

POWERLOCAN ENERGY STORAGE



Contents

Introduction:	6
The benefits of The POWERLOCK-ENERGY-STORAGE	6
Self-Power Your Home With The POWERLOCK-ENERGY-STORAGE:	7
Tools:	8
Master List Of Materials:	13
ESP Module Drawing and Diagram:	19
POWERLOCK-ENERGY-STORAGE Cable Connections:	23
1. Cable Connections in Drawings.....	23
2. Cable Connections in Drawings.....	47
Putting Togheter The POWERLOCK-ENERGY-STORAGE In Images:	71
1. Making the Cell Modules	71
2. Each Part Added To The POWERLOCK-ENERGY-STORAGE	
3. ⁸¹ Cable Connections	84
Sorting The Cells:	99
1. Using the Opus Charger:	99
2. Using the MegaCell Charger.....	105
1. Warning:	105
2. Charger Interface:.....	105
3. Display Diagram:	106
4. Function and Reset Button:	106
5. Power Supply:.....	107
6. Installing the MegaCell Monitor Software on Your Laptop/PC:.....	108
7. Exploring the Simple Mode Interface of the Software:	110
8. Add the Charger to Your WiFi Network, Using your Laptop/PC:.....	111
9. Add the Charger to Your WiFi Network, Using the WPS Method:	113
10. Add a Charger and Set-Up:.....	114
Setting-up the ESP:	116
1. Flashing the firmware:	117
2. WiFi set-up:.....	127
3. Scan for IP:.....	137

Copyright

Copyright © 2021 EnergyPeakShaver.com. All rights reserved. All literary work, images, and graphics in this user guide belong to and is the sole property of its respective authors. Reproduction, copy, or any other form of use of the pieces contained within this book is strictly forbidden without express written permission from the author.

Those who have received or purchased the POWERLOCK-ENERGY-STORAGE user guide are neither authorized nor permitted to transmit copies of this file to anyone without express written permission from the author. Giving away copies to people who haven't paid for them is illegal under international copyright laws and will submit you to possible legal action. Those violating our copyrights or using our trademarks will be prosecuted to the full extent of the law.

***Note:** The owner of the user guide is permitted to print one or more hard copies of the user guide for personal use.

Notice

This is NOT a free user guide. You may NOT forward this user guide (or any other part of our program) to anyone else. You do **NOT** have resale rights for this user guide. We have spent years developing the POWERLOCK-ENERGY-STORAGE System and will take legal action to protect it against anyone violating our copyrights, trademarks, and terms.

Energypeakshaver.com

Terms & Legal Disclaimer

The authors and publishers both disclaim liability regarding any loss or risk incurred as direct, or indirect, consequence of the application and usage of any of the contents within POWERLOCK-ENERGY-STORAGE guide.

By using, viewing, and/or interacting with Energypeakshaver.com website, you agree to all terms of engagement, thus assuming complete responsibility for your own actions. The authors and publishers will not be held liable or claim accountability for any loss or injuries. Use, view, and interact with these resources at your own risk.

All products from Energypeakshaver.com and its related companies are strictly for information and entertainment purposes only. While all attempts have been made to verify the accuracy of information provided on our website and within our publications, neither the authors nor the publishers are responsible for assuming liability for possible inaccuracies.

The authors and publishers disclaim any responsibility for the inaccuracy of the content, including but not limited to errors or omissions, loss or damage of property, injury to self or others, and even death can occur as a direct or indirect consequence of the use and application of any content found herein.

Using and working with solar panels, Li-ion cells, equipment/sources, and electricity are dangerous. You are working with many dangerous factors (including but not limited to electricity, hot soldering equipment, power tools and many other unknown conditions that will arise during your project) so seek expert opinion and help when necessary. The authors and publishers assume that you are aware of all the risks and possible damage associated with a DIY project and while using electricity and green energy resources.

Check with your local officials, state, county, and country for applicable laws about home improvements, alterations, and using green energy (especially if connecting to the grid). It is often necessary to obtain local government permits and licenses to prevent legal implications.

We also highly recommend you consult your local electrician, and other applicable home improvement professionals, to assist in your green energy project. Failure to do so could result in injury, loss, damage of property, or death- you are acting at your own risk.

By choosing to use the information made available on energypeakshaver.com or within any of our publications, videos, or related works, you agree to indemnify, defend, and hold harmless the authors, publishers, and any other related company from all claims (either valid or invalid),

judgements, suits, proceedings, losses, damages, and costs or expenses of any nature that result from the use or misuse of any information in our POWERLOCK-ENERGY-STORAGE user guide.

The information provided in our DIY user guide may need to be downloaded using third party software, such as Acrobat or Flash Player. Moreover, any downloads, either purchased or given for free from our website, any related/affiliated websites, or our web hosting, are done at your own risk. We give no warranty that these websites are free of corrupting computer codes, viruses, or worms.

If you are a minor, you can only use POWERLOCK-ENERGY-STORAGE user guide and related contents with permission and guidance from your parents or guardians.

Children are not eligible to use our services unsupervised. Further, Energypeakshaver.com specifically denies access to any individual covered by the Child Privacy Act (COPA) of 1998.

Please Remember

Safety First! Everything you do that is related to your DIY project is at your own risk. Please use safety precautions at all times. If you do not understand something or not feel comfortable doing something – consult a professional.

Have fun, enjoy, and good luck!

Introduction:

POWERLOCK-ENERGY-STORAGE is a home battery that stores energy so you can use it on demand and self-power your home to reduce your reliance on grid electricity. In the event of a grid outage, POWERLOCK-ENERGY-STORAGE automatically provides backup power or easily integrates with solar to ensure your home is powered 24/7. With POWERLOCK-ENERGY-STORAGE, you are assured of energy and clean energy lifestyle.

The benefits of The POWERLOCK-ENERGY-STORAGE:

POWERLOCK-ENERGY-STORAGE allows you to store 0.88 kWh of energy but you can scale it so you can store more power and use that energy to run your home during the night and back up your home in the event of a power outage. POWERLOCK-ENERGY-STORAGE is compact, safe and includes a battery inverter, which provides easier integration.

Self-Powered Home

Use the POWERLOCK-ENERGY-STORAGE to reduce reliance on the grid and power your home day and night.

Backup Power

Protect your home from a power outage with seamless and reliable backup power.

Energy Savings

Reduce your electric bill, if your utility offers a time-of-use rate plan.

Self-Power Your Home With The POWERLOCK-ENERGY-STORAGE:

A self-powered home is one that runs on POWERLOCK-ENERGY-STORAGE, which gives you the ability to own your energy and reduce your reliance on the grid. With POWERLOCK-ENERGY-STORAGE you can save more of your excess energy and use it at night, which roughly doubles the amount of energy that directly powers your home.

Tools:

Angle Nose Plier



Screwdriver



Bent Nose Plier



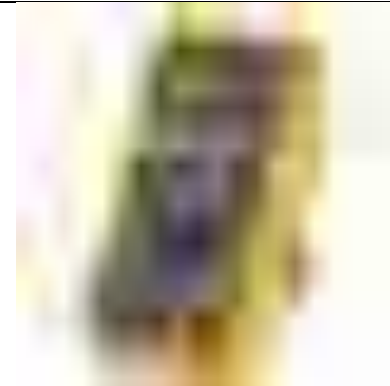
Plier



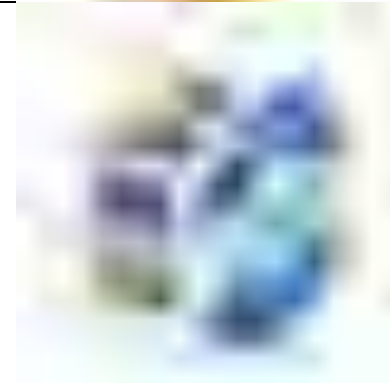
Soldering Station/Soldering Gun



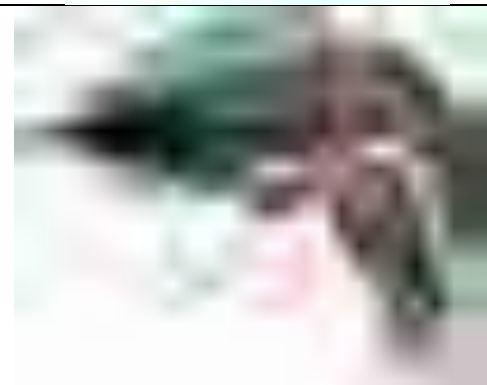
Digital Multimeter



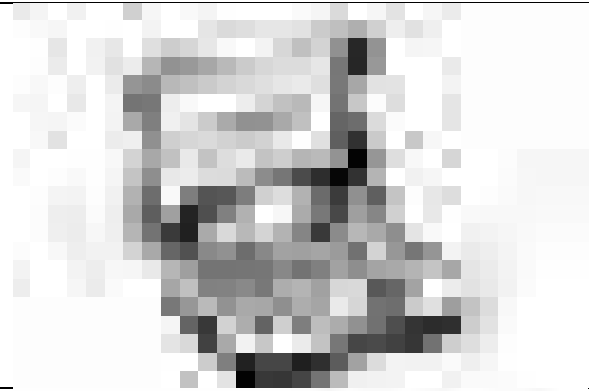
Rosin Core Solder



Electric Screwdriver



Screwdriver Bit and Ratchet Set



Caliper



Tweezer



Drill



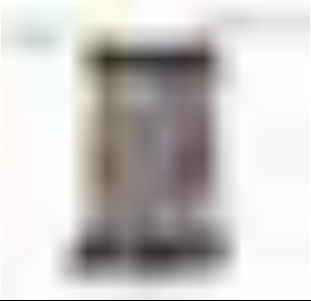



Drill Bits

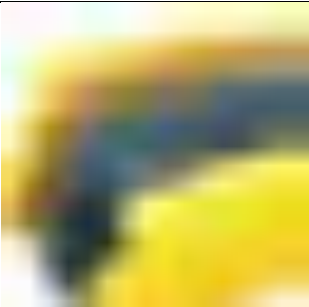





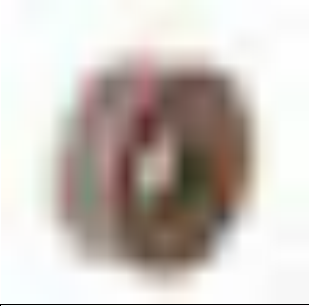

Master List Of Materials:

Nr. Crt.	Description	Qty/Unit	Vendor	Images
1	Box Enclosure 800mm x 600mm x 260mm	1	eBay LINK	
2	Basic PCB Kit	20	Kit LINK	
3	BMS Module Complete Kit	1	Kit LINK	

4	Battery Capacity Voltage Checker Tester	1	eBay LINK	
5	AC 110V-220V TO DC 5V 12V 24V Switch Power Supply Driver Adapter LED Strip Light	1	eBay LINK	
6	1200W 20A DC Converter Boost Car Step-up Power Supply Module 8-60V to 12-83V	1	Ebay LINK	
7	4 Four Channel Relay Module DC 5V + Optocoupler For Arduino PIC ARM AVR DSP	1	eBay LINK	

8	40PCS Dupont Wire Jumper Cable 2.54mm 1P-1P Male to Female 10CM/20CM/30CM (chose 10CM Female to Female)	1	eBay LINK	
9	WEMOS D1 ESP8266 WIFI Mini Pro 16M Connector IoT Board 2.4G SMA External Antenna	1	eBay LINK	
10	DC-DC / 3A adjustable buck module LM2596 regulated 24V to 12V 5V 3V	1	eBay LINK	
11	Double Side Prototype PCB Tinned Universal Breadboard 5x7 cm 50mmx70mm FR4	1	eBay LINK	

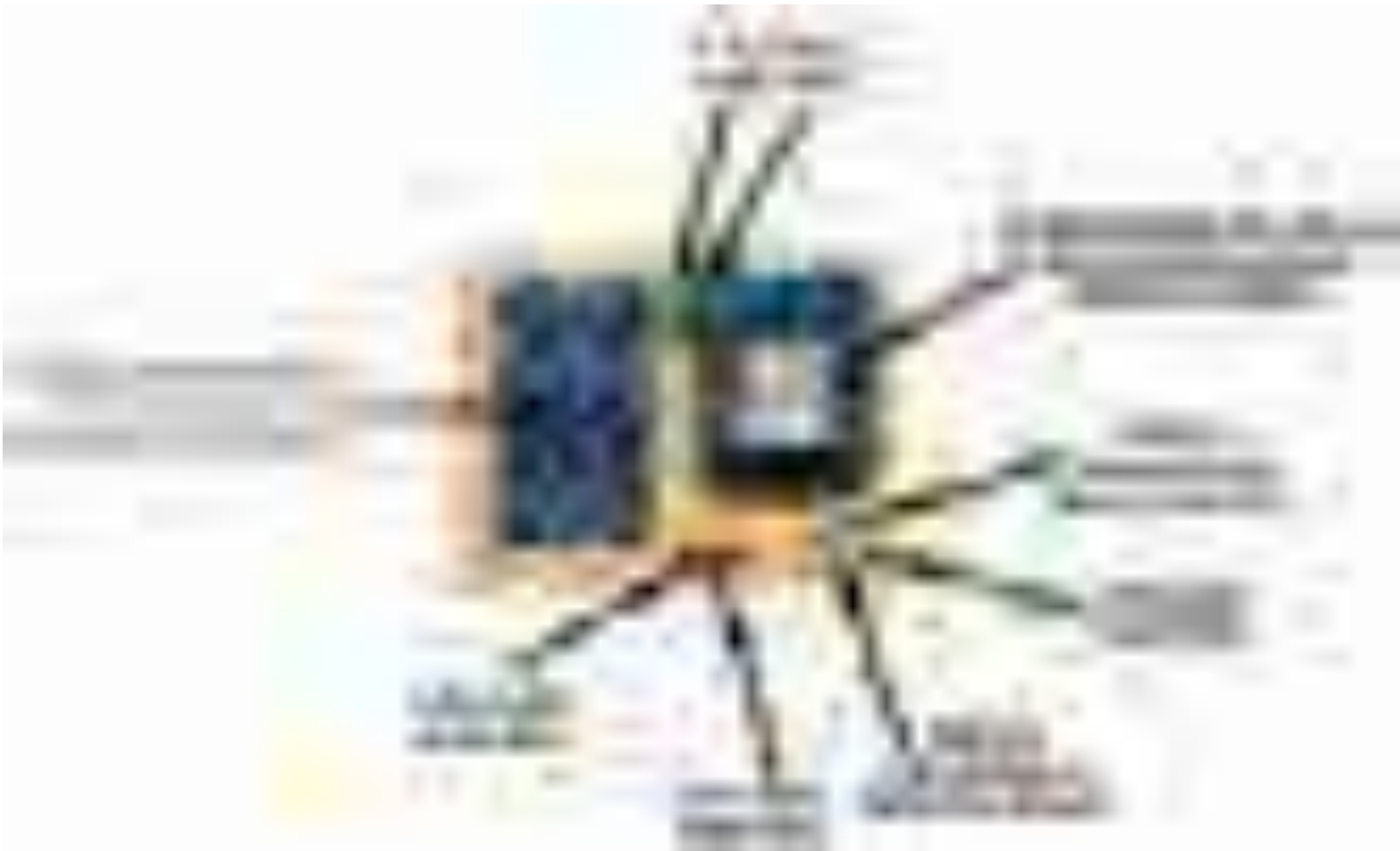
12	30Values 10-1M Ohm 1/4w Resistance 1% Metal Film Resistor Assortment Kit	1	eBay LINK	
13	Diode IN4007 1N4007 Gleichrichterdiode DO-41 1A 1000V	1	eBay LINK	
14	2A472 0.0047uf 4.7nf 4700pf 100V Mylar Film Capacitor	1	eBay LINK	
15	PC817 PC817C 817C Optocoupler DIP4 SHARP NEW	1	eBay LINK	

16	1000W Grid Tie Inverter Stackable DC10.8-30V to AC110V Pure Sine Wave Inverter	2	eBay LINK	
17	Lot of Battery Laptop	-	Search eBay Alibaba or Aliexpress	
18	16 Pin Flat IDC Cable Extension DuPont Wire&1.27mm Line Pitch Wires Connect	5	eBay LINK	
19	XT60 Male+ Female Bullet Connectors Plugs for RC Lipo Battery	10	eBay LINK	

