Solar Power Extender Kit

February 2017

SwitchDoc Labs

What is in the Solar Power Extender Kit?

The Solar Power Extender Kit for the OurWeather Weather Kit has a total of eight types of parts.

- Grove SunAirPlus (contains I2C sensing for reading Solar Power, Battery Power and Output Power)
- Solar Panel 330mA (3)
- JST-PH Extender for Solar Panel JST-PH 2 Plug
- USB PowerControl V2
- USB cable - A/MicroB
- Multi Solar Panel Connector Board (no soldering needed!)
- F/F Multiple Solar Connector Board to SunAirPlus Solar Connection
- One Female to Female Jumper Wire

This assembly manual assumes that you have built and tested your OurWeather kit. If you have not done that, go back and assemble and test your OurWeather kit.

How does this Kit work?

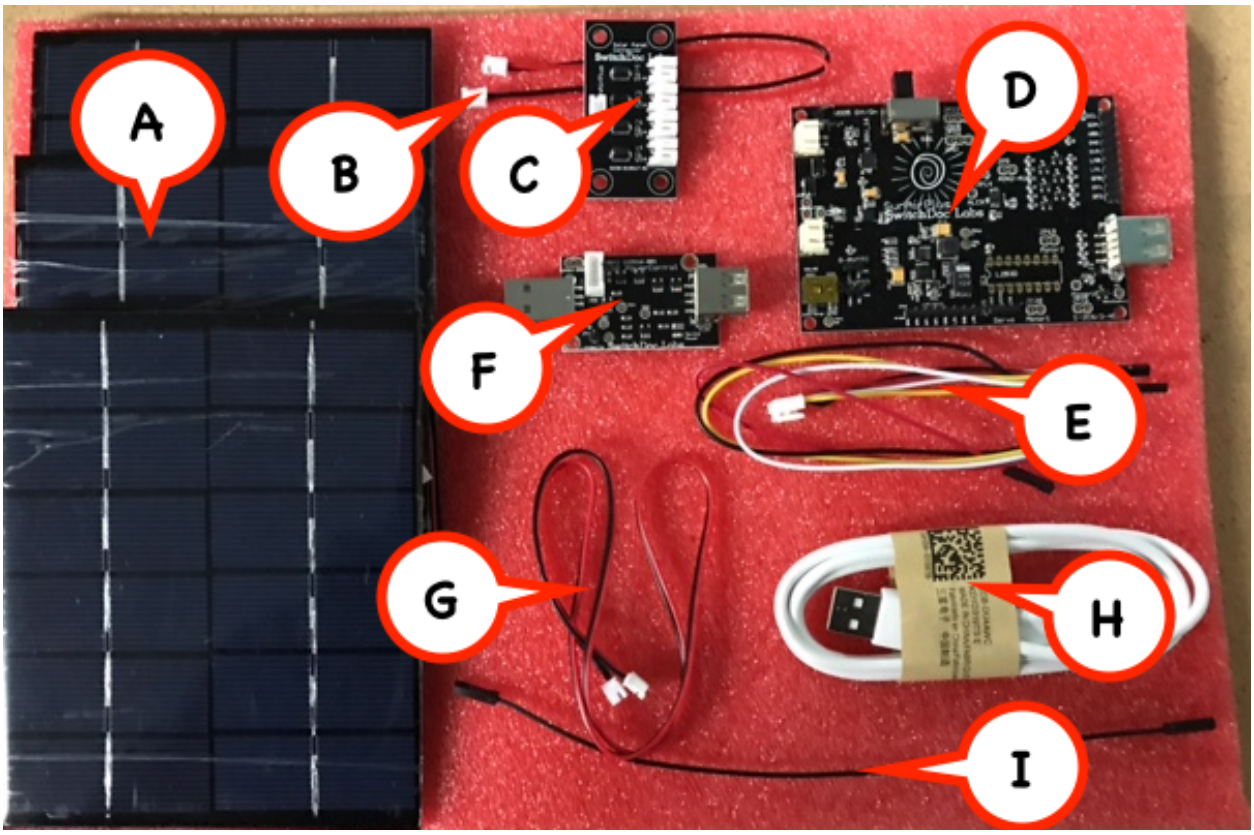
The key part to this kit is the SunAirPlus solar charger and data gathering board. The solar panels are connected to the SunAirPlus smart charging system and the circuitry on board takes the power from the panels and appropriately charges the battery. The Voltage boosting section of the board provides a steady 5V power supply from the 3.7V LiPo batter and supplies it to the OurWeather board.

When the LiPo battery levels get too low, the SunAirPlus board signals the USB PowerControl board to shut off the power to OurWeather until the solar system has recharged the battery sufficiently. Using hysteresis, this keeps the OurWeather system from turning on and off repeatedly until the battery can support a longer period of operating.

SunAirPlus also supplies information to OurWeather about the solar charging system that can be studied to understand the solar power system.

