



# MCU Quick Start

Device Development > Tuya Development Boards > Tuya Sandwich

Evaluation Kits > Development Guide

Version: 20200108

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## 1 Introduction

After the development environment of Tuya Sandwich Development Board is set up, this article will introduce the connection between Tuya Sandwich development board and each end in development, how to create a development project based on specific products, and how to download the developed program to Tuya Sandwich Development Board. .

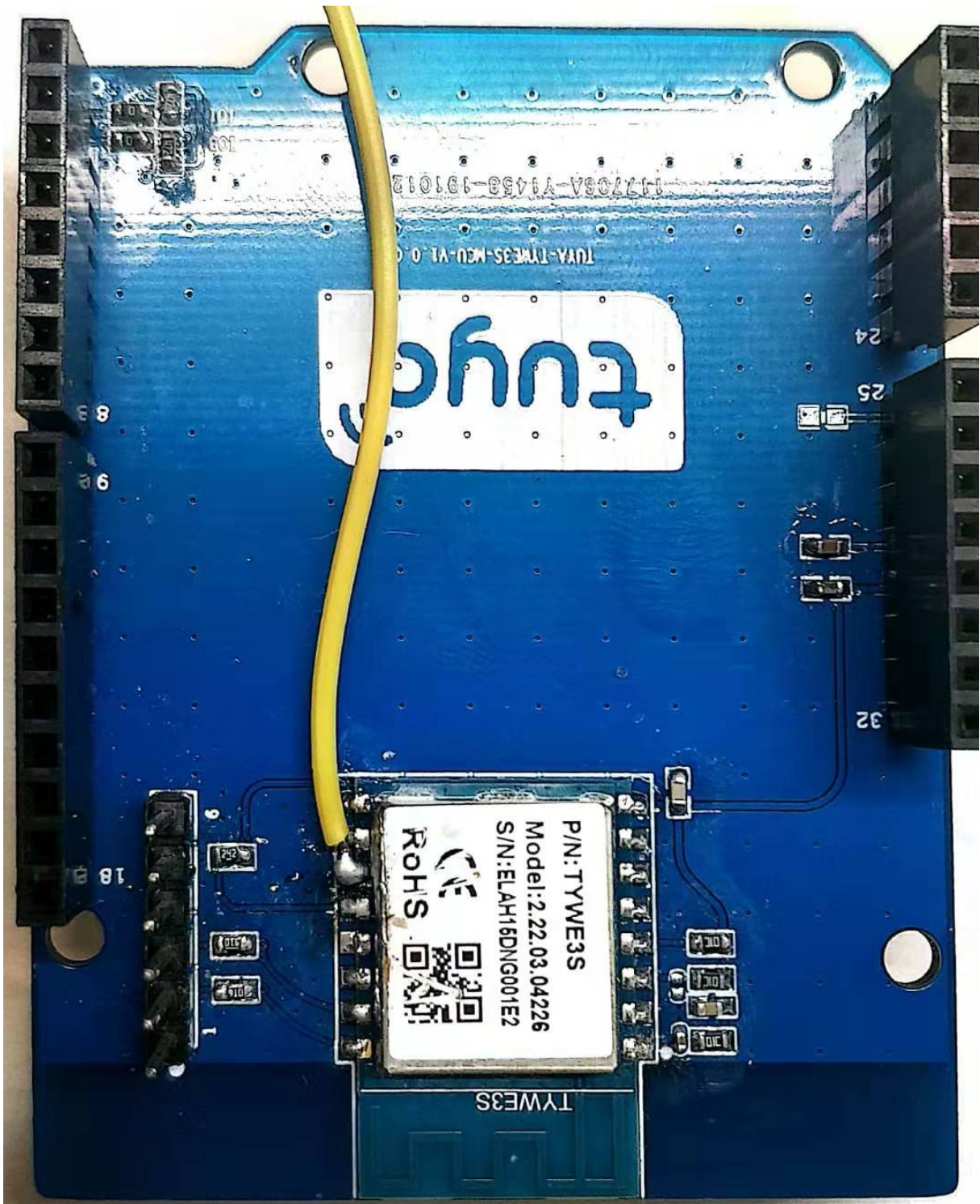
## 2 Glossary

See [Explanation of Terminology](#).

