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Shenzhen Doctors of Intelligence & Technology

ESP8266 Serial WiFi Shield for Arduino

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1.Introduction

ESP8266 serial WiFi shield is designed and developed based on ESPressif by Shenzhen Doctors of Intelligence Technology, which can be compatible with Arduino UNO, Mega, and other standard development board. By this way, one can quickly go on the next development and design.

This WiFi shield can be easy to realize serial to WiFi function with the following features:

- WiFi chip is adopted the industrial ESP8266, and the module is encapsulated by a metal shell, which make the module have the strong anti-interference;
- This shield is fully compatible with Arduino UNO, Mega 2560, and so on, the working voltage of the connection between Arduino UNO and shield can be 3.3V and 5V by the voltage transformation;
- The serial port use a double-way switch to control the shield. If sw1 is off, then this shield board can be used separately, otherwise, the shield board would work by connecting the Arduino control board;
- Arduino board don't need any configuration, then Arduino uno board can be on internet by inserting this shield board;
- Be able to configure the WiFi parameters and serial port by the Webserver;
- This shield board can be used as a desperate ESP8266 board, and certainly use the AT command, and our other firmwares;
- Can be used as a shield board for Arduino UNO.
- SW1 can control the connection with Arduino, which is corresponding to the RX, TX with 1, and 2 for SW1.

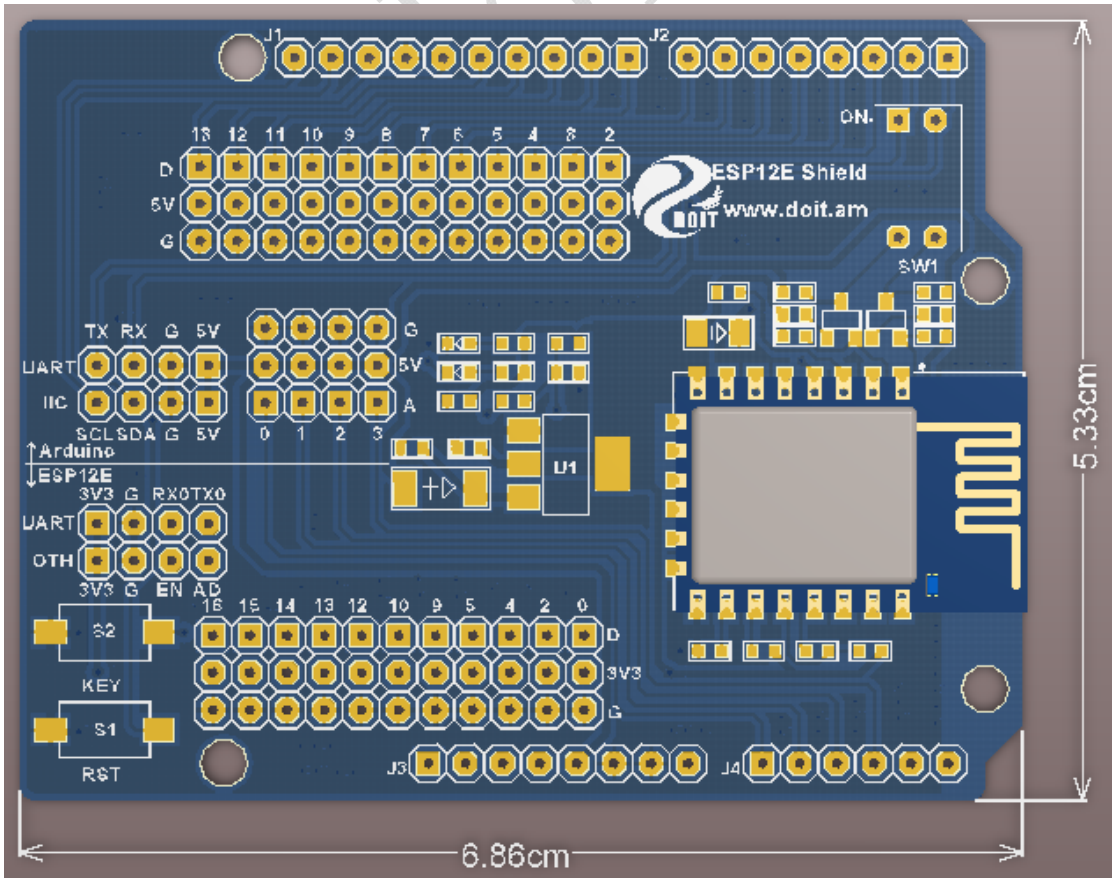
More details, please visit http://www.doit.am, and http://www.smartarduino.com.

