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Adafruit PowerBoost 500 Shield

Created by lady ada

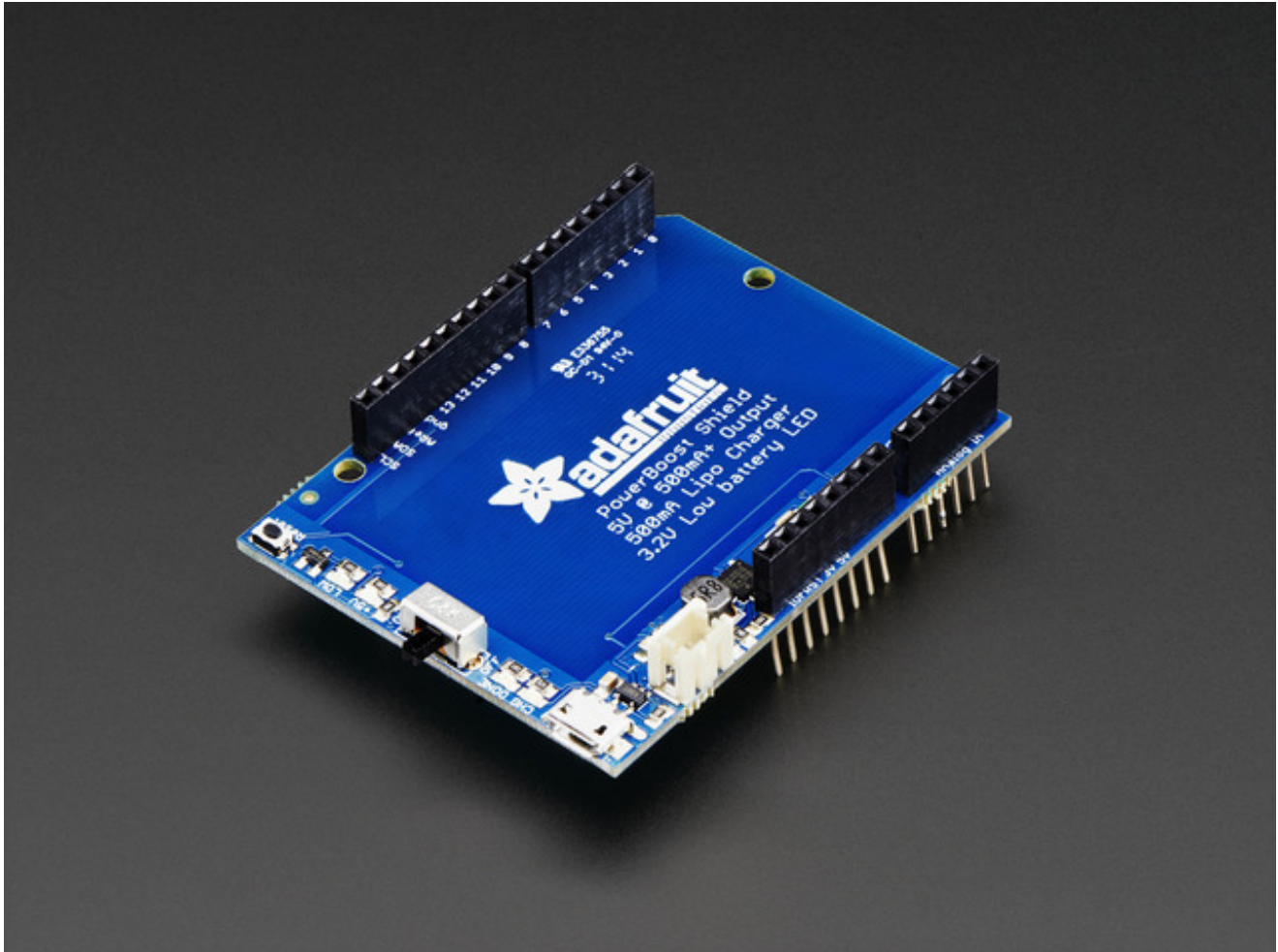