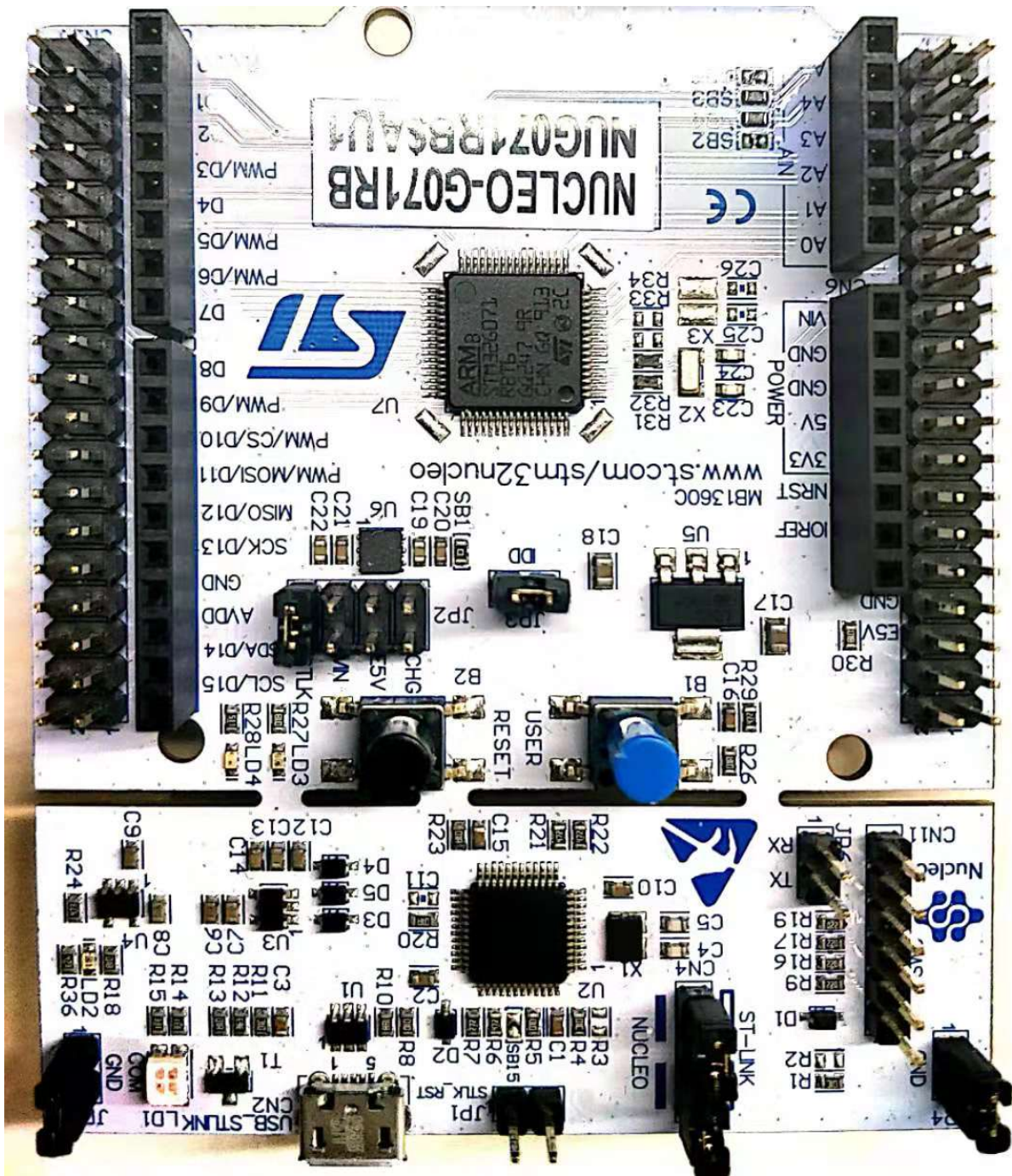
## 3 Bill of Materials

### 3.1 Hardware

1. Tuya Sandwich E3S Wi-Fi Development Board



2. ST Nucleo Development Board



### 3.2 Software

Arduino IDE

### 3.3 References

[“Tuya Cloud Universal Serial Port Access Protocol”  
MCU SDK Migration](#)

## 4 Project creation

As developers, we need to create projects to implement the most basic communication functions between Tuya Sandwich Development Board and Tuya E3S Wi-Fi module, and Tuya Sandwich's specific DP functions need to be written by developers according to their own needs.

### 4.1 Get SDK

In order to realize the communication between Tuya Sandwich Development Board and Tuya E3S Wi-Fi module, we need to use the SDK package generated by Tuya IOT platform according to the product.

Taking the realization of the product socket as an example, the steps to obtain the SDK development kit for the product socket are as follows:

Create product



**Figure 1:** 1576495896177

2. Choose a development-free solution



Figure 2: 1576496045748



The screenshot shows a web interface for creating a product. At the top, there is a green square icon with a white plug symbol. Below it, the text reads "创建插座类产品" (Create plug product) and "重选类别" (Re-select category). The main form area contains the following fields and options:

- \* 产品名称: 插座
- 产品型号: 1.0.0
- \* 通信类型:  蓝牙,  蓝牙mesh(涂鸦),  NB-IoT,  蓝牙mesh(SIG),  其他,  WiFi+蓝牙,  Zigbee,  Wi-Fi

A green button labeled "确定" (Confirm) is located at the bottom of the form.

**Figure 3:** 1576496132490

3. Choose the function we need



Figure 4: 1576496228722

4. Select the appropriate module



5. Download MCU-SDK



Figure 5: 1576496364539

6. SDK directory is as follows



When we perform the above operations, we have successfully obtained the SDK development kit for the socket. Next, we need to port the SDK development kit to our project.

## 4.2 MCU-SDK package porting

Open Arduino IDE and save the new project



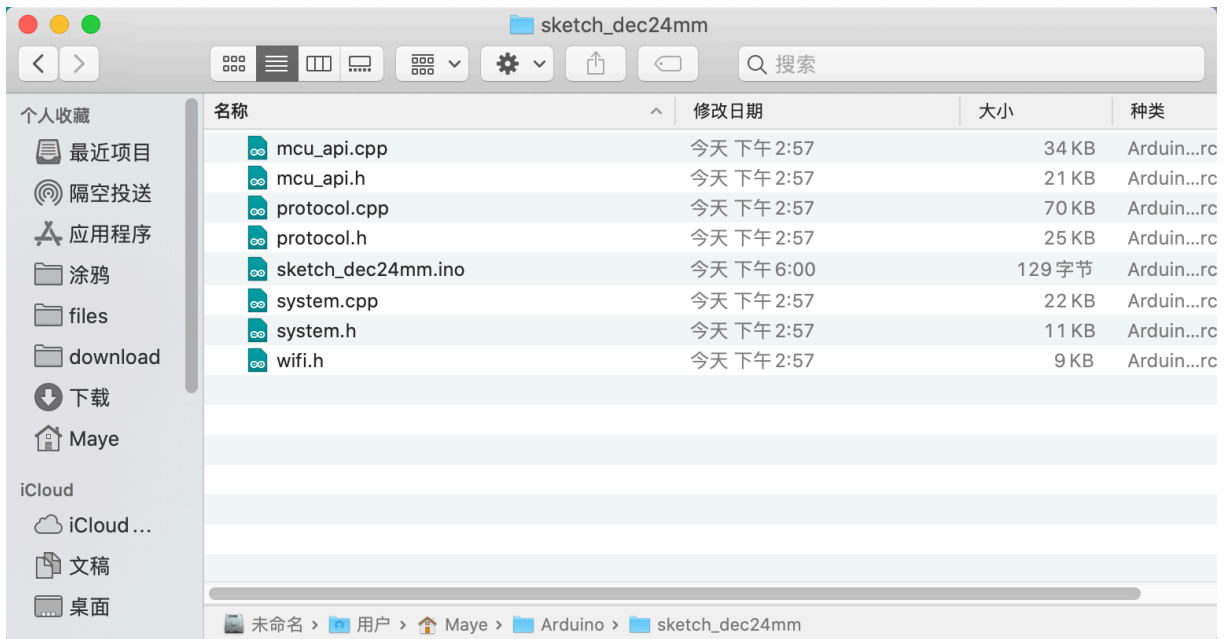
```
sketch_dec24mm | Arduino 1.8.10
sketch_dec24mm
1 void setup() {
2   // put your setup code here, to run once:
3
4 }
5
6 void loop() {
7   // put your main code here, to run repeatedly:
8
9 }
```