NOTE: This kit does not include a LiPo battery. Many sizes are available on adafruit.com with the JST-PH2 connectors, such as: https://www.adafruit.com/products/2011

Inventory of the Kit



Part A - 3 (three) 330mA 6V Solar Panels (with JST-PH 2 Plugs soldered on back)

Part B - Female to Female JST-PH 2 cable for connection from Multi Solar Panel Connector board to SunAirPlus

Part C - Multi Solar Panel Connector Board

Part D - SunAirPlus Solar Panel Charger

Part E - Female Pin Header to Grove Conversion Cable

Part F - USB PowerControl

Part G - JST-PH 2 Extender Plug (lengthens Part B)

Part H - USB A/Micro B cable for SunAIrPlus to OurWeather

Part I - Female to Female Header Jumper Cable

NOTE: This kit does not include a LiPo battery. Many sizes are available on adafruit.com with the JST-PH2 connectors, such as: https://www.adafruit.com/products/2011

Step by Step Assembly

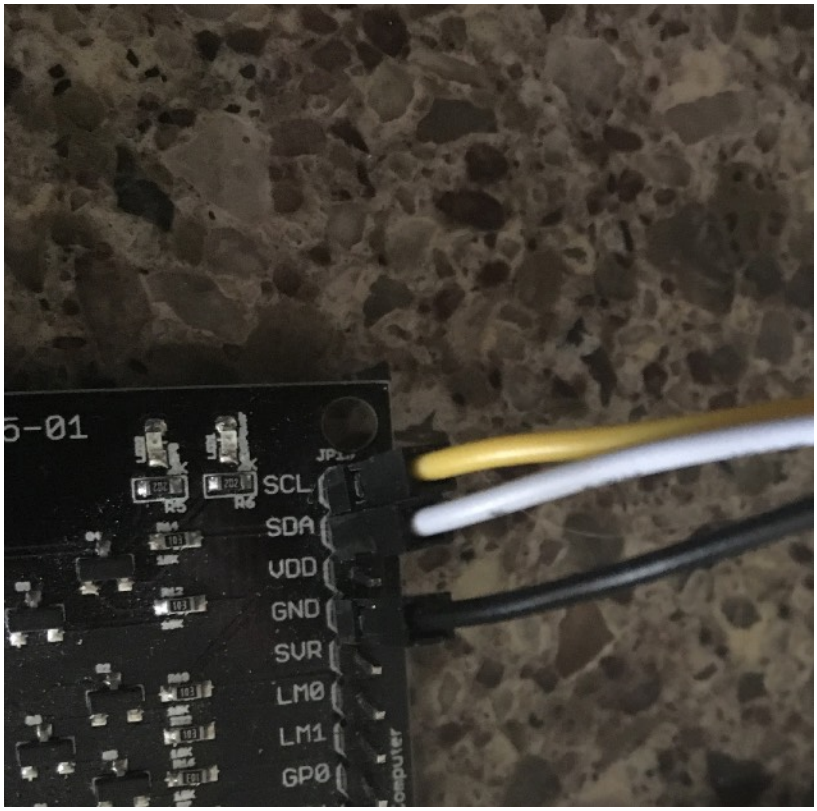
Step 1 - Unplug all power to your OurWeather Weather Kit

Step 2 - Connect the Female Pin Header to Grove Conversion Cable (Part E) into the correct pins on the SunAIrPlus board (Part D). Note: You may damage your OurWeather Kit and / or the SunAirPlus board if you do this incorrectly. Please be very careful and check your work.

You connect it in this manner:

Pin 1 - Yellow - SCL
Pin 2 - White - SDA
RED (DO NOT CONNECT!)
Pin 4 - Black - GND

Before moving on to Step 3, check this again. Make sure you have the header plugs on the correct pins.



