

Introduction

The Wi-Fi module is a plug-in option for the TIM2015 Speaking Clock

- It allows the clock to obtain the time and date from a Google server.
- Assuming Google keep their servers well synchronized, the time could be set to within about +/- 1 second.
- Nearby Google servers can be accessed via DNS making it easier to get a reliable response without the need to specify server names or IP addresses.

This module can either be purchased pre-programmed ([contact unusualelectronics.co.uk](http://contact.unusualelectronics.co.uk))

Price: **£10 plus postage.**

or you can follow the instructions below to program your own module.

(Go straight to the section 7 if you have purchased a pre-programmed module)

1: The Wi-Fi module

The module used by TIM2015 is an ESP8266-01 made by Espressif Systems.



This “ESP-01” is the first and most popular version of the board. It has a printed antenna and an 8-pin header block to allow it to easily be plugged-in to the main board. The module is readily and cheaply available from many China Ebay vendors and various websites.

The factory supplied firmware uses a serial AT command set for basic functions.

It requires a different firmware to allow time sync functionality using the “NodeLUA” programming language.

The factory firmware can be replaced and the required program scripts loaded by following the instructions below.

The required USB to TTL logic serial adapter may look something like the photo below
There are many types available from Ebay etc.
This one has an option to switch between 5V and 3.3V logic



Another common type looks like this:



This one uses 3.3V logic voltages.
Check your serial adapter TXD voltages with a meter to be certain before connecting it to the circuit.

3: Download the required files

The complete set of files including the firmware and time scripts can be downloaded from:
<http://unusualelectronics.co.uk/sp91wqmbc78a/WiFimodule.zip>

Alternatively the latest firmware is available from:
<https://github.com/nodemcu/nodemcu-firmware/releases>

(Select the “**Integer**” .BIN file e.g. nodemcu_integer_0.9.6-dev_20150704.bin)

The tool to flash the NodeMCU firmware is the nodemcu-flasher. It's open source from github.

Go to the [nodemcu-flasher](#) page and choose the Win32 or Win64 release (depending on your Windows type). Click on ESP8266Flasher.exe and then right click and select “Save Link As...” to download it to your PC.

Or use these direct links below:

[ESP8266Flasher.exe for Win32](#)

[ESP8266Flasher.exe for Win64](#)

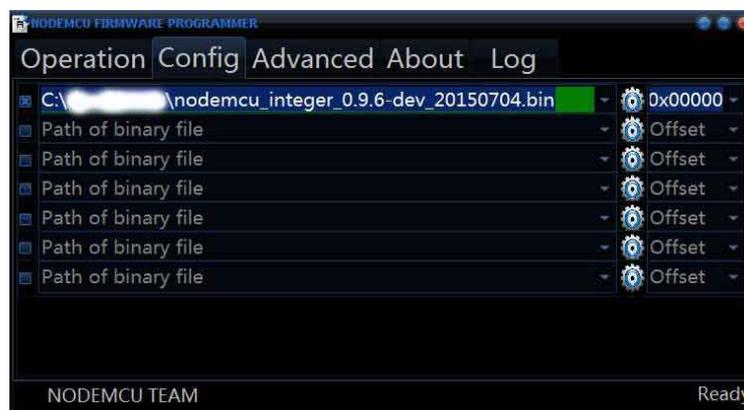
4: Flash the firmware

- Plug in your USB to serial adapter (most serial adapters are automatically recognised by Windows 7 onwards (otherwise install the driver for your adapter).
- Connect it to your ESP8266 adapter board.
- Close switch “S1” (firmware program enable) and turn on the power. (the Wi-Fi module Red power LED should light)
- Run ESP8266flasher.exe



If there is only one com port available, it will be automatically selected, otherwise choose the com port for your USB serial adapter.

Now click the “Config” tab..



Click the gear wheel icon to the right of the first (internal) file path and select the path to your nodemcu firmware .bin file. (similar to that shown in the photo)

Click the “Operation” tab to return to the first screen, then click the “Flash(F)” button. The AP and STA MAC address should then appear together with a progress bar and QR code icon.

Also, the Blue LED on the Wi-Fi module should flash to indicate data transfer.

When finished, a Green “Tick” will be shown and the status will show “Ready”!!br0ken!! Close the program and power-off the module.