保存完成。

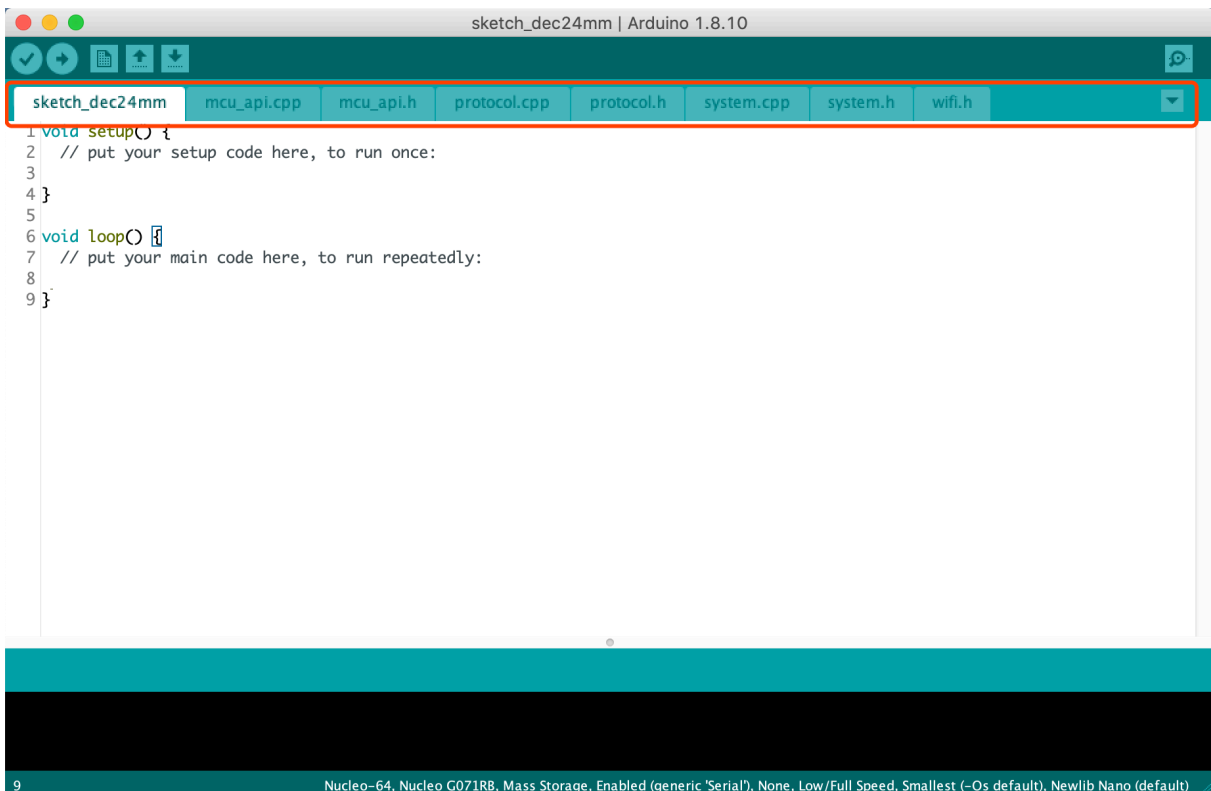
...râge, Enabled (generic 'Serial'), None, Low/Full Speed, Smallest (-Os default), Newlib Nano (default)

At this time, there are two functions in our project: `setup ()` is generally used for initialization and executed only once. The `loop ()` function is executed in a loop. All the following `.C` and `.H` files in the MCU development kit are copied to the newly created one. The same level directory under the sandwich project path, and change

the suffix **.c** to **.Cpp**. As shown below:



Close the Arduino IDE, click on the extension ending with **.ino** and open it again, you can see the added files:



Click the check mark in the upper left corner to verify.

#### 4.2.1 Fix error

After the first verification, an error message will appear. Follow the prompts to make corrections, and click Verify until there are no errors.

Possible errors are as follows:

Error one:

```

196 {DPID_CONTINUE_LED, DP_TYPE_VARIABLE},
197 {DPID_RELAY_STATUS, DP_TYPE_ENUM},
198 {DPID_LIGHT_MODE, DP_TYPE_ENUM},
199 {DPID_CHILD_LOCK, DP_TYPE_BOOL},
200 {DPID_CYCLE_TIME, DP_TYPE_STRING},
201 {DPID_RANDOM_TIME, DP_TYPE_STRING},
202 {DPID_SWITCH_INCHING, DP_TYPE_STRING},
203 };
204
205
206 /*****
207          2: 串口单字节发送函数
208  请将MCU串口发送函数填入该函数内,并将接收到的数据作为参数传入串口发送函数
209  *****/
210
211 /*****
212  函数名称 : uart_transmit_output
213  功能描述 : 发数据处理
214  输入参数 : value:串口收到字节数据
215  返回参数 : 无
216  使用说明 : 请将MCU串口发送函数填入该函数内,并将接收到的数据作为参数传入串口发送函数
217  *****/
218 void uart_transmit_output(unsigned char value)
219 {
220 | #error "请将MCU串口发送函数填入该函数,并删除该行"
    
```

#error "请将MCU串口发送函数填入该函数,并删除该行" 复制错误信息

exit status 1

#error "请将MCU串口发送函数填入该函数,并删除该行"

220 Nucleo-64, Nucleo G071RB, Mass Storage, Enabled (generic 'Serial'), None, Low/Full Speed, Smallest (-Os default), Newlib Nano (default)

Correction method: Add // before **#error** to make it in a comment state, click [Verify](#), if successful, the next error will be displayed

Error two:

```

221 }
222 else
223 {
224     length = set_wifi_uart_byte(length, TRUE);
225 }
226
227 wifi_uart_write_frame(HEAT_BEAT_CMD, length);
228 }
229 /*****
230 函数名称 : product_info_update
231 功能描述 : 产品信息上传
232 输入参数 : 无
233 返回参数 : 无
234 *****/
235 static void product_info_update(void)
236 {
237     unsigned char length = 0;
238
239     length = set_wifi_uart_buffer(length, "{ \"p \": \"", my_strlen("{ \"p \": \"");
240     length = set_wifi_uart_buffer(length, (unsigned char *)PRODUCT_KEY, my_strlen((unsigned char *)PRODUCT_KEY));
241     length = set_wifi_uart_buffer(length, "\", \"v \": \"", my_strlen "\", \"v \": \"");
242     length = set_wifi_uart_buffer(length, (unsigned char *)MCU_VER, my_strlen((unsigned char *)MCU_VER));
243     length = set_wifi_uart_buffer(length, "\", \"m \": \"", my_strlen "\", \"m \": \"");
244     length = set_wifi_uart_buffer(length, (unsigned char *)CONFIG_MODE, my_strlen((unsigned char *)CONFIG_MODE));
245     length = set_wifi_uart_buffer(length, "}", my_strlen("}"));

