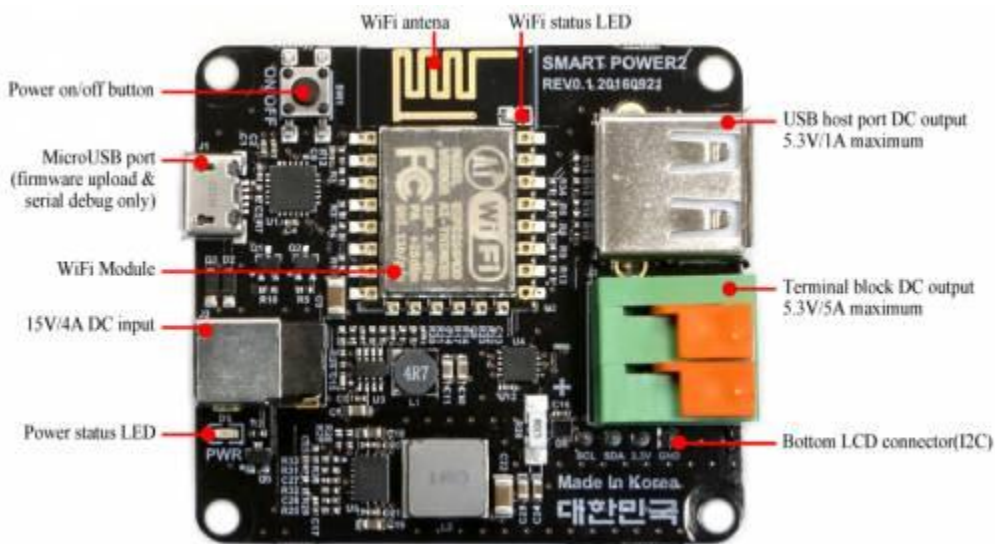
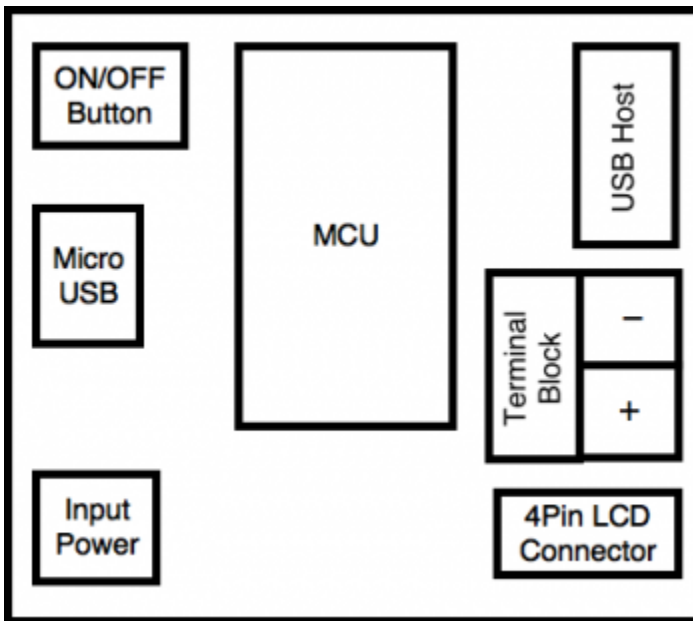


Odroid Smart Power 2 - How to use



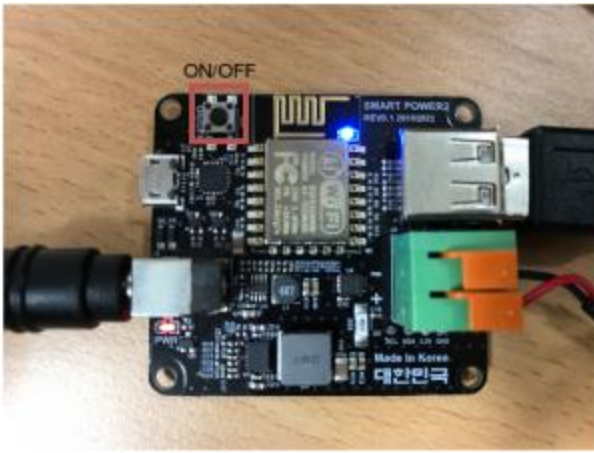
0. Connect the included 15V/4A adapter and plug the output cable in the terminal block. Ensure the DC plug cable is properly connected to negative(black) and positive(red).

Caution! if you plug it the other way, your board will be seriously damaged.

Without WiFi (Standalone mode)

1. Output Power ON/OFF

You can turn the output power on/off using the tact switch on SmartPower2



2. Power monitoring with 16×2 LCD

We recommend connecting the LCD after disconnecting the main power source.



With WiFi (Connected mode)

The webpage supports IE 11+, Edge 13+, Firefox 47+, Chrome 49+, Safari 9.1+, Opera 41+, IOS Safari 9.3+, Android Browser 4.4+, Chrome for Android 53+