2.Specifications

- Support wireless 802.11 b/g/n standard;
- Support STA/AP working modes;
- Built-in TCP/IP protocol stack, can configure a socket;
- Support TCP/UDP Server and Client;
- Baud:1200/2400/4800/9600/19200/38400/57600/74800/115200 bps;

- Serial data bit: 5/6/7/8 bits;
- Serial parity check: none;
- Serial stop bits: 1/2bits;
- Standard Arduino UNO, Mega pin-length;
- Have Arduino Pin 2/3/4/5/6/7/8/9/10/11/12/13;
- Have ESP8266 GPIO 0/2/4/5/9/10/12/13/14/15/16/ADC/EN/UART TX/UART RX;
- RESET;
- KEY for configuration;
- SW1 to realize switch function between Arduino UNO and ESP8266 (RX and TX for 2bits);
- WiFi work current: continuous ≈70mA (200mA MAX), standby: <200uA;
- Wireless transmission rate: 110-460800bps;
- Working temperature: -40℃～＋125℃
- Weight: about 20g

3 size



4 Definition for interface and LED index

4.1 Interface definition

Definitions for the pins on shield board:

items	pin	function	note
Arduino	G	GND	
	D	Digital IO	
	A	Analog IO	
	5V	5V	
	TX	Arduino Uno TX	SW1 be able to connect ESP8266
	RX	Arduino Uno RX	SW1 be able to ESP8266
	SCL	Arduino SCL	
	SDA	Arduino SDA	
ESP8266	G	GND	
	D	Digital IO	
	3V3	3.3V	
	RX0	ESP8266 RX0	SW1 be able to connect Arduino
	TX0	ESP8266 TX0	SW1 be able to connect Arduino
	EN	ESP8266 EN	
	AD	ESP8266 AD	
	RST	ESP8266 Reset	
	KEY	ESP8266 Configuration	
	SW	ESP8266 And Arduino	When download Arduino code, the 2nd bit of SW1 must be at "off".

4.2 LED index

There are two LED index on the ESP8266WiFi shield board, where, red is for the power, and blue is denoted as follows.

Continuously twinkling fast 4 times	Receive the data on the serial or interenet
Twinkling one time at 0.5s	WiFi module is at configuration state
Twinkling one time at 1s	WiFimodule try to connect the router at STA mode.

Always light	Enter into AP or STA working mode

5 Get started

Present two example to show the serial transparent function for this ESP8266 board.