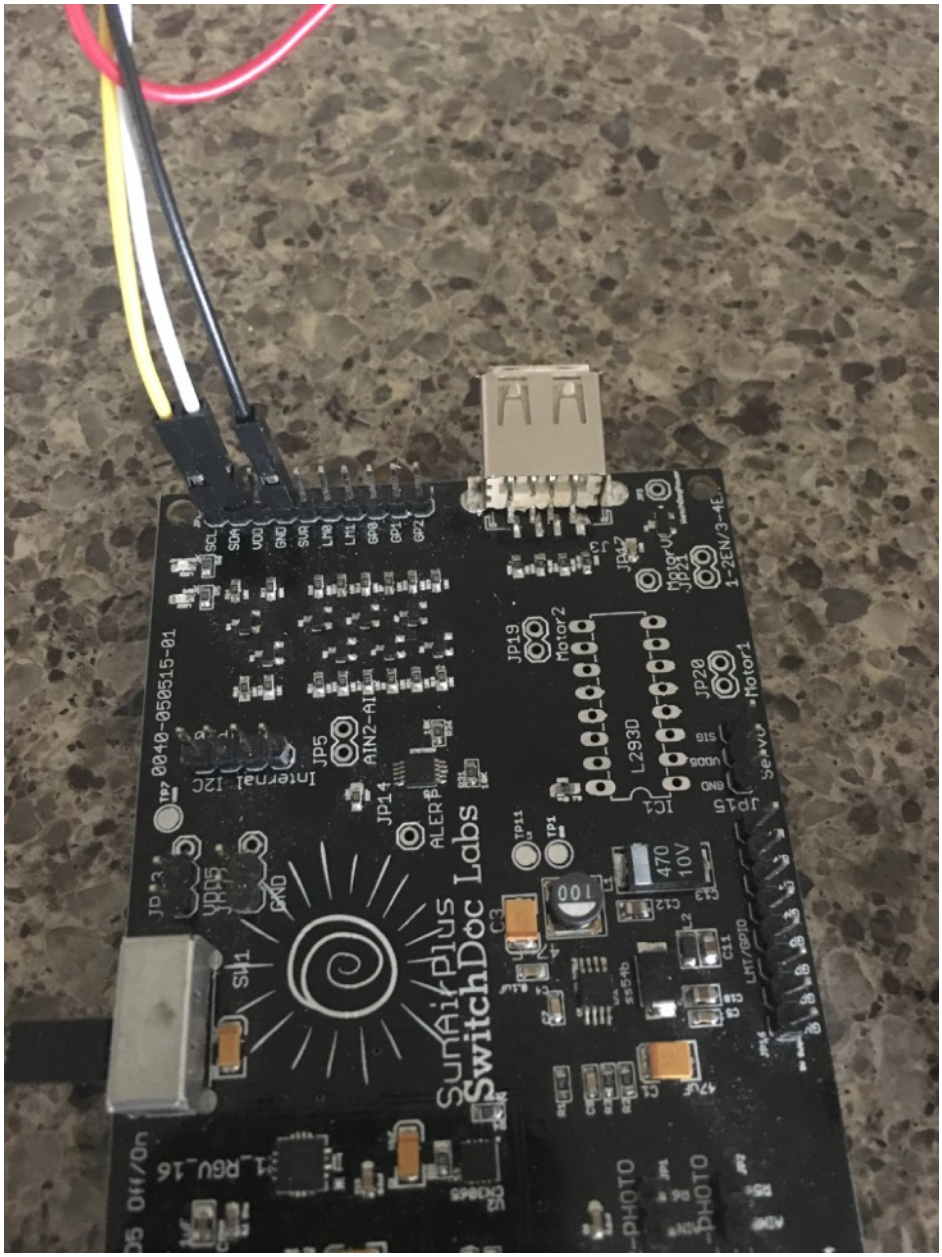

SCL
SDA
VDD
GND
SDR
LYR
LYL
GP0
GP1
GP2
0040-050515-01
Internal I2C
JP5
AIN2-AI
JP14
ALERT
JP19
Motor2
JP20
Motor1
L293D
IC1
JP15
Servo
SIG
VDD
GND
TP11
TP1
470
10V
100
C3
C12
C11
SW1
GND
VBUS
SunAir Plus
SwitchDoc Labs
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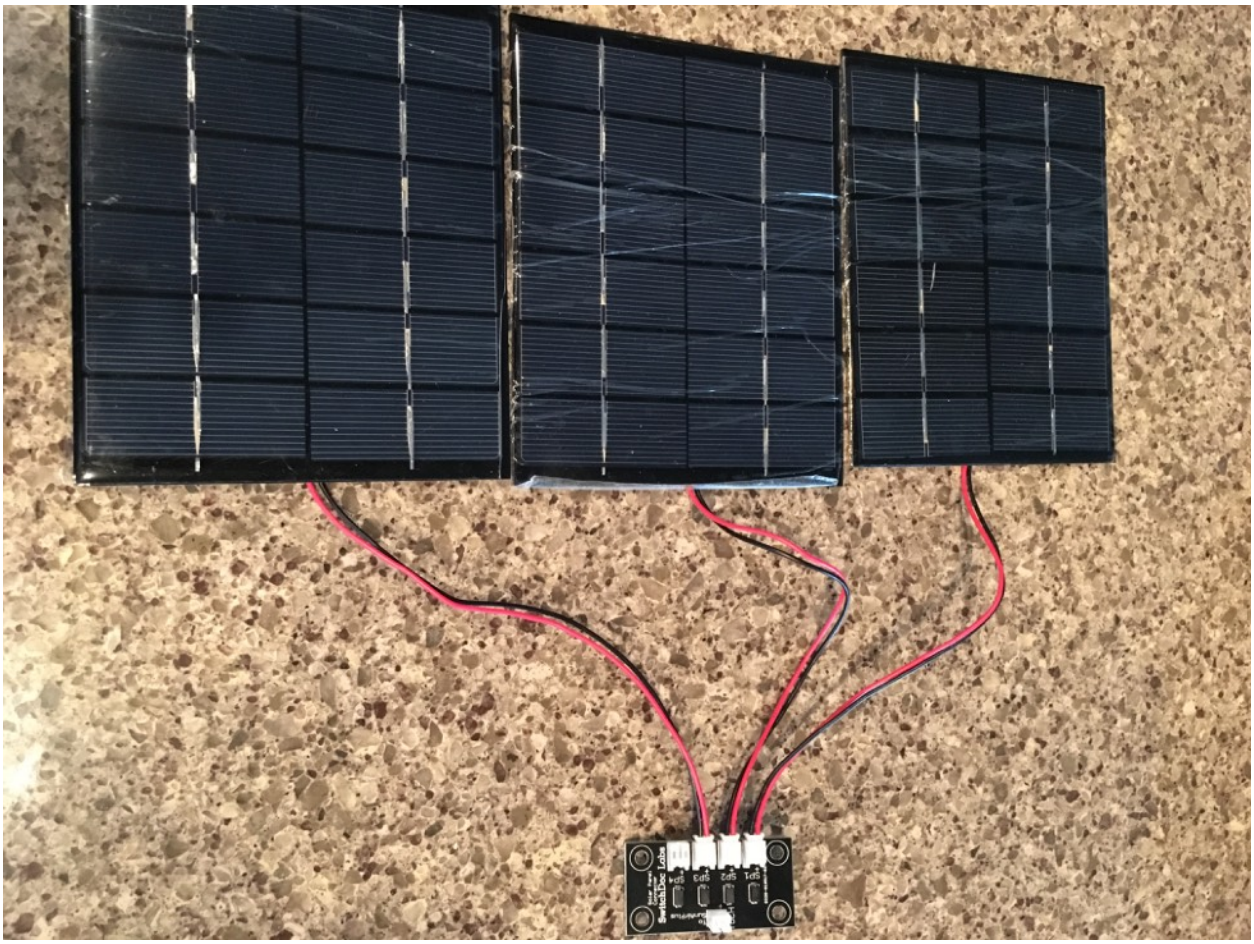