```

invalid conversion from 'const char\*' to 'unsigned char\*' [-fpermissive] 复制错误信息

exit status 1  
invalid conversion from 'const char\*' to 'unsigned char\*' [-fpermissive]

245 Nucleo-64, Nucleo G071RB, Mass Storage, Enabled (generic 'Serial'), None, Low/Full Speed, Smallest (-Os default), Newlib Nano (default)

Correction method: due to the compilation environment, if the compilation fails, a cast is required. In the `system.cpp` file, the code reference is as follows:

```

1 static void product_info_update (void)
2 {
3     unsigned char length = 0;
4     length = set_wifi_uart_buffer (length, (unsigned char *) "{ \" p \": \"
      \", my_strlen ((unsigned char *)" { \" p \": \"");
5     length = set_wifi_uart_buffer (length, (unsigned char *) PRODUCT_KEY,
      my_strlen ((unsigned char *) PRODUCT_KEY));
6     length = set_wifi_uart_buffer (length, (unsigned char *) "\", \" v \": \"
      : \", my_strlen ((unsigned char *) "\", \" v \": \"");
7     length = set_wifi_uart_buffer (length, (unsigned char *) MCU_VER,
      my_strlen ((unsigned char *) MCU_VER));
8     length = set_wifi_uart_buffer (length, (unsigned char *) "\", \" m \": \"
      : \", my_strlen ((unsigned char *)" \", \" m \": \"");
9     length = set_wifi_uart_buffer (length, (unsigned char *) CONFIG_MODE,
      my_strlen ((unsigned char *) CONFIG_MODE));
10    length = set_wifi_uart_buffer (length, (unsigned char *) "}",
      my_strlen ((unsigned char *) "}"));

```

Error three:

The screenshot shows the Arduino IDE interface for a sketch named 'sketch\_dec24mm' on an 'Arduino 1.8.10' board. The code in `mcu_api.cpp` includes a `while` loop for data handling and a `my_memcpy` call. Below the code, a function signature for `wifi_protocol_init` is shown with its description and parameters.

An orange error banner at the bottom states: "为开发板 Nucleo-64 编译时出错。" (Compilation error for development board Nucleo-64). The error message in the console below reads:

```

/Users/Maye/Library/Arduino15/packages/STM32/tools/arm-none-eabi-gcc/8.2.1-1.7/bin/../lib/gcc/arm-none-eabi/8.2.1/../../../../arm
system.cpp:(.text._Z11data_handle+0x1e0): undefined reference to `download_cmd'
"SoftwareSerial.h" 对应多个库
已使用: /Users/Maye/Library/Arduino15/packages/STM32/hardware/stm32/1.7.0/libraries/SoftwareSerial
/Users/Maye/Library/Arduino15/packages/STM32/tools/arm-none-eabi-gcc/8.2.1-1.7/bin/../lib/gcc/arm-none-eabi/8.2.1/../../../../arm
collect2: error: ld returned 1 exit status
exit status 1
为开发板 Nucleo-64 编译时出错。
    
```

The status bar at the bottom indicates line 1010 and the board is set to Nucleo-64.

Modification method: Remove **const** at the screenshots in the **protocol.cpp** and **system.cpp** files

sketch\_dec24mm - protocol.cpp | Arduino 1.8.10

sketch\_dec24mm mcu\_api.cpp mcu\_api.h protocol.cpp protocol.h system.cpp system.h wifi.h

```

151 5:单片机进入while循环后调用mcu_api.c文件内的wifi_uart_service()函数
152 *****/
153
154 /*****/
155 1: dp数据点序列类型对照表
156 **此为自动生成代码,如在开发平台有相关修改请重新下载MCU_SDK**
157 *****/
158 const DOWNLOAD_CMD_S download_cmd[] =
159 {
160 {DPID_SWITCH_1, DP_TYPE_BOOL},
161 {DPID_SWITCH_2, DP_TYPE_BOOL},
162 {DPID_SWITCH_3, DP_TYPE_BOOL},
163 {DPID_SWITCH_4, DP_TYPE_BOOL},
164 {DPID_SWITCH_5, DP_TYPE_BOOL},
165 {DPID_SWITCH_6, DP_TYPE_BOOL},
166 {DPID_SWITCH_USB1, DP_TYPE_BOOL},
167 {DPID_SWITCH_USB2, DP_TYPE_BOOL},
168 {DPID_COUNTDOWN_1, DP_TYPE_VALUE},
169 {DPID_COUNTDOWN_2, DP_TYPE_VALUE},
170 {DPID_COUNTDOWN_3, DP_TYPE_VALUE},

```

为开发板 Nucleo-64 编译时出错。 复制错误信息

```

/Users/Maye/Library/Arduino15/packages/STM32/tools/arm-none-eabi-gcc/8.2.1-1.7/bin/./lib/gcc/arm-none-eabi/8.2.1/../../../../arm
system.cpp:(.text._Z11data_handlet+0x1e0): undefined reference to `download_cmd'
"SoftwareSerial.h" 对应多个库
已使用: /Users/Maye/Library/Arduino15/packages/STM32/hardware/stm32/1.7.0/Libraries/SoftwareSerial
/Users/Maye/Library/Arduino15/packages/STM32/tools/arm-none-eabi-gcc/8.2.1-1.7/bin/./lib/gcc/arm-none-eabi/8.2.1/../../../../arm
collect2: error: ld returned 1 exit status
exit status 1
为开发板 Nucleo-64 编译时出错。

```

113 Nucleo-64

The screenshot shows an IDE window titled "sketch\_dec24mm - system.cpp | Arduino 1.8.10". The code in the editor includes headers for "wifi.h" and "protocol.h", and defines a constant "DOWNLOAD\_CMD\_S" and a variable "firm\_size". A function "set\_wifi\_uart\_byte" is defined. A red box highlights the "const" keyword in the definition of "DOWNLOAD\_CMD\_S".