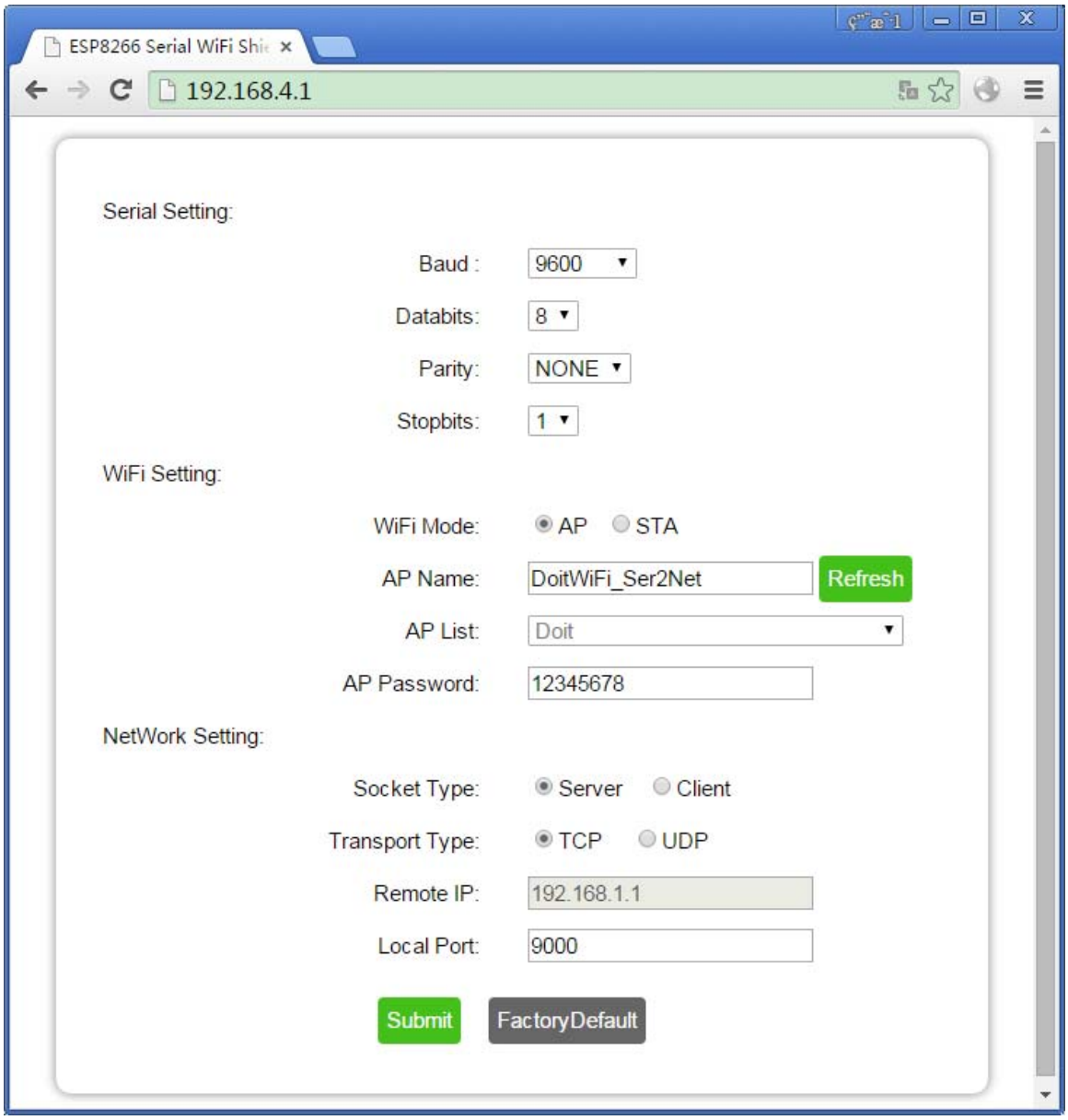
5.1 Entre into configuration

The default setting is at configuration mode. The shield board can be used after configurated. In addition, if this shield board is already at configuration mode, it can be try to use the following ways to enter into configuration mode.

Method one	Press the KEY button over 1s.
Method two	Send the character ”[!@!]” to WiFi module from serial port.

1) After power, the WiFi signal is named as “DoitWiFi_Config” at the configuration state, and the password is “12345678”

2) Input the IP addres: 192.168.4.1 at browser to open the configuration page, as shown in the following.



The built-in WebServer in this WiFi shield board supports serial parameters, ESP8266 WiFi working mode (AP and STA), network parameters configuration, and support scan the AP list automatically and/or manually.

3) After set, then press “Submit” directly, and show the submission successfully.

After submission, this shield board would reset and enter into the AP mode. The serial parameters is 9600, n, 8, 1. SSID is “DoitWiFi_Ser2Net”， and the password

is “12345678”. Set up TCP Server, and the monitor port is 9000. If use “FactorDefault”, one can get the same results.

5.2 Arduino to WiFi

After the above setting, Arduino can realize the transparent transmission shown as follows.

1) Insert shield board to Arduino, and let the 2 switches on SW1 be at OFF state, it aims to let WiFi shield board dis-connect Arduino serial port.
2) Download the following code to the Arduino board to initialized the serial port as 9600, n, 8, 1.

```
1.  void setup()
2.  {
3.  Serial.begin(9600);
4.  }
5.  void loop()
6.  {
7.  delay(1000);
8.  Serial.println("hello ESP8266 WiFi");
9.  }
```

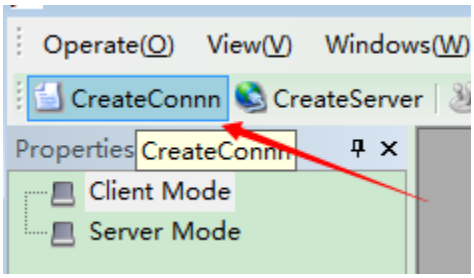
3) Let the 2 switches on SW1 be at ON to let WiFi shield board connect Arduino serial port, and power it.
4) Then the device with wireless WiFi card can search and connect the WiFisignal named as : “DoitWiFi_Ser2Net” and the password is “12345678”.