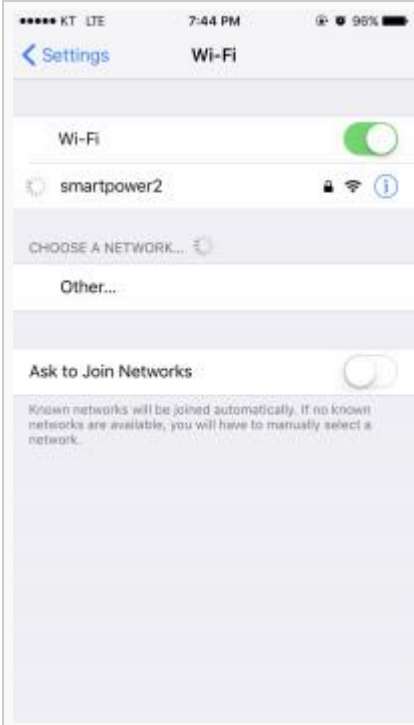
1. WiFi Connection

Default SSID : smartpower2, Password : 12345678

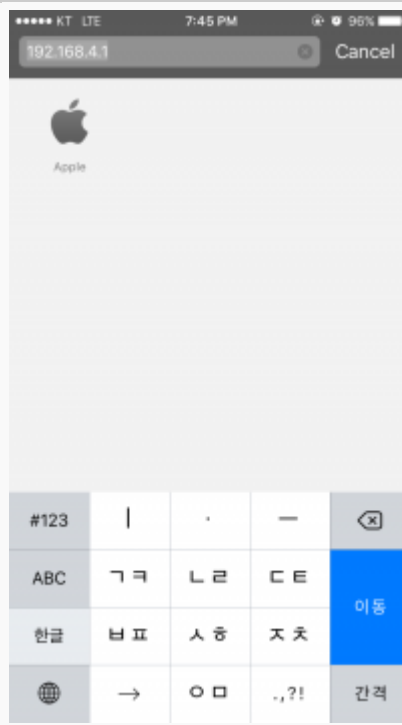
2. Access Web UI

Default webserver ip : 192.168.4.1

1. WiFi Connection



2. Access Web UI

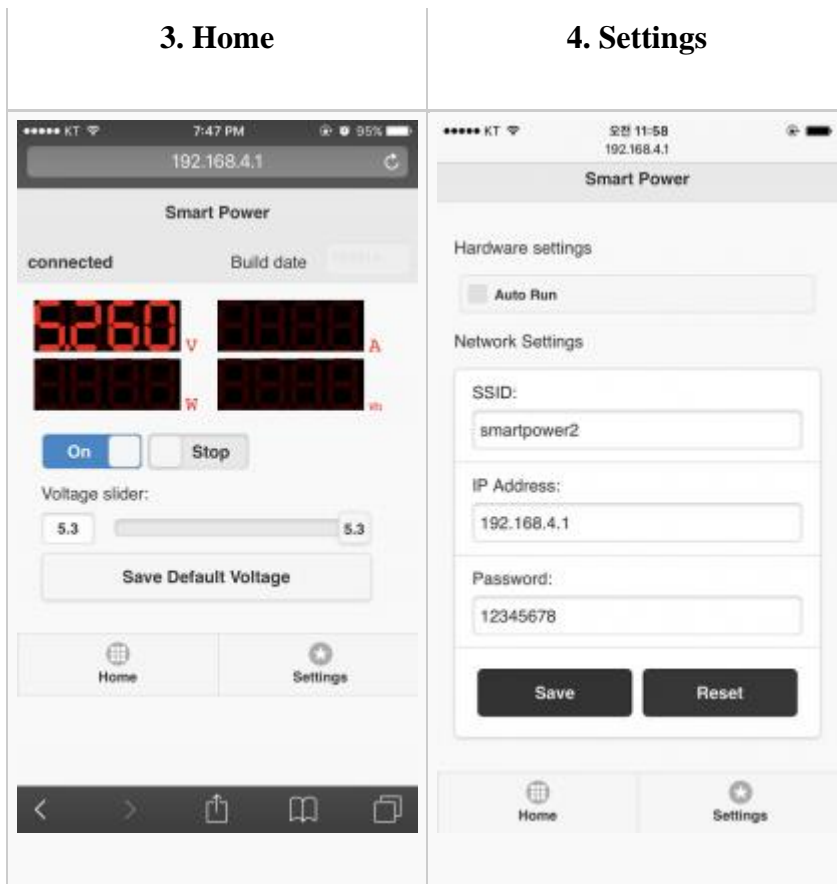


3. Home

- Seven Segments : voltage, ampere, watt, watt-hour.
- ON/OFF slide : Output power ON/OFF.
- Start/Stop slide : Watt-hour measurement Start/Stop.
- Voltage slider : Change output voltage.
- Save Default Voltage button : Set default voltage.

4. Settings

- Auto Run checkbox - Output power ON/OFF automatically when you power on the SmartPower2.
- Save Button - Save Network Configuration (SSID, IP Address, Password).
- Reset Button - Initialize User Network Configuration (Factory reset)



With Telnet (Connected mode)

After connection with [WiFi](#), you can get power data via telnet.
 [Voltage],[Ampere],[Power],[Watt hour]

```
$ telnet 192.168.4.1
5.255,0.451,2.374,0.000
5.256,0.451,2.374,0.000
```

Receiving Power Data via microUSB cable

This feature is available in F/W v1.4 or later.

You can receive power data(current, voltage, power, watt-hour) from your SmartPower2 to your PC or ODDROIDS through serial.

The serial output is available only when the output power is enabled.

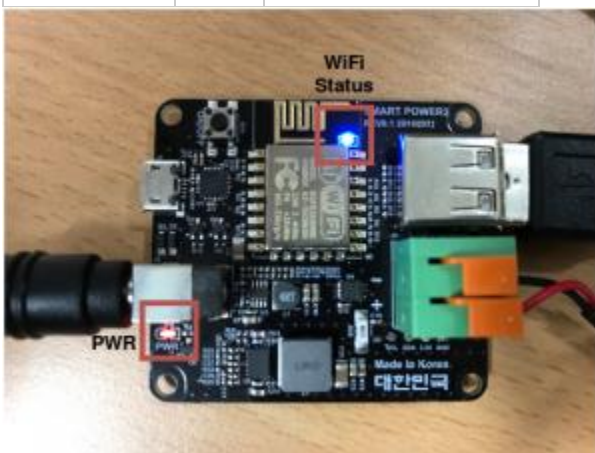
Requirement Parameters

- 115200bps 8N1
- no-flow-control

1. Connect your SmartPower2 to PC via microUSB cable
2. Run Serial serial console program like putty or minicom
3. Enable power on