Below the code, an orange error banner reads: "为开发板 Nucleo-64 编译时出错。" (Compilation error for development board Nucleo-64). A button labeled "复制错误信息" (Copy error message) is visible.

The error message in the console is:
 

```

/Users/Maye/Library/Arduino15/packages/STM32/tools/arm-none-eabi-gcc/8.2.1-1.7/bin/../lib/gcc/arm-none-eabi/8.2.1/../../../../arm-none-eabi/bin/arm-none-eabi-g++ -c system.cpp:(.text._Z11data_handlet+0x1e0): undefined reference to `download_cmd'
"SoftwareSerial.h" 对应多个库
已使用: /Users/Maye/Library/Arduino15/packages/STM32/hardware/stm32/1.7.0/Libraries/SoftwareSerial
/Users/Maye/Library/Arduino15/packages/STM32/tools/arm-none-eabi-gcc/8.2.1-1.7/bin/../lib/gcc/arm-none-eabi/8.2.1/../../../../arm-none-eabi/bin/arm-none-eabi-g++ -c system.cpp:(.text._Z11data_handlet+0x1e0): undefined reference to `download_cmd'
collect2: error: ld returned 1 exit status
exit status 1
为开发板 Nucleo-64 编译时出错。
    
```

The footer of the IDE window shows "244" on the left and "Nucleo-64" on the right.

Error four:

```

98
99 **-----**
100 *****/
101 #define SYSTEM_GLOBAL
102
103 #include "wifi.h"
104 #include "protocol.h"
105 //
106 //
107 extern DOWNLOAD_CMD_S download_cmd[];
108 unsigned short firm_size; //升级包一包的大小
109
110 /**-----**
111 函数名称 : set_wifi_uart_byte
112 功能描述 : 写wifi_uart字节
113 输入参数 : dest:缓存区其实地址;
114           byte:写入字节值
115 返回参数 : 写入完成后的总长度
116 *****/
117 unsigned short set_wifi_uart_byte(unsigned short dest, unsigned char byte)
118
119
    
```

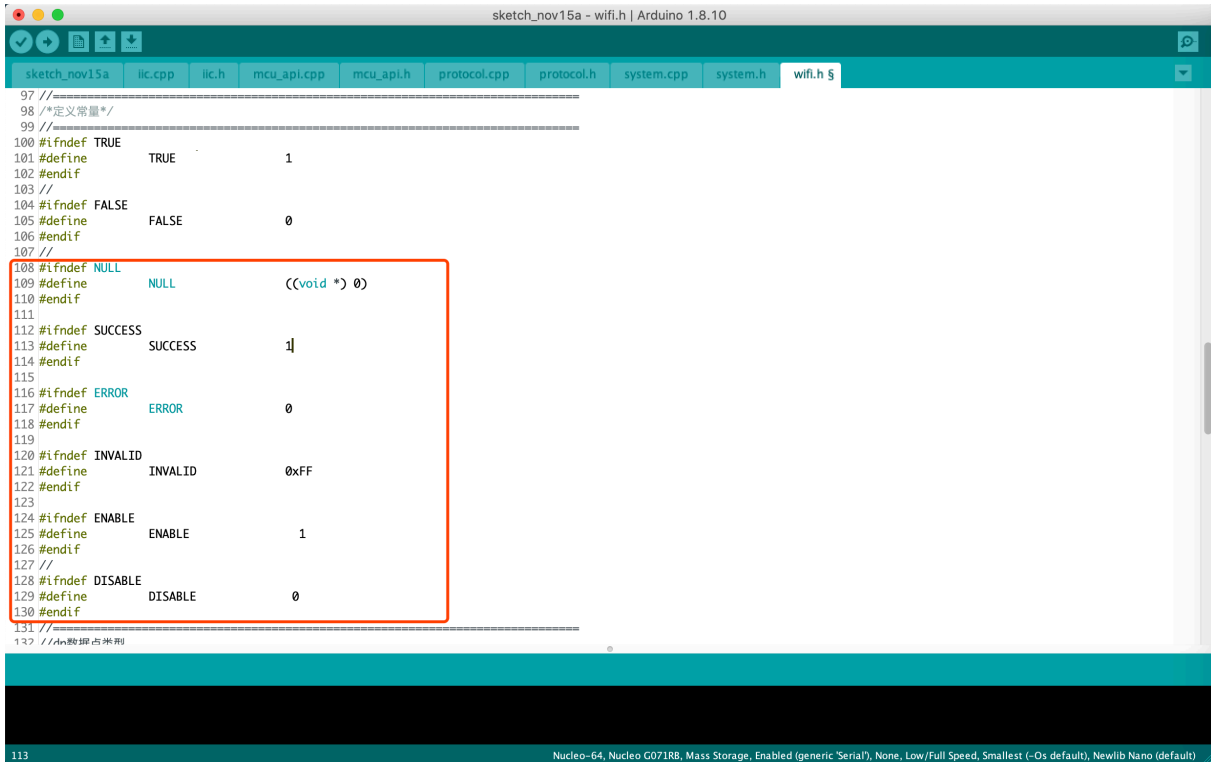
为开发板 Nucleo-64 编译时出错。 复制错误信息

```

/Users/Maye/Library/Arduino15/packages/STM32/tools/arm-none-eabi-gcc/8.2.1-1.7/bin/../lib/gcc/arm-none-eabi/8.2.1/../../../../arm
system.cpp:(.text._Z11data_handlet+0x1e0): undefined reference to `download_cmd'
"SoftwareSerial.h" 对应多个库
已使用: /Users/Maye/Library/Arduino15/packages/STM32/hardware/stm32/1.7.0/Libraries/SoftwareSerial
/Users/Maye/Library/Arduino15/packages/STM32/tools/arm-none-eabi-gcc/8.2.1-1.7/bin/../lib/gcc/arm-none-eabi/8.2.1/../../../../arm
collect2: error: ld returned 1 exit status
exit status 1
为开发板 Nucleo-64 编译时出错。
    
```

107 Nucleo-64

Correction method: To avoid repeated definition errors, remove the duplicate part in wifi.h, as shown in the following figure:



```

97 //
98 /*定义常量*/
99 //
100 #ifndef TRUE
101 #define TRUE 1
102 #endif
103 //
104 #ifndef FALSE
105 #define FALSE 0
106 #endif
107 //
108 #ifndef NULL
109 #define NULL ((void *) 0)
110 #endif
111
112 #ifndef SUCCESS
113 #define SUCCESS 1
114 #endif
115
116 #ifndef ERROR
117 #define ERROR 0
118 #endif
119
120 #ifndef INVALID
121 #define INVALID 0xFF
122 #endif
123
124 #ifndef ENABLE
125 #define ENABLE 1
126 #endif
127 //
128 #ifndef DISABLE
129 #define DISABLE 0
130 #endif
131 //
132 //宏定义占位符
    
```

After the error is resolved, compile and pass. We need to implement the serial port sending and receiving functions between the sandwich development board and the Wi-Fi module communication. For other porting details, please refer to [MCU SDK Porting](#).