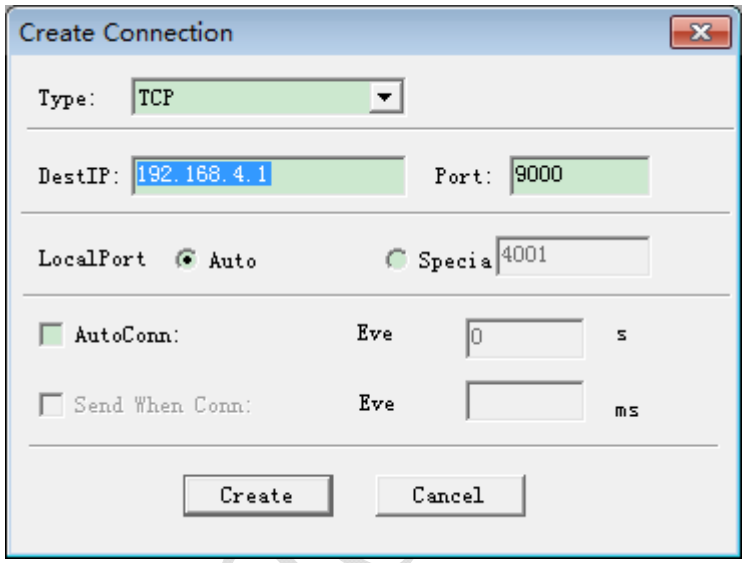
5) Run the tcpudp debugger tool at PC.

The tcpudpdebugger download address:

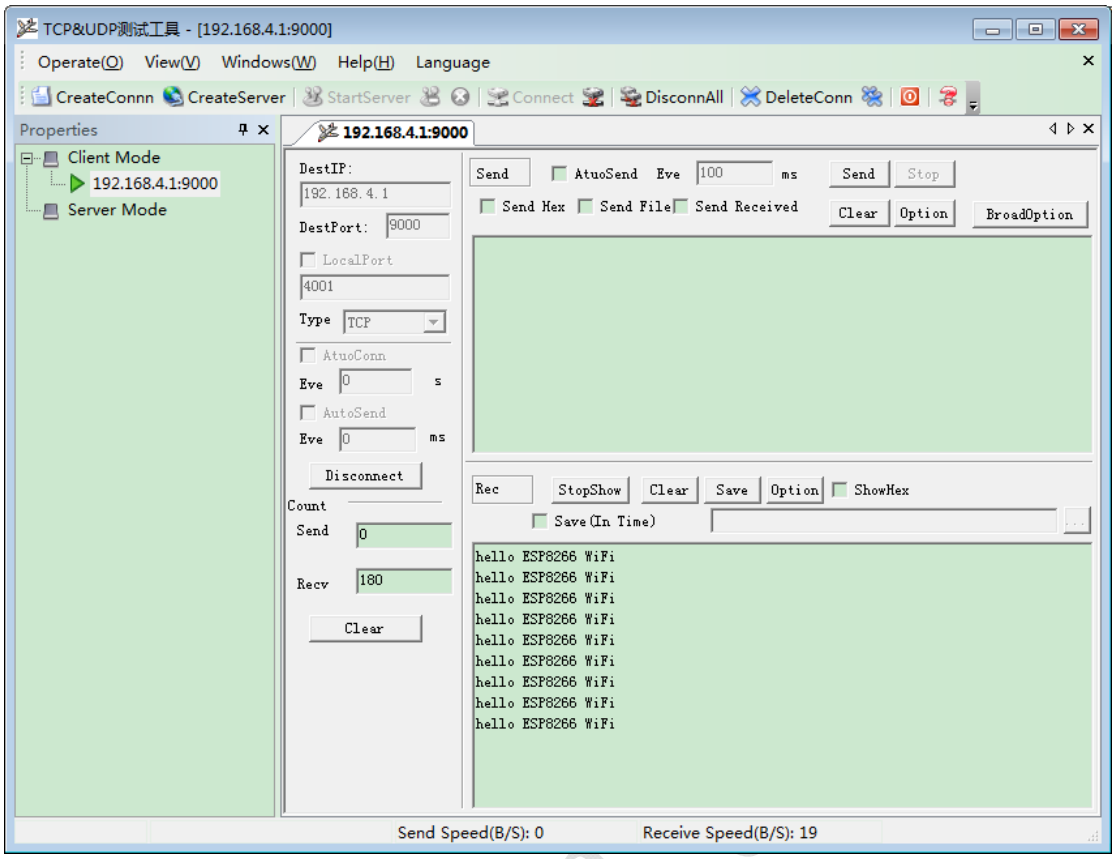
https://github.com/SmartArduino/ESPboard/blob/master/TCPUDPDbg.rar

Then run the software and build up a TCP connection, and set the IP address DestIP is 192.168.4.1, port: 9000, and LocalPort is Auto.