LED State

LED	State	Description
PWR(D1)	off	Input power off
	on	Input power on
	blink	Output power on
WiFi Status	off	no WiFi connection
	on	WiFi connected
	blink	Webpage loaded

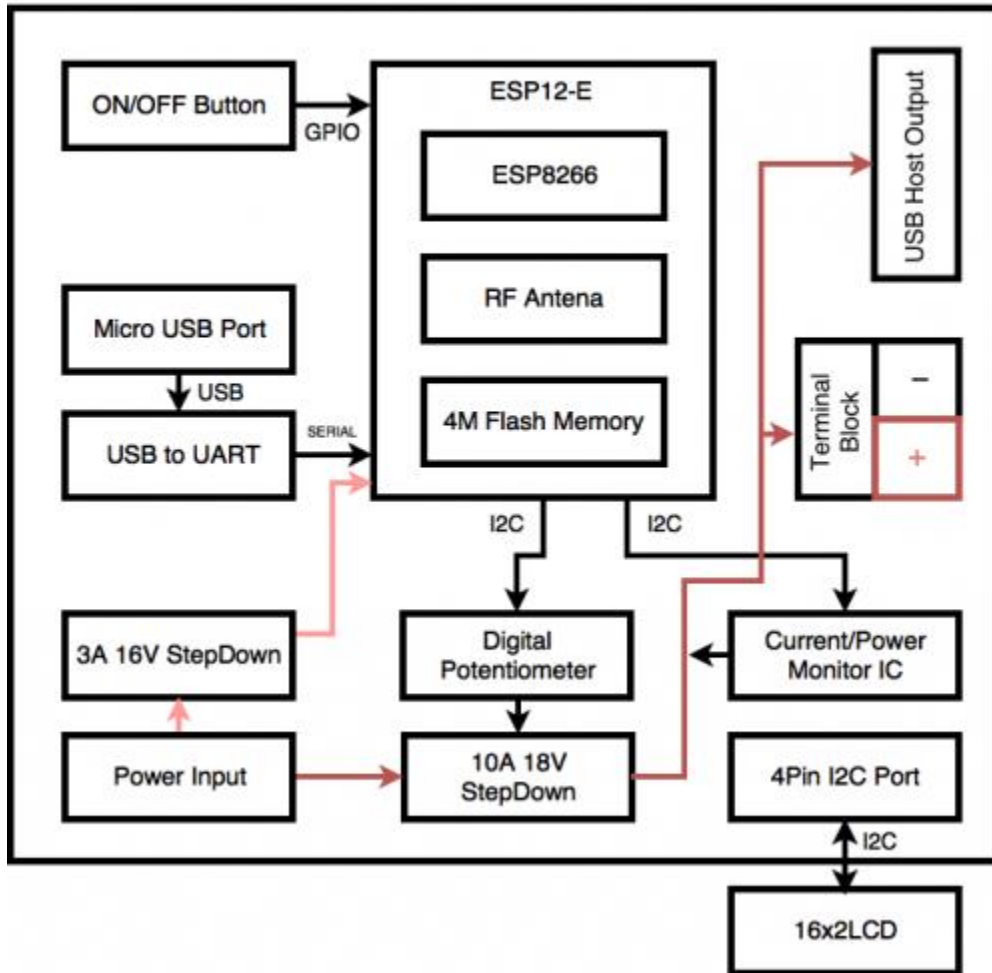


System Reset

After boot, press the ON/OFF switch for 5 seconds to reset all settings including WiFi.

Hardware

H/W Block Diagram



Documentation

Schematic

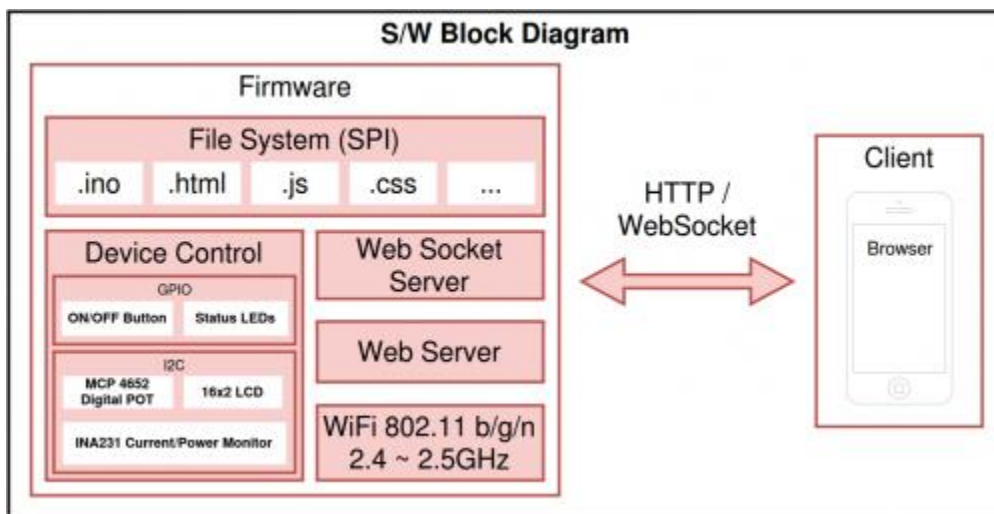
- [SmartPower2](#)

Data Sheet

- MCU - [ESP8266 Espressif](#) low power 32-bit MCU

- USB to UART - [CP2104](#) single chip usb-to-uart bridge
- 3A 16V Stepdown - [MP1495S](#) High Efficiency 3A, 16V, 500kHz Synchronous Step Down Converter
- Digital Potentional Meter - [MCP4652](#) 7/8-Bit Single/Dual I2C Digital POT with Volatile Memory
- Current/Power Monitor - [ina231](#) High- or Low-Side Measurement, Bidirectional CURRENT/POWER MONITOR with 1.8-V I2C Interface
- 10A 18V Stepdown - [MP8762](#) High Efficiency, 10A, 18V Synchronous Step-down converter

Software



Framework - Arduino, JQuery

Build Platform - **Platformio**, **Arduino IDE**

Upload the Firmware

Simple instruction for Firmware upload.

