

Instruction manual control system

Preface

The actual Smart Bud box consists of a control unit that combines the light, water pump and sensors to a web interface with which the user can comfortably operate everything. This means that you can not only grow comfortably but also let the drying process run automatically.

So you can only build the controller and install it in a chest of drawers, I will explain here again how the board is put together, how everything is set up and which sensors are needed. This may sound complicated at first, but it is definitely feasible and worth it. Since we order all parts from the Far East, the whole thing takes a little time but is unbeatable cheap.

table of contents

[Preface](#)

[purchase](#)

[Soldering the circuit board](#)

[Webinterface on own webspace](#)

[Firmware on the controller with Arduino IDE](#)

[Connect the controller](#)

[Brief introduction to the interface](#)

purchase

The shopping list for the PCB

Finished breadboard min. 6 x 8 cm @PCBWay (Instructions below) 6€

2x Metal film Resistor 4k7 Ohm @eBay 1€

2x Metal film Resistor 560 Ohm @eBay 1€

2x Metal film Resistor 100 Ohm @eBay 1€

2x ceramic capacitor 100pf @eBay 1€

2x BC547 NPN Transistor @eBay 1€

1x 1N4148 Diode@eBay 1€

2x Mosfet IRLB8721PBF @eBay 3,5€

1x Wemos D1 mini @eBay 3,5€

6x 2 Pin Plug-in Screw Terminal Block Connector 5.08mm @eBay 3€

Shopping list of sensors

DHT22 (ideally the one with the red circuit board)@eBay 3€

CJMCU Plant Watering Alarm @eBay 3€

You also need a web server with PHP and MySQL for the interface.

Sorted by eBay according to cheap first, for the rest of the setup like light and power supply you can consult the building instructions for the box and see how to do it.

Order the PCB from PCBWay

To order the PCB go to <https://www.pcbway.com>, create an account and order the PCB.

Enter the following data:

Width: 78 / Length: 88 / Layer: 2 / Pcs: 5 / Thickness: 1,6mm
calculate

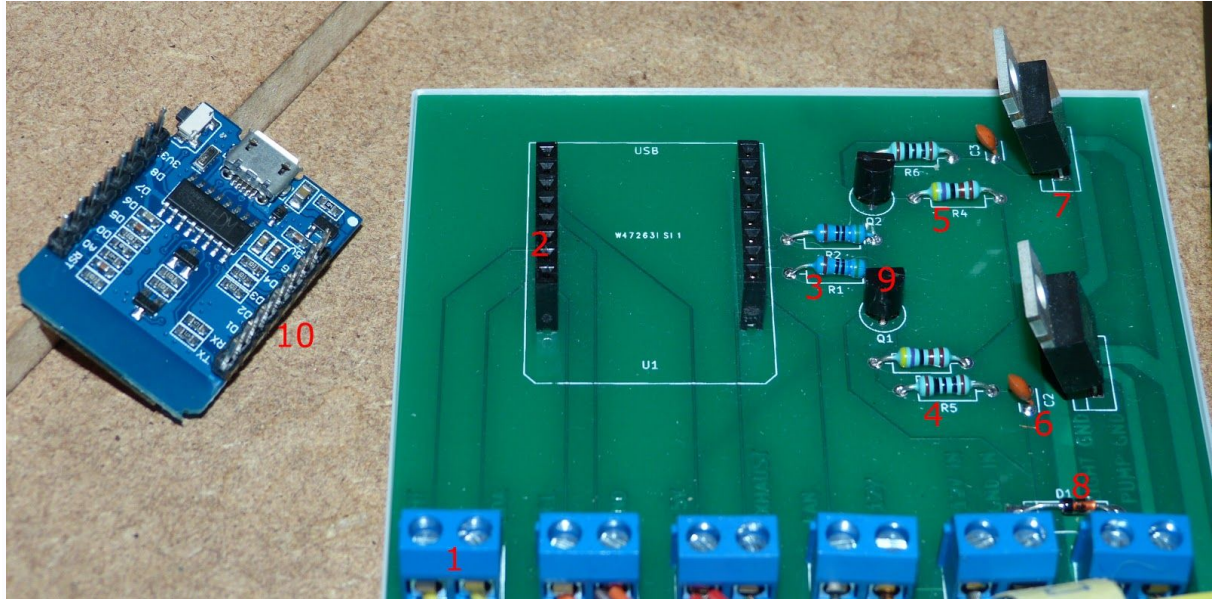
Shipping: China Post -> Add to Cart

Download the files from Github

<https://github.com/SmartBudBox/Smart-Bud-Box>

Take all plot files from Smart-Bud-Box/build_the_box/KiCAD/plot/ and upload it to PCBway and complete the purchase.

Soldering the circuit board



Solder the screw terminals (1) to the PCB first, then take the socket (2) that came with the Wemos D1 mini and solder it as well.

Then it goes on with the 560 Ohm resistors (3) on R1 and R2, with the resistors it doesn't matter how you solder them. You can use the color code on the resistor to find out how much Ohm it has.

The 100 Ohm resistor (4) is on R5 and R6 and the 4k7 Ohm resistor (5) is on R3 and R4.

The capacitors (6) get to C2 and C3, no matter how.

Now solder the two MOSFET transistors (7) to the big three points with the heat sink towards the base of the board as shown on the picture / board.

The diode (8) is placed on Q1 with the black bar pointing towards the controller or square box on the PCB.

Solder the two NPN transistors (9) with the flat side facing upwards as shown on the PCB.

And finally the feet (10) to the controller (are there) on the side where the chip can be seen, the long legs down.