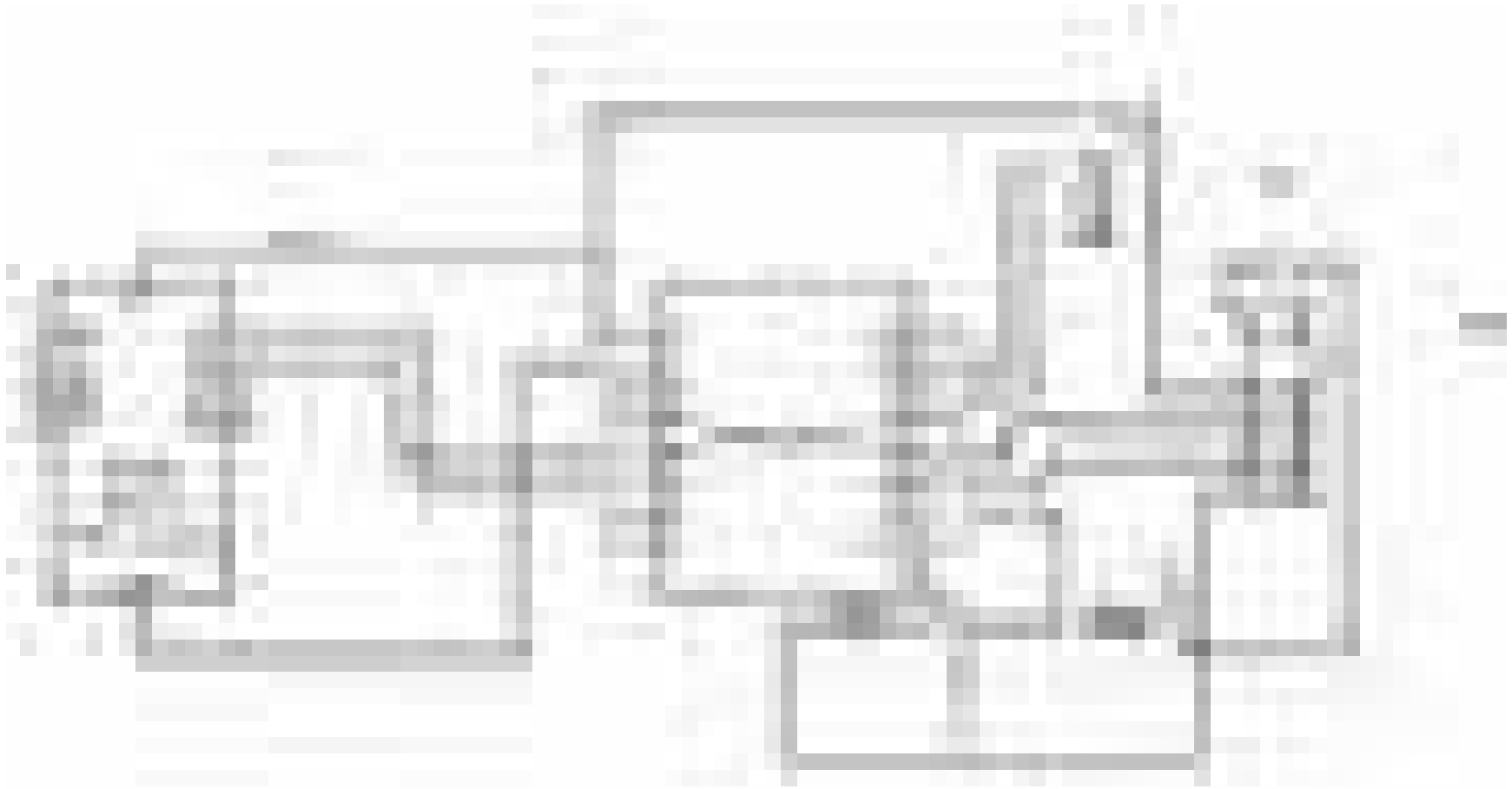
20	XT90 Female Male Banana Bullet Connector Plug For RC LiPo Battery Plug	1	eBay LINK	
21	Power Extension Cable Kettle Male to Female UPS Monitor, PC Lead C13 - C14	1	eBay LINK	
22	JST 2Pin Connector Male/Female Plug Cable 10cm Wire For Battery LED Lights	1	eBay LINK	

ESP Module Drawing and Diagram:

The position of the parts related to the Prefboard:



ESP module diagram:



ESP module diagram with the pieces on perfboard:



ESP Module PCB design:



POWERLOCK-ENERGY-STORAGE Cable Connections:

1. Cable Connections in Drawings



Step 1



Step 2



Step 3



Step 4



Step 5



Step 6



Step 7



Step 8



Step 9



Step 10



Step 11



Step 12



Step 13



Step 14



Step 15



Step 16



Step 17



Step 18



Step 19



Step 20



Step 21



Step 22



Step 23



Step 24

2. Cable Connections in Drawings



Step 1



Step 2



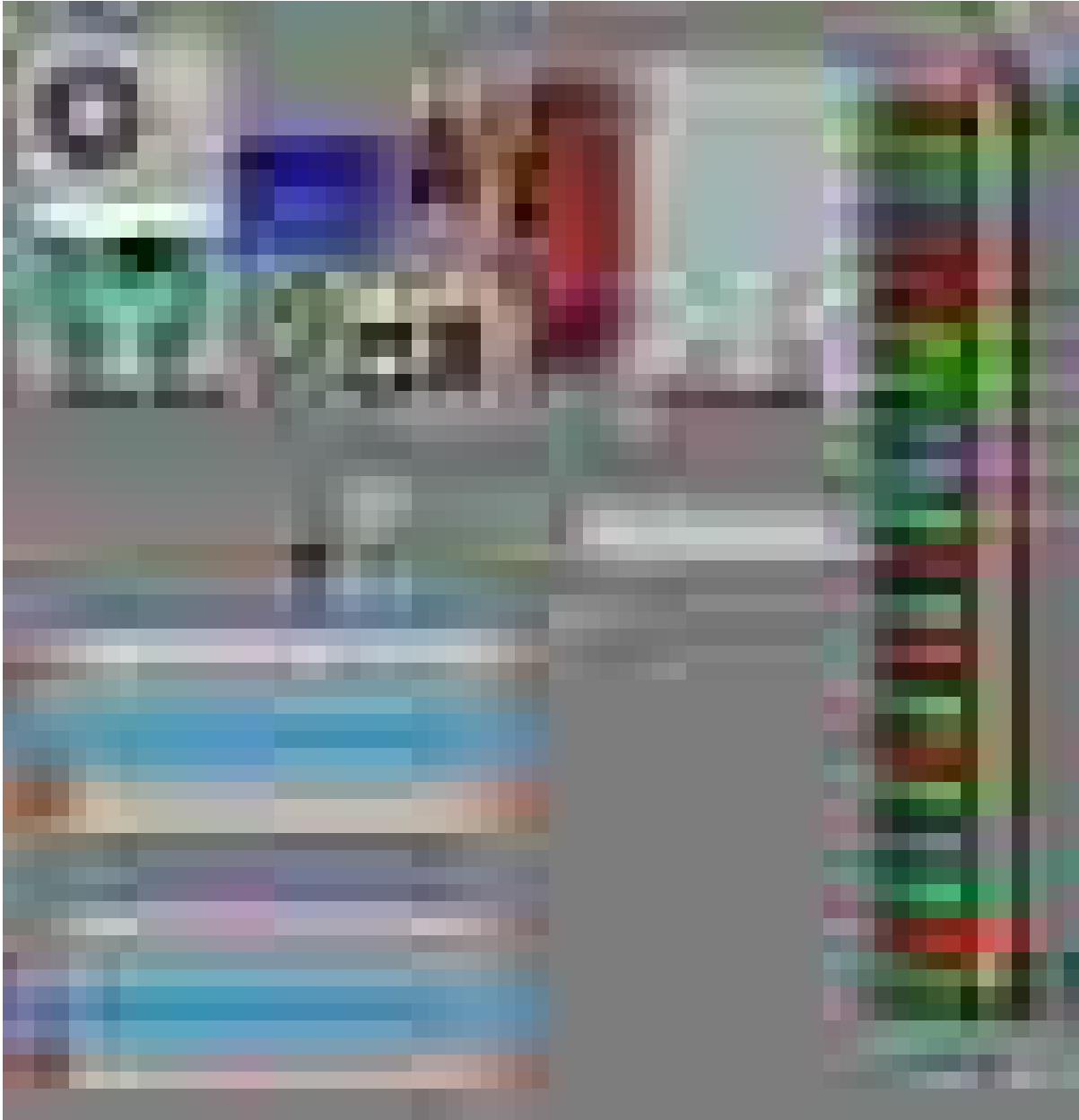
Step 3



Step 4



Step 5



Step 6



Step 7



Step 8



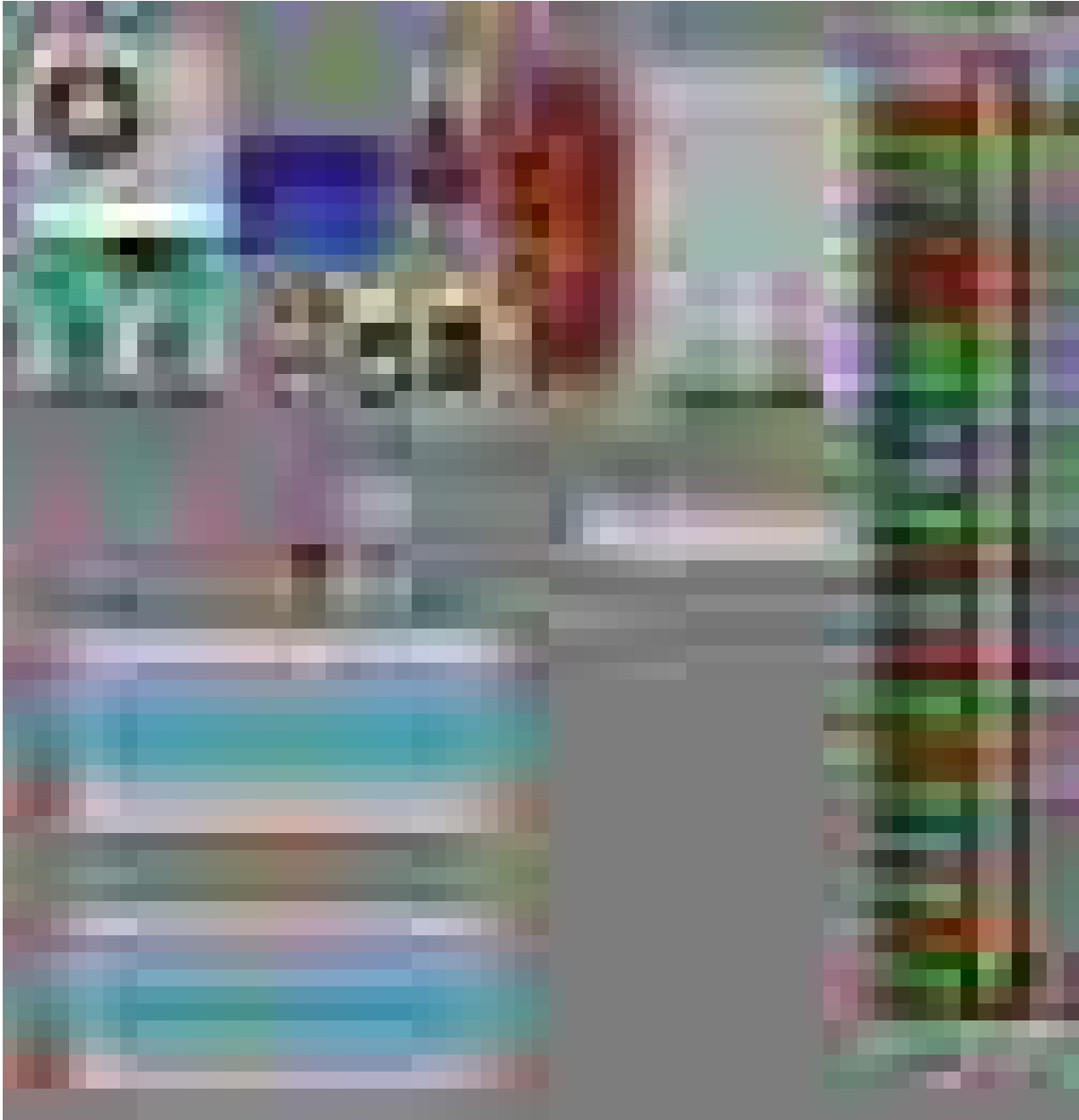
Step 9



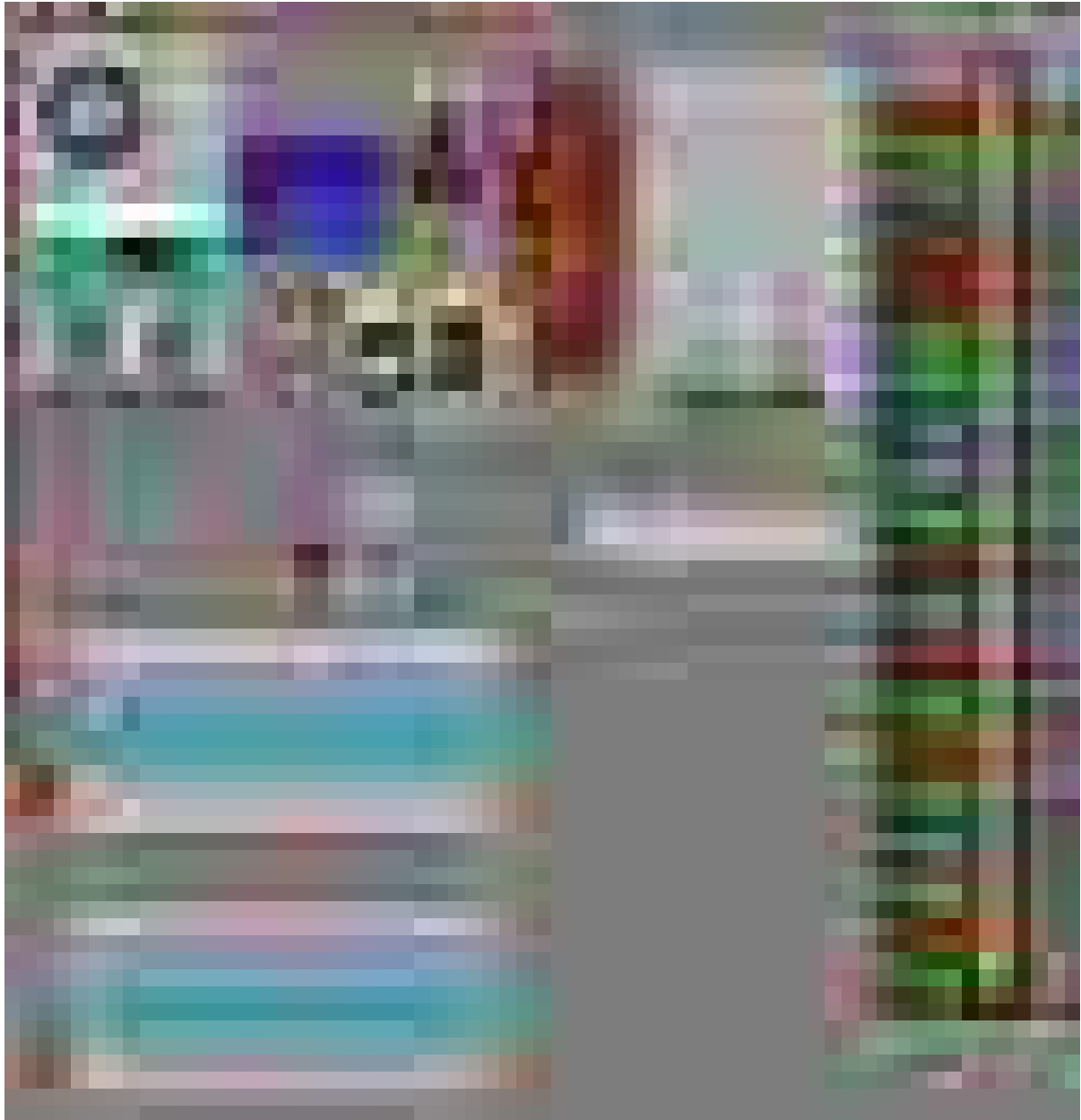
Step 10



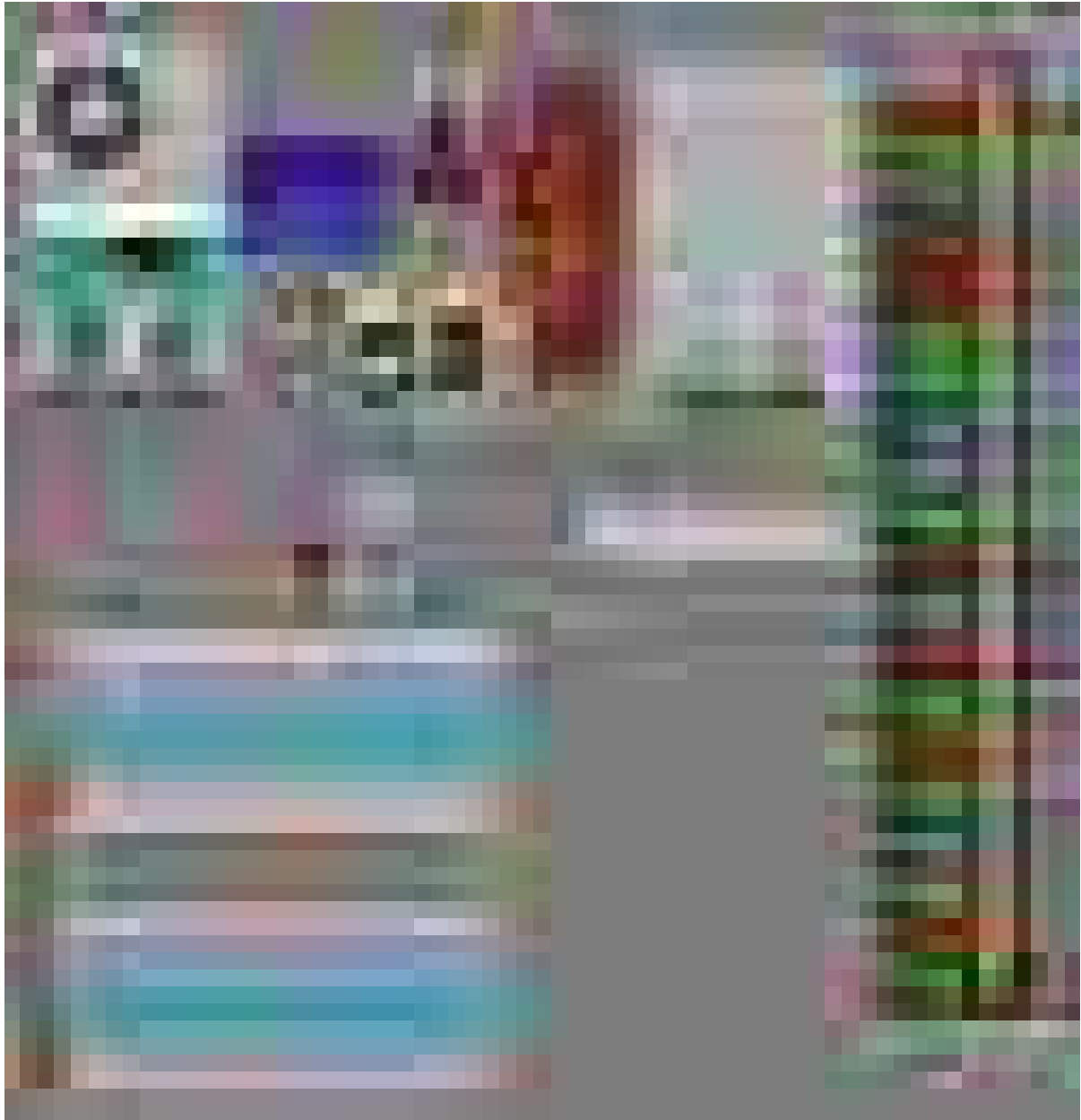
Step 11



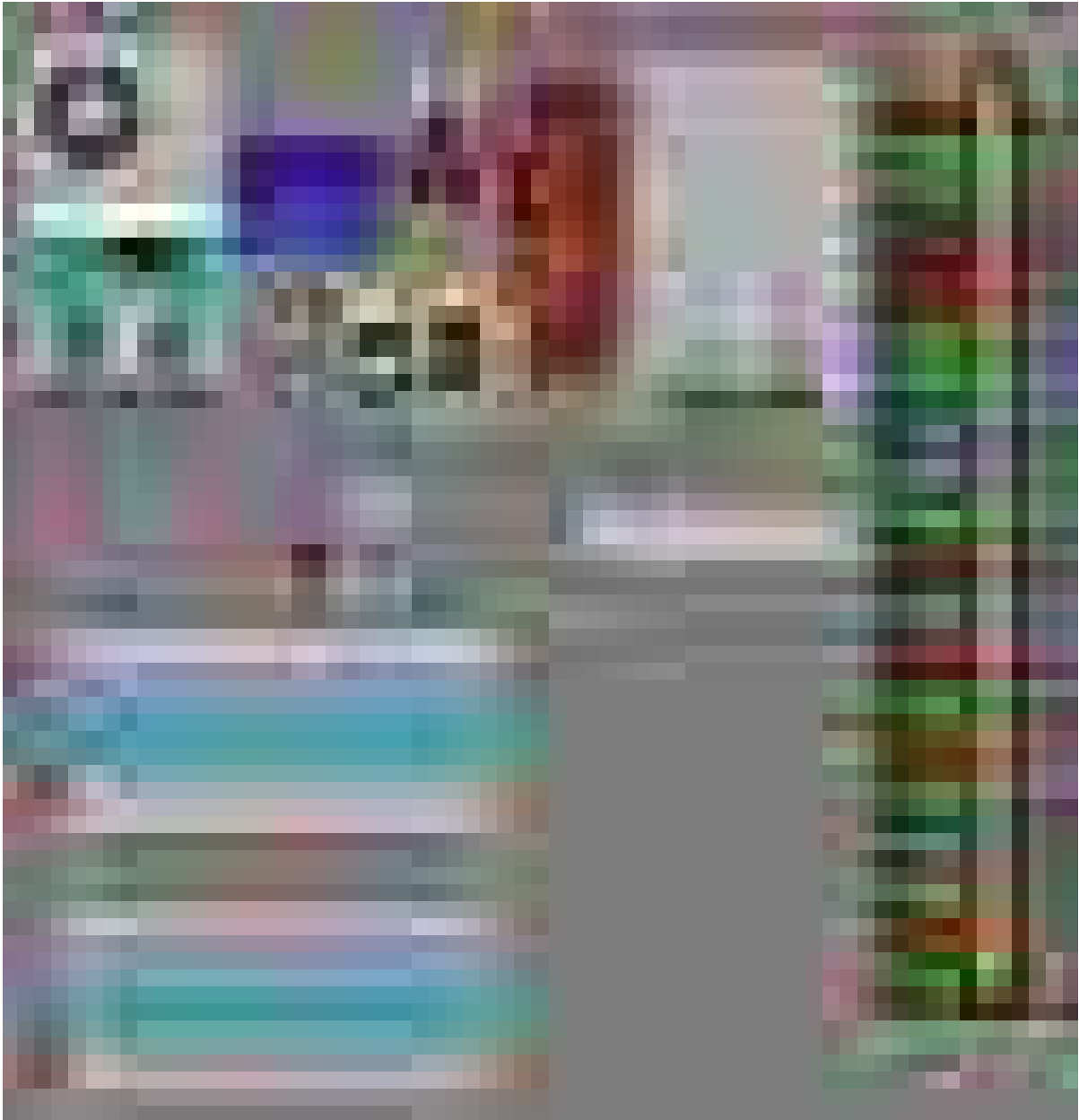
Step 12



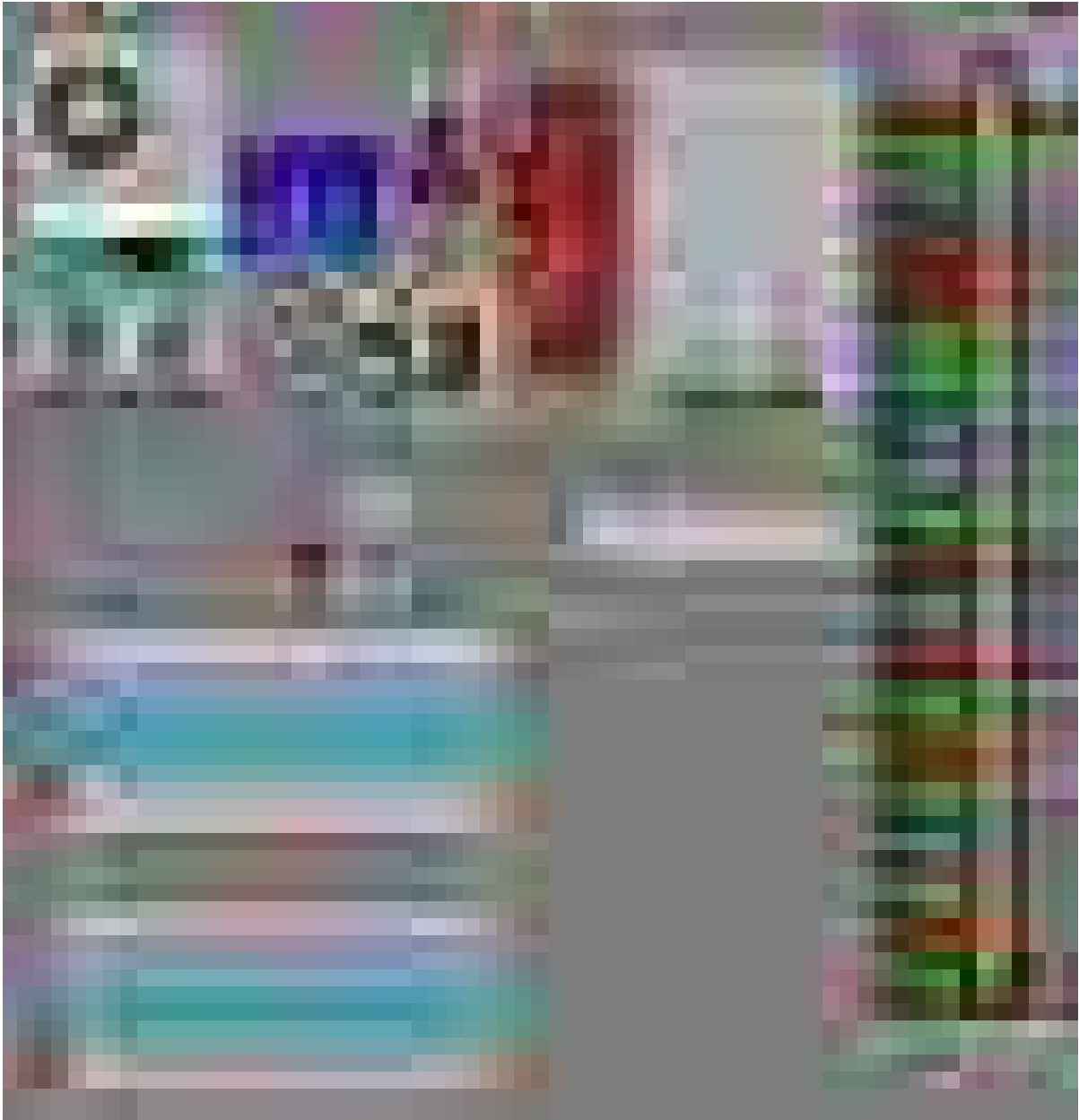
Step 13



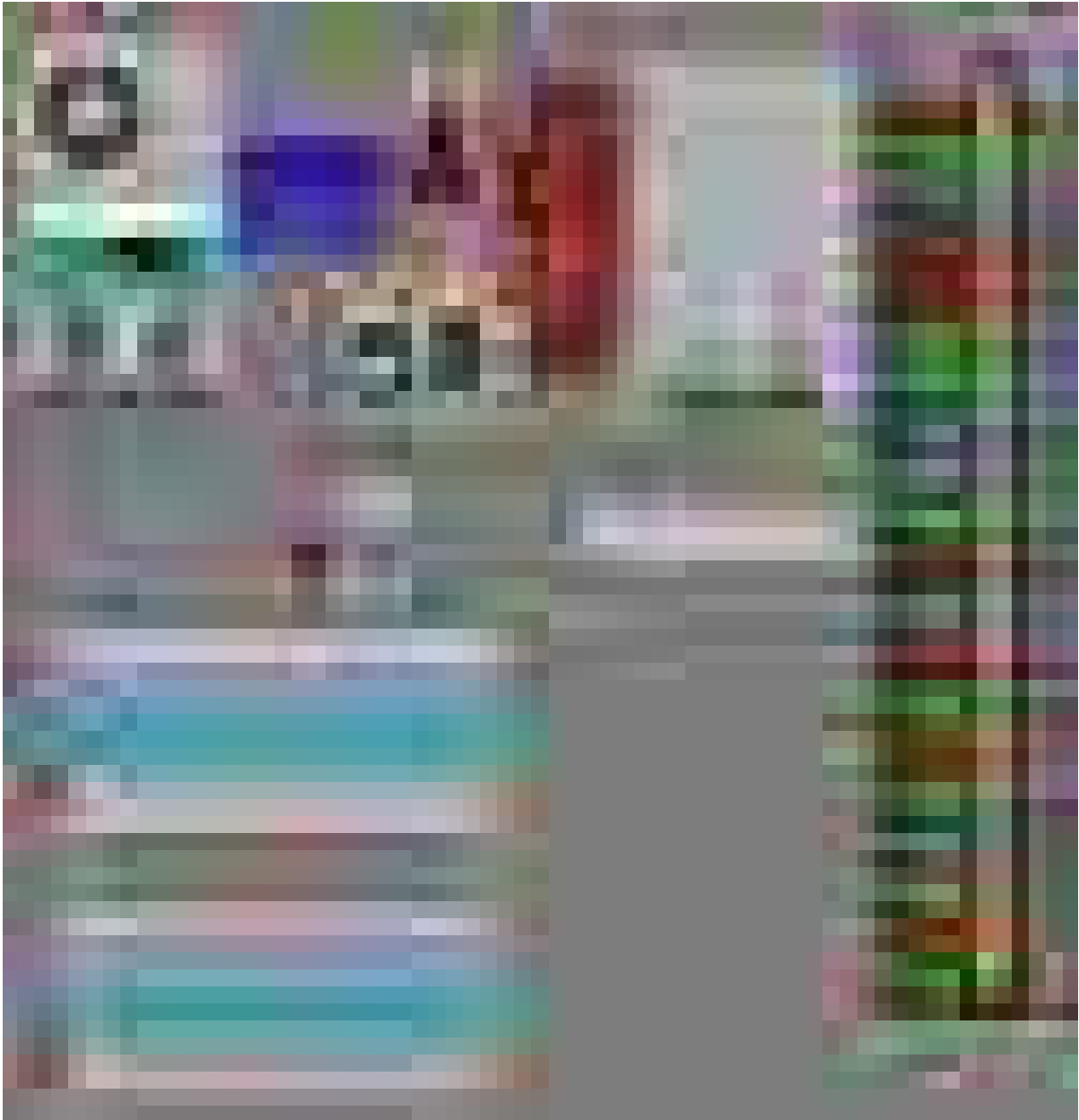
Step 14



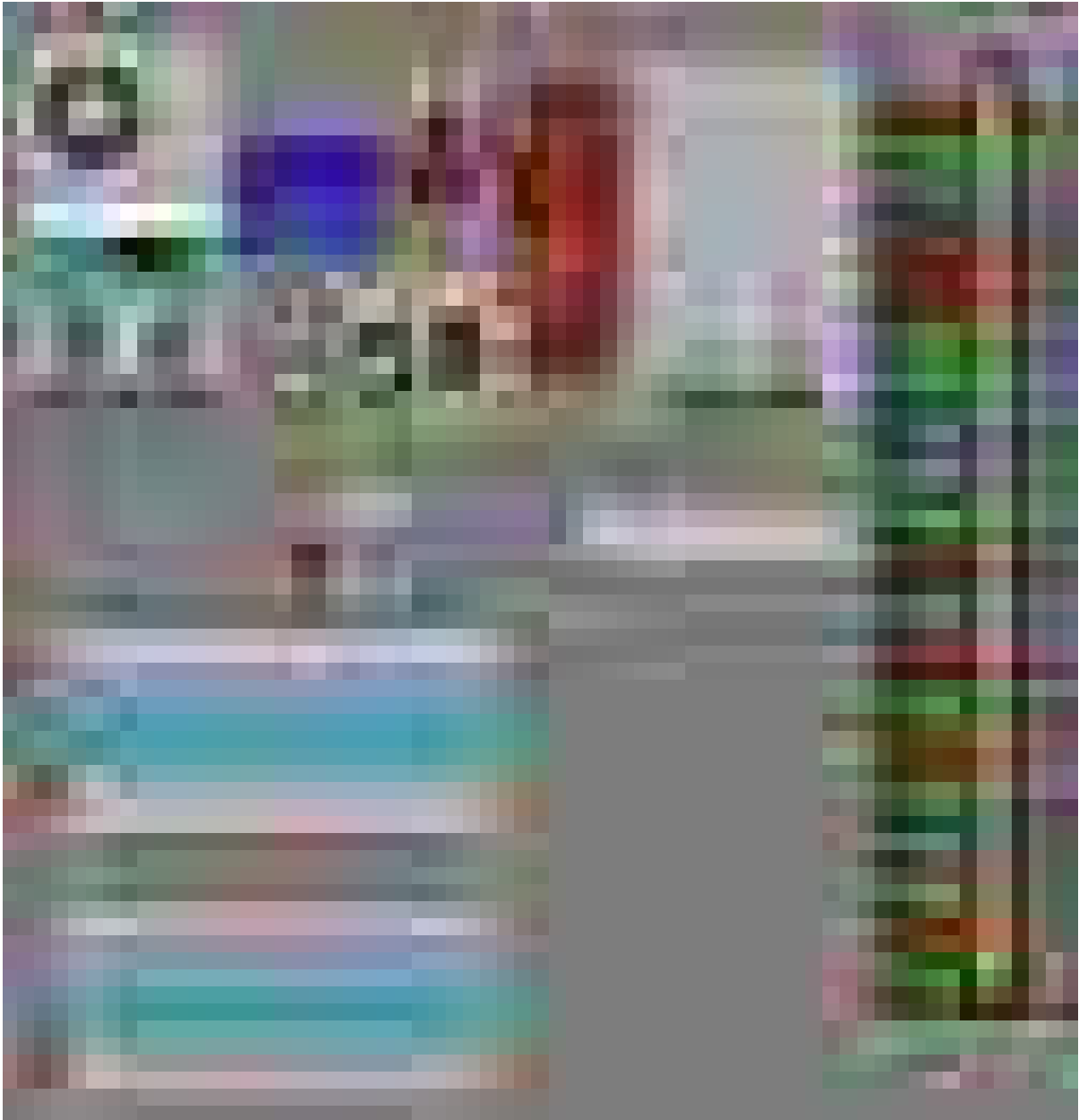
Step 15



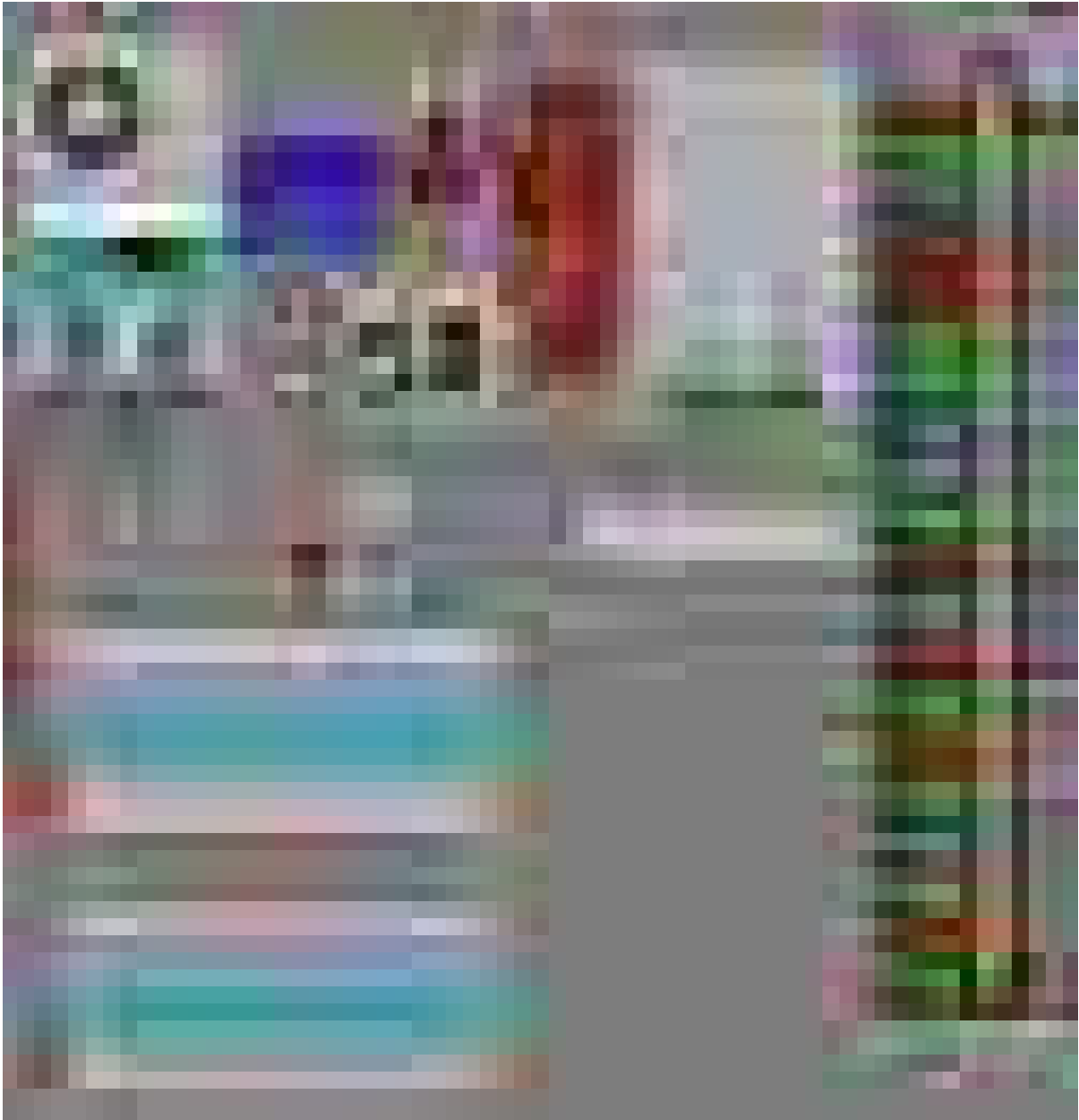
Step 16



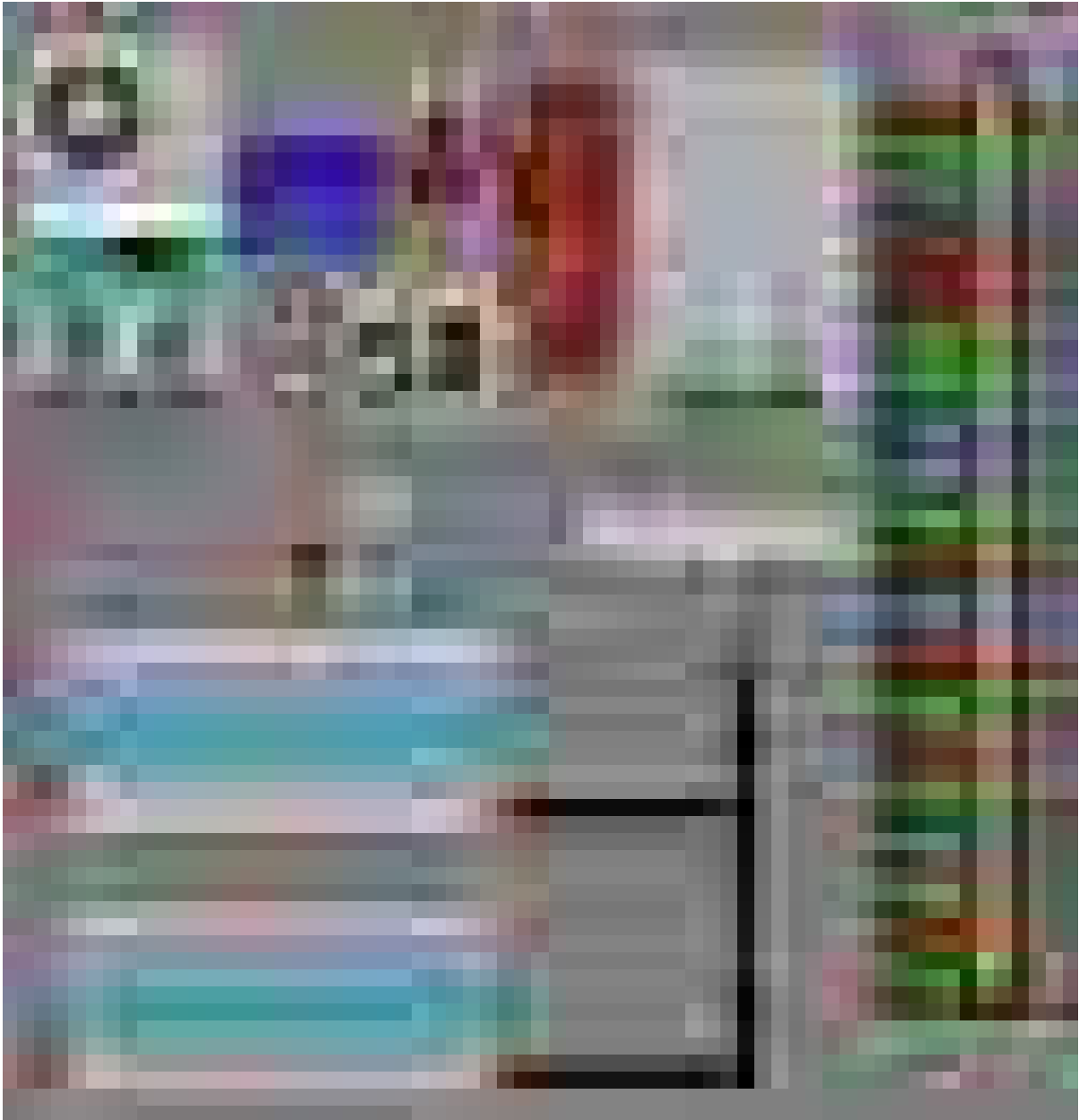
Step 17



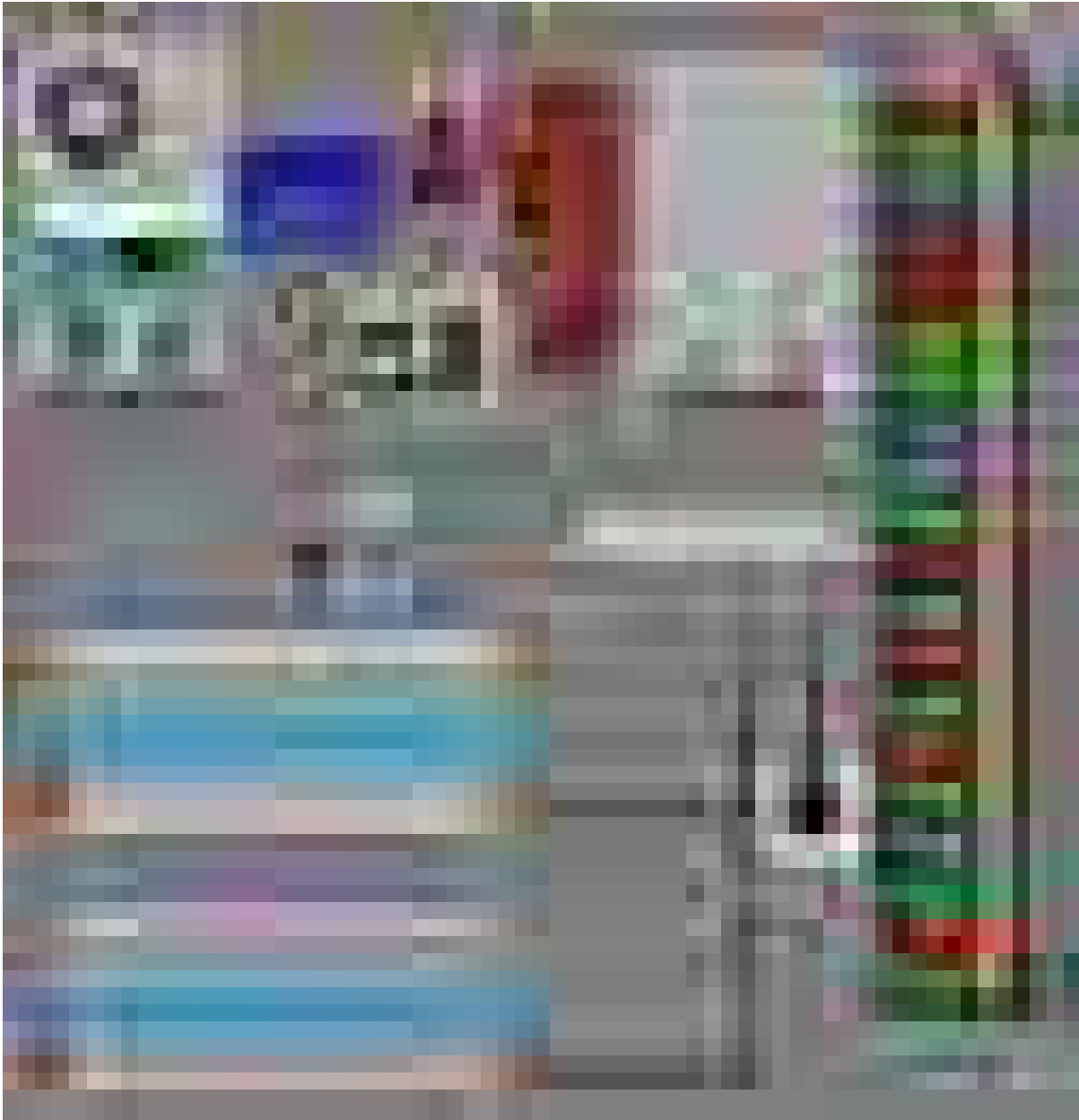
Step 18



Step 19



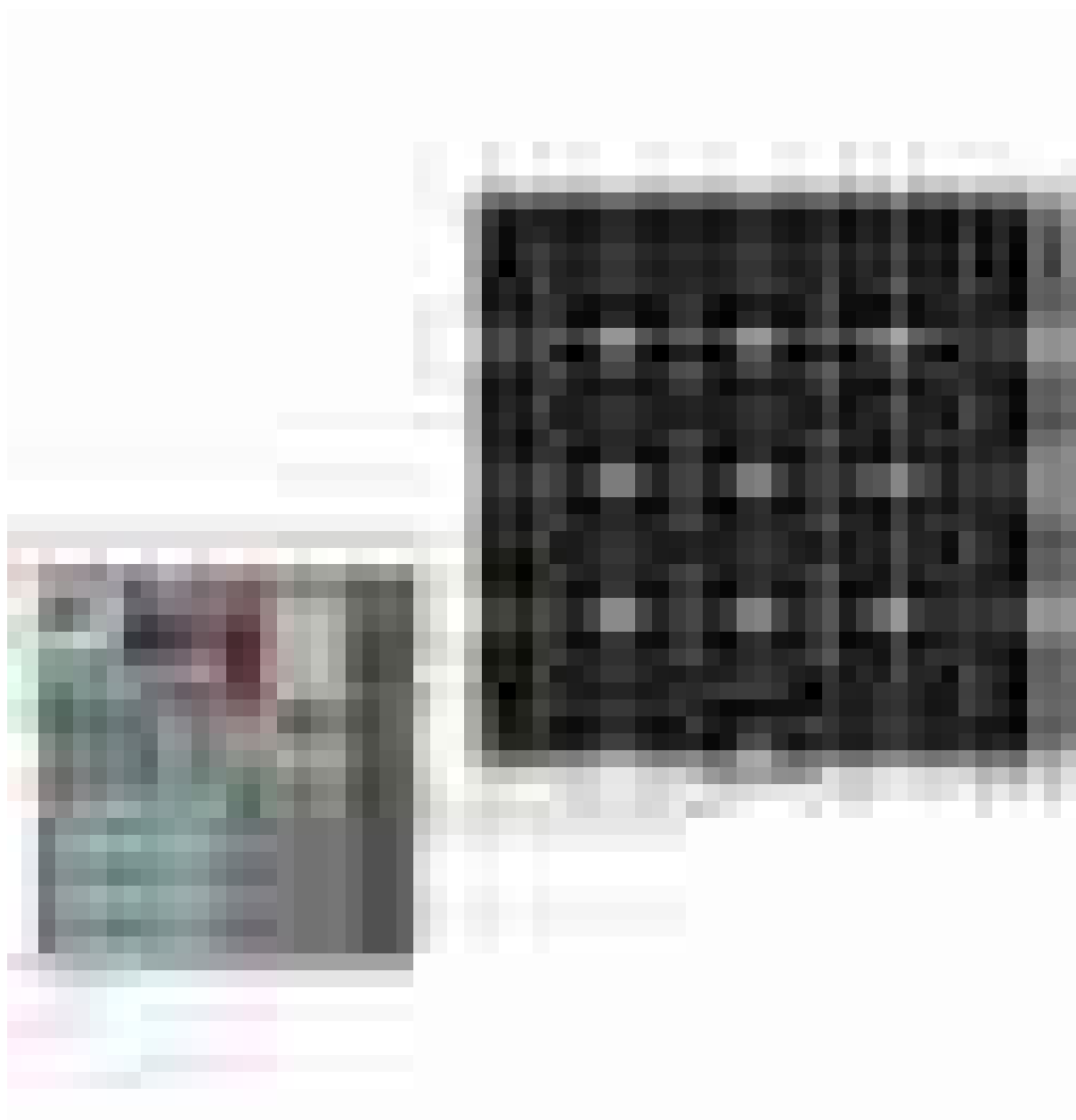
Step 20



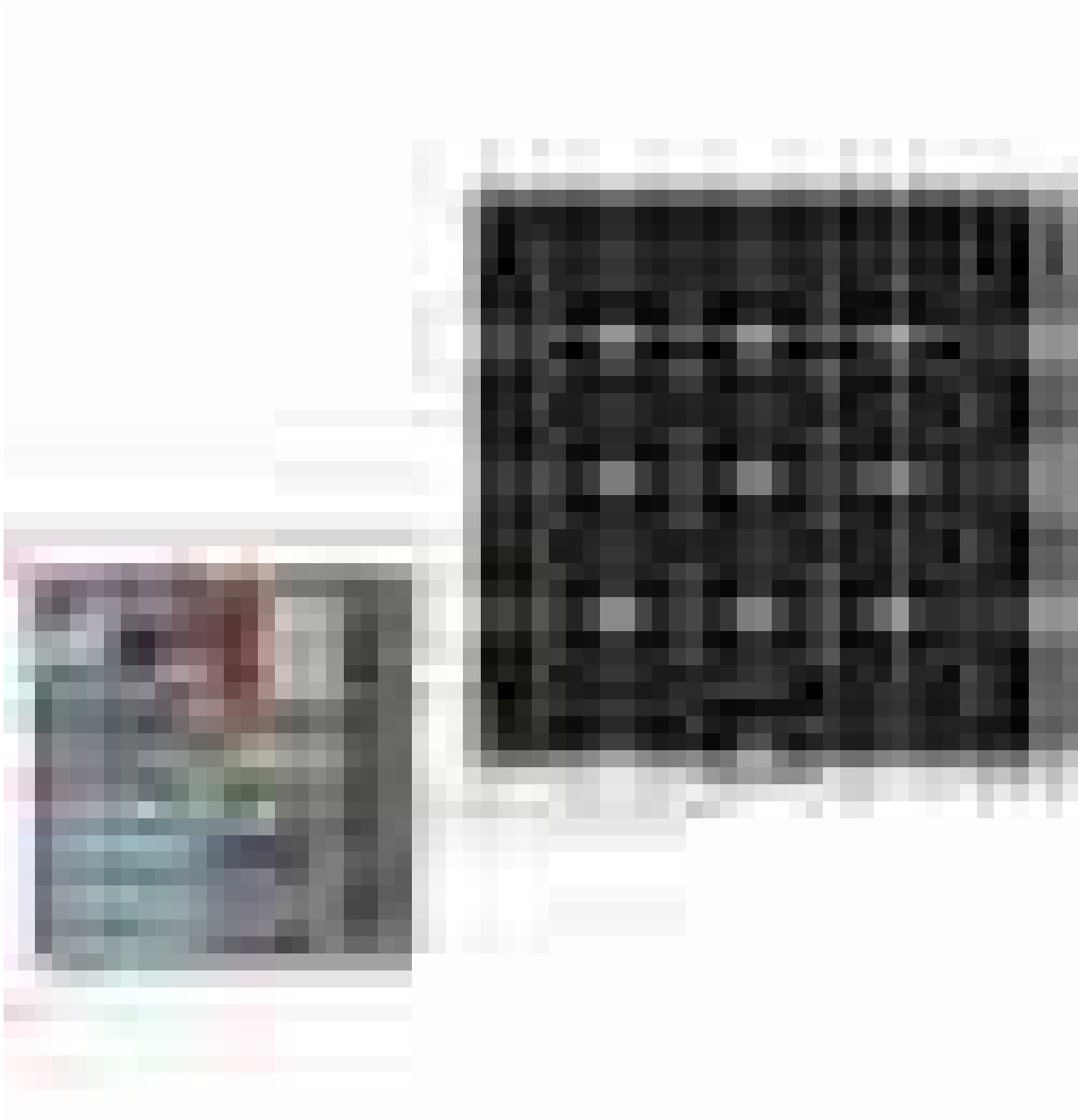
Step 21



