

**Smart-light**

Version 2020-07-26

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Summary

This has not yet been written, although writing this sentence here makes it in one form or another written. I would argue it is not properly written yet.

# Quick start guide

Follow the following steps to setup the lamp, stop after the first step if you do not want to set up Wi-Fi.

1. Connect a proper power supply. The LEDs will blink shortly a soft white for a split second to show that bootup was successful.
2. [Wi-Fi] Long press the button, this will make the LEDs go PURPLE/RED/PURPLE/RED this means it is trying to connect to Wi-Fi, if this takes more than 10 seconds it will have created an Access Point. Long press the button again to cancel this setup.
3. Connect to this Access Point, by default it will be called “*smart-light*”.
4. When connected go to [192.168.4.1](http://192.168.4.1/) this will show a page where the WI-FI name and password can be set, do not forget to submit. The light will also try to make a captive portal to prompt you to login and setup these settings. Sadly, this only works with HTTP, use the mentioned IP if the device doesn’t prompt the login page.
5. When the device is connected to WIFI it can be accessed by its IP address, but on devices who support mDNS, like Windows and Apple, [smart-light.local/info](http://smart-light.local/info) can be used.

# Creating a unit

## 2.2 Printing

There will be 3 files that need to be printed

1. *Lamp body.STL* is the main body. It is suggested to do at least 0.5mm walls so light will not shine though as much.
2. *Lamp shield.STL* is just a simple shield to add aluminium foil on, and will be intern so can be printed quick and dirty.
3. *Lamp stand.STL* can have 3\*2 embedded magnets in it, if the magnets are desired a layer pause need to be used.

## 2.3 PCB & wires

Please refer the in the *appendix - PCB & schematic* for the schematic, but here are some common notes about the schematic. Later on for example in *4.1 Input* voltage and *4.1 Power consumption* more information is given about the specifications of the electrics.

## 2.4 Firmware

Please refer the in the *appendix -* Firmwarefor the source code. Note you need to install some libraries to Arduino to compile the code, for example the ESP32 library. This is further explained in the firmware itself.

# Features

## 3.2 Button

Although these options change a bit over time, here is a list of 3 actions what the button generally does, these can also change in different modes.

1. **StartPress** Triggered when you start a press, will be rejected if sooner than Time\_RejectStarts (80ms) of the last press).

* Will toggle the lamp ON/OFF

1. **StartDoublePress** Triggered when you start a second press between Time\_RejectStarts (80) and Time\_StartDoublePress (200) ms after the last one ended.

* Will change the mode to ‘DoublePressMode’ (RAINBOW by default)

1. **StartLongPress** Triggered when you press the button longer than Time\_StartLongPressMS (5000) but shorter than Time\_ESPrestartMS (15000) ms.

* If in APmode it will cancel and reboot.
* If it was connected to WI-FI it will show its IP. that is explained in *3.4 WI-FI page - Getting its IP*.
* If it isn’t connected to WI-FI it will start connecting to WI-FI (and possible go into AP mode, that is explained in *3.4 WI-FI page - Setup*.

## 3.3 Pot meter

The 4 pot meters are Red, Green, Blue, and White. Where white stand for the luminescence. When any of these are turned the mode will switch to on/manual and the RGB value will be shown.

## 3.4 WI-FI page

Here are the 2 most important pages listed with their descriptions. Keep in mind more functions could be added or a different layout could be used, but the intention should be the same as these.

Some special functions like manual updating time (IP/time?h=2&m=4&s=1) are not listed here. If important things missing feel free to contact me, but all functions can be found in the code.

### Setup

The setup page will be accessible and shown in APmode, but can also be access by going to ‘IP/setup’. An example of this page is shown in *Figure 2 - Wi-Fi* page.

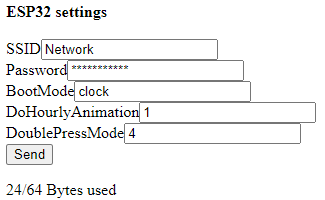


Figure - Wi-Fi page

The password is replaced with starts, and cannot be received without changing the firmware.

Leave fields blank (or for the password leaving only stars) to not update those values upon sending this forum.

By default the SSID and password is limited to 16 characters by the firmware, and the total bytes that can be stored in memory is limited to 64. Going over these values results in unexpected behaviour.

### Getting its IP

To trigger this menu please see *3.2 Button*, this part is just about how to read it. The LEDs are divided into 10 sections, and each char in the IP range will be shown one at a time. The numbers are like a clock and in clockwise direction, top/right is 0 and the one right/down of that is 1. Where RGB will be the order of the numbers, so red will have a \*100 multiplication and green will have \*10, so when the IP is 198.168.1.150 and it shows the last section (150) then section 1 will be Red, 5 will be green and 0 will be blue. This is shown in *Figure 3 – IP address ‘198.168.1.150’* .