After connection, we can see that Arduino send the data after each 1s, and realize the function: send serial data to network.

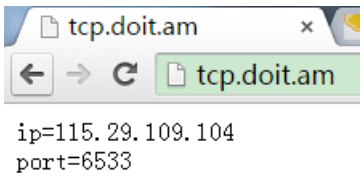


5.3 Connect to the remote server

In this example, we just test the remote WiFi communication between WiFi shield and the remote server by the Doit public TCP tool.

1) Get a temporary IP and port from Dot TCP server.

We already get the IP address is “115.29.109.104”, and the port is “6533”.



More details, please visit the public link:

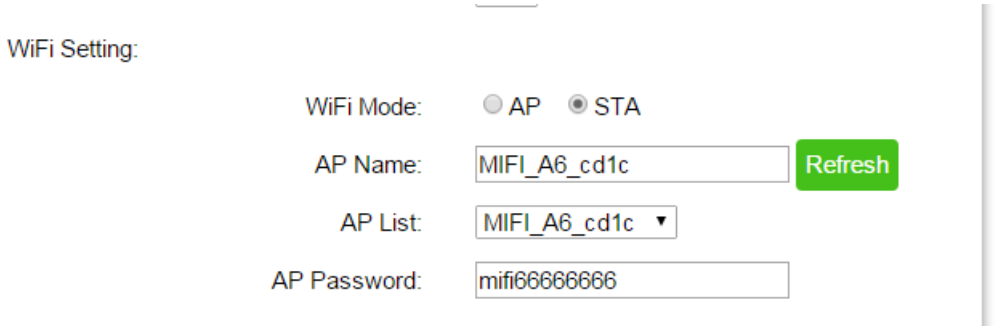
http://bbs.doit.am/forum.php?mod=viewthread&tid=12&extra=page%3D1

2) Let WiFi shield board as configuration mode

After power the WiFi shield board, press the KEY button on the shield board over 1s, then can enter into the configuration. Connect “DoitWiFi_Config”, input: “12345678”. Then input the IP address “192.168.4.1” to arrive at WebServer.

3) Configure the WiFi shield board working at (STA mode) to let this shield board can connect to the wireless router. As shown inthe following.

“WiFi Mode”is“STA”。In this example, the wireless router is “MIFI_A6_cd1c”, and the password is “mifi66666666”. When loading the page, Webserver would refresh automatically the existed AP list, and shown in the “AP list”.



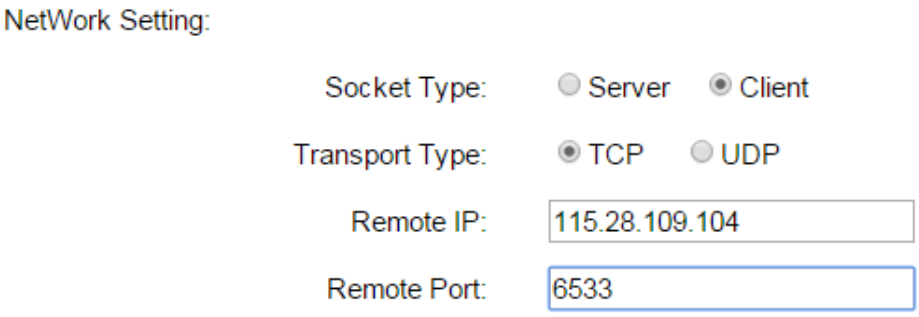
4) Configure the paramters for the WiFi shield board

Socket Type：“Client”。

Transport Type：“TCP”。

Remote IP:“115.28.109.104”