Linux

1. Install the requerments

```
$ sudo apt install python-pip git
$ sudo pip install esptool
```

2. Get the binaries about firmware and web source

```
$ git clone https://github.com/hardkernel/smartpower2.git
```

```
$ cd smartpower2
```

3. Upload

You should check your esp8266 serial number like “/dev/ttyUSB0” or “/dev/ttyUSB1”

```
$ sudo esptool.py --chip esp8266 --port /dev/ttyUSB0 --baud 921600 write_flash 0x0000  
0 prebuilt/firmware.bin 0x100000 prebuilt/spiffs.bin
```

Windows

The instructions were tested on Windows 10.

1. Get the binaries about firmware and web source from this link

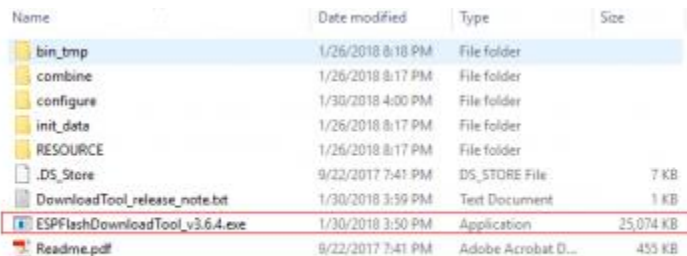
<https://github.com/hardkernel/smartpower2/releases>

And then, you need to extract the zip file on your work folder.

2. Download and extract the flash tool

[flash download tools v3.6.6 o.zip](#)

3. Run the exe file into the folder



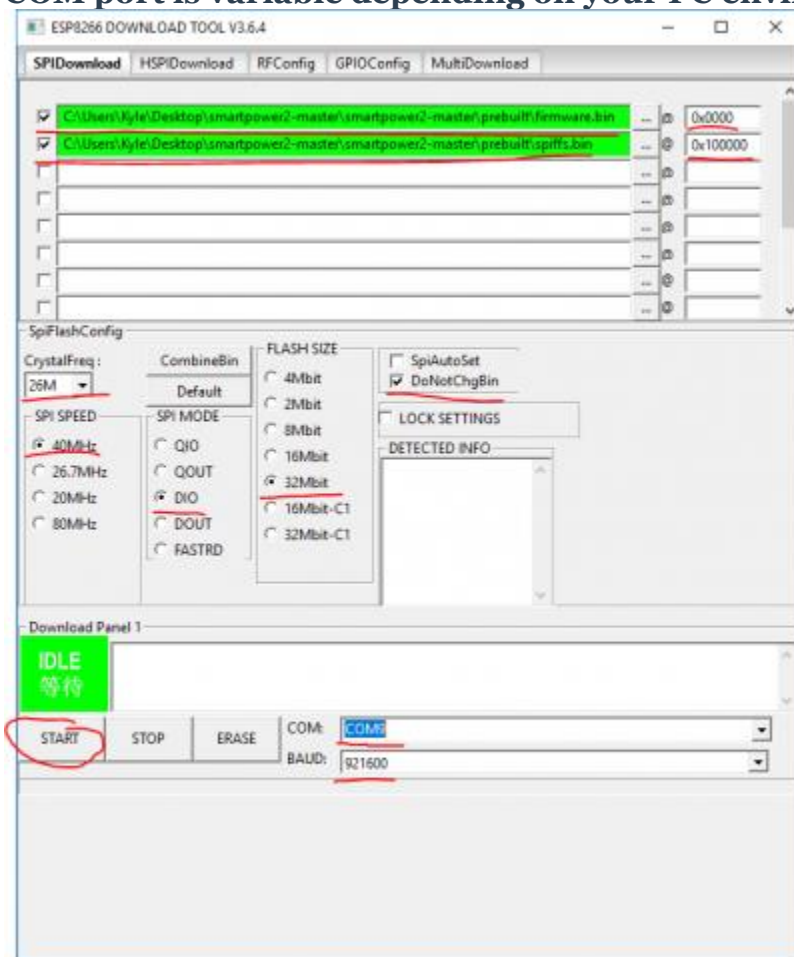
Name	Date modified	Type	Size
bin_tmp	1/26/2018 8:18 PM	File folder	
combine	1/26/2018 8:17 PM	File folder	
configure	1/30/2018 4:00 PM	File folder	
init_data	1/26/2018 8:17 PM	File folder	
RESOURCE	1/26/2018 8:17 PM	File folder	
.DS_Store	9/22/2017 7:41 PM	DS_STORE File	7 KB
DownloadTool_release_note.txt	1/30/2018 3:59 PM	Text Document	1 KB
ESPFashDownloadTool_v3.6.4.exe	1/30/2018 3:50 PM	Application	25,074 KB
Readme.pdf	9/22/2017 7:41 PM	Adobe Acrobat D...	455 KB

4. Select ESP8266



5. Start upload

You have to input binaries and other parameters as shown below picture. COM port is variable depending on your PC environment.



Build Firmware

This guide is working with x86 platforms only. The development tools are not available for ARM platforms.

You can use Arduino IDE or PlatformIO for build platform.