Webinterface on own webspace

You should upload the interface to your own server, but it doesn't sound very complex at first. You can take a Raspberry Pi Zero and install a web server there, the Raspberry Pi Zero costs about 5 € with SD card maybe 10 €. Here is a good video on how to do the whole thing https://www.youtube.com/watch?v=5yNKwH9K1_g

If you have installed the webserver, upload the /web files and open /install/index. php on the webserver. Here you have to enter the data for your mySQL database, as well as the URL to your interface and the password.

Then click on Ok and the configuration and database will be created automatically, after that you can get your web interface and login with the password Point

Firmware on the controller with Arduino IDE

First install the drivers for the microcontroller, you will find them under build_the_box/ch340g. rar.

Now you have two options, the first one would be to use our setup tool which you can find at /Setup Tool/SBB Tool. exe (Windows) or you can do the following:

Download the Arduino Editor at <https://www.arduino.cc/en/Main/Software>

After that you have to install the board definition there, go to "File - Settings" and enter the following URL at Additional Board Manager:

http://arduino.esp8266.com/stable/package_esp8266com_index.json

Now you can search under "Tools - Board - Board Manager" for "esp8266". Then click on it and then on "Install".

In the editor load the wems/wemos.ino (also called Sketch), just drag and drop it in OR under File - Open select. Now you see a lot of text in the editor, some things you have to change.

Above in grey font you can see which libraries you have to install and how to do this (similar to the board manager).

After that you have to change the following things in the sketch to save your data on it.

```
const char* ssid = "wlan"; // name of your wlan ssid
```

Here is the name of your WLAN

```
const char* pass = "password"; // wlan wpa password or key for wep
```

Here is the password of your WLAN

```
const char* host = "site.com"; // hostname, ip addresses wont work, example: host.com
```

The domain to your web interface

```
const int httpPort = 80;
```

Thus, in the usual case

```
const char* host_url = "/folder"; // folder without slash at end, example: /your/folder
```

Here everything that follows after the domain to your web interface

```
const char* api_password = "123456"; // password for interface wich defined at  
config.inc.php
```

The password for your web interface you set in config. inc. php.

Then connect the Wemos D1 mini to your PC via a microUSB cable, in the Arduino IDE under Tools - Port you have to select the port to your Wemos, if you have more than one, plug it in again and see which one disappears. Then plug it in again and select the correct port. Then upload the sketch with Sketch - Upload. It'll take a while to finish, but after that you're finally through.

Connect the controller

The instructions for the box explain how to attach cables to the sensors and lay them, if you are not sure, take a look first.

DHT22

If you have the sensor with PCB, then "DAT" comes in here, if you have the sensor without PCB, then the second foot comes in from the front.

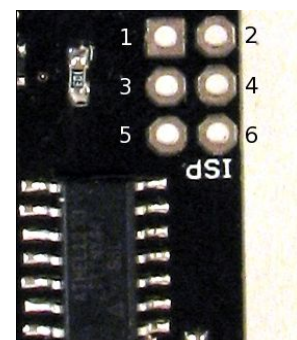
SDA

From the ground humidity sensor of the SDA connection (pin 4)

SCL

From the ground humidity sensor of the SCL connection (pin 3)

GND



- Ground of 5V power supply unit
- Ground Ground Moisture Sensor (Pin 6)
- GND of DHT22 (fourth leg)

+5V

- 5V From power supply (red)
- 5V Ground humidity sensor (Pin 2)
- VCC from DHT22 or first leg

EXHAUST

PWM to the activated carbon filter fan, for PC fan the fourth cable (blue)

FAN

PWM to fan Fan fan, for PC fan the fourth cable (blue)

+12V

- 12 V of fan and activated carbon filter Fan (usually also yellow)
- 12 V to the LED strips (red)
- 12 V to the pump (red)

+12V IN

12 V From power supply unit (yellow)

GND IN

Ground from power supply 12V connector (black)

LIGHT GND

Ground of the LED stripes (black)

PUMP GND

Ground of the pump (black)

Brief introduction to the interface

As soon as they have finished connecting everything and the web-interface will probably stand there that the controller is still offline. As soon as you power up your controller and he successfully connects to it you can update the page and see a number above, this is the ID of your controller and you can click on it.

Then you can make various settings under Settings like e. g. assign a name for this box or set the on and off times for the light. At the beginning everything is pre-configured for the vegetation phase.

If you now start to put your plant in the box, you can click on Vegi in the interface and then the counter is highlighted in green and counts one day every day. If it is off then nothing will be counted and under "more - reset counter" you can also reset the counter completely. When you enter the flower, just click on Flower, it will be highlighted in green and the counter will continue counting.

If you click on it, the pump will be turned on X times with a running time of Y, depending on how you have set it in the settings. As soon as you click on watering, the processes or orders will be created, if there are still orders left and the plant is wet enough, then go to "more - delete orders".

Concerning the soil moisture sensor it has to be said that a value of less than 400 is actually a relatively dry earth and a value of less than 500 is wet. You can also turn off the fan by clicking on it, then the button will be grayed out. Nevertheless, the fan still rotates at the lowest speed.

In the notes field you can add notes to your notes, it is very useful if you want to write some things down.

Last but not least you can see below a diagram with the past sensors, each field is one hour and in the hour the average was calculated and entered into the diagram.

What suggestions would you have for how to use the box comfortably, even over the internet maybe it is safe but nevertheless. And now there's the crux of the matter: it has to be accessible for everyone at some point, if I use such a board then he has to install an entire web server and so on.

It is also planned to do the whole thing without a website and to install an Oled Display and maybe four buttons for the operation. Or an operation via Bluetooth with an app, but unfortunately I can't use Java.