

Using MQTT on Arduino with ESP ATCMD and RTL872xD dev board

This guide demonstrates how to connect to an MQTT server on an Arduino board without WiFi capability, by using the ESP AT command set to control the RTL872xD dev board to connect to WiFi and communicate over the internet.

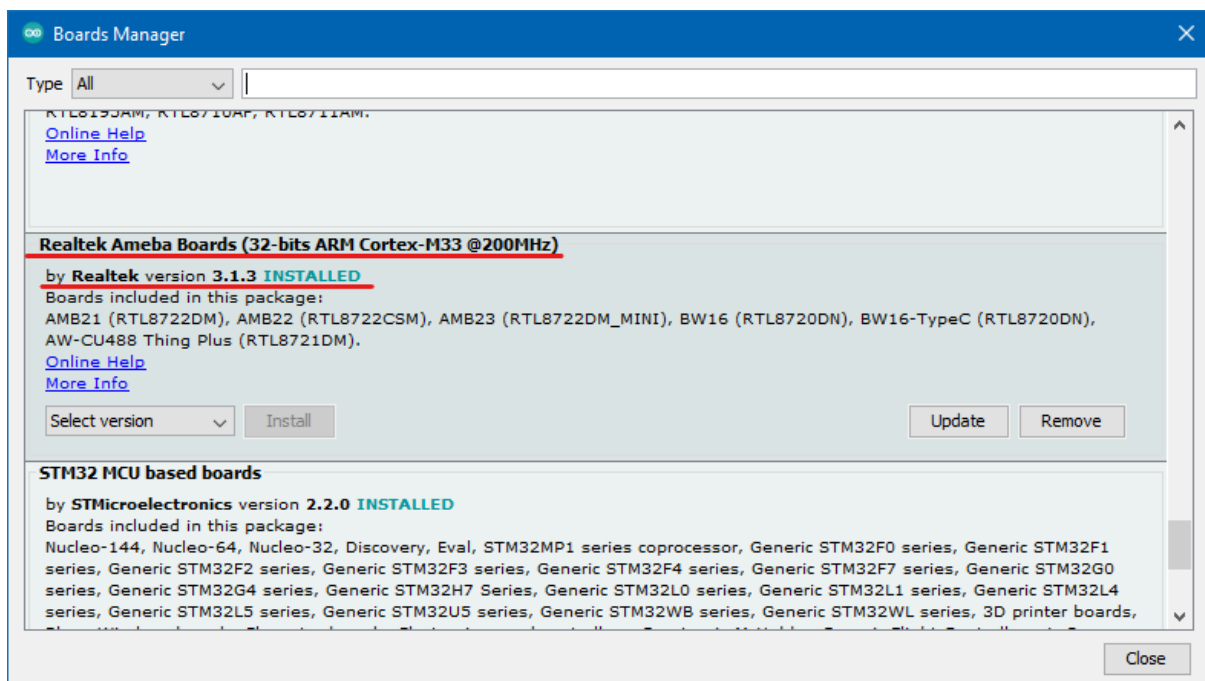
Parts required

- AmebaD [AMB23 / AMB21 / AMB22 / BW16] x 1
- Arduino UNO x 1

Preparation

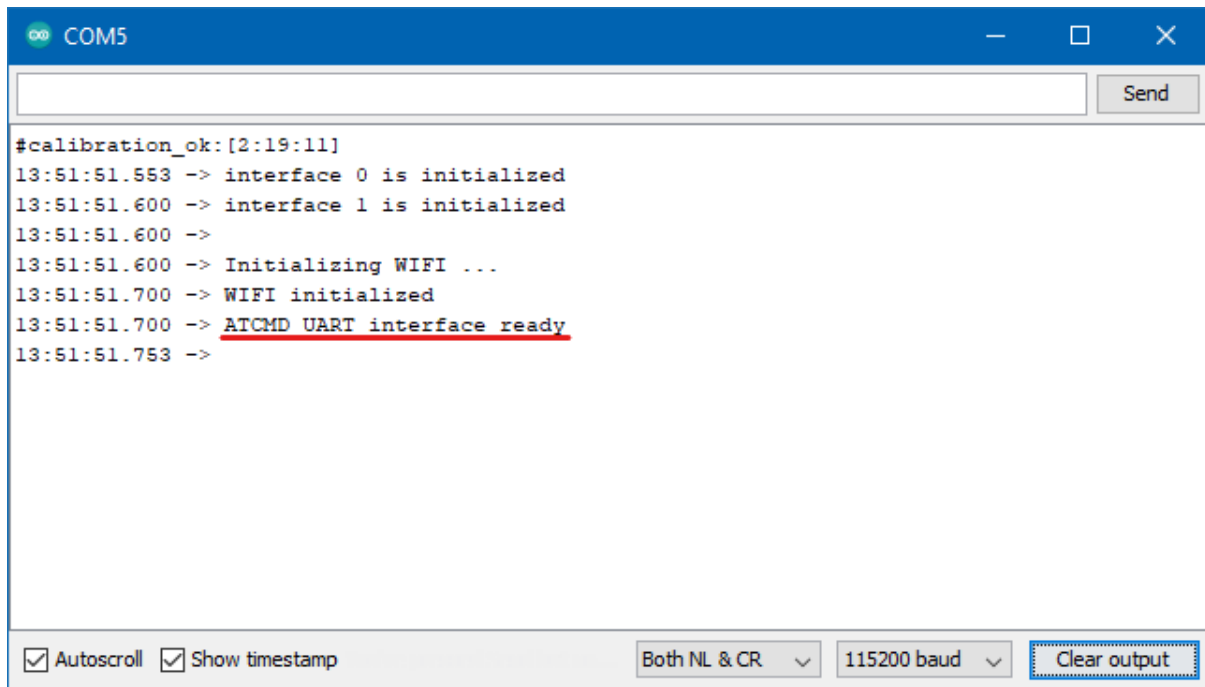
For the RTL872xD board, you will need to compile and upload an Arduino sketch that will accept and process the ESP AT commands.