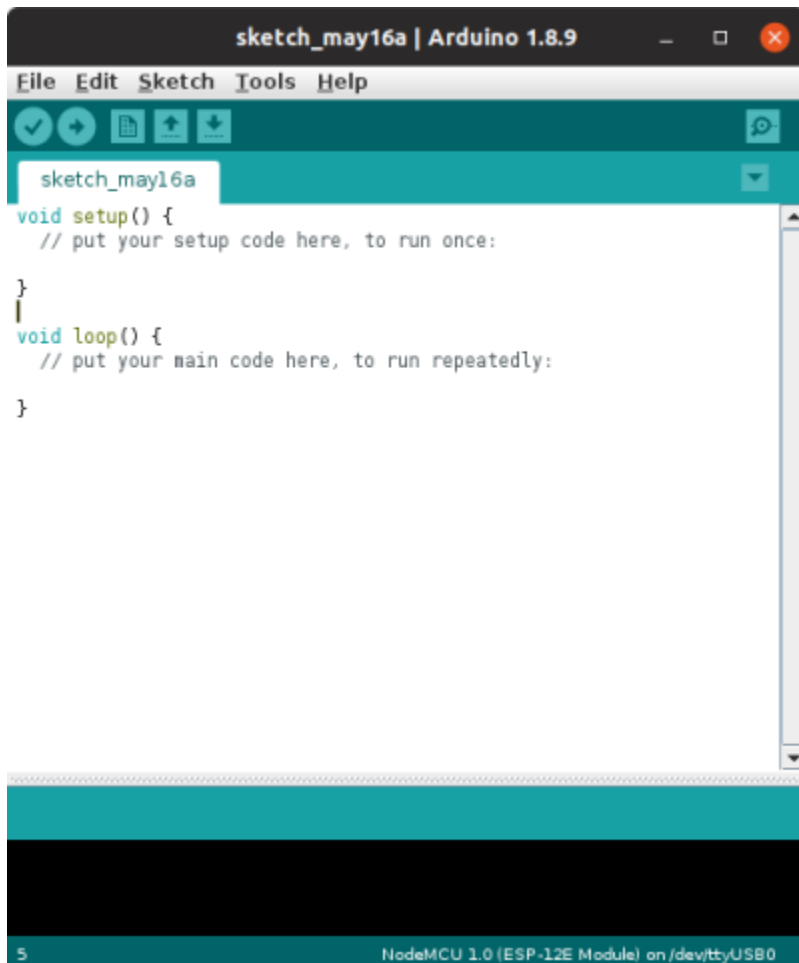
Arduino IDE

1. Install Arduino IDE for ESP8266

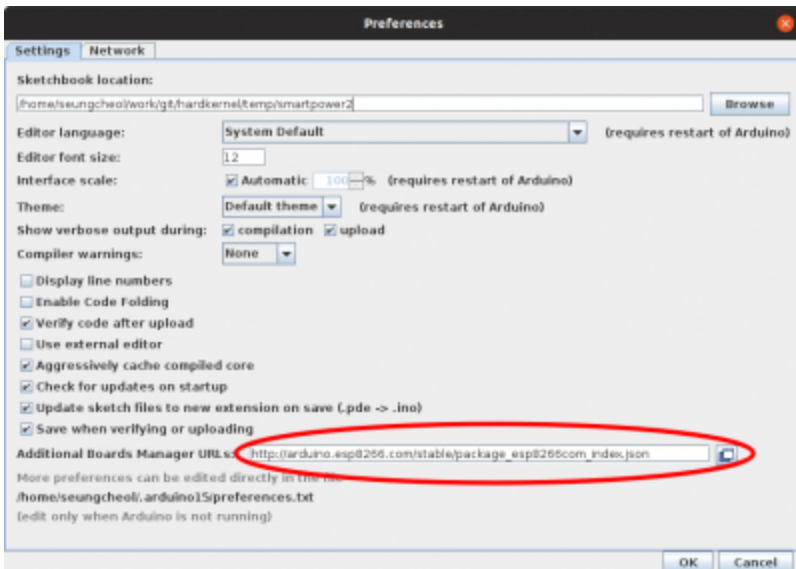
Download the Arduino IDE via this link

<https://www.arduino.cc/en/Main/Software>

Run Arduino IDE and open “File → Preferences” on the menu bar

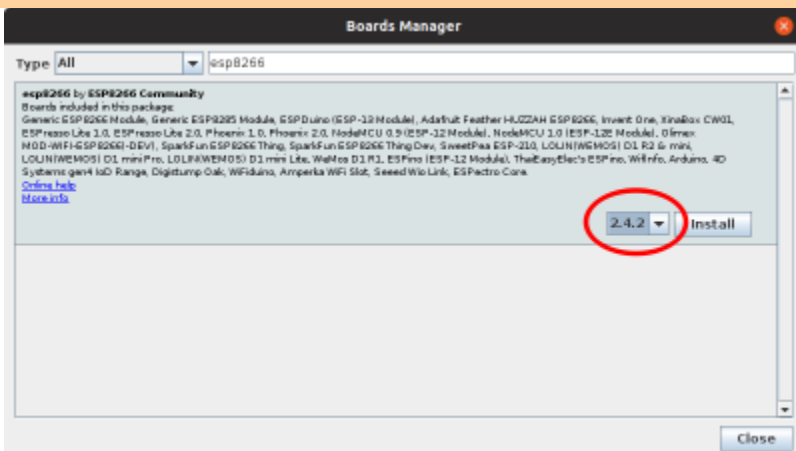


Add https://arduino.esp8266.com/stable/package_esp8266com_index.json into “Additional Boards Manager URLs”