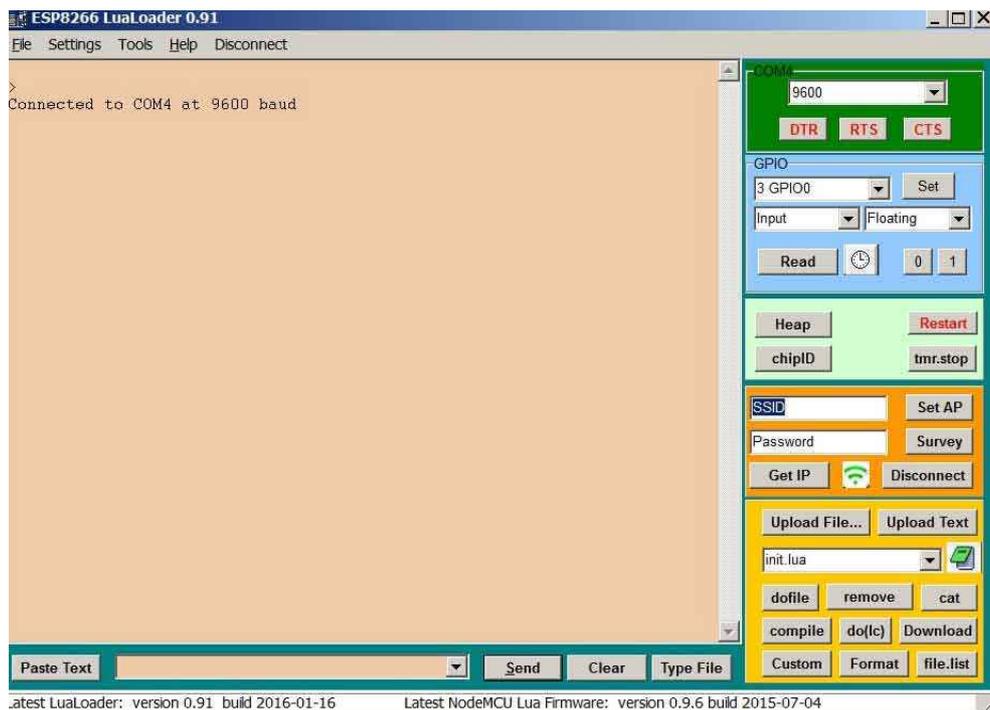
5: Load the LUA scripts

The LUA scripts can be uploaded to the module using a utility called LuaLoader.exe
This file is included in the pack or you can download it direct from the author's website:
<http://benlo.com/esp8266/index.html#LuaLoader>

Open Switch “S1” (normal mode).

Turn on the power to the module

Run the file LuaLoader.exe



If it doesn't connect, click on “Settings” choose your com port and click “Connect”

Click “Upload File” and select the file: “**Init.lua**”

A series of > arrows will indicate progress (ignore any error messages during the upload)

Repeat for file: “**Task.lua**”

Repeat for file: “**configServerInit.lua**”

Repeat for file: “**configServer.lua**”

Now click the “file.list” button which should list all the four files uploaded.

If everything was loaded okay then click the “Restart” button to restart the module.

6: Initial Power-on after loading the scripts

At power-on or restart the module initially sends a line of random characters

Then it will change its' baud rate and show the current firmware version e.g.:

```
NodeMCU 0.9.6 build 20150704 powered by Lua 5.1.4
```

Finally it should show the current status while it acts as a web server for the initial network configuration:

```
$Stat,0,Idle,* (repeated for up to 45 seconds while the module attempts to connect)
```

```
$Stat,6,Starting an AP.,* (this indicates it is starting an Access Point)
```

```
$Stat,7,TimeSync-08:a6,* (this is the Access Point name being advertised on the network  
(the last five characters are the last 2 bytes your module's MAC address).
```

At this stage you can use a Smart-Phone/Tablet or PC to browse the list of Wi-Fi networks and you should see the above Access Point name listed.

If all is OK you can plug the module into the clock, select Wi-Fi time source and follow the instructions below.