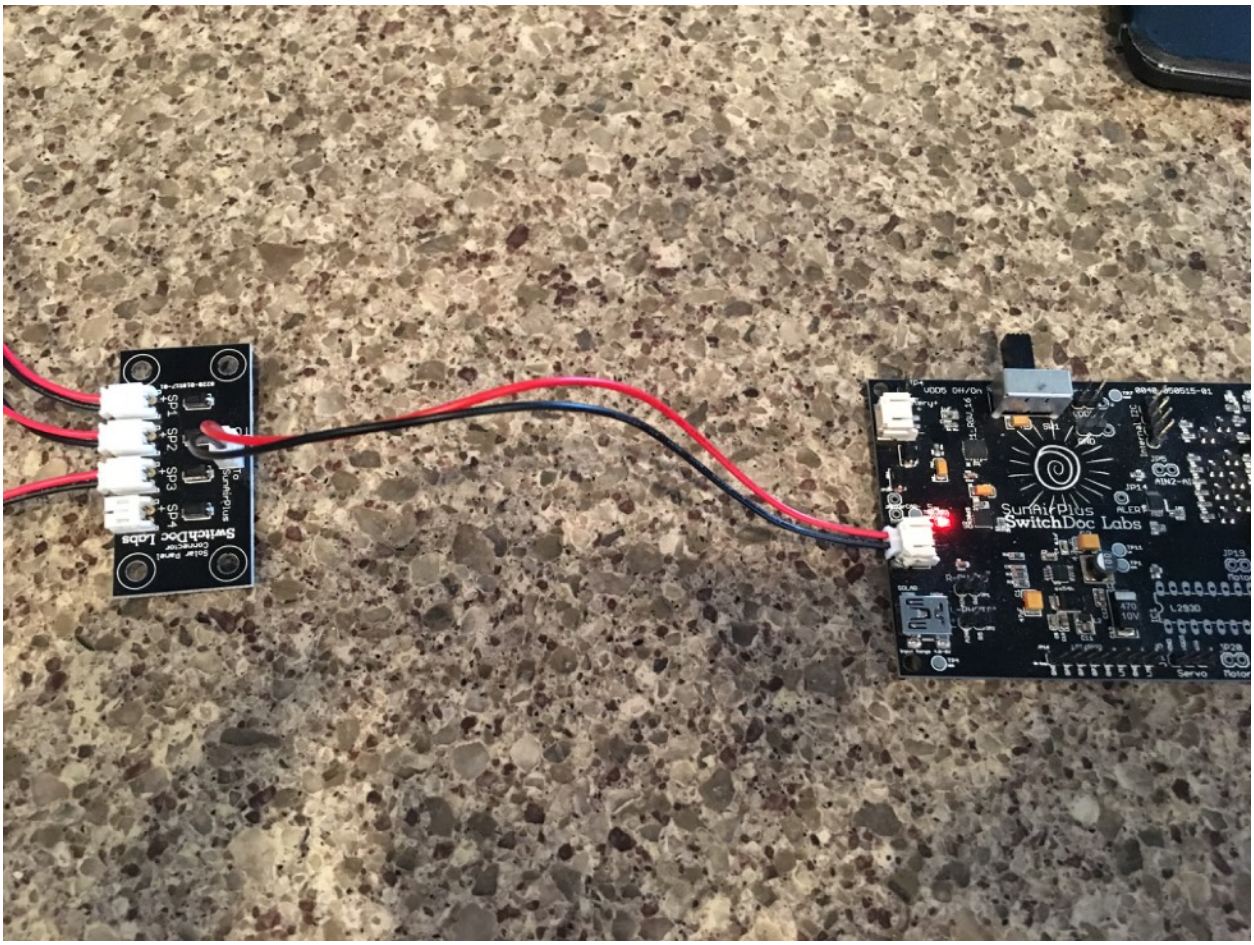
PHOTO

Step 3) Take the Multi Solar Panel Connector Board (Part C) and Plug in the F/F JST-PH2 (Part B) into the single connector (Labled TOCH and To SunAIrPlus) on the left side of the Multi Solar Panel Connector Board (Part C).