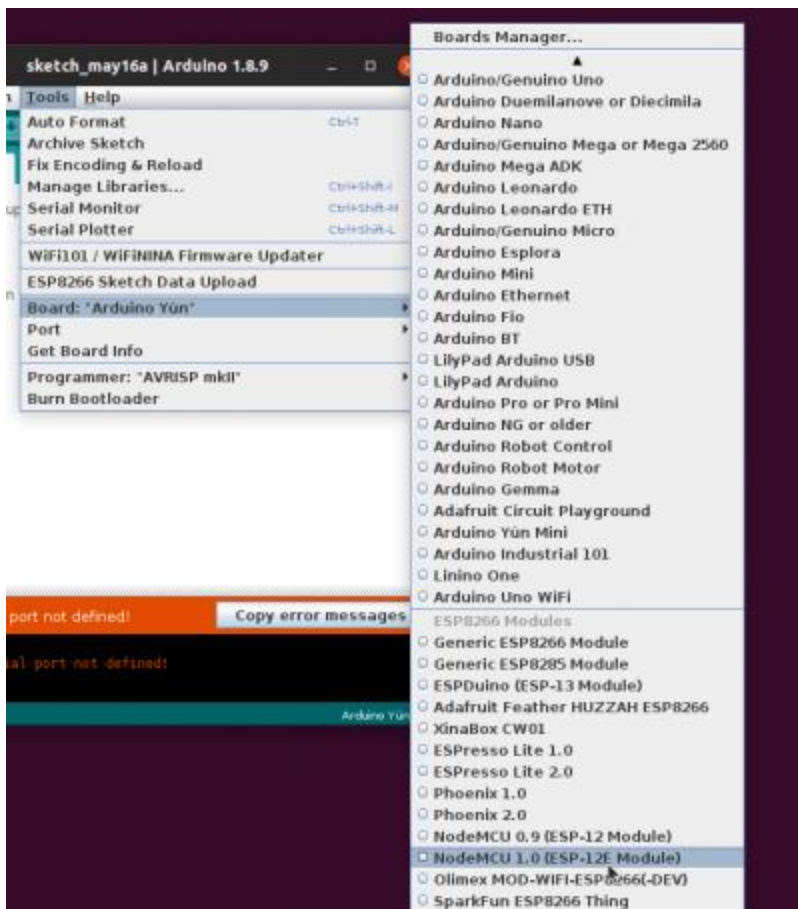


After adding the url, you are able to search “esp8266” in “Tools → Board → Boards Manager”. Install the esp8266 Android version 2.4.2!

Currently, Smartpower2 is not compatible with version esp8266 Android v2.5.0 or higher.



Select “Tools → board” to “NodeMCU 1.0(ESP-12E Module)”

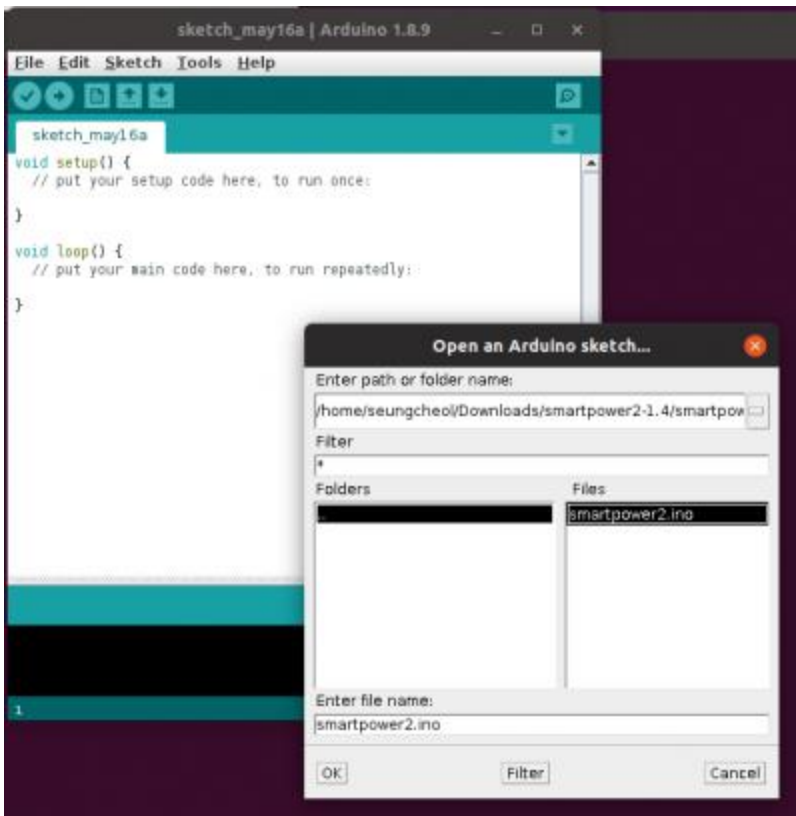


2. Get source code

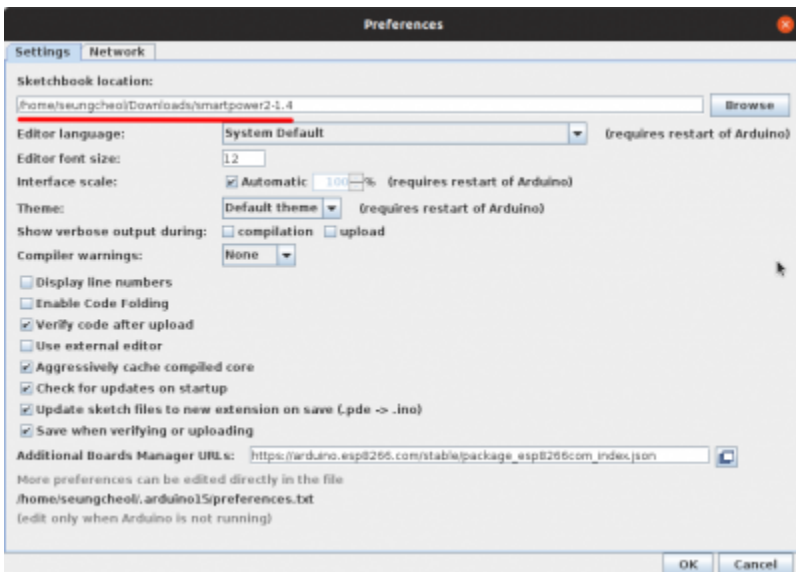
Download the latest source code.