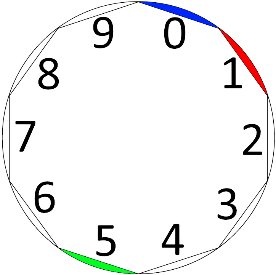
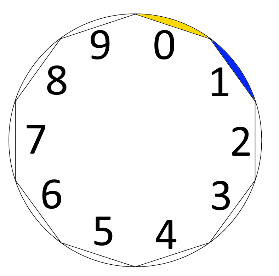
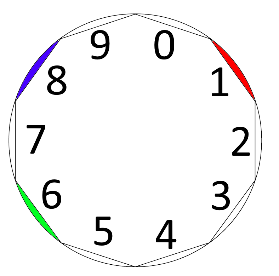
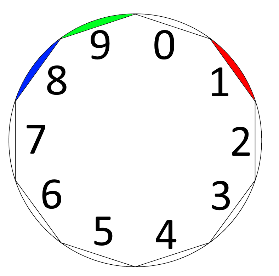


Figure – IP address ‘198.168.1.150’



### Control

The control page is the default landing page the user will land on when the lamp is connected to Wi-Fi. An example of this page is shown in *Figure 4 - Control* page.

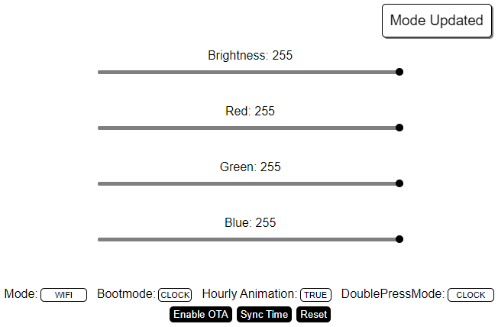


Figure - Control page

* **The brightness slider** will always change the brightness no matter in what mode it is in (except for AP since that is not a defined mode), these values are only sent and updated on releasing the slide bar.
* **The RGB sliders** will either (try) change the animation accent to the given RGB colour, or switch the mode to Wi-Fi control and set the RGB colour.
* **Mode** is the current mode the light is in.
* **Bootmode** is the mode the light will go into on start-up.
* **Hourly animation** is when the light is in the clock mode an hourly animation needs to be played.
* **DoublePressMode** is the mode the light will switch to when a double press on the button is made.
* **Enable OTA** will enable Arduino Over The Air updates, so the firmware can be updated remotely with the Arduino IDE.
* **Sync Time** will get the current updated time from the server, this function is called automatically every day on 04:00 if the light is in clock mode.
* **Reset** will fully restart the ESP

## 3.5 Soft settings

There are multiple soft settings, these are settings that can be changed after the sketch has been uploaded.

The most up-to-date values can be find in the top of the ‘handler.ino’ source file. Some settings can only be set in ‘[smart-light.local/IP](http://smart-light.local/ip)’, others can be done by the settings menu in the main screen.

* **AutoBrightness** Turns on brightness if enabled, the curve of which can be set with N and P
* **AutoBrightnessN** Brightness = M\*X+N
* **AutoBrightnessP**
* **ClockHourLines** how bright each hour mark needs to be on a scale of 0 (OFF) to 255
* **ClockHourAnalog** Will use all 60 LEDs to display the hour, not just 12
* **ClockOffset** Number of LEDs to offset/rotate the clock, so 12 o'clock would be UP. Does NOT work in Animations
* **Bootmode** In which mode to start in after start-up
* **Mode** The current mode the light is in
* **DoublePressMode** In what mode to go into when the button is double pressed
* **HourlyAnimation** If it needs to show hourly animations when in CLOCK mode

# Specifications

## 4.1 Input voltage

The power supply is either 5V or 12V. The difference in the voltage is the used LED strip. If the WS2812B (older model) is used it would need to be 5V, but if the WS2815 are used then 12V is required. The newer model WS2815 with redundant data lines is 12V.

## 4.1 Power consumption

The lamp will consume 18Watts at maximum, so as an example for 5V a 3.6A power supply is required to allow full brightness. Although actual measurements came closer to 12Watt.

The idle power consumption is 5V 0.13A which is 0.65Watt (measured with no LEDs, but WIFI is on)

The pinout of the DC jack has by default positive polarity. Meaning the outer tube, as shown in *Figure 1 - positive* polarity, is the ground connection. The lamp will fail to work otherwise. The power supply is either 5V or 12V, and the power consumption is 18 Watt.

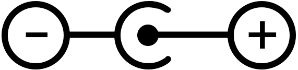


Figure - positive polarity

# Appendix

## Firmware

<https://github.com/jellewie/Arduino-Smart-light>

## PCB & schematic

<https://easyeda.com/jellewietsma/smart-light>

<https://easyeda.com/jellewietsma/smart-clock>

## 3D models

<https://github.com/jellewie/Arduino-Smart-light>