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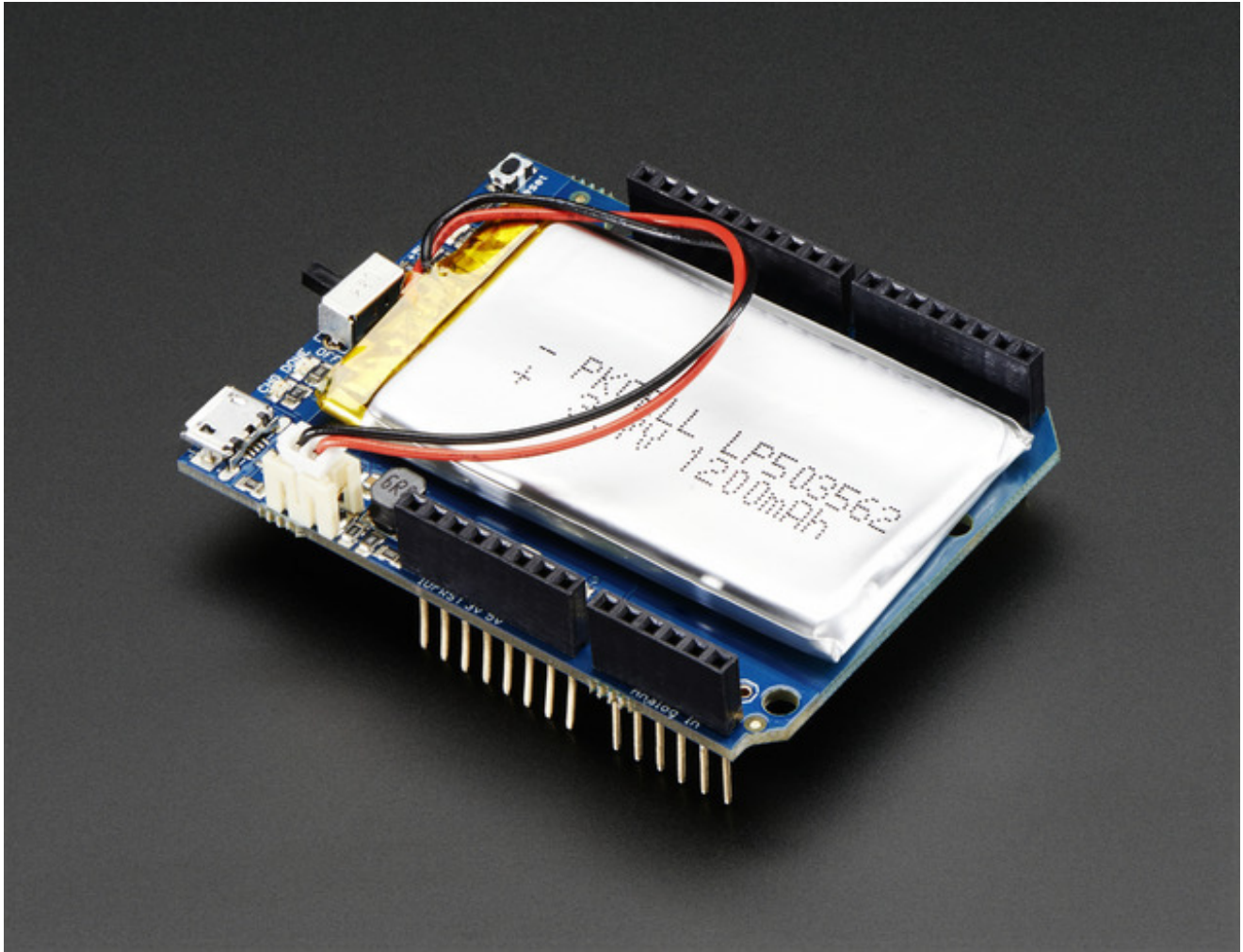
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Overview