v1.6-arduino.zip

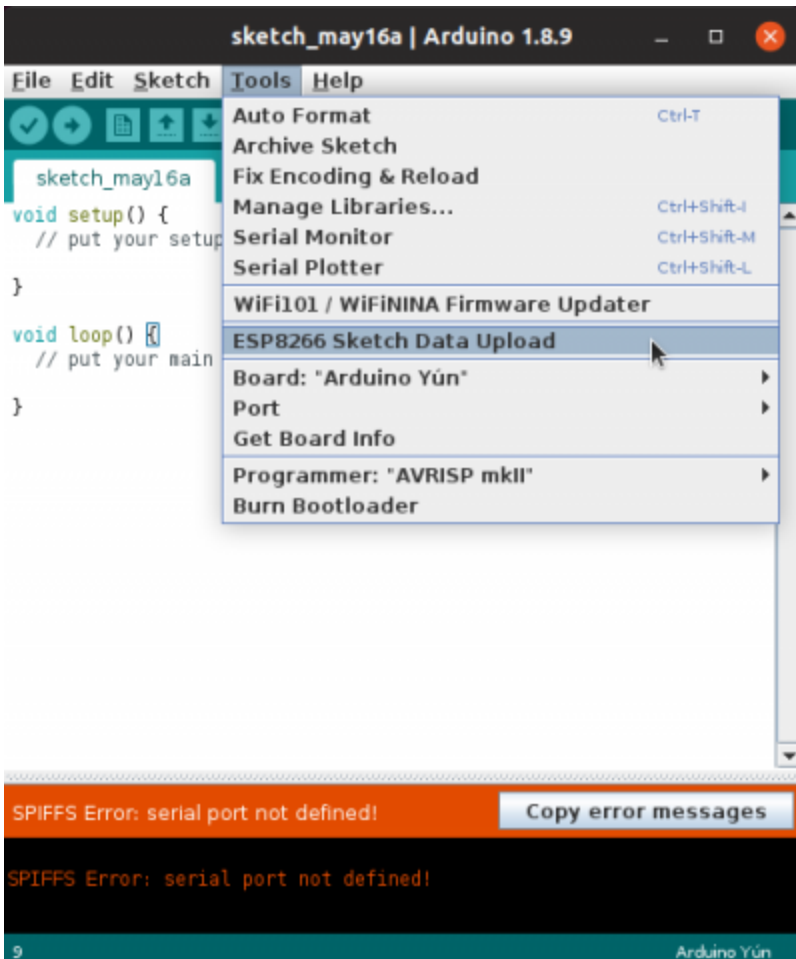
Unpack and open the “smartpower2.ino” in Arduino



Configure your Sketchbook location to your project root folder.(In my case \$HOME/Downloads/smartpower2-1.4)

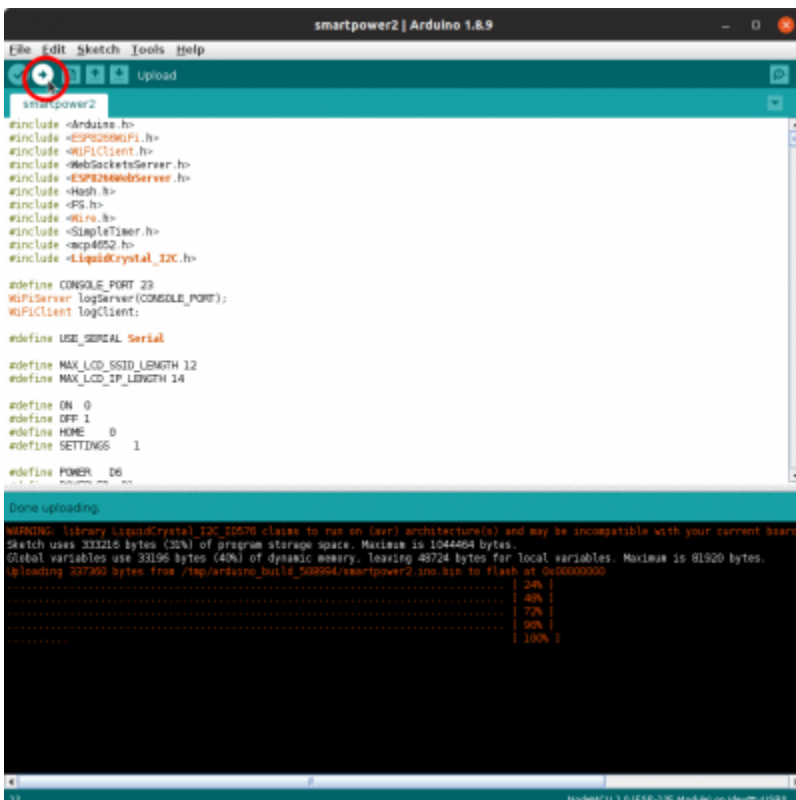


Restart Arduino IDE. Then, you can see “ESP8266 Sketch Data Upload” on the tools menu bar.