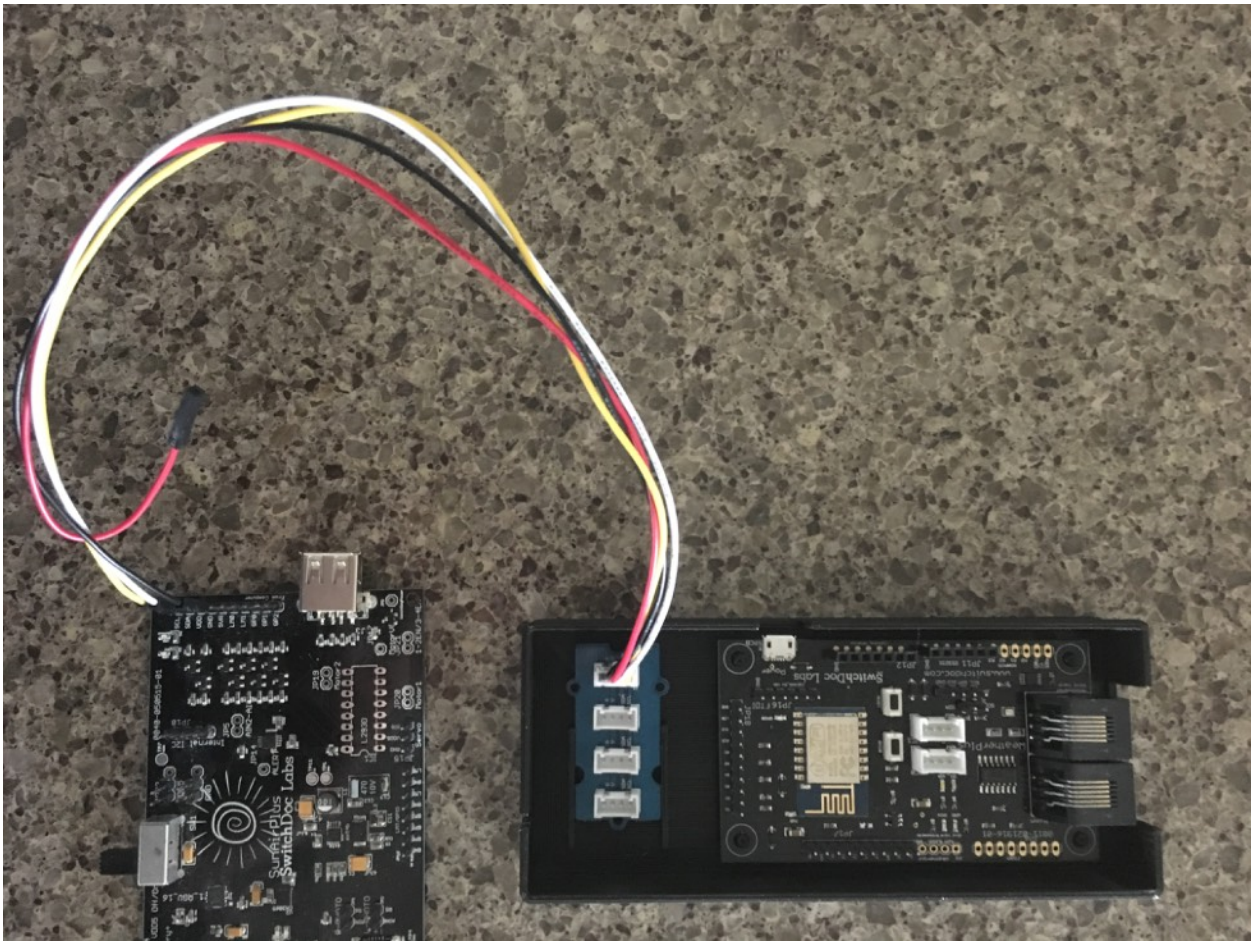
Step 4) Take the JST-PH2 female connectors on each of the three solar panels (Part A) and plug them into the SP1, SP2 and SP3 connectors on the Multi Solar Panel Connector Board (Part C). You can remove the plastic wrap on top of the solar panels at this point also.



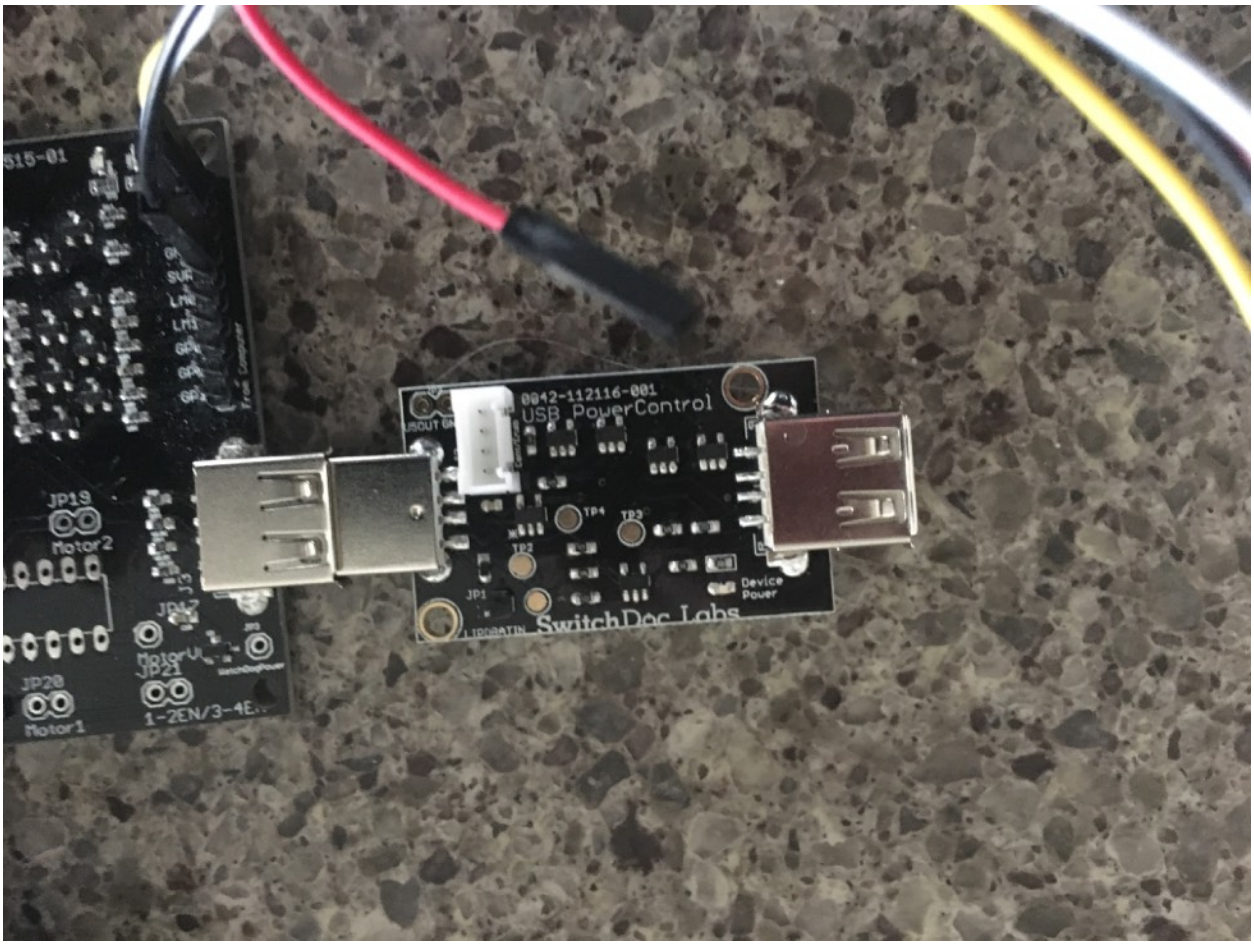
Step 5) Take end the F/F JSTPH-2 cable (Part B) not plugged into the Multi Solar Panel Connector Board (Part C) and plug it into the Solar Panel input on the SunAirPlus board (Part D). If you are in bright lights, you may see a red LED light up on the SunAirPlus board.