Step 22



Step 23

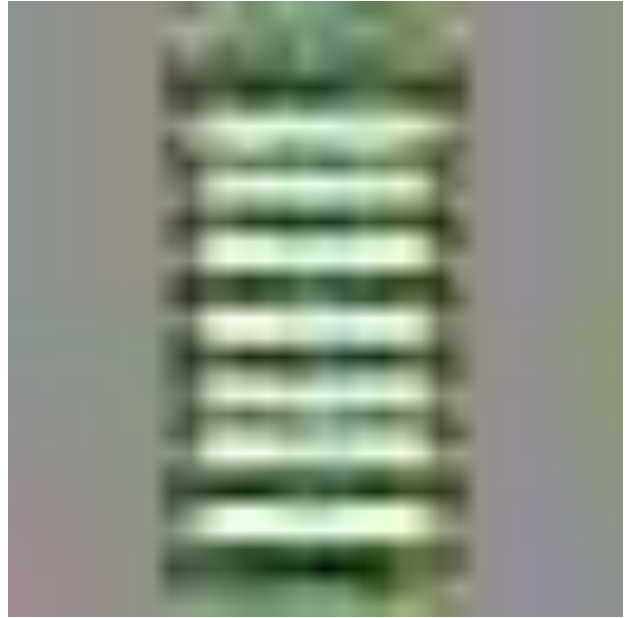


All Connections

Putting Together The EPOWERLOCK-ENERGY-STORAGE Images:

1. Making the Cell Modules

First we are going to attach the cell holders to the PCB. The holders have pins at the bottom which you will have to solder them to the PCB board in the holes you see in the second image.



After this we will insert the cells in the holders.



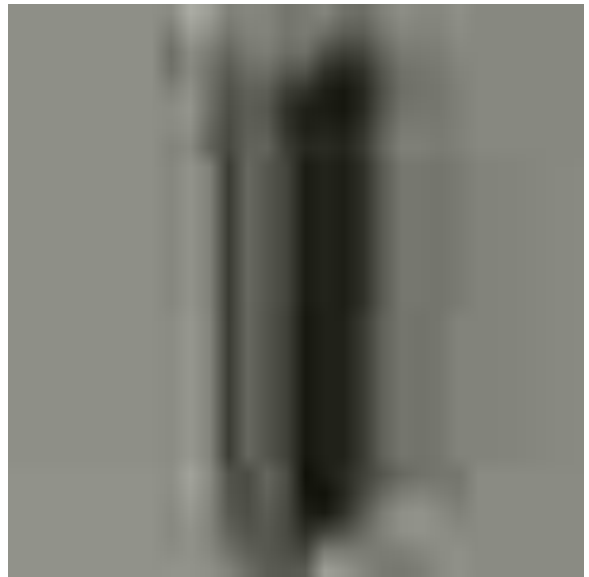
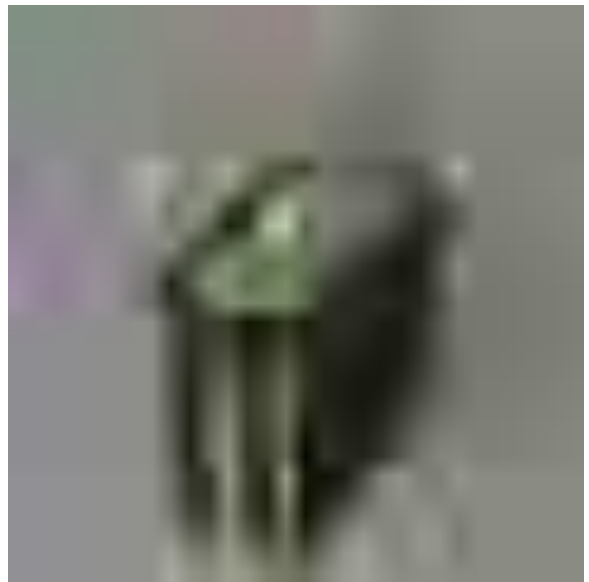
The next step is to add the IDC connector to the PCB. Keep in mind that when you will connect the 2 connectors will also be added the cable ribbon.



After this we will add the M4 Brass Standoff Spacer.



Second we will add each Cells Modules on top of each other creating a stack of 20 modules.



After all the cell modules have been stacked together we will add the BMS Module.
Attach the BMS Module PCB. (The BMS Module Must be put together separately.)



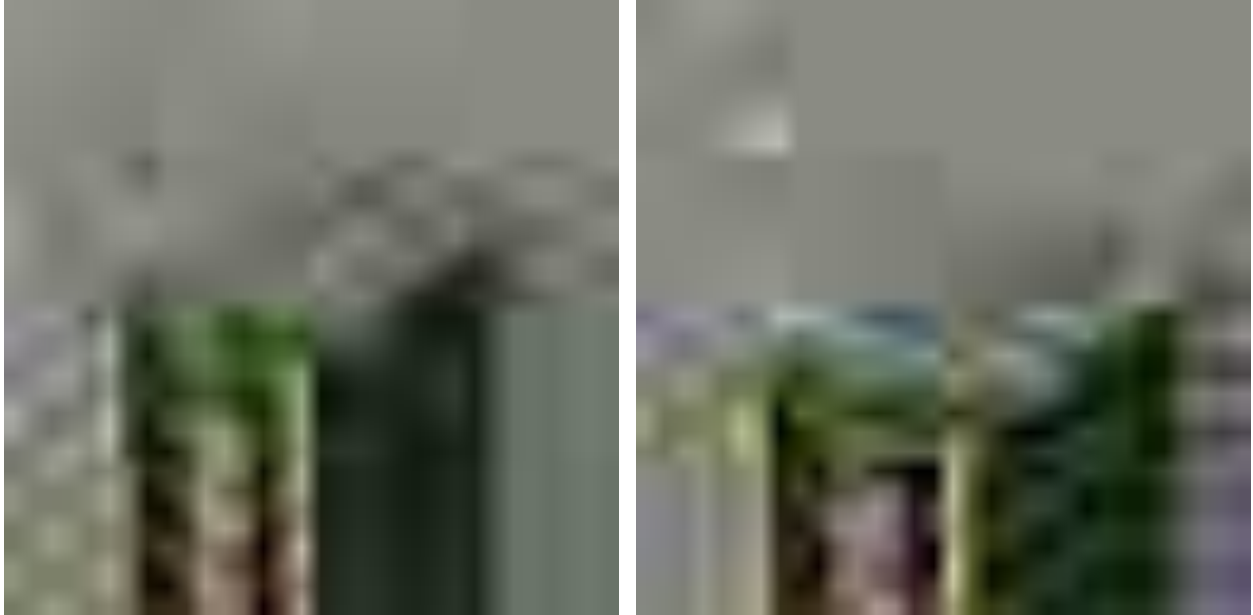
Next add the 20A BMS units, using the 3M Double sided adhesive which comes in the package.