#### 4.2.2 Function implementation of serial port

The serial port of the sandwich development board uses the Arduino serial port API. For instructions on using the Arduino API, developers can check on the Arduino website

Refer to the following code to implement the serial port receiving function in the main file:

```
1 #include "wifi.h"
2 #include <SoftwareSerial.h>
3
4 SoftwareSerial mySerial(0, 1); // RX, TX
5 #define _SS_MAX_RX_BUFF 300
6 #define relay 10
7 int time_cnt = 0, cnt = 0, init_flag = 0;
8
9
10
11 void setup() {
12
13     pinMode(relay, OUTPUT); //继电器IO初始化
14     digitalWrite(relay, LOW);
15
16     pinMode(PC13, INPUT); //重置wifi按键初始化
17     pinMode(8, OUTPUT); //WiFi状态指示灯初始化
18
19     mySerial.begin(9600); //软件串口初始化
20     mySerial.println("myserial init successful!");
21     Serial.begin(115200); //PA3 RX PA2 TX
22     Serial.println("serial init successful!");
23
24     wifi_protocol_init();
25 }
26
27 void loop() {
28     if (init_flag == 0) {
29         time_cnt++;
30         if (time_cnt % 6000 == 0) {
31             time_cnt = 0;
32             cnt ++;
33         }
34         wifi_stat_led(&cnt); //WIFI状态处理
35     }
36     wifi_uart_service();
37     myserialEvent(); //串口接收处理
38     key_scan(); //重置配网按键检测
39
40
41 }
42
43
44 void myserialEvent() {
45     if (mySerial.available()) {
46         unsigned char ch = (unsigned char)mySerial.read();
47         uart_receive_input(ch);
48     }
49 }
50
51 void key_scan(void)
52 {
53     static char ap_ez_change = 0;
54     unsigned char buttonState = HIGH;
55     buttonState = digitalRead(PC13);
56     if (buttonState == LOW) {
57         delay(3000);
58         buttonState = digitalRead(PC13);
59         printf("-----%d", buttonState);
60         if (buttonState == LOW) {
```

串口发送函数实现:



```
209 *****/
210
211 /*****
212 函数名称 : uart_transmit_output
213 功能描述 : 发数据处理
214 输入参数 : value:串口收到字节数据
215 返回参数 : 无
216 使用说明 : 请将MCU串口发送函数填入该函数内,并将接收到的数据作为参数传入串口发送函数
217 *****/
218 void uart_transmit_output(unsigned char value)
219 {
220 // #error "请将MCU串口发送函数填入该函数,并删除该行"
221 /*
222 //示例:
223 extern void Uart_PutChar(unsigned char value);
224 Uart_PutChar(value); //串口发送函数
225 */
226 }
227 /*****
228 第二步:实现具体用户函数
229 1:APP下发数据处理
230 2:数据上报处理
231 *****/
```

编译完成.

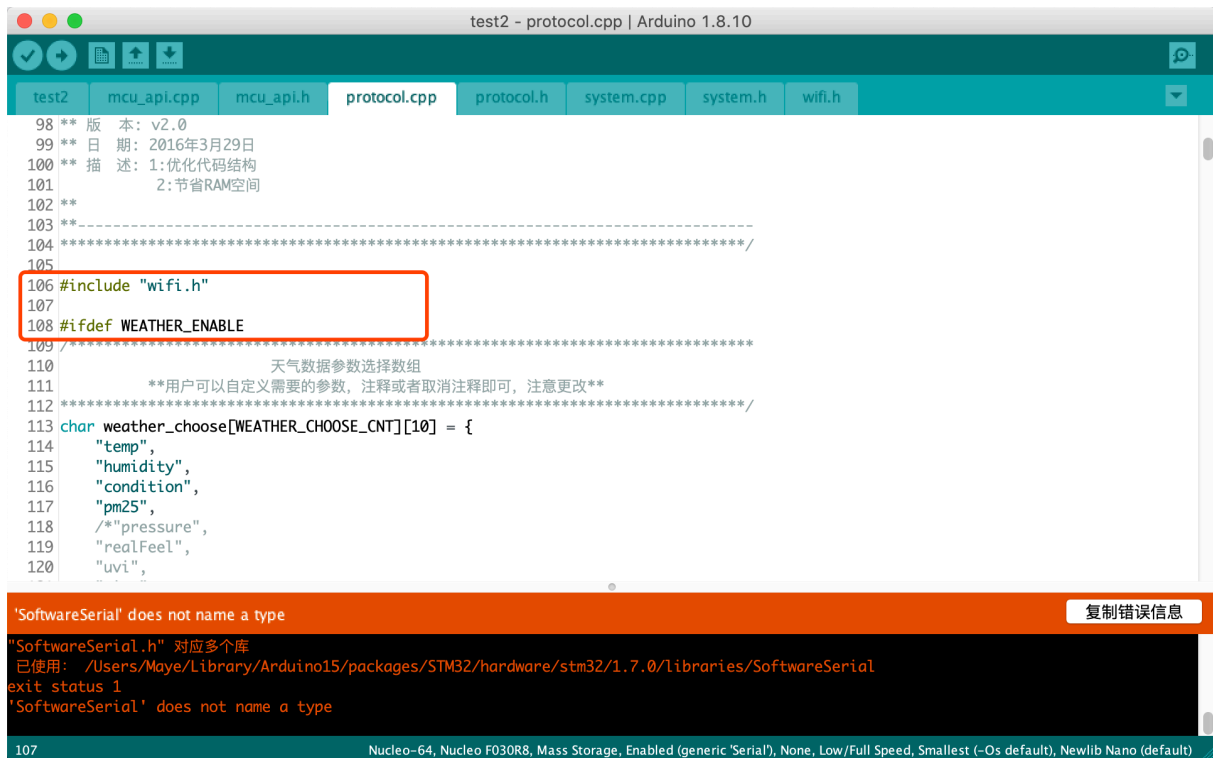
207 Nucleo-64, Nucleo F030R8, Mass Storage, Enabled (generic 'Serial'), None, Low/Full Speed, Smallest (-Os default), Newlib Nano (default)

