

## WEMOS D1 WIFI

# Getting started with the WeMos D1 ESP8266 WiFi Board

The WeMos D1 is a ESP8266 WiFi based board that uses the Arduino layout with a operating voltage of 3.3V. As the documentation of this board online can be a little confusing, the purpose of this tutorial is to combine and simplify the steps needed to setup this board for development. With that, let's proceed on with the specifications of the board.

*Note: This is **NOT** an Arduino board, it only uses the Arduino Uno layout for the board design!*



## Specifications

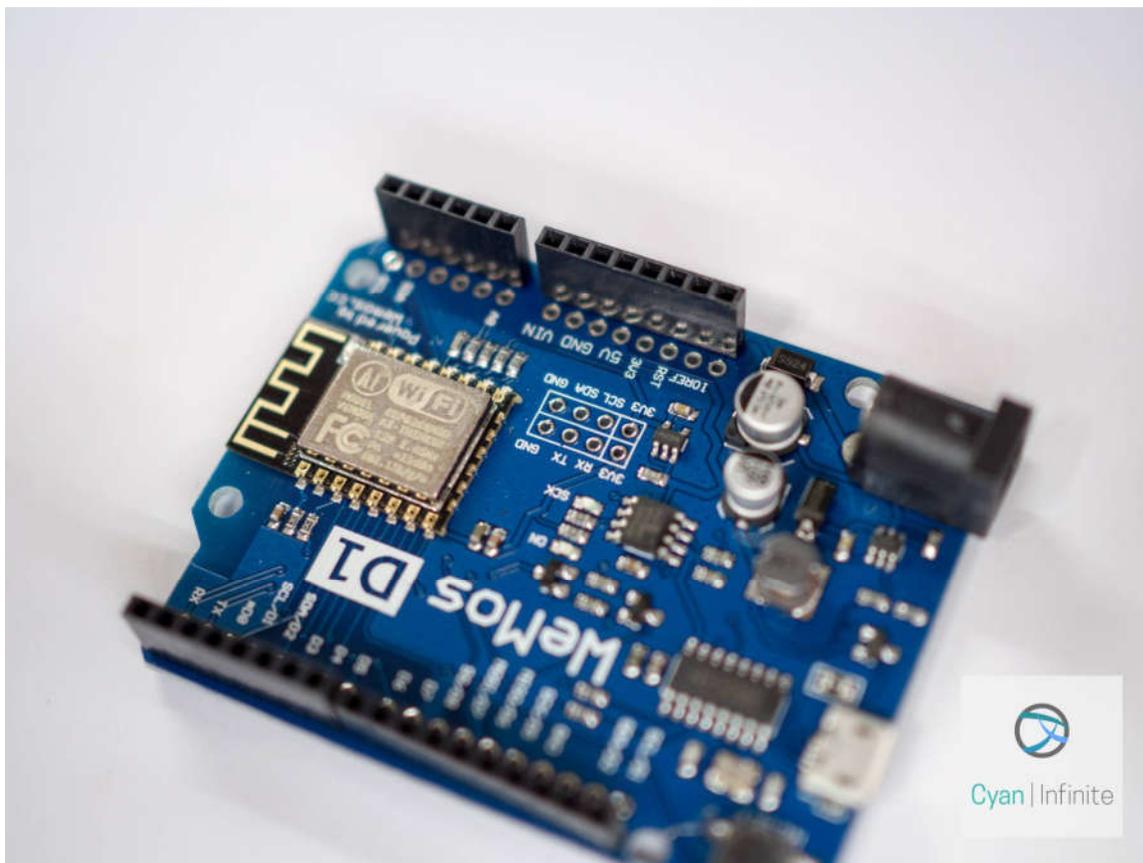
Here are the specification of the board:

Microcontroller

ESP-8266EX

Operating Voltage	3.3V
Digital I/O Pins	11
Analog Input Pins	1
Clock Speed	80MHz/160MHz
Flash	4M bytes
Length	68.6mm
Width	53.4mm
Weight	25g

In summary, the board is controlled by the ESP8266 chip (a 32-Bit processor) and has a larger flash memory compared to an Arduino Uno. It consists of 11 digital I/O pins and 1 analogue (input) pin. the board can be connected using a Micro-B type USB cable. (Aka “*Android Cable*”)



# Pinouts

All the I/O pins:

- Runs at 3.3V
- Have interrupt/PWM/I2C/one-wire support **except D0**

Pin	Function	ESP-8266 Pin
TX	TXD	TXD
RX	RXD	RXD
A0	Analog input, max 3.3V input	A0
D0	IO	GPIO16
D1	IO, SCL	GPIO5
D2	IO, SDA	GPIO4
D3	IO, 10k Pull-up	GPIO0
D4	IO, 10k Pull-up, BUILTIN_LED	GPIO2
D5	IO, SCK	GPIO14
D6	IO, MISO	GPIO12
D7	IO, MOSI	GPIO13
D8	IO, 10k Pull-down, SS	GPIO15
G	Ground	GND
5V	5V	–
3V3	3.3V	3.3V
RST	Reset	RST

## IDE

There are 2 IDE that can be used to program the ESP8266:

- The Arduino IDE
- The NodeMCU IDE

In this tutorial, we'll be looking at how to setup the board with the Arduino IDE on Windows. (For installation on a Linux-based system, you can visit this website, though the installation instructions are very similar: <https://www.wemos.cc/tutorial/get-started-arduino.html>)

# Software Requirements

- CH340G USB to UART driver: <https://www.wemos.cc/downloads>
- Python 2.7: <https://www.python.org/downloads/release/python-2713/>
- Arduino 1.8.2: <https://www.arduino.cc/en/Main/Software>

## Installation

Create a new folder *esp8266com/esp8266* in your Arduino sketch directory. (The Arduino sketch location should be located in “*My Documents > Arduino*” by default).

 > This PC > Documents > Arduino > hardware > esp8266com > esp8266

Next, download the library/driver file (as zip) from Github: <https://github.com/esp8266/Arduino>



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ESP8266 core for Arduino

2,330 commits 14 branches 11 releases 164 contributors LGPL-2.1

Branch: master New pull request

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- sergiotomasello committed with igrr Arduino boards with ESP8266 (#3121)
- bootloaders/eboot Store git version of the core in the compiled binary (#2099)
- cores/esp8266 Arduino boards with ESP8266 (#3121)
- doc add AsyncPing library to libraries.md (#2889)
- libraries Add an LLMNR responder implementation (#2880)

Clone with HTTPS

Use Git or checkout with SVN using the web URL.

https://github.com/esp8266/Arduino.git

Open in Desktop

Download ZIP

2 months ago

After the download has completed, copy the zip file over to the `[Arduino sketch]/hardware/esp8266com/esp8266` directory & extract the contents.

A `Arduino-Master` folder will be created.

This PC > Documents > Arduino > hardware > esp8266com > esp8266

Name	Date modified
Arduino-master	11/4/2017 8:19 AM
Arduino-master.zip	23/4/2017 2:15 PM

Next, enter the directory and drag all the content into the main directory.

Finally, remove both the `Arduino-master.zip` and the `Arduino-master` folder. Your directory now should look like this:

This PC > Documents > Arduino > hardware > esp8266com > esp8266

Name	Date modified	Type	Size
bootloaders	11/4/2017 8:19 AM	File folder	
cores	11/4/2017 8:19 AM	File folder	
doc	11/4/2017 8:19 AM	File folder	
libraries	11/4/2017 8:19 AM	File folder	
package	11/4/2017 8:19 AM	File folder	
tests	11/4/2017 8:19 AM	File folder	
tools	11/4/2017 8:19 AM	File folder	
variants	11/4/2017 8:19 AM	File folder	
.gitignore	11/4/2017 8:19 AM	GITIGNORE File	1 KB
.travis.yml	11/4/2017 8:19 AM	YML File	2 KB
boards.txt	11/4/2017 8:19 AM	Text Document	84 KB
ISSUE_TEMPLATE.md	11/4/2017 8:19 AM	MD File	1 KB
LICENSE	11/4/2017 8:19 AM	File	26 KB
platform.txt	11/4/2017 8:19 AM	Text Document	7 KB
programmers.txt	11/4/2017 8:19 AM	Text Document	0 KB
README.md	11/4/2017 8:19 AM	MD File	8 KB

Open the terminal and enter the `esp8266/tools` folder. (e.g. `[Arduino sketch]/hardware/esp8266com/esp8266/tools`) After that, execute the `get.py` script via the python command.

```
C:\Users[username]\My Documents\Arduino\hardware\esp8266com\esp8266\tools> python get.py
```