Remote Port：“6533”。



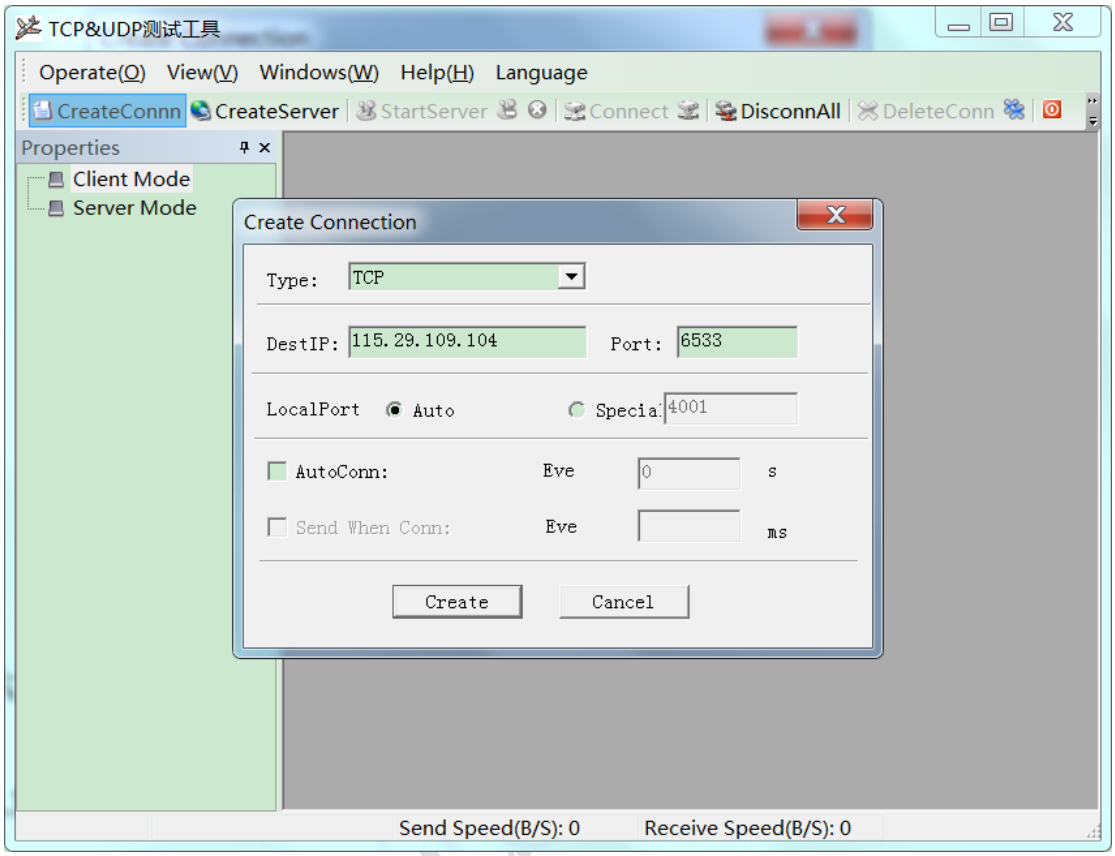
5) “Submit”

6) Run the tcpudp debugger tool

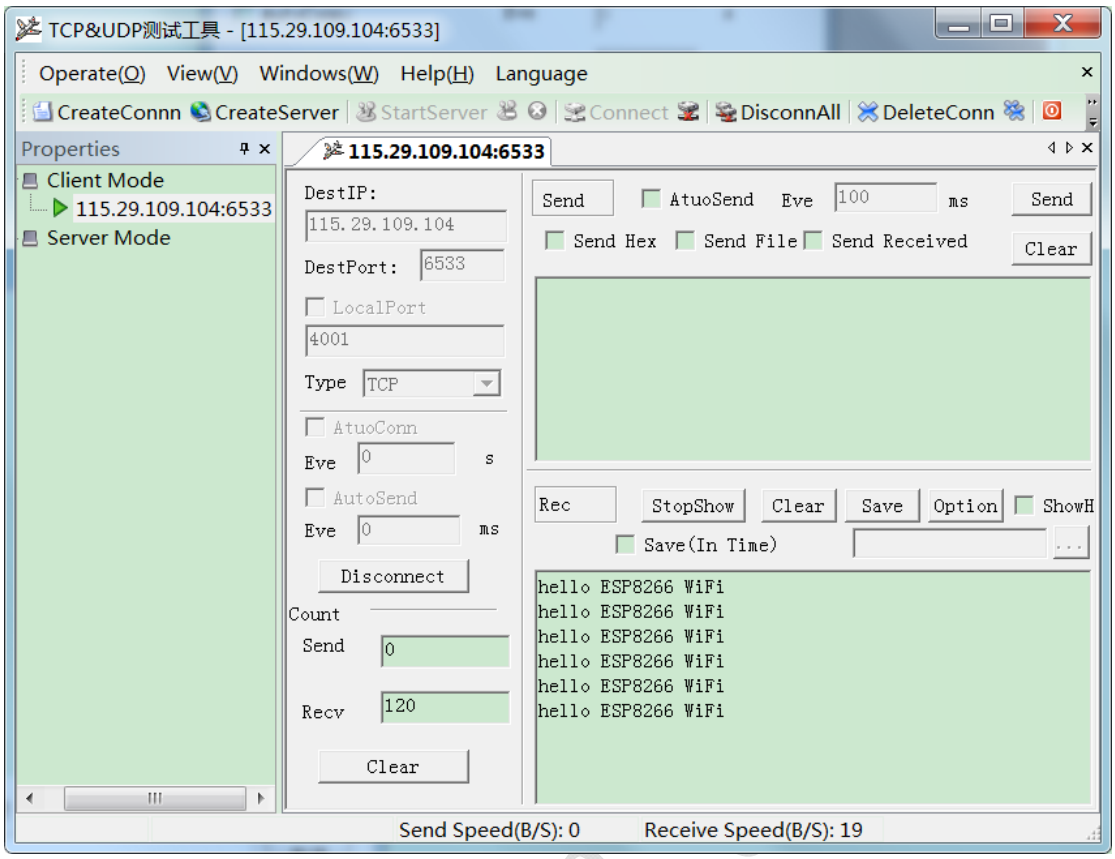
The download address:

http://bbs.doit.am/forum.php?mod=viewthread&tid=12&extra=page%3D1

Run this software, and build up a TCL client link with the DestIP “115.29.109.104”, and port is “6533”. The LocalPort is set as Auto.



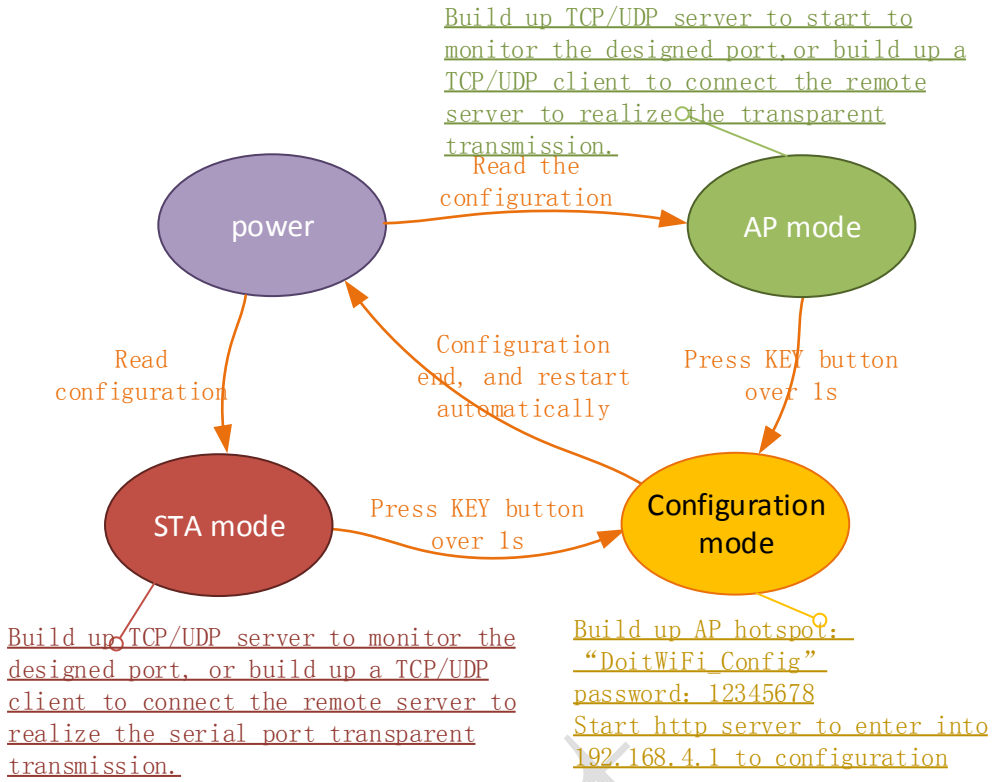
7) Then we can see the received data at TCP tool from Arduino, and realize to send the Arduino data to the remote TCP server.



6 Configuration

6.1 Mode switch

ESP8266 serial port to WiFi for the shield board as shown in the following.