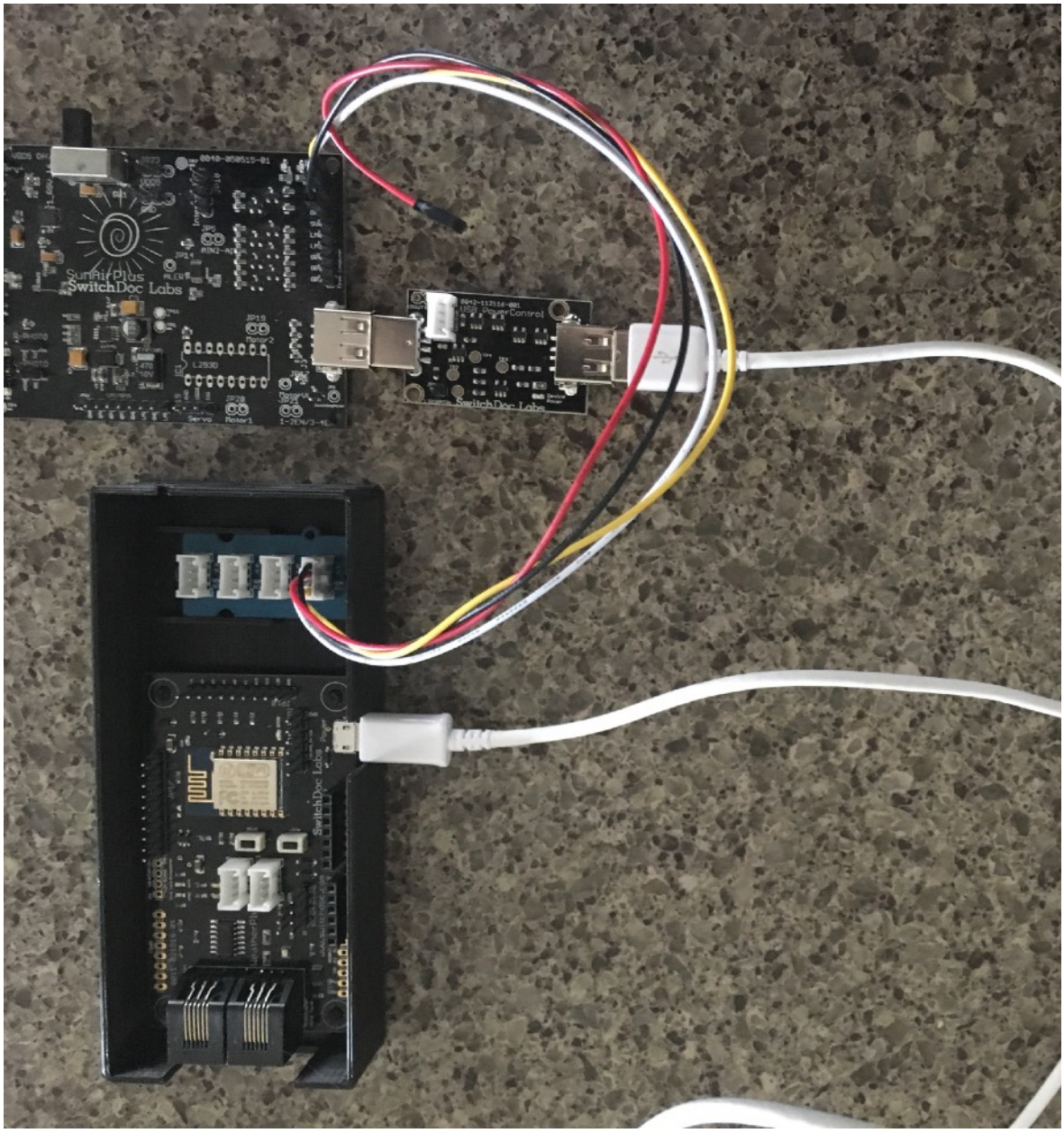
Step 6) Plug the Grove Cable (Part E) that you connected to SunAirPlus (Part D) in Step 2) into one of the Grove Connectors in OurWeather on the I2C Expansion Board. Check again to see that you did Step 2 correctly.