First, in Arduino -> Tools -> Board -> Boards Manager, ensure that the board support package for Realtek Ameba Boards is installed.



Download the Ameba_ATCMD_ESP sketch from

https://github.com/ambiot/ambd_arduino/tree/dev/Ameba_misc/ESP_ATCMD_on_AmebaD and open it in Arduino IDE. Ensure that the correct board and COM port is selected, then compile and upload.



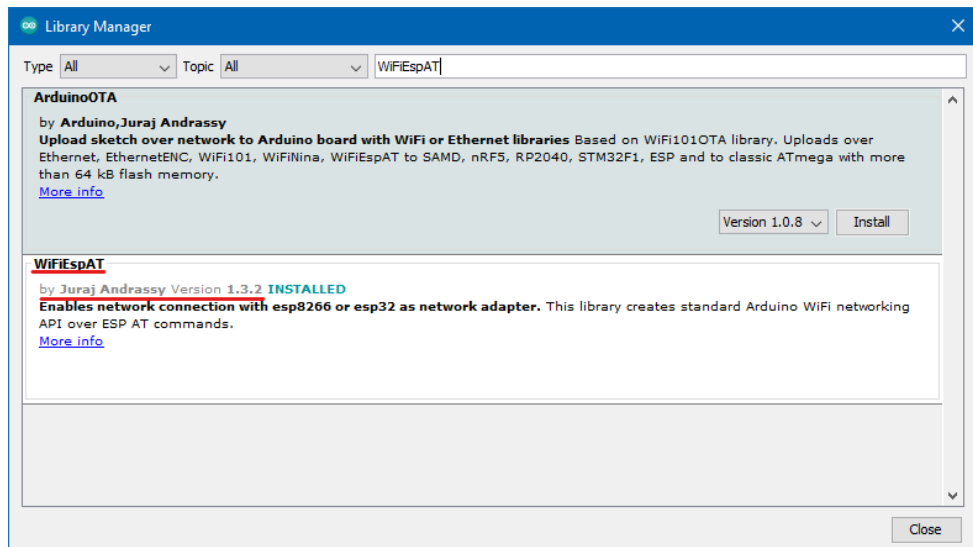
```
#calibration_ok:[2:19:11]
13:51:51.553 -> interface 0 is initialized
13:51:51.600 -> interface 1 is initialized
13:51:51.600 ->
13:51:51.600 -> Initializing WIFI ...
13:51:51.700 -> WIFI initialized
13:51:51.700 -> ATCMD UART interface ready
13:51:51.753 ->
```