改为:

```
1 void uart_transmit_output(unsigned char value)
2 {
3 // #error "请将MCU串口发送函数填入该函数,并删除该行"
4 extern SoftwareSerial mySerial;
5     mySerial.write(value);
6 }
```

Import Arduino corresponding library function header files:

- Copy screenshot from protocol.cpp file



```
test2 - protocol.cpp | Arduino 1.8.10
test2 mcu_api.cpp mcu_api.h protocol.cpp protocol.h system.cpp system.h wifi.h
98 ** 版本: v2.0
99 ** 日期: 2016年3月29日
100 ** 描述: 1:优化代码结构
101          2:节省RAM空间
102 **
103 **-----
104 *****/
105
106 #include "wifi.h"
107
108 #ifndef WEATHER_ENABLE
109 *****/
110          天气数据参数选择数组
111          **用户可以自定义需要的参数, 注释或者取消注释即可, 注意更改**
112 *****/
113 char weather_choose[WEATHER_CHOOSE_CNT][10] = {
114     "temp",
115     "humidity",
116     "condition",
117     "pm25",
118     /*"pressure",
119     "realFeel",
120     "uvi",
121
122
123
124
125
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```

```
test2 - wifi.h | Arduino 1.8.10
test2 mcu_api.cpp mcu_api.h protocol.cpp protocol.h system.cpp system.h wifi.h
196 #define UPDATE_MODE 0X02 //升级模式
197
198 //=====
199 //配网方式选择
200 //=====
201 #define CONFIG_MODE_DEFAULT "0" //默认配网方式
202 #define CONFIG_MODE_LOWPOWER "1" //低功耗配网方式
203 #define CONFIG_MODE_SPECIAL "2" //特殊配网方式
204
205 #include "protocol.h"
206 #include "system.h"
207 #include "mcu_api.h"
208
209
210 //=====
211 //下发命令
212 //=====
213 typedef struct {
214     unsigned char dp_id; //dp序号
215     unsigned char dp_type; //dp类型
216 } DOWNLOAD_CMD_S;
217
218 #endif

expected identifier before numeric constant 复制错误信息
已使用: /Users/Maye/Library/Arduino15/packages/STM32/hardware/stm32/1.7.0/libraries/SoftwareSerial
exit status 1
expected identifier before numeric constant

124 Nucleo-64, Nucleo F030R8, Mass Storage, Enabled (generic 'Serial'), None, Low/Full Speed, Smallest (-Os default), Newlib Nano (default)
```

Add a line:

```
1 #include "Arduino.h"
```

### 4.3 Product function implementation

After the serial port sending and receiving functions are implemented, developers need to implement the specific functions of the product. We generated the corresponding DP function functions from the SDK package downloaded by Tuya IoT platform. When creating the product, we selected the switch function, and the specific function was implemented in the protocol. c function

```

1769     ret = dp_download_switch_5_handle(value, length);
1770     break;
1771 case DPID_SWITCH_6:
1772     //开关6处理函数
1773     ret = dp_download_switch_6_handle(value, length);
1774     break;
1775 case DPID_SWITCH_USB1:
1776     //USB1开关处理函数
1777     ret = dp_download_switch_usb1_handle(value, length);
1778     break;
1779 case DPID_SWITCH_USB2:
1780     //USB2开关处理函数
1781     ret = dp_download_switch_usb2_handle(value, length);
1782     break;
1783 case DPID_COUNTDOWN_1:
1784     //开关1倒计时处理函数
1785     ret = dp_download_countdown_1_handle(value, length);
1786     break;
1787 case DPID_COUNTDOWN_2:
1788     //开关2倒计时处理函数
1789     ret = dp_download_countdown_2_handle(value, length);
1790     break;
1791 case DPID_COUNTDOWN_3:
1792     //开关3倒计时处理函数
1793     ret = dp_download_countdown_3_handle(value, length);
1794     break;
1795 case DPID_COUNTDOWN_4:
    
```

expected identifier before numeric constant

```

#define SUCCESS 1
              ^
/Users/Move/Library/Arduino15/packages/STM32/hardware/stm32/1.7.0/system/Drivers/CMSIS/Device/ST/STM32G0xx/Include/stm32g0xx.h:139:
    