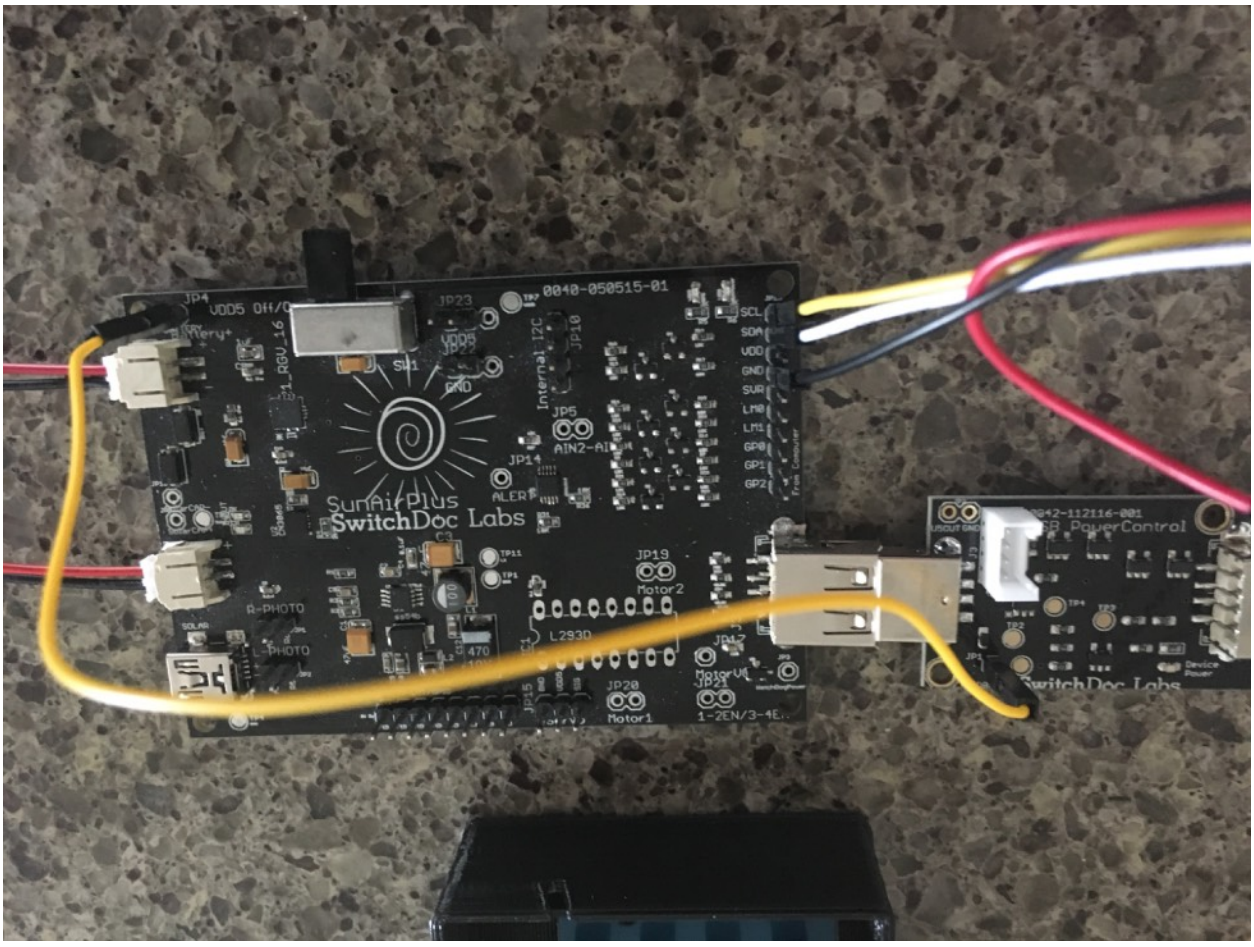
Step 7) Plug the USB PowerControl Board (Part F) into the USB A size Connector on SunAirPlus (Part D)



Step 8) Plug the USB Cable into the end of the USB PowerControl (Part F) and then into the MicroB plug on OurWeather. Note some wires are removed on the OurWeather station for clarity.