When the BMS units are attached to the PCB, add the connectors with cables. The end of the cables will be soldered to the PCB.



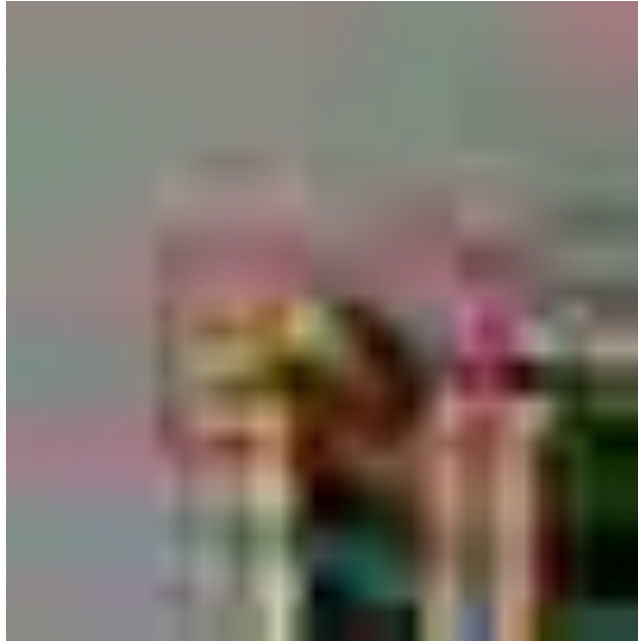
Next add the fuse sockets, and after this put the fuses in place.



Attach the IDC connector to the PCB.



Add the XT90 Pigtail connector.



After this we will add the L-Shapes to the entire pack, see the image bellow.



The next step is to add the screws so we can tighten the pack in place on the metal sheet which came with the enclosure box, as you will see later.



After this to secure the pack we will use Standoff Spacers M4 Male x M4 Female.



Repeat the last 3 steps to the bottom part, with the exception that to secure the pack we will use M4 Nuts.



After this continue with the other packs, until you have 20 of each.



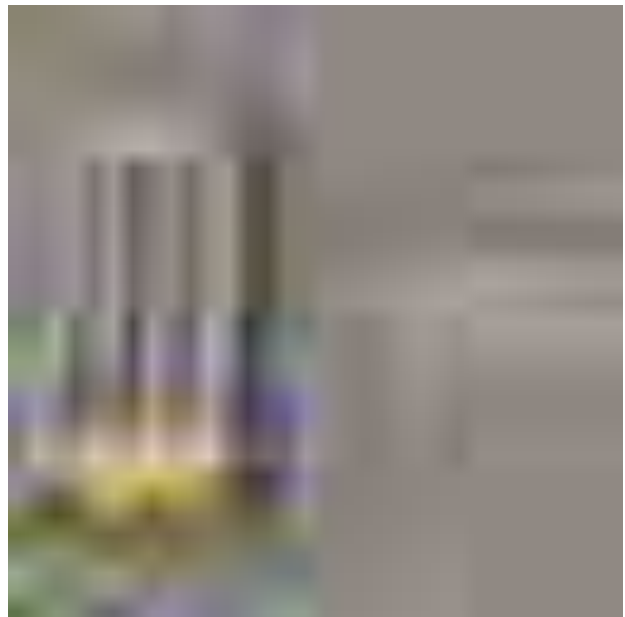
All the pack are attached to a metal sheet which comes with the enclosure box.



The metal sheet with the cell packs are inserted in the enclosure box and tighten in place with screws (which also comes with the enclosure box).