This will download the Binary Tools required to program the board. Once the installation has completed, it should look like that:

```
C:\Users\WK\My Documents\Arduino\hardware\esp8266com\esp8266\tools>python get.py
Platform: i686-mingw32
Downloading esptool-0.4.9-win32.zip
Done
Extracting dist/esptool-0.4.9-win32.zip
Renaming esptool-0.4.9-win32/ to esptool
Downloading win32-xtensa-lx106-elf-gb404fb9-2.tar.gz
Done
Extracting dist/win32-xtensa-lx106-elf-gb404fb9-2.tar.gz
Downloading mkspiffs-0.1.2-windows.zip
Done
Extracting dist/mkspiffs-0.1.2-windows.zip
Renaming mkspiffs-0.1.2-windows/ to mkspiffs
C:\Users\WK\My Documents\Arduino\hardware\esp8266com\esp8266\tools>
```

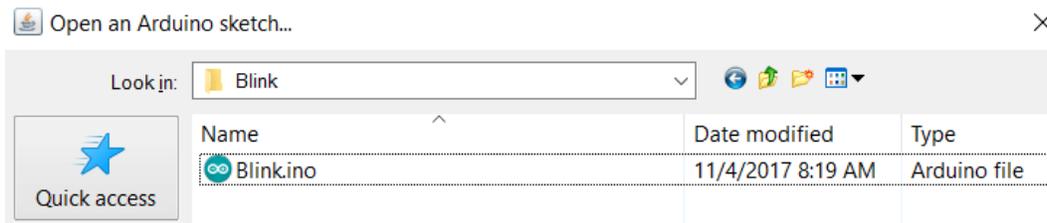
With that, you are ready to test out your WeMos D1 board!

## Examples

# Blink

To test out whether the hardware library/driver is properly installed, we'll be testing out the sample program Blink, an equivalent to the *Hello World!* example in the Hardware environment. To do so, start the Arduino IDE and open the sketch at the following location:

*C:\Users[username]\Documents\Arduino\hardware\esp8266\comesp8266\libraries\esp8266\examples\Blink*



If you are lazy, just copy the code below:

```
/*
ESP8266 Blink by Simon Peter
Blink the blue LED on the ESP-01 module
This example code is in the public domain

The blue LED on the ESP-01 module is connected to GPIO1
(which is also the TXD pin; so we cannot use Serial.print() at the same time)

Note that this sketch uses LED_BUILTIN to find the pin with the internal LED
*/

void setup() {
  pinMode(LED_BUILTIN, OUTPUT); // Initialize the LED_BUILTIN pin as an output
}

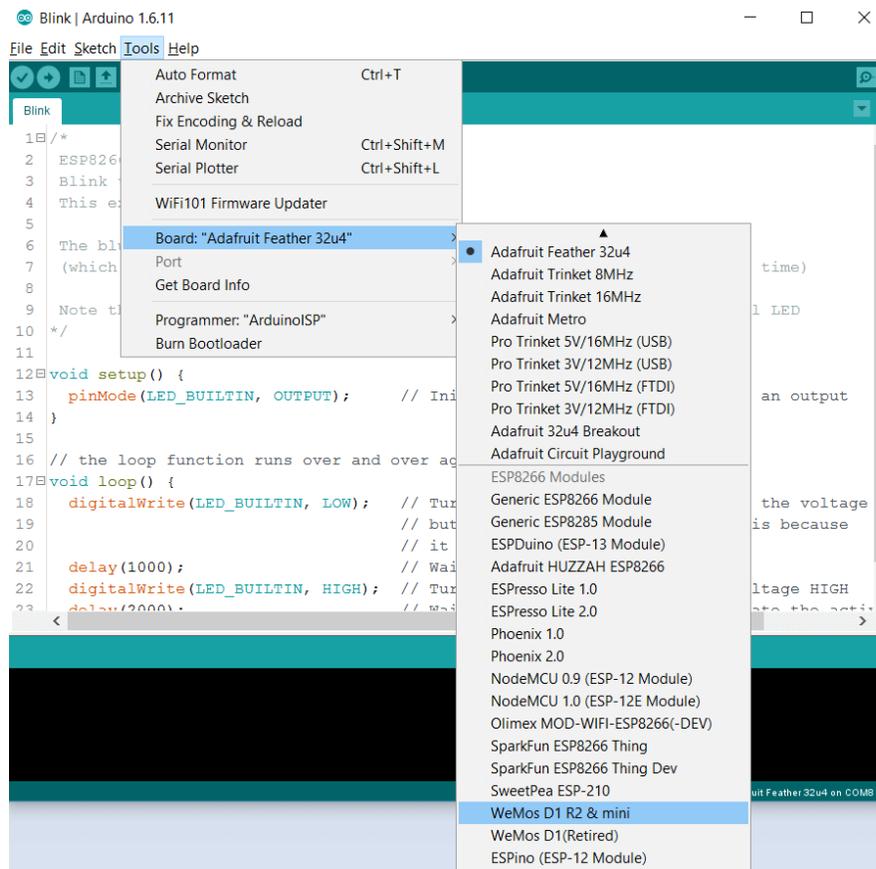
// the loop function runs over and over again forever
void loop() {
  digitalWrite(LED_BUILTIN, LOW); // Turn the LED on (Note that LOW is the
  // voltage level
  // but actually the LED is on; this is because
  // it is active low on the ESP-01)
```

```

delay(1000); // Wait for a second
digitalWrite(LED_BUILTIN, HIGH); // Turn the LED off by making the voltage HIGH
delay(2000); // Wait for two seconds (to demonstrate the
active low LED)
}