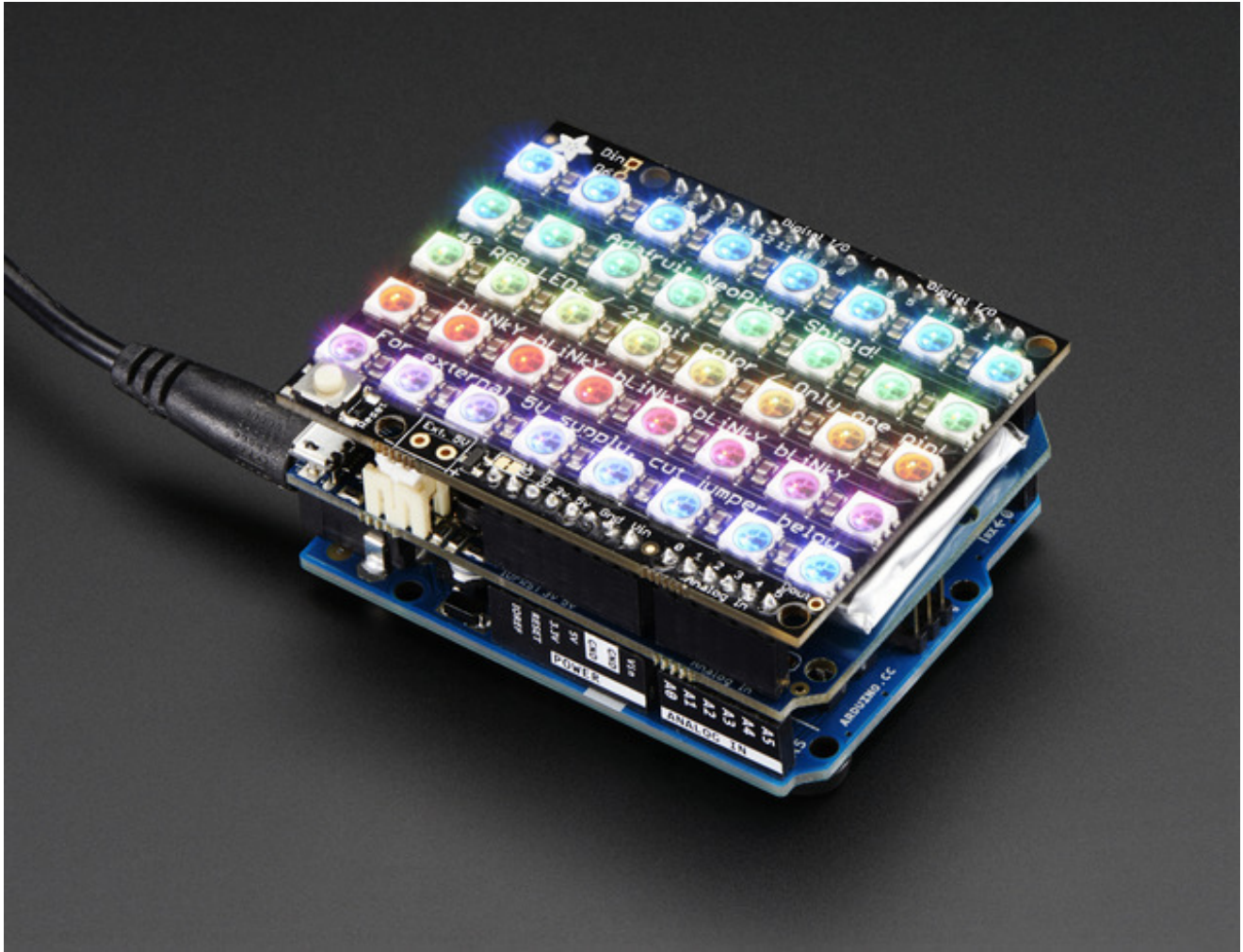
What's a project if it's trapped on your desk? Now you can take your Arduino anywhere you wish with the PowerBoost shield! This stackable shield goes onto your Arduino and provides a slim rechargeable power pack, with a built in battery charger as well as DC/DC booster.

Compatible with Arduino Uno, Duemilanove, Mega, Leonardo and Due - basically any Arduino-pinout-shaped Arduino as only the GND and 5V pins are used. You can stack shields on top, or stack the PowerBoost on top. Please note that the powerboost does not pass through the ICSP headers (the battery is in the way) so if your stacking shield uses ICSP for data transfer (like the Ethernet Shield), you'll need to stack the Powerboost above it!