Other possible status messages:

```
$Stat,1,Connecting,* (Connecting to the local network)
```

```
$Stat,2,Wrong password,* (The stored network password is incorrect)
```

```
$Stat,3,No AP found,* (Can't find the specified Access Point (wrong SSID))
```

```
$Stat,4,Connect fail,* (Failed to connect to the local network)
```

```
$Stat,5,Got IP,* (Successfully connected and obtained an IP address)
```

```
$Stat,8,GET received,* (The config web server received a page get request)
```

```
$Stat,9,GET favicon request,* (config web server received a request to send a favicon)
```

```
$Stat,A,POST received,* (Config web server POST data received (from user config))
```

```
$Stat,B,SSID: "xxxxxx",* (echoes the SSID entered by the user during setup)
```

```
$Stat,C>Password: " xxxxxxx",* (echoes the password entered by the user during setup)
```

```
$Stat,D,Rebooting,* (Rebooting after completing the SSID/password config setup)
```

After a successful time sync, the module sends the following string to the clock:

```
$Time,hms,dmy,* (hour minute second, day month year)
```

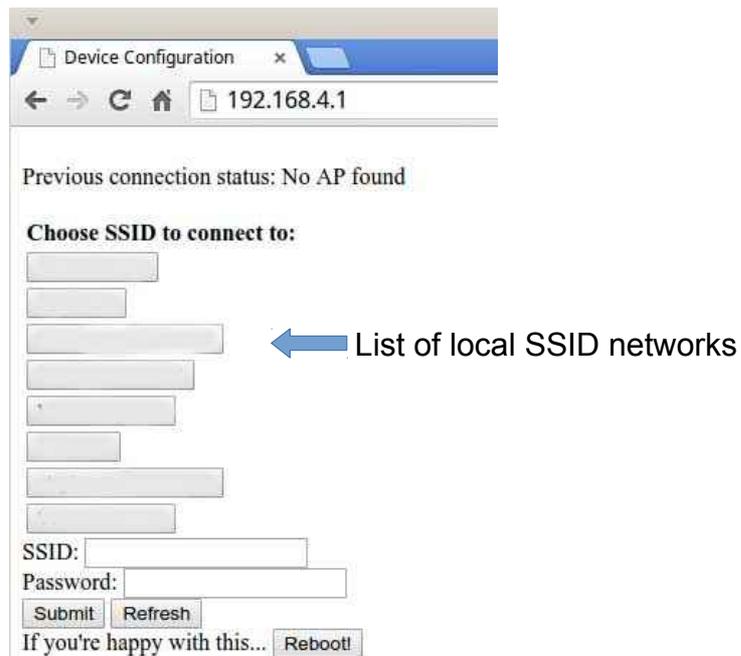
(The time is always sent as UTC (GMT))

7: Wi-Fi Module setup (SSID name and password)

- Enable the Wi-Fi module by selecting it in the “Time Source” menu (save the setting).
- The clock will immediately attempt to get the network time from a server.
- If the module has not been previously configured or is unable to connect to your network for any reason, after a time-out the following screen will be displayed:

"* No Wi-Fi Connection*" "Use a mobile device, " "Connect to network: " *TimeSync-xx:yy* "Use a web browser and" "address: 192.168.4.1 " "Then enter your SSID " "And Network password."

- Use a laptop, tablet or smart-phone. Browse the list of available Wi-Fi access points.
- Connect to the access point “TimeSync-xx:yy” (where xx:yy are the last 5 bytes of the Wi-Fi module mac address).
- When connected, open a web browser and enter the address http://192.168.4.1
- A configuration web page should now be seen on your web browser:



- The clock should also show a screen saying:

"Web Browser Connected"

"Select your Network. "

"And type the password"

- Choose your Wi-Fi network from the list shown (or enter the name in the SSID box)
- Enter your network password (case sensitive) then click on "Reboot"
- The module will then reboot, attempt to connect to your network and get the time. (After rebooting the module will no-longer provide an access point or web page and you should re-connect your mobile device back to it's usual network)
- The blue data led should flash briefly whilst requesting the network time and the yellow led should light when successfully synced.
- The Wi-Fi module will then power-off and wait until a random time between midnight and 7am to get the next time sync.
- The module will store your network SSID and password internally. If you change your password or network name you will need to repeat the above configuration process to store the new details.

Wi-Fi Manual revisions

v1.0 - Original version.