After uploading, open the serial terminal and you should see the message “ATCMD UART interface ready”. This indicates that the board is ready to accept AT commands. The default UART port uses TX pin PB_1 and RX pin PB_2, with a baud rate of 9600 bps, 8 data bits, 1 stop bit, no parity bit, no flow control.

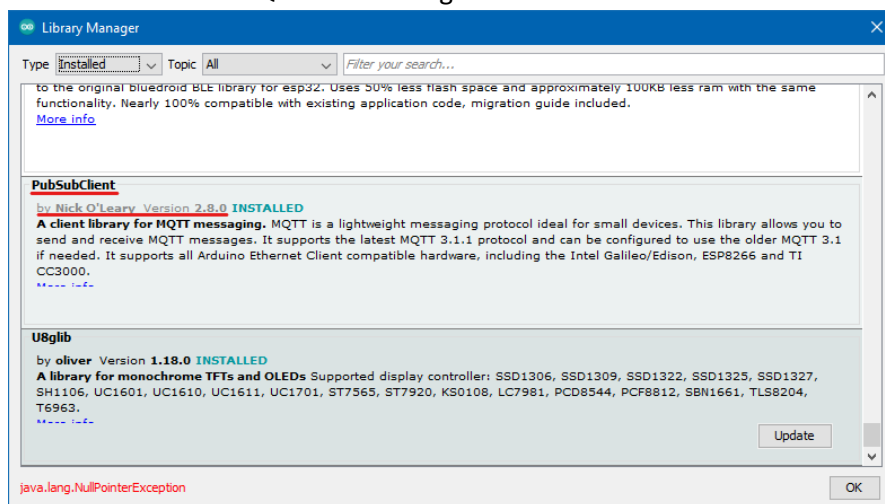
To test the ATCMD interface, you may choose to connect a USB-UART adapter to the TX and RX pins, then open a serial terminal and type in AT commands. Refer to https://espressif-docs.readthedocs-hosted.com/projects/esp-at/en/release-v2.2.0.0_esp32/AT_Command_Set/index.html for the command syntax. Note that not all ESP AT commands are supported on AmebaD boards.

For the Arduino Due board, you will need to install these two libraries from the Arduino IDE Library Manager:

- WiFiEspAT by Juraj Andrassy
 - This provides a WiFi class and Client class that can use AT commands to connect to the internet.



-
- PubSubClient by Nick O'Leary
 - This connects to a MQTT server using a Client class.



○

If you are using a development board other than Arduino UNO, ensure that the corresponding board support package is installed in Arduino -> Tools -> Board -> Boards Manager.