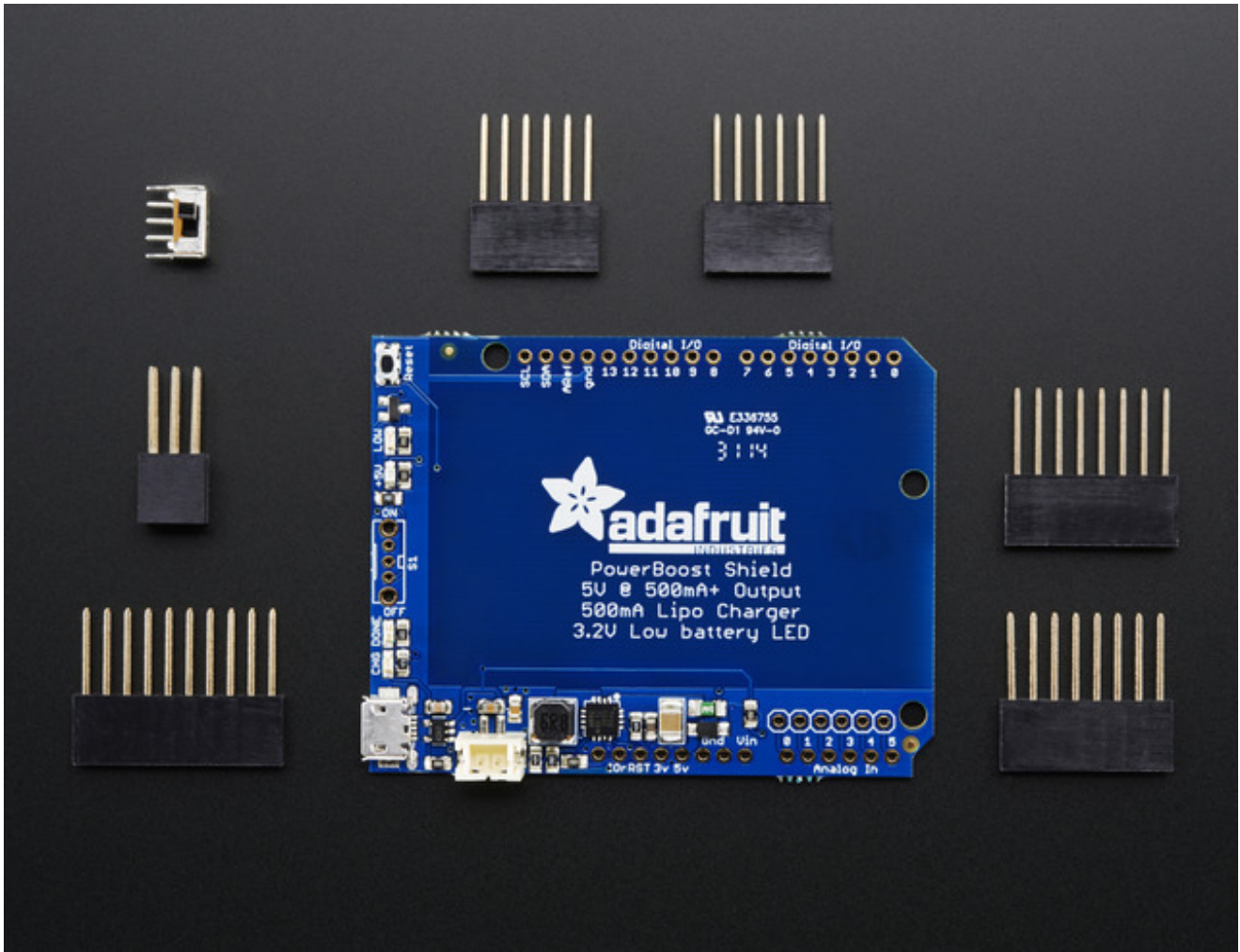
The PowerBoost shield can run off of any Lithium Ion or Lithium Polymer battery (3.7/4.2V kind) but we suggest our 1200mAh capacity one which fits very nicely in the empty space of the shield. Plug in the battery and recharge it via the microUSB jack. When you're ready to go, just unplug the Arduino from USB or the wall adapter and it will automatically switch over to shield power.

Use only Lipoly batteries with protection circuitry!