2. Each Part Added To The POWERLOCK-ENERGY-STORAGE







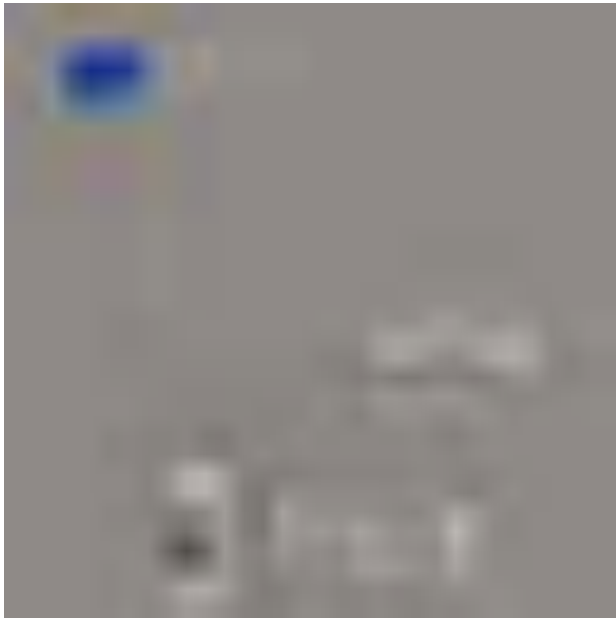


3. Cable Connections





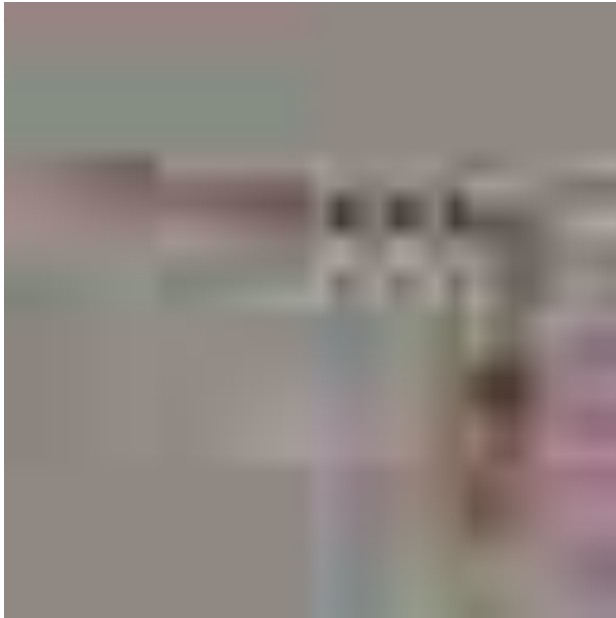












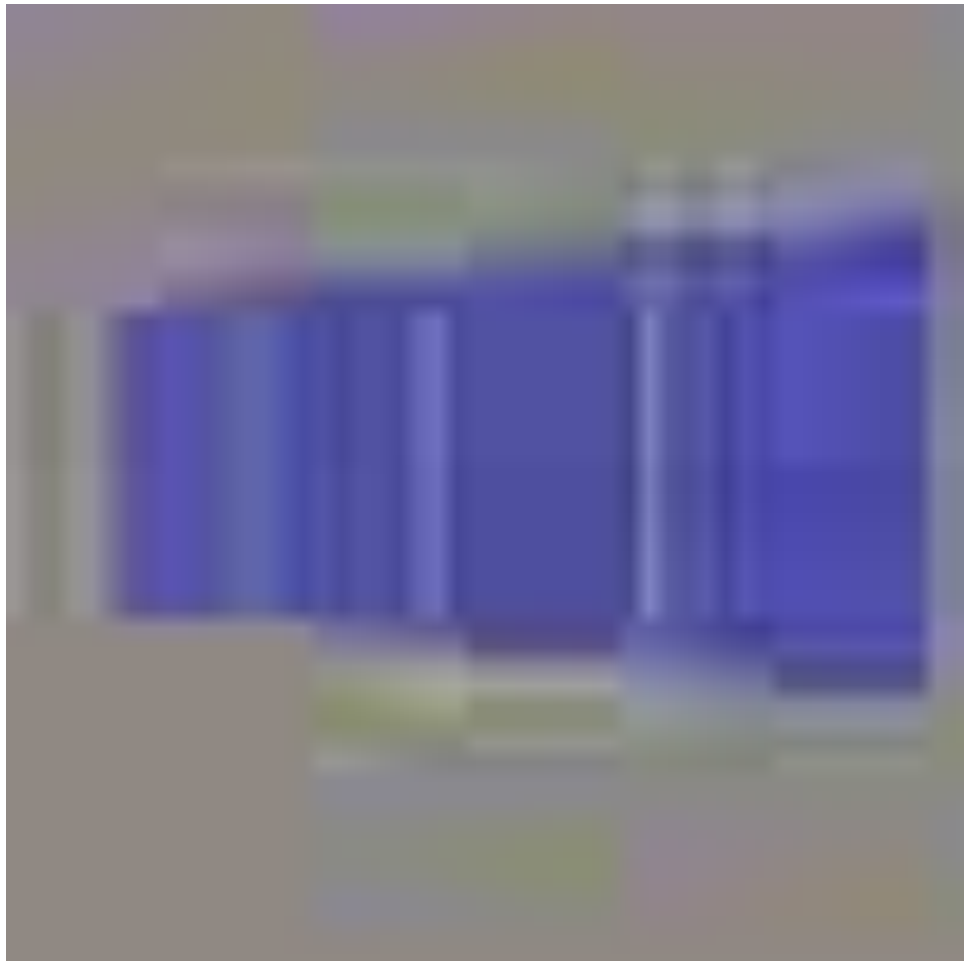










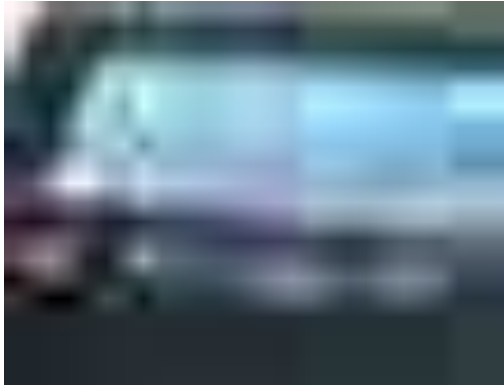




Sorting The Cells:

We have used 2 methods to sort the cells. Use the method that suits you best.

1. Using the Opus Charger:



Easy-to-read LCD with backlight display makes it show more clearly in the dark.

Refresh mode can show you batteries capacity, letting you know real magnitude.



Quick test mode to test to test the battery impedance

There are also charge/discharge modes



When the display is flashing it is possible to select mode and current.



Using the SLOT button it is possible to reselect a slot and change parameters for it, also when the charger is working.

When putting multiple batteries in the charger at the same time, it is possible to select mode and current simultaneous for all of them.

When charging or discharging it is possible to use the DISPLAY button to select between V, mA, and mAh.



The DISPLAY button can also be used when the charge/discharge is finished, but the charger will change back to FULL display rather quickly.

I use an excel spreadsheet to write the values of each cell to use later with an online calculator called repackr.com .

Type in the address bar of your browser repackr.com

After this insert the excel spreadsheet in the cells section on the page.



I am building a pack with 7 cells in series and 20 in parallel.

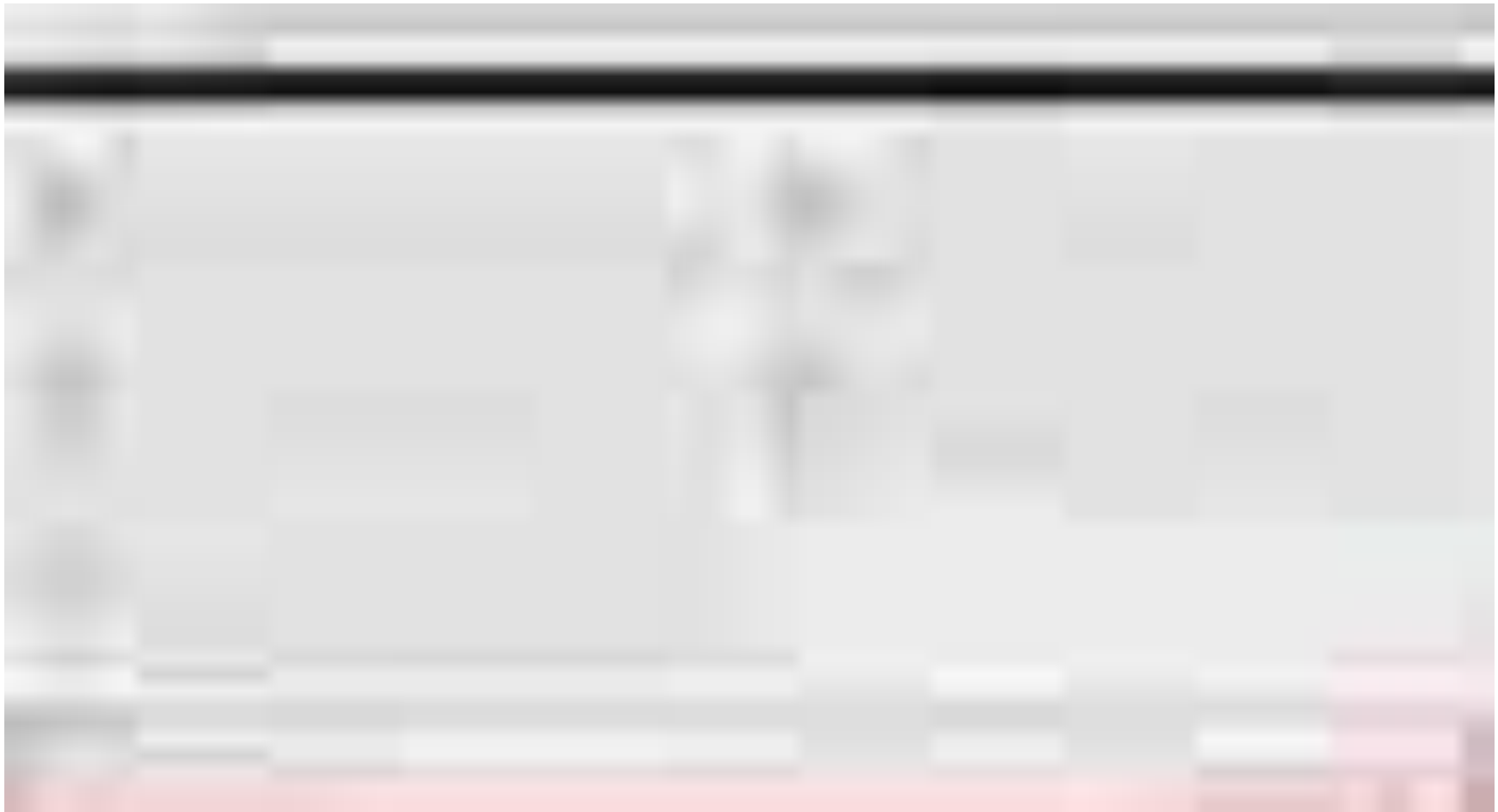


Before clicking on generate packs make sure you check the arrange cell in to packs so each have similar capacity and same number of cells in parallel.



After hitting "Generate Packs" it will calculate the modules which must be created.

I Copy and print the bottom values and arrange the cells as specified for each pack.



2. Using the MegaCell Charger

The MegaCell Charger, is a smart charger with 16 independent bays for 18650 Battery/Cells.

1. Warning:

This charger can only charge cylindrical lithium-ion batteries.

Please refer to the instructions carefully before use, do not charge cells that do not support at least 1 A charging current.

It's normal for cells to get warm during testing process. If they are hotter than 50 Degree Celsius, the testing process will automatically stop.

Unplug the power and remove the batteries when you stop using the charger.

Only indoor use.

2. Charger Interface:



3. Display Diagram:



4. Function and Reset Button:

Pressing shortly on the functions button will cycle display info for each cell.

Holding down the functions button for more than 2 seconds will cycle through the menu options:

1. Start mCap: Starts the Measure Capacity function
2. Stop mCap: Stops the Measure Capacity function
3. Start Charge: start charging the cells
4. Stop Charge: stop charging the cells
5. Start Discharge: start discharging the cells
6. Stop Discharge: stop discharge the cells
7. IP Information: Shows the charger IP from your network if device is connected
8. Self Test: Starts the self-test for debugging (make sure no cells are inserted in the charger)
9. Factory Reset: Deletes all the settings and returns to the default factory settings
10. Firmware V: Shows the firmware version currently installed
11. Store Charge: Starts the store charge
12. Stop Store Charge: Stops the store charge
13. Exit Push Menu

The reset button, restarts the charger operating system, measuring data is lost and process must restart.

5. Power Supply:



The MegaCell Charger requires a 5 volts power supply to be powered. For the current, we recommend at least 18 Amps. It is recommended using 4mm cross sectional copper wire for the connection between PSU and Megacellcharger.

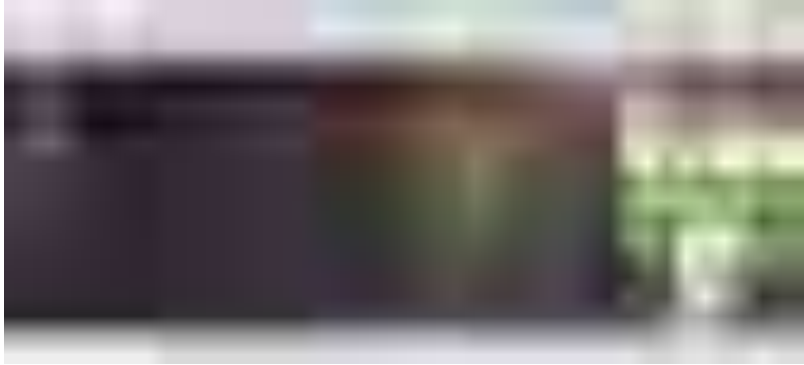
Please make sure that the power supply is providing 5V. MegaCell Charger requires the voltage to be always +5V, but not higher than

5,6V. after the cables are connected to the charger, you're ready to power your MegaCell Charger.



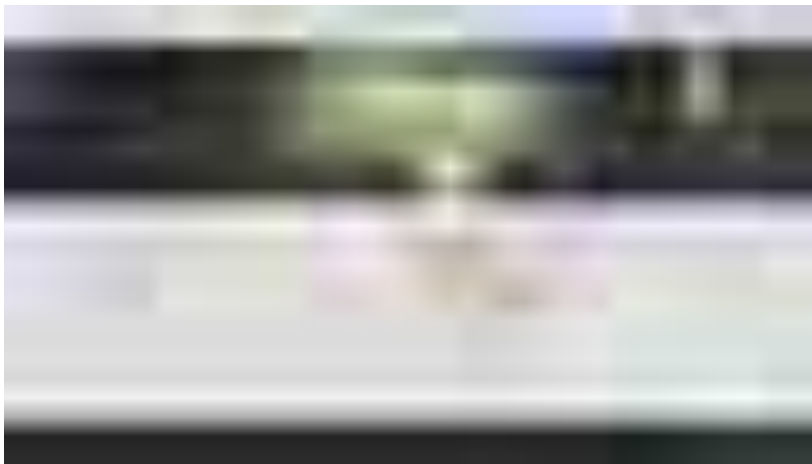
6. Installing the MegaCell Monitor Software on Your Laptop/PC:

Head to megacellmonitor.com. At the top of the page you will see tree tabs, go to the home tab

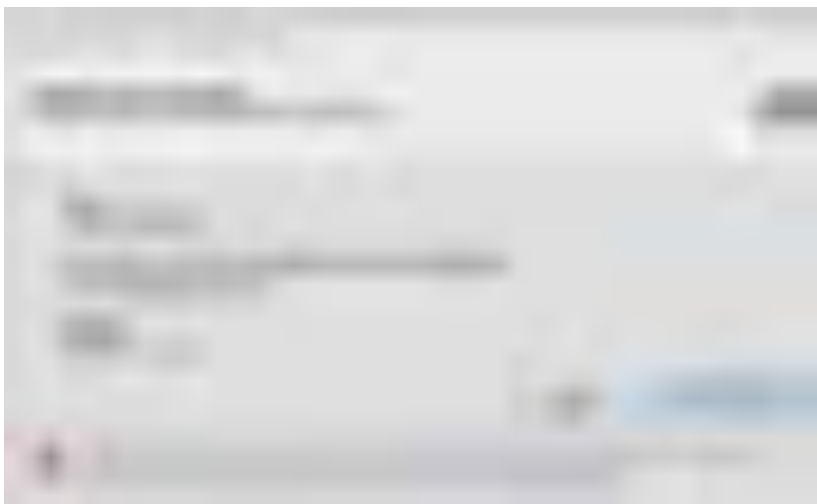


and from the sub tabs list click on downloads.

You will be directed to the next page. On this page click on DOWNLOAD MCM button, and you will be redirected to download the MegaCell Monitor Software.

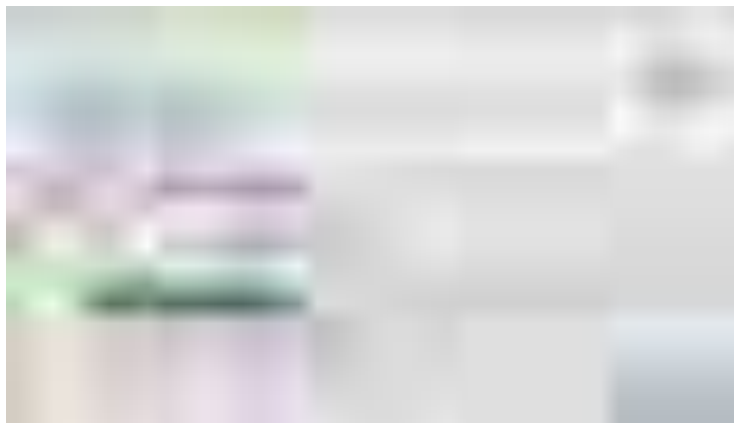


On this page click on the install button, and save the file to your Laptop/PC. Double click on it to install the software. The software will install automatically from our server.



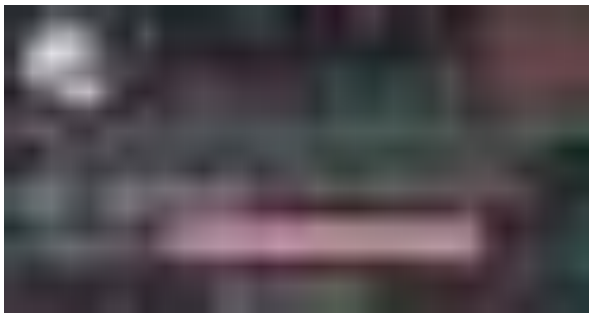


If you get the pop-up window from windows, click on more info and then click the Run anyway button.





The first launch of the software, will try to find if you have a license. If it doesn't detect any license, a pop-up window will appear to ask for an email address.



Type the email address you have purchased the charger, click on close and submit button and the license is automatically installed on your Laptop/PC at the next launch of the software.

7. Exploring the Simple Mode Interface of the Software:

The simple mode interface will give you a start on measuring your first cells.

The software has two operations mode: simple and advanced.

It defaults to the simple mode interface, to make the learning process more comfortable to help get you started fast on measuring cells.

Let's go through the buttons and see what each one does.

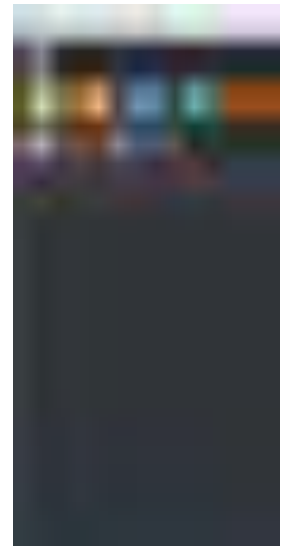
The green button is for charging the cells to the set voltage.