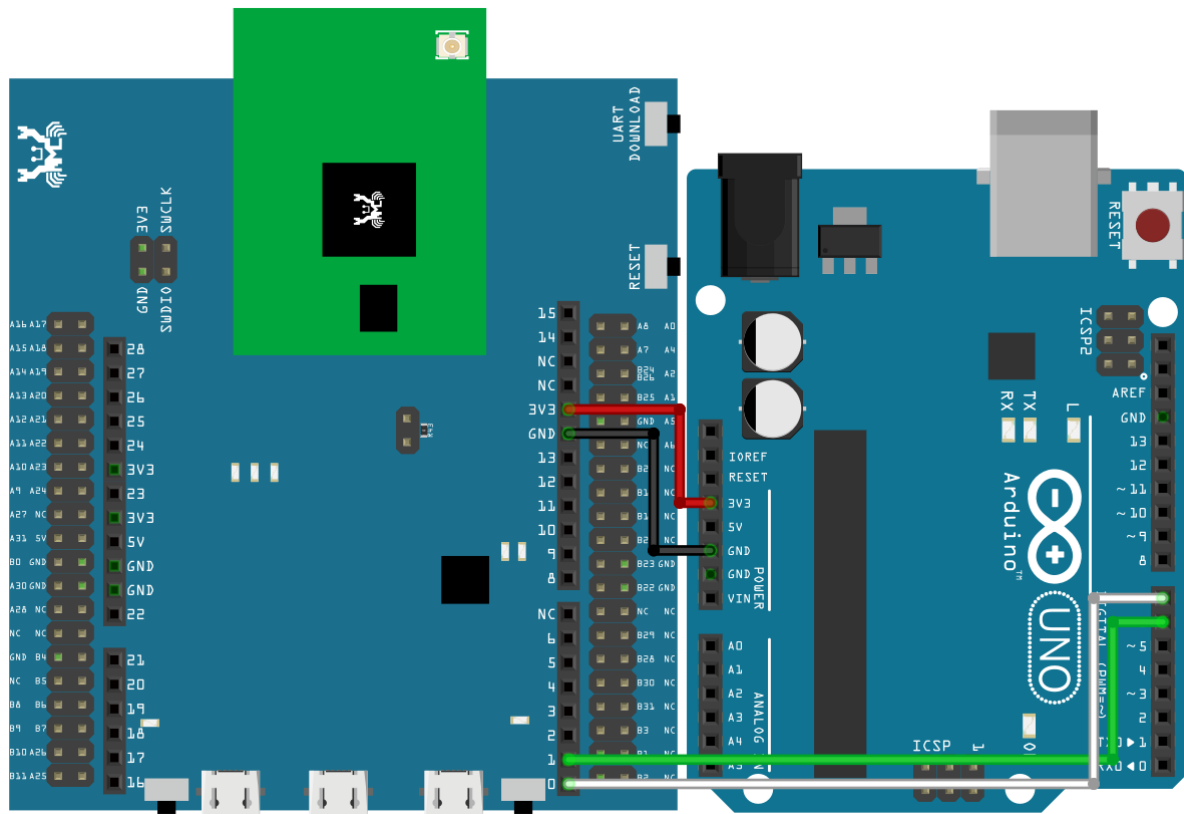
To configure the WiFiEspAT Library to use Version 2 of the ESP ATCMD set, open the file "`\\libraries\\WiFiEspAT\\src\\utility\\EspAtDrvTypes.h`" in your Arduino IDE sketchbook location, and comment out the line "`#define WIFIESPAT1`".

Download the Arduino_MQTT_ATCMD sketch from https://github.com/ambiot/ambd_arduino/tree/dev/Ameba_misc/ESP_ATCMD_on_AmebaD and open it in Arduino IDE.

In the code, modify "ssid" and "pass" to connect to your WiFi network.

Ensure that the correct board and COM port is selected, then compile and upload.

Connect the UART ports of the AmebaD board and Arduino UNO board together as shown.



Reset both boards, select the COM port for Arduino UNO and open the Serial Monitor, you should see the following messages if it manages to connect to the MQTT server successfully.

```

COM21
14:17:43.375 -> WiFi shield init done
14:17:43.422 -> Connecting to SSID: xiaomi_test
14:17:58.111 -> Attempting MQTT connection...connected

[Autoscroll] [Show timestamp] [Both NL & CR] [115200 baud] [Clear output]

```

On your mobile phone, you can use a MQTT client app to send and receive MQTT messages.