6.2 serial port parameters

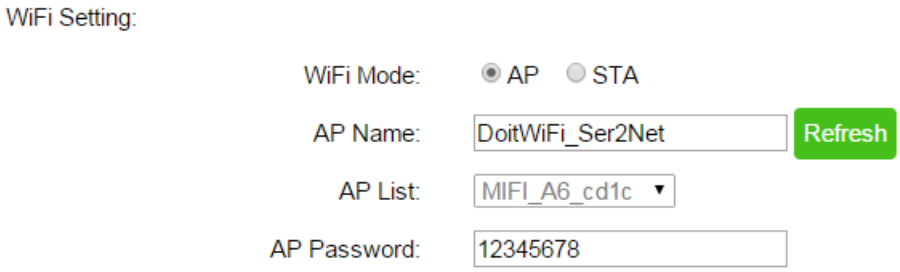
ESP8266 shield board configurable parameters

Baud(bps)	1200,2400,4800,9600,19200,38400,57600,74800,115200
Databits	5,6,7,8
Parity	NONE
Stopbits	1,2

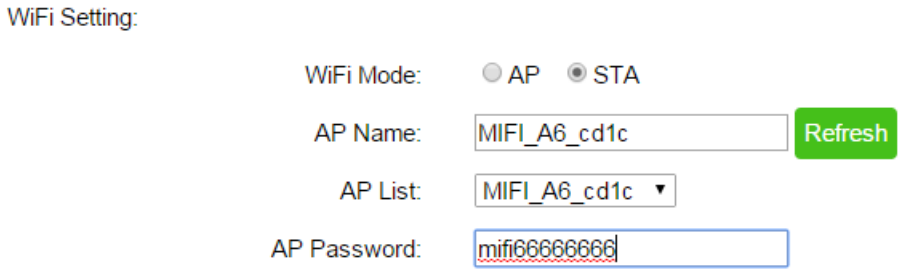
6.3 WiFi mode setting

There are two types of working modes: AP and STA.

In the WebServer, if choose AP mode, "Refresh" button and "AP List" are unable to use. Meanwhile, can set the SSID and password at AP mode.



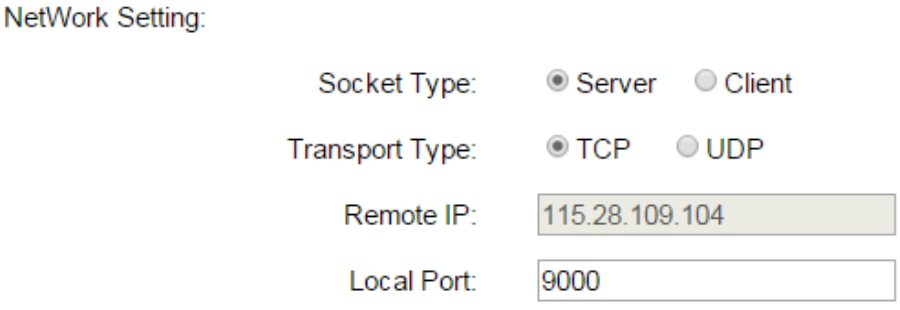
If “STA” mode is selected, “Refresh” button and “AP List” would be enabled. By “Refresh” button, can scan the hotspot SSID, and the scanned results would be seen at the “AP List”.



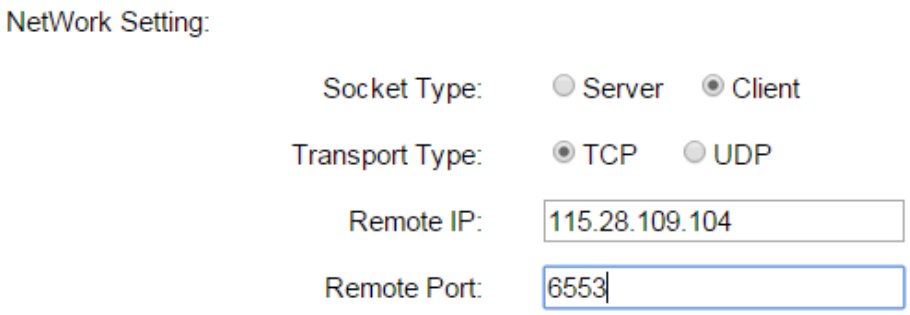
WiFi shield board would be try to connect the designed wireless router until connect the router.

6.4 Network setting

Network can be set as server or client modes. But wifi shield board just supports one Socket. When the setting is “Server”, “Remote IP” is forbidden to input, and the “Local Port” is 9000.



When the setting is “Client”, “Remote IP” is able to input, and thus need to write the remote server IP and port. The internet protocol can be TCP and/or UDP.



6.5 Reboot to the factory setting

At Webserver, click “FactoryDefault” to recover the factory setting (if at STA mode, must press the KEY button over 1s). The factory setting is shown as follows.

Default WiFi mode	AP mode
Default SSID	DoitWiFi_Ser2Net
Default password	12345678
IP address for module	192.168.4.1
Server client mode	TCP Server
Monitor port	9000
Serial parameters	9600,n,8,1, 9600, no parity, 8 data bits, 1stopbits

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