The orange button is for discharging the cells.



The blue button is for measuring the capacity.





The green button with a box icon will get the cells to the store voltage.



The red button will stop any operation.



The pink button will stop any operation.



The brown button will stop any operation.

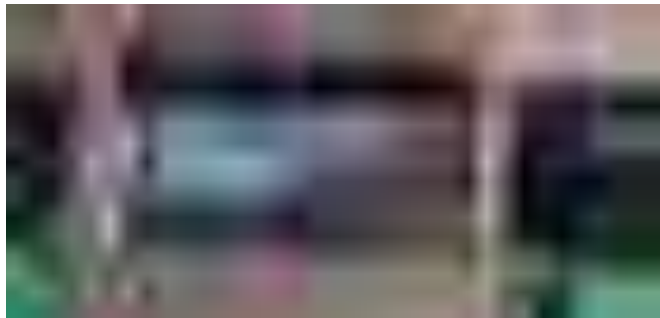


The purple button will stop any operation.



This button will stop any operation.

8. Add the Charger to Your WiFi Network, Using your Laptop/PC:

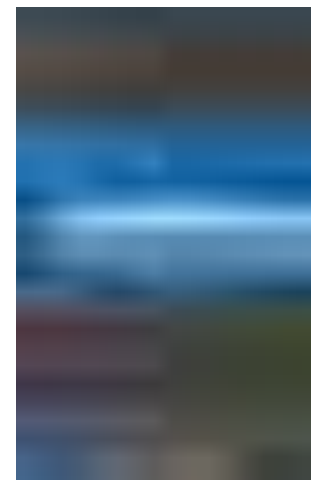


First connect with your laptop to the WiFi access point that MegaCell Charger creates when there's no WiFi Connection set, or if the old connection is not available.

You will see Start conf portal on the display. The access point name and the password is also shown on the display.

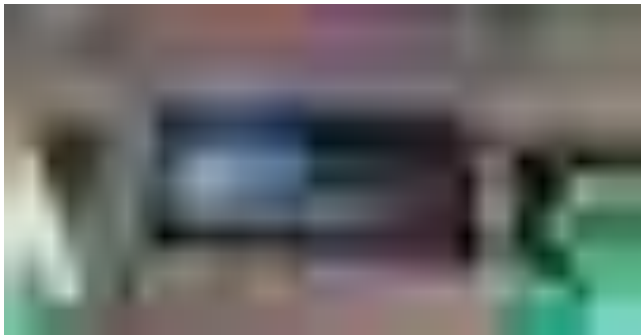


Select the access point name from your Laptop/PC WiFi search tab and enter the password.





After you have inserted the password shown on your MegaCell Charger you should be redirected to the WiFi configuration Page. If for some reason you don't get there, manually type the IP 192.168.4.1 into your browser to get to the WiFi manager Page.



Click on the Configure WiFi button, and after this click on scan to see the available networks.

Select the id, add the password and click the save button.

The charger is now connected to your WiFi network.

9. Add the Charger to Your WiFi Network, Using the WPS Method:



You can connect your device through your router using the WPS Method.

If there's no saved WiFi info, or the old connection is not available, the charger will try to connect first through WPS.

Most routers have a button, which will allow the charger to connect without having to type in the password. Keep that button pressed a few seconds, until the router enters in the WPS mode.



The connected message and the IP address should appear on the display in a few seconds after the WPS has been activated on your router, and the MegaCell Charger completed the connection.

10. Add a Charger and Set-Up:



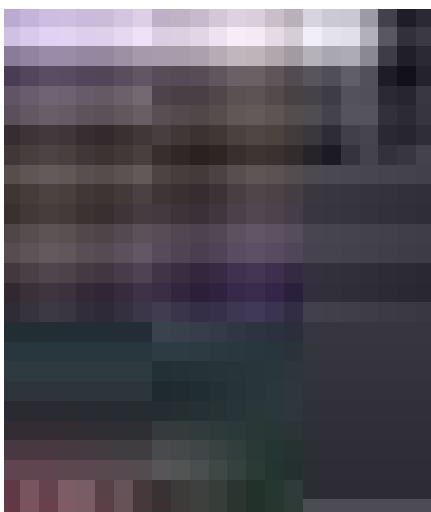
First connect your device to the laptop/PC.

The device and the laptop/pc must be connected to the same internet network.

In the software interface click on the gear icon, and on the McM configuration page select Charger settings tab.



Click on the scan button, and when the select to range scan window appears, select an ip range for the software to scan, and click on the scan button.



After the scan is complete select your device ip, click on add chargers button and your charger will be added inside the software.





Another method is to get the IP of your device and type it in the text field next to the add button.

If the IP is correct you should see the charger added in the list below, and the cells appearing in the main window.

Thanks to the DIY community for supporting this project!

For more information, please visit megacellcharger.com

All the best from the DeepCycle-Power Team.

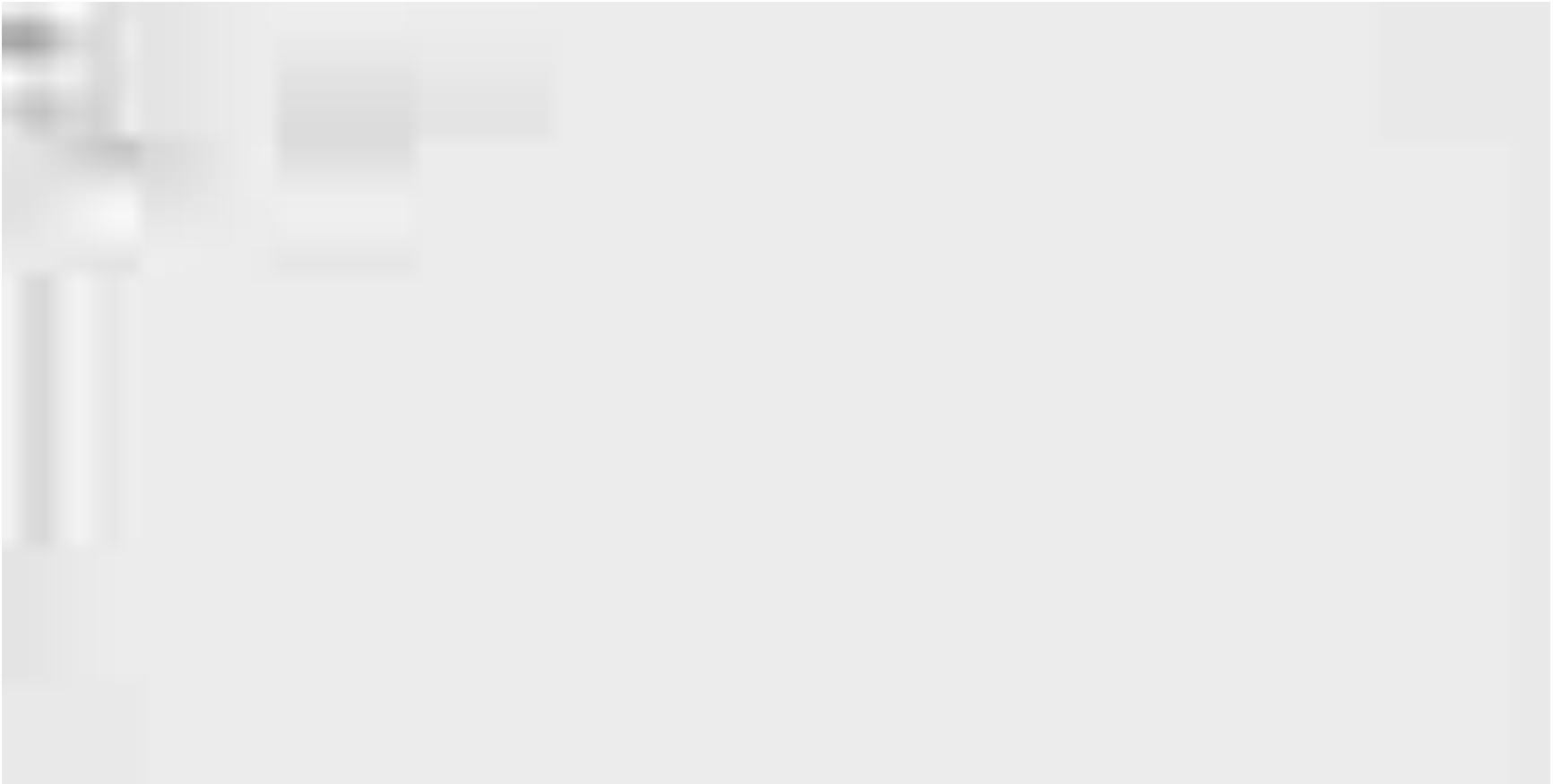
Setting-up the ESP:

To do that, connect the device to your computer with a micro USB cable, download the file called “ESP_Firmware.zip” on the download page and unzip it.

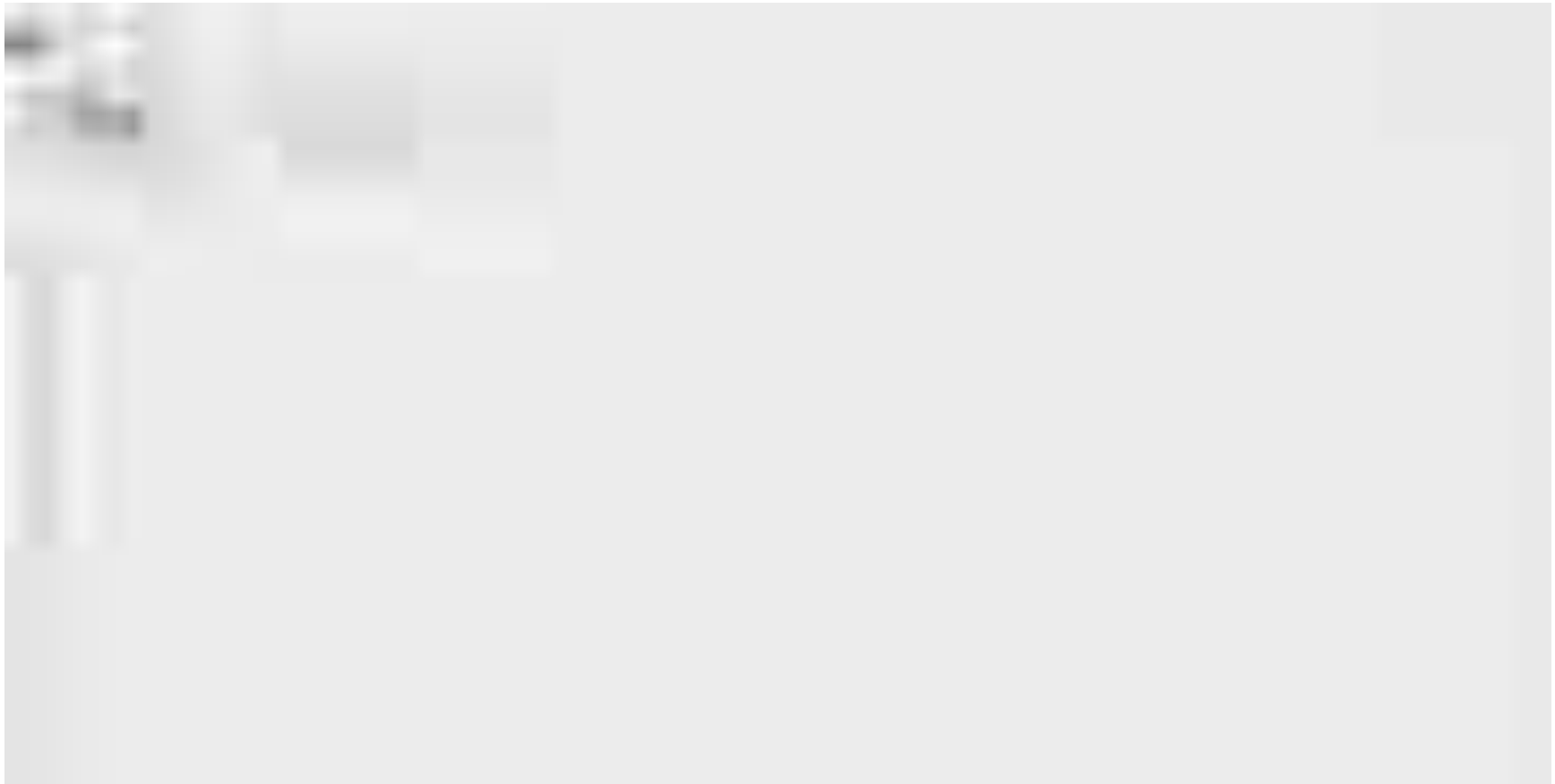


1. Flashing the firmware:

Inside you will see the files displayed in this video.

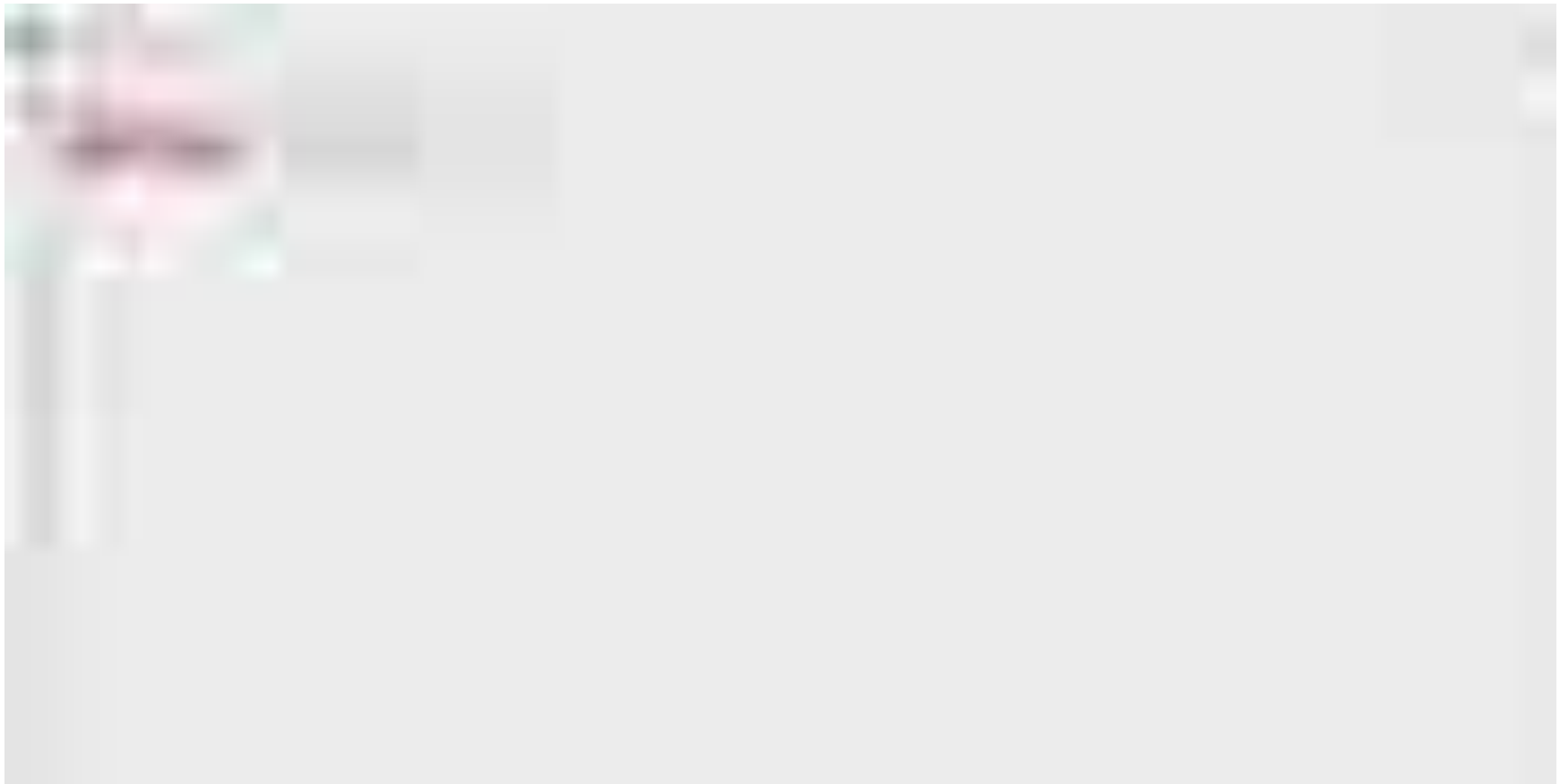


This process can be done on a windows machine. In order to connect to the ESP, you must have this driver installed, double click on CH341SER file and follow the installation steps.





