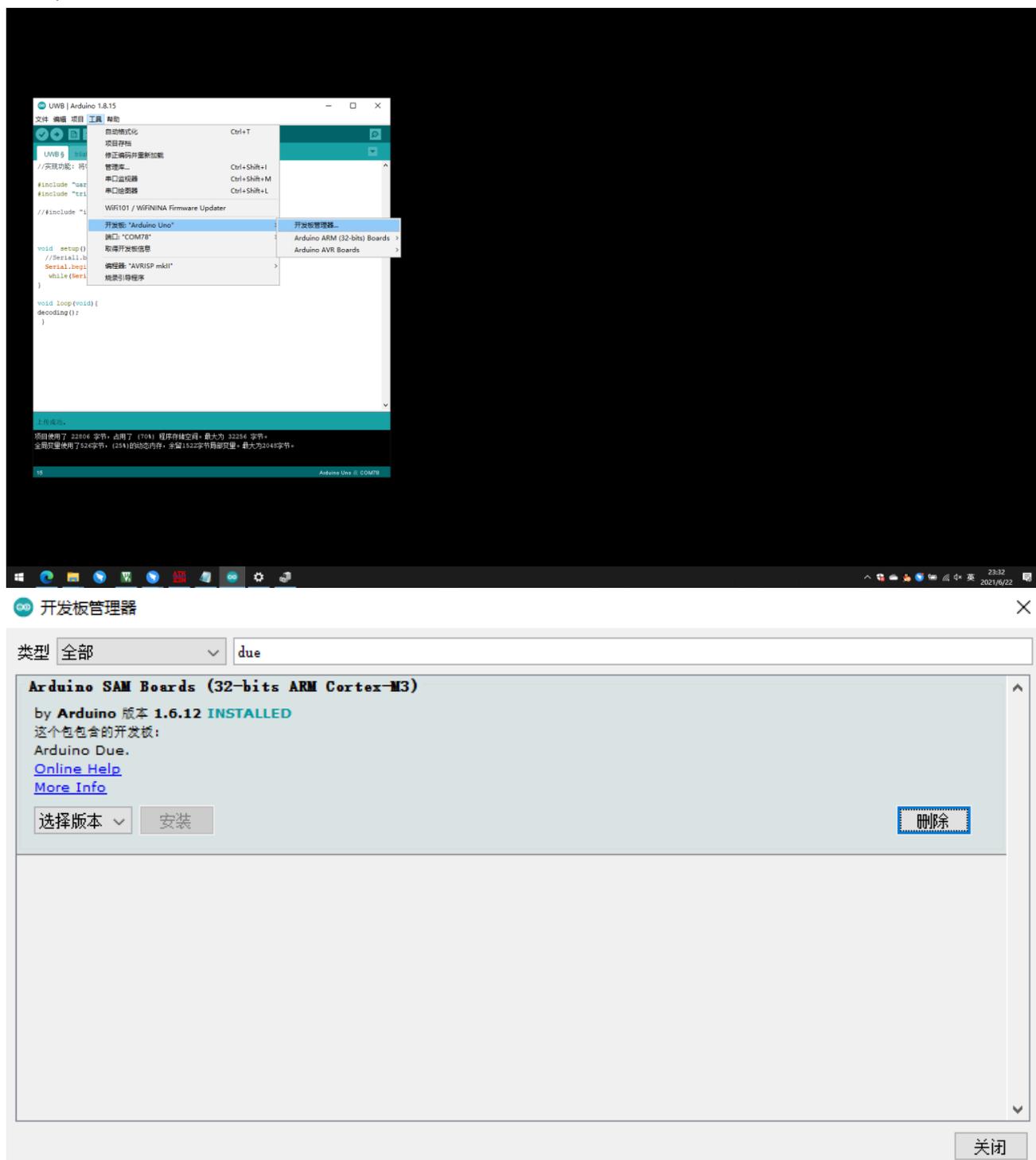


```
UWB trilateration.h uart.h

int a = 0, b = 0, c = 0, d = 0;
/*****查看是否有完整的65byte数据*****/
bool check() {
  int i = 0;
  int timeout = 0;
  while (i < 65 && timeout <= 500)
  {
    if (!Serial1.available())
    {
      timeout++;
      //delayMicroseconds(200);
      continue;
    }
    timeout = 0;
    buff[i++] = Serial1.read();
    if (i == 65)
    {
      buff[i] = 0;
      return 1;
    }
  }
  return 0;
}
```

3.3 Download to Arduino Due development board

3.3.1 The software does not have a Due development board, you need to download the Due development board library, find the development board manager, search for Due, and select version 1.6.12 to install



3.3.2 After the installation is complete, select the development board, select the port, and the other steps are the same as 3.2

4 Document Management Information Form

Subject	UWB dev-kit works with Arduino
Version	V1.2
Reference documents	
Creation time	2019/01/01
Founder	Lynn
Latest release date	2023/01/01

Operator	Date	Document change record
Lynn	2019-01-01	<u>V1.0</u> V1.0 release
Lynn	2021-07-28	<u>V1.1</u> Rewrite chapters 2 and 3 to introduce the software download steps and precautions in detail
Lynn	2023-01-01	<u>V1.2</u> Modify the format and apply the new YCHIOT document visual style