```

1780 Nucleo-64

**Figure 6:** 1576496829375

For serial port related transplantation, please refer to [《MCU SDK Migration》](#) For detailed implementation details of the communication protocol, please refer to [Tuya Cloud Universal Serial Port Access Protocol](#).

## 5 Download and debug

### 5.1 Download

After the developer has written the application for the product, the following steps can be used to download the code to the Tuya Sandwich Development Board.

1. Connect the sandwich development board to the computer and select the corresponding port
2. Click Upload

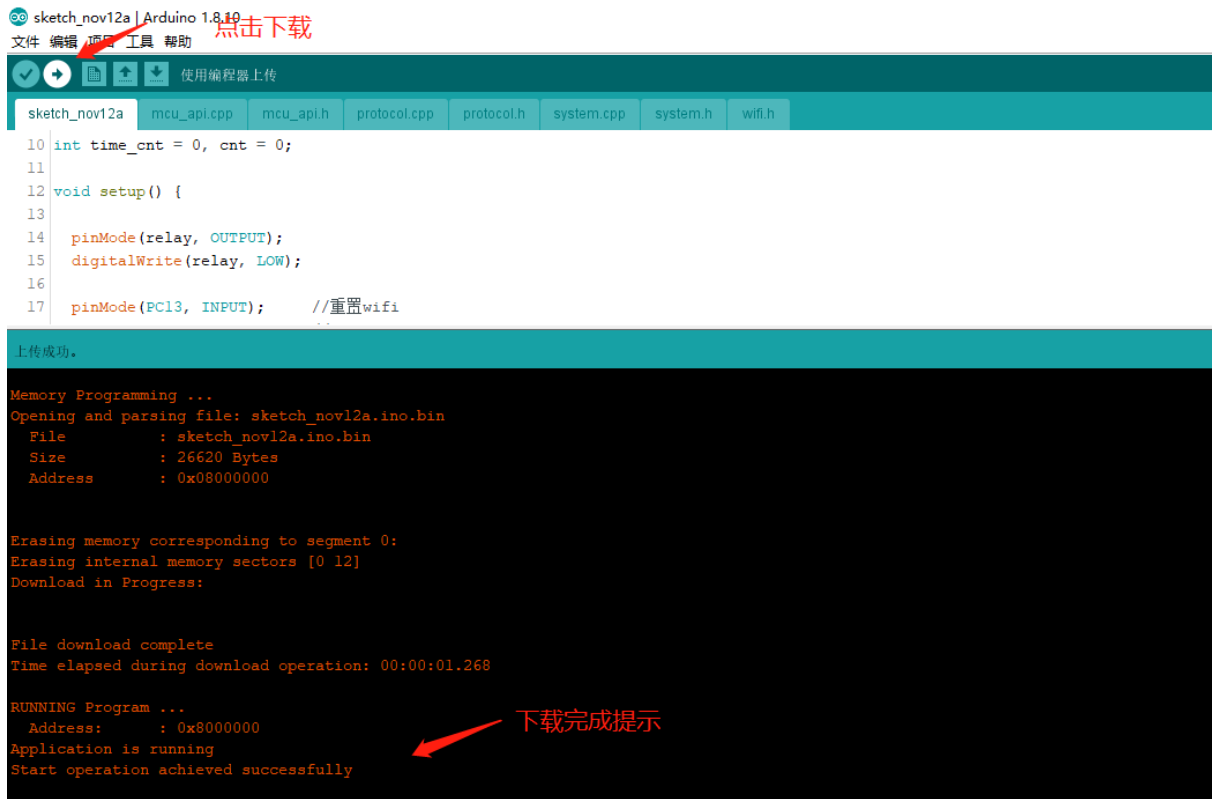


```
sketch_dec24mm - protocol.cpp | Arduino 1.8.10
sketch_dec24mm mcu_api.cpp mcu_api.h protocol.cpp protocol.h system.cpp system.h wifi.h
217 返回参数 : 无
218 使用说明 : 请将MCU串口发送函数填入该函数内,并将接收到的数据作为参数传入串口发送函数
219 *****/
220 void uart_transmit_output(unsigned char value)
221 {
222 // #error "请将MCU串口发送函数填入该函数,并删除该行"
223 extern SoftwareSerial mySerial;
224 mySerial.write(value);
225 }
226 *****/
227 第二步:实现具体用户函数
228 1: APP下发数据处理
229 2: 数据上报处理
230 *****/
231
232 *****/
233 1: 所有数据上报处理
234 当前函数处理全部数据上报(包括可下发/可上报和只上报)
235 需要用户按照实际情况实现:
236 1: 需要实现可下发/可上报数据点上报
237 2: 需要实现只上报数据点上报
238 此函数为MCU内部必须调用
239 用户也可调用此函数实现全部数据上报
240 *****/
241
242 //自动化生成数据上报函数
243
```

Figure 7: 1576736303858

## 6 Results display

After downloading the program to our development board through the above steps, the following page appears after downloading successfully:



```
sketch_nov12a | Arduino 1.8.19
文件 编辑 硬件 工具 帮助 点击下载
使用编译器上传
sketch_nov12a mcu_api.cpp mcu_api.h protocol.cpp protocol.h system.cpp system.h wifi.h
10 int time_cnt = 0, cnt = 0;
11
12 void setup() {
13
14   pinMode(relay, OUTPUT);
15   digitalWrite(relay, LOW);
16
17   pinMode(PC13, INPUT); //重置wifi
18
19 }
20
21 void loop() {
22   cnt++;
23   if (cnt == 10) {
24     digitalWrite(relay, HIGH);
25     delay(1000);
26     digitalWrite(relay, LOW);
27     delay(1000);
28     cnt = 0;
29   }
30 }
上传成功。
Memory Programming ...
Opening and parsing file: sketch_nov12a.ino.bin
File      : sketch_nov12a.ino.bin
Size     : 26620 Bytes
Address  : 0x08000000
Erasing memory corresponding to segment 0:
Erasing internal memory sectors [0 12]
Download in Progress:
File download complete
Time elapsed during download operation: 00:00:01.268
RUNNING Program ...
Address:      : 0x8000000
Application is running
Start operation achieved successfully
下载完成提示
```

### 6.1 Debug

The graffiti sandwich development board debugging can use the printf function to format and output the information we need to debug

1. Initialize the hardware serial port `Serial.begin (115200);`
2. Since the printf () function has been redirected to our serial port in the Tuya Sandwich Development Board library, you can use the printf () function directly.

## 7 Distribution

Download the program to the development board and power it on again. At this time, the Wi-Fi module is in EZ network configuration mode by default. Use Tuya Smart App for network configuration.

Network indicator:

---

Flashing	EZ network status, waiting for network
Slow flashing	AP network configuration status, waiting for network configuration
Off	WIFI is configured and connected to the router
Always lit	Connected to the router and connected to the cloud

---

Networking steps:

1. Open Tuya Smart Click icon



Figure 8: image.png

## 2. Add device



Figure 9: image.png



Figure 10: image.png

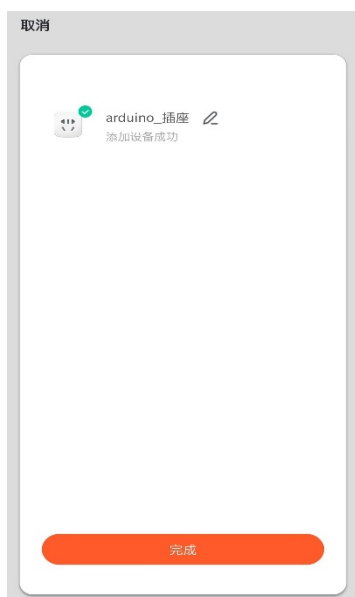


**Figure 11:** image.png

3. Wait for the network to complete



**Figure 12:** image.png



4. After the equipment network is successfully configured, we can control it through APP