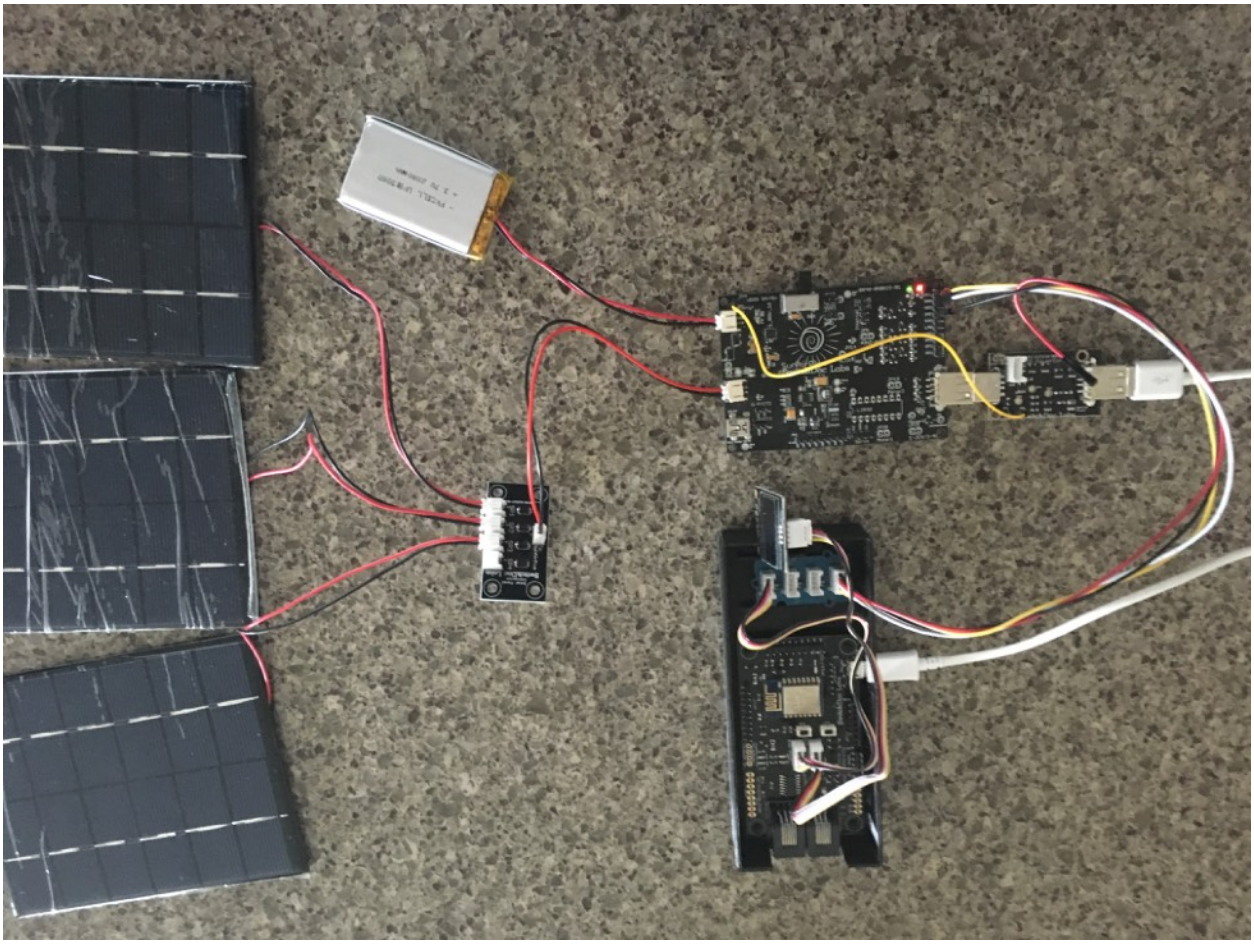
Step 9) Plug one end of the F/F Header Jumper wire (Part I) into the JP4 Single Pin header on SunAirPlus (Part D) and the other end into LIPOBATIN (JP5) on the USB PowerControl Board (Part F).



Step 10) Plug in your 3.7V LiPo (Lithium Poly) battery (NOT INCLUDED) into the BatteryJSTPH-2 Plug on SunAirPlus (Part D). Flip the SunAirPlus Power switch to the right as shown in the picture. If your LiPo battery is charged, the OurWeather should come on (the blue light will turn on on the USB PowerControl Board (Part F)). If it does not come on, then your LiPo battery is not charged enough to run OurWeather.

If it is not charged, then you can do one of two things. 1 - Put the Solar Panels in the Sun and let the sun charge your battery or 2 - If you have a 5V USB Mini-b power supply, you can plug into into the Mini-b connector below the Solar JSTPH-2 plug on SunAirPlus to charge the battery (and run OurWeather at the same time).

This completes the assembly of the OurWeather Solar Power Extender Kit.



Testing the OurWeather Solar Power Extender Kit

The above assembly manual assumes that you have built and tested your OurWeather kit.

To test, complete all the assembly tests of your OurWeather kit, make sure that you have updated your OurWeather to the latest firmware (see OurWeather manual on how to do this) and get your OurWeather connected to your WiFi.

Finally, plug the USB Cable from the Solar Extender Kit to your OurWeather board. Note: See comments in step 10) above about how to charge your LiPo battery so OurWeather will work.

Once you get OurWeather connected to the Solar Panel Extender Kit, watch the OLED as OurWeather Boots up. After the weather information display, you should see something like the following picture.

You can also try this:

http://<your OurWeather ip number>/FullDataString

On our OurWeather test system system it is (yours will be different):

http://192.168.1.101/FullDataString

This will give you the full data string from the OurWeather REST Interface. Look in the OurWeather Advanced Usage Manual for the format of this string.

Experiment! Move it out into the sun and watch the values change!

Final Thoughts and Comments

This Solar Power Extender kit makes it much easier to deploy OurWeather outside. Depending on your local weather conditions and sun cover, you will find that OurWeather will run most of the time on Solar Power. When you have a long string of clouds, the system will shut down. But as soon as it is sufficiently charged (which may take a good day of sun!), it will turn on again (that's what the USB PowerControl is doing in the kit).

If you want to learn more about Solar Power and how it works, use the REST interface to see what power the sun is generating for your OurWeather kit.