- Android: <https://play.google.com/store/apps/details?id=in.dc297.mqttclpro>
- iOS: <https://apps.apple.com/us/app/mqtttool/id1085976398>

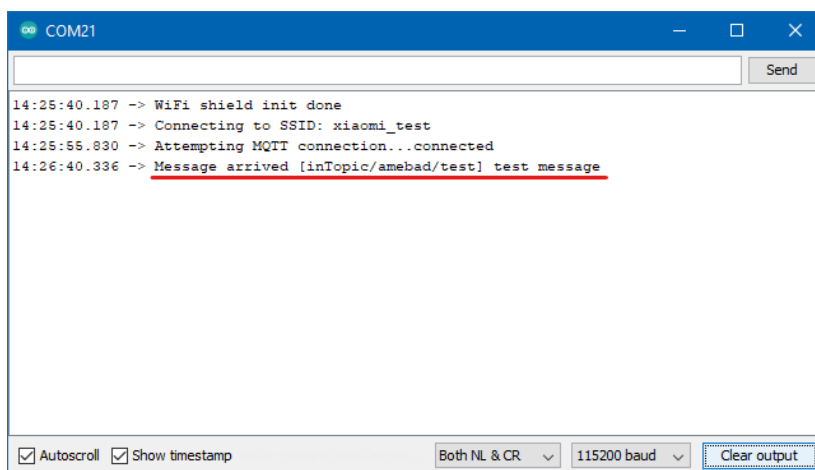
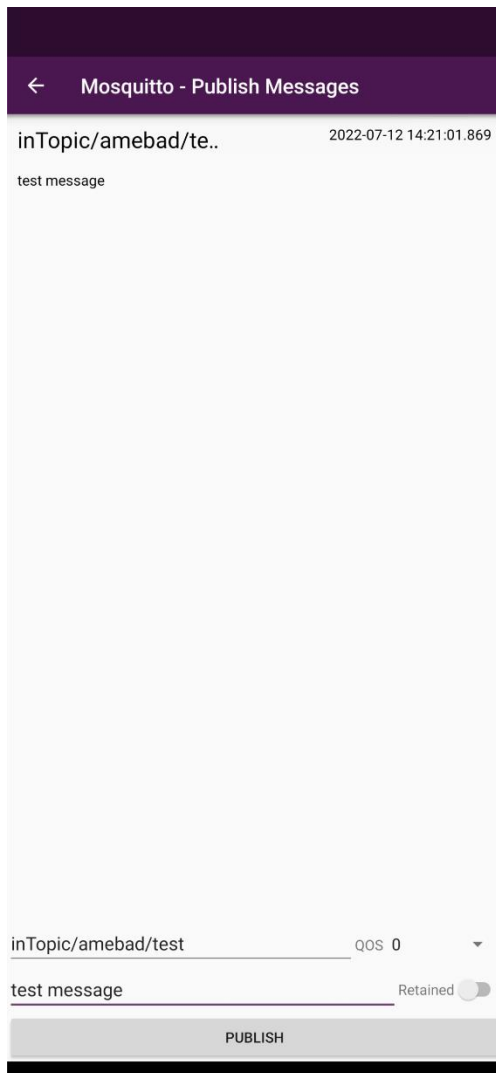
In the MQTT client app, connect to the public Mosquitto MQTT server with the following settings:

- Host: test.mosquitto.org
- Port: 1883

Subscribe to the topic “outTopic/amebad/test” and you will receive a message every time the Arduino Due reconnects to the MQTT server.



Publish a message to the topic “inTopic/amebad/test” and you will see it received and printed out in the Serial Terminal.



References

- Documentation and syntax for ESP AT commands can be found at https://espressif-docs.readthedocs-hosted.com/projects/esp-at/en/release-v2.2.0.0_esp32/AT_Command_Set/index.html