After the driver is installed, double click on “NodeMCU-PyFlasher-4.0-x64” to launch the application that’s going to write the code to the ESP.



After the window opens, click on browse and navigate to the folder location where you have the file called Powerwall.bin.





If no device is connected, click on the refresh button then select the COM port that's available for communication with the ESP device.





Once everything is set, click on the button called “Flash NodeMCU”. The code is now written on the device. You can unplug and plug the USB cable so the device is reset. After a few seconds, you should be able to login to the device.



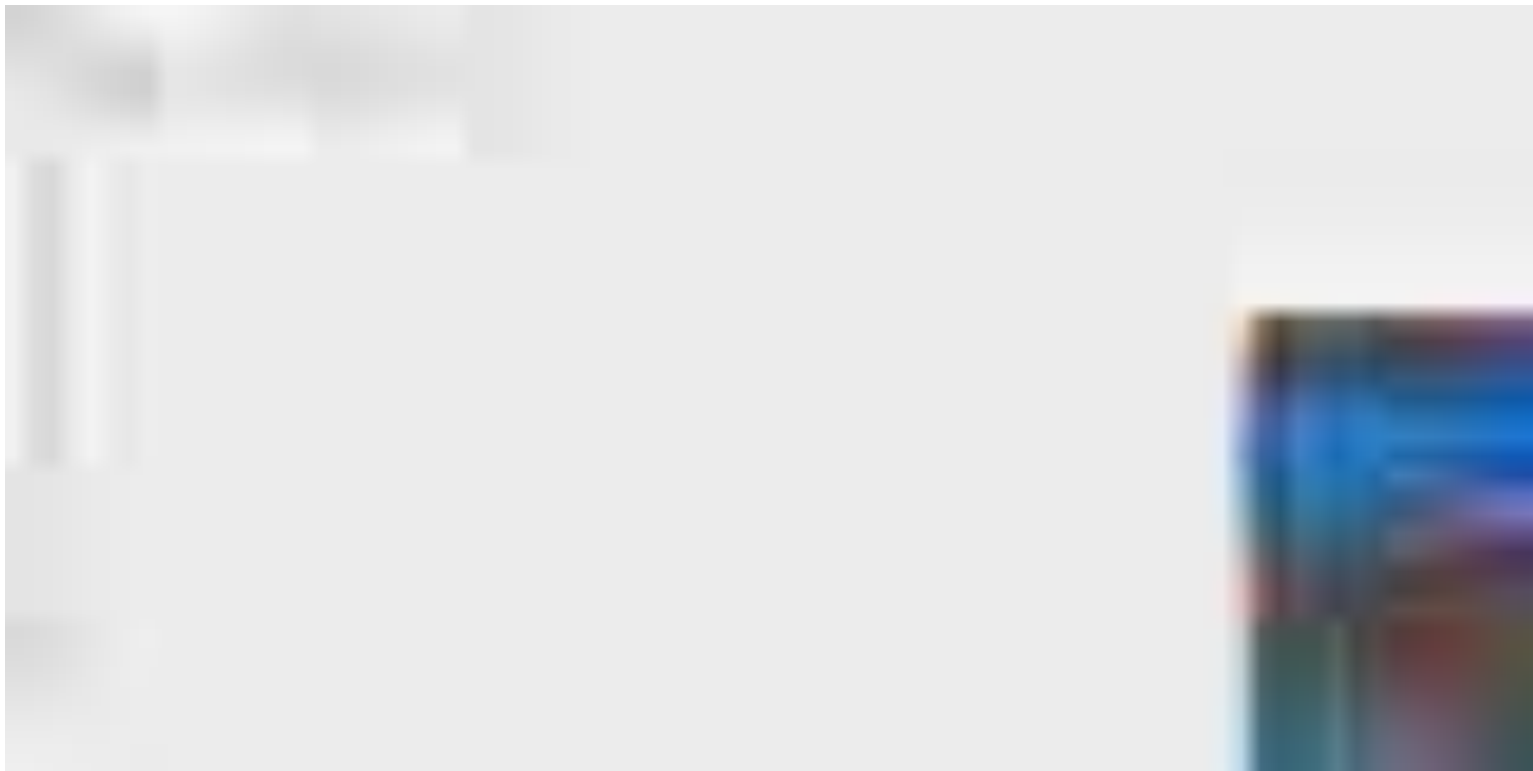


2. Wi-Fi set-up:

In order to access the device in your network, you must connect to it and set the WiFi credentials from your router.

You can perform this step on a phone or laptop with wireless access.

Go to WiFi Connections and look for PowerWall_AP and choose to connect to it. Usually you will get redirected to a configuration page after it's connected. If that's not happening, open an internet browser and type this address: <http://192.168.4.1>.





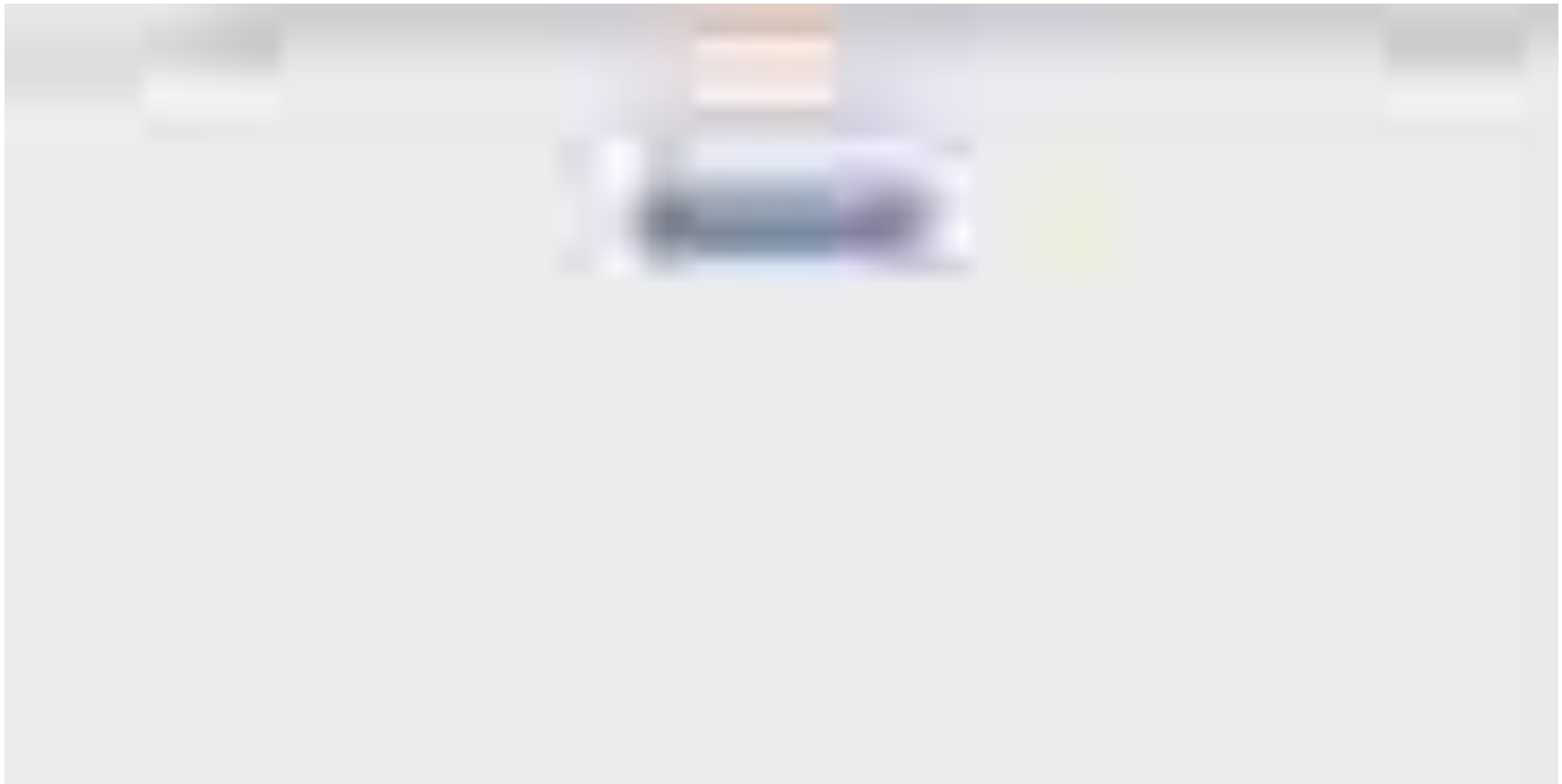
On the configuration page choose the "Configure WiFi" option.



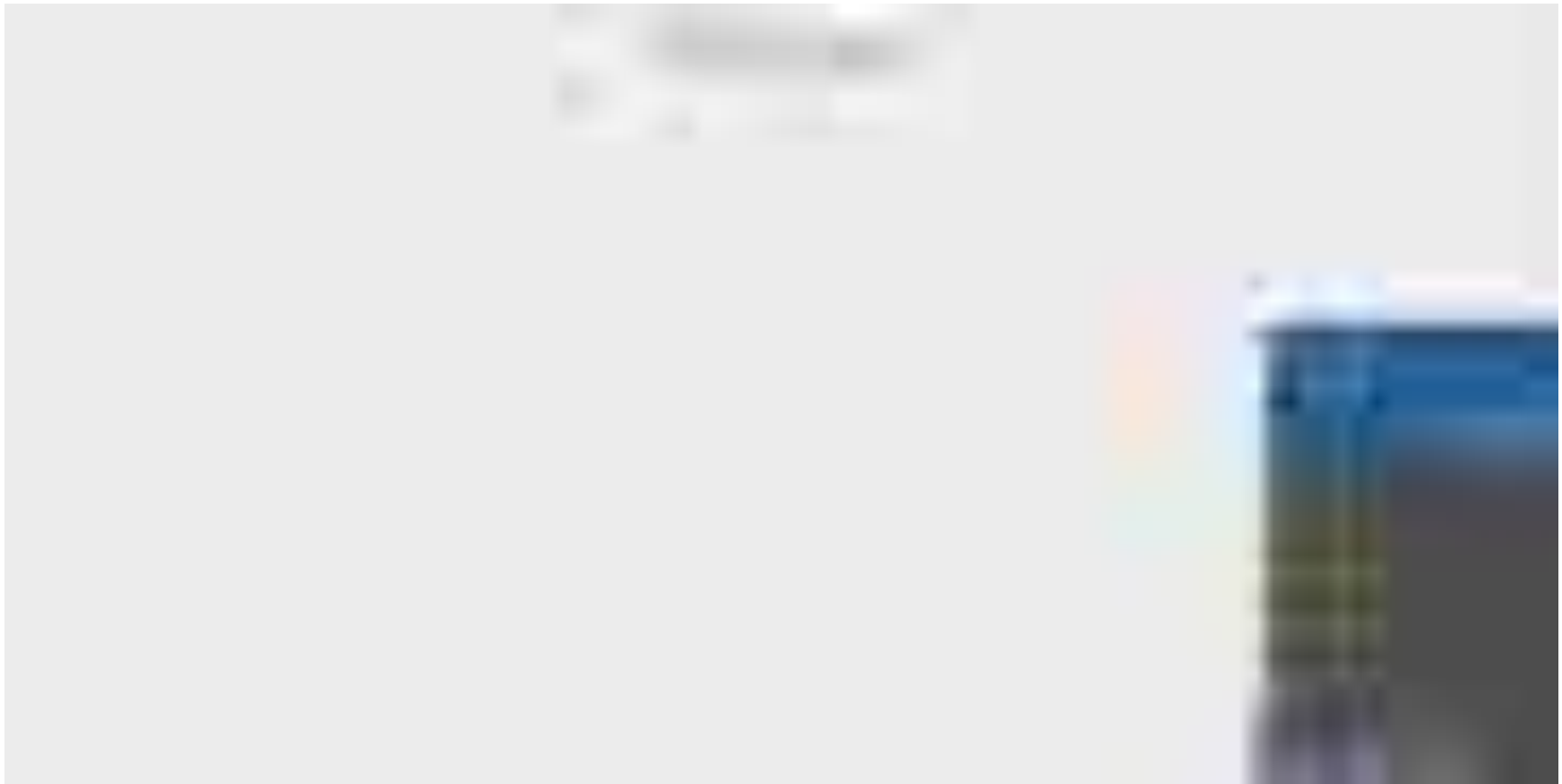
On that page, you will see the available routers to connect to. Choose the System ID of your router by clicking on it, then input your wireless password. Mine is named ASUS.



Click Save and the device will reboot and connect to your local network so you can access it from a phone or computer easily.



Turn WiFi off and on, connect to your main network and now you can access the IP which has been assigned automatically by your router to get the options for the powerwall.









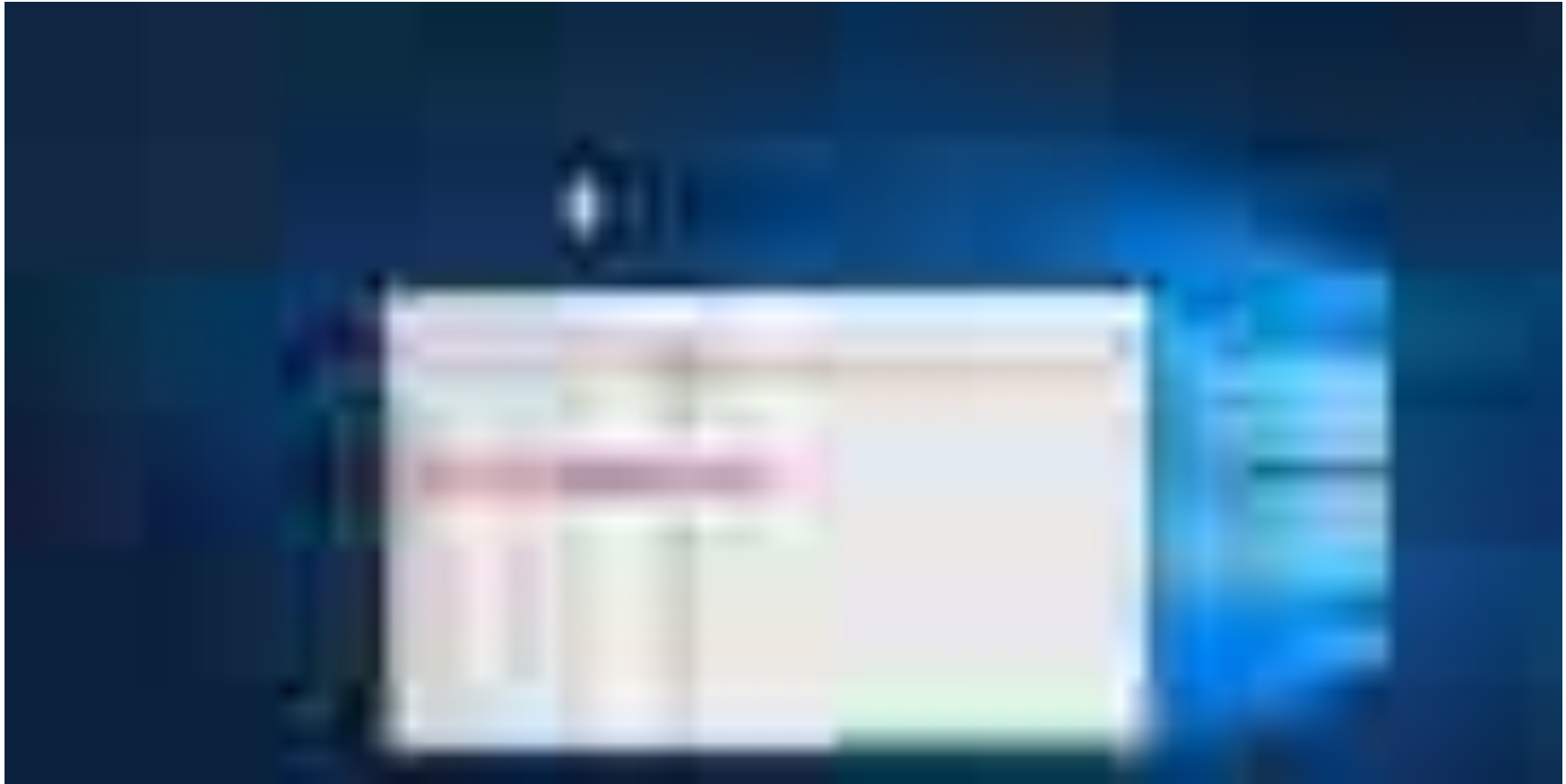


3. Scan for IP:

To get the IP address you can either connect to your router or check IP's of all connected devices, or you use a network scanning software that's going to list all the devices from your network.









I know that it might look overwhelming for some users, but if you pay attention and follow the video step-by-step, you should not have any problems setting this up. The nice thing is that you set it once and forget about it.

Once the brain of the unit is programmed, I place it inside the circuit that I built.