```

After opening the sketch file, go to Tools > Board and select the “WeMos D1 R2 & Mini” option. Connect the WeMos Board & upload the code. The LED on the ESP8266 will start to blink. (If the LED on the ESP8266 is blinking when a USB is plugged, you can try modifying the “delay” values to see whether it updates accordingly.)



## Checking out the Chip ID

To check the ID of the chip, copy the code below & upload into the WeMos D1 board.

```
/* Get Chip ID
 * wemos.cc
 *
 *
 */

void setup() {
  Serial.begin(115200);
}

void loop() {
  Serial.println("");
  Serial.println("");
  Serial.println("Check ID in:");
  Serial.println("https://www.wemos.cc/verify_products");
  Serial.printf("Chip ID = %08Xn", ESP.getChipId());
  Serial.println("");
  Serial.println("");
  delay(5000);
}
```

After the code has been uploaded, open up the Serial Monitor and set the baudrate to **115200**. The ID should be printed in the monitor.

## Running a Simple Web Server

For this section, the ESP8266 will be ran as a simple server in a local network, hosting a simple HTML file at port 80. Go to the following directory & open up *HelloServer.ino*.

*C:\Users[username]\Documents\Arduino\hardware\esp8266\comesp8266\libraries\ESP8266\6WebServer\examples\HelloServer*

Alternatively, you can copy the code below:

```
#include <ESP8266WiFi.h>
#include <WiFiClient.h>
#include <ESP8266WebServer.h>
#include <ESP8266mDNS.h>

const char* ssid = ".....";
const char* password = ".....";

ESP8266WebServer server(80);

const int led = 13;

void handleRoot() {
  digitalWrite(led, 1);
  server.send(200, "text/plain", "Hello from esp8266!");
  digitalWrite(led, 0);
}

void handleNotFound(){
  digitalWrite(led, 1);
  String message = "File Not Found\n";
  message += "URI: ";
  message += server.uri();
  message += "\nMethod: ";
  message += (server.method() == HTTP_GET)?"GET":"POST";
  message += "\nArguments: ";
  message += server.args();
  message += "\n";
  for (uint8_t i=0; i<server.args(); i++){
    message += " " + server.argName(i) + ": " + server.arg(i) + "\n";
  }
  server.send(404, "text/plain", message);
  digitalWrite(led, 0);
}

void setup(void){
  pinMode(led, OUTPUT);
  digitalWrite(led, 0);
  Serial.begin(115200);
  WiFi.begin(ssid, password);
  Serial.println("");

  // Wait for connection
```

```

while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
}
Serial.println("");
Serial.print("Connected to ");
Serial.println(ssid);
Serial.print("IP address: ");
Serial.println(WiFi.localIP());

if (MDNS.begin("esp8266")) {
    Serial.println("MDNS responder started");
}

server.on("/", handleRoot);

server.on("/inline", []() {
    server.send(200, "text/plain", "this works as well");
});

server.onNotFound(handleNotFound);

server.begin();
Serial.println("HTTP server started");
}

void loop(void) {
    server.handleClient();
}

```

Before uploading the code, you have to change 2 variable value: *ssid* and *password*. Replace them with your router's ssid (or connection name) and the password accordingly. For example, if the router name is "router-17" and password "1234", the variables would look something like this:

```

const char* ssid = "router-17";
const char* password = "1234";

```

After changing the variable values, upload the code and open up the Serial Monitor. (Set the baud rate to *115200*) If the board is connected to the network, it will display it's IP address. Assuming that your computer is

connected to the same network, copy the IP address of the server and paste it over at your preferred web browser. The webpage would display a simple "Hello from esp8266!" webpage.