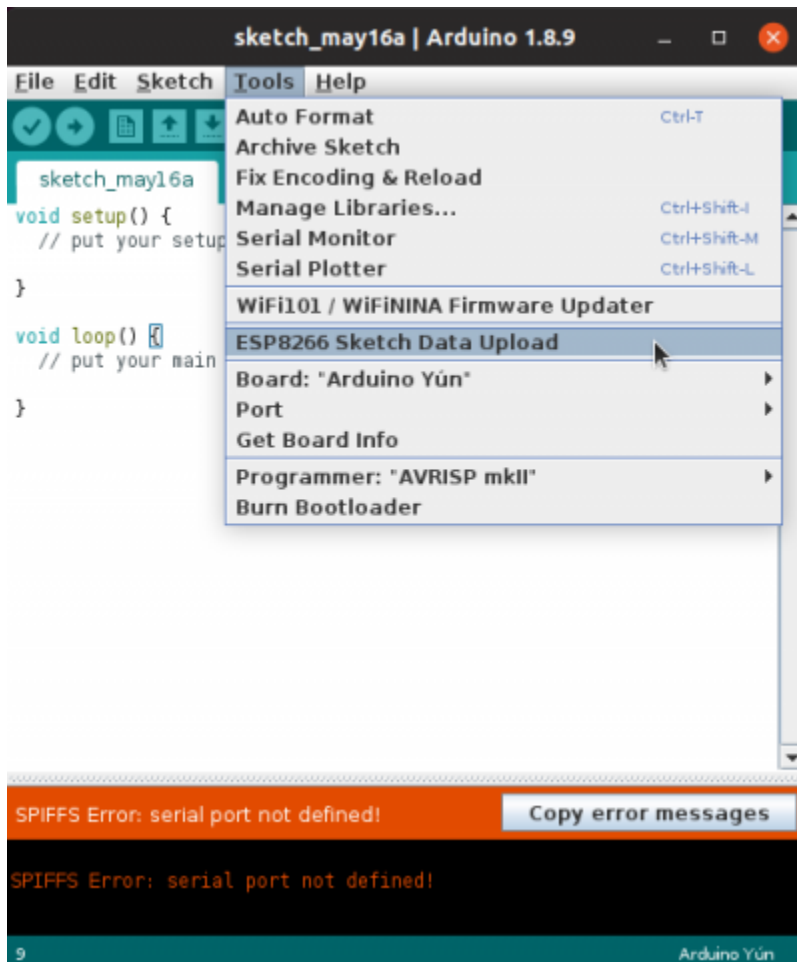


3. Compile and upload

Run upload!



Run “ESP8266 Sketch Data Upload” on the tools menu bar.



PlatformIO

Linux

1. Install PlatformIO

```
sudo apt-get install python-pip
sudo pip install -U platformio
platformio --version
```

If you have any issue while installing it, refer this guide.
<http://docs.platformio.org/en/stable/installation.html>

2. Get source code

```
sudo apt-get install git
git clone https://github.com/hardkernel/smartpower2.git -b v1.6-platformio
```

3. Build & Upload Connect microUSB to Host PC.

You can see the list of USB drivers “CP210x UART Bridge” by lsusb in the terminal.

```
cd smartpower2
sudo platformio run
sudo platformio run --target upload
sudo platformio run --target uploadfs
```

Windows

1. Install platformIO

<http://docs.platformio.org/en/stable/installation.html>

2. Get source code

[v1.6-platformio.zip](#)

3. Build & Upload

Run CMD and move to the smartpower2 folder and Connect microUSB to Host PC.

You can see the list of USB drivers “CP210x USB to UART Bridge(COMx)” on the Device Manager.

```
cd /path/to/dir/smartpower2
platformio run
platformio run --target upload
platformio run --target uploadfs
```

Troubleshooting

"undefined reference to sqrt" error

If you have any errors such as the following.

```
/home/kyle/.platformio/packages/toolchain-xtensa/bin/../lib/gcc/xtensa-lx106-elf/4.8.2/../../../../xtensa-lx106-elf/lib/libm.a(lib_a-w_sqrt.o):(.literal+0x8): undefined reference to `__ieee754_sqrt'
/home/kyle/.platformio/packages/toolchain-xtensa/bin/../lib/gcc/xtensa-lx106-elf/4.8.2/../../../../xtensa-lx106-elf/lib/libm.a(lib_a-w_sqrt.o): In function `sqrt':
/xtensa/esp-open-sdk/crosstool-NG/.build/src/newlib-2.0.0/newlib/libm/math/w_sqrt.c:69: undefined reference to `__ieee754_sqrt'
collect2: error: ld returned 1 exit status
*** [.pioenvs/esp12e/firmware.elf] Error 1
```

Please try to replace the [libm.a](#) file in the “.platformio/packages/toolchain-xtensa/xtensa-lx106-elf/lib/” after extract.

Refer to : <https://github.com/esp8266/Arduino/issues/612>

F/W Version History

Release Date	Version	Description	Git
Oct 11 2019	v1.6	Fix the “ISR not in IRAM” error	https://github.com/hardkernel/smartpower2/tree/v1.6-arduino
May 17 2019	v1.5	Add arduino branch	https://github.com/hardkernel/smartpower2/tree/v1.5-arduino
May 28 2018	v1.4	Add receiving power data function through serial	https://github.com/hardkernel/smartpower2/tree/v1.4
February 12 2018	v1.3	Fix compile errors	
March 27 2017	v1.2	Fix the LCD display of watt hours, display volts and amps to three decimal places on the web interface.	
January 22 2017	v1.1	Add console logging with telnet and make SSID unique to each device	https://github.com/hardkernel/smartpower2/tree/v1.1

[F/W upload tutorials](#)

Release Note of F/W v1.6

- Fix the “ISR not in IRAM” error : <https://github.com/hardkernel/smartpower2/commit/03741a6fb96f5e2b64f3f342e8ed324136e78ea3>

Release Note of F/W v1.5

- Add the Arduino branch

- Fix build flags on the platformio
: <https://github.com/hardkernel/smartpower2/commit/998e002d1c4520b54701307dd60f841c9bf58f63>

Release Note of F/W v1.4

- You can receive power data(current, voltage, power, watt-hour) from your SmartPower2 through serial
- [How to use this](#)

Release Note of F/W v1.1

Thanks to <https://github.com/OtherCrashOverride>

New features

- [console logging with telnet](#)
- Assign a Unique SSID on each device for using multiple SmartPower2s simultaneously.