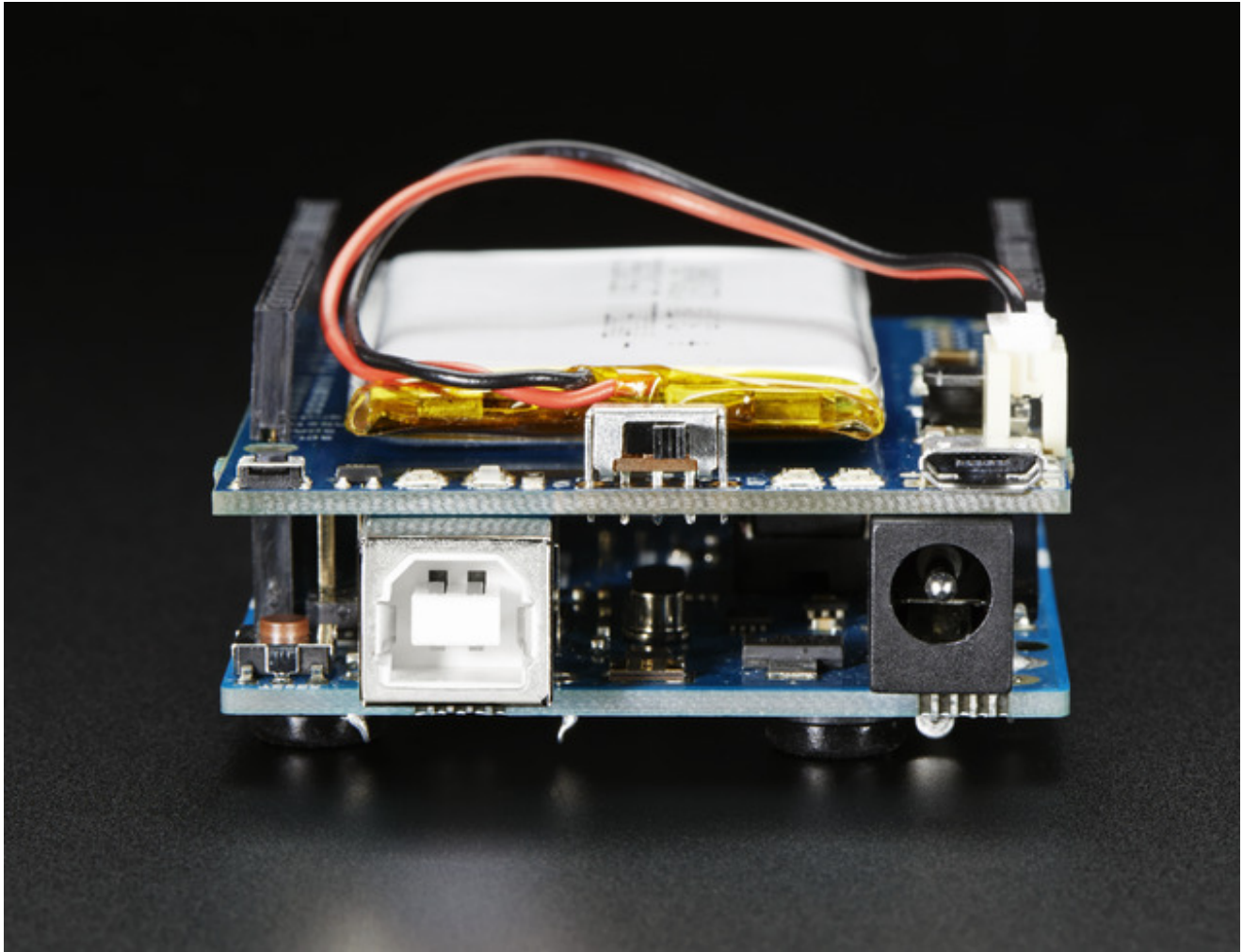


The onboard boost converter can provide at least 500mA current, and can peak at 1A. There's an onboard fuse to protect against higher current draws which could damage the boost converter or battery. The output of the Boost shield is fed directly into the 5V pin on the Arduino, through a protection diode

The boost converter can be damaged by high current spikes and is not recommended for driving motors or robots where the stall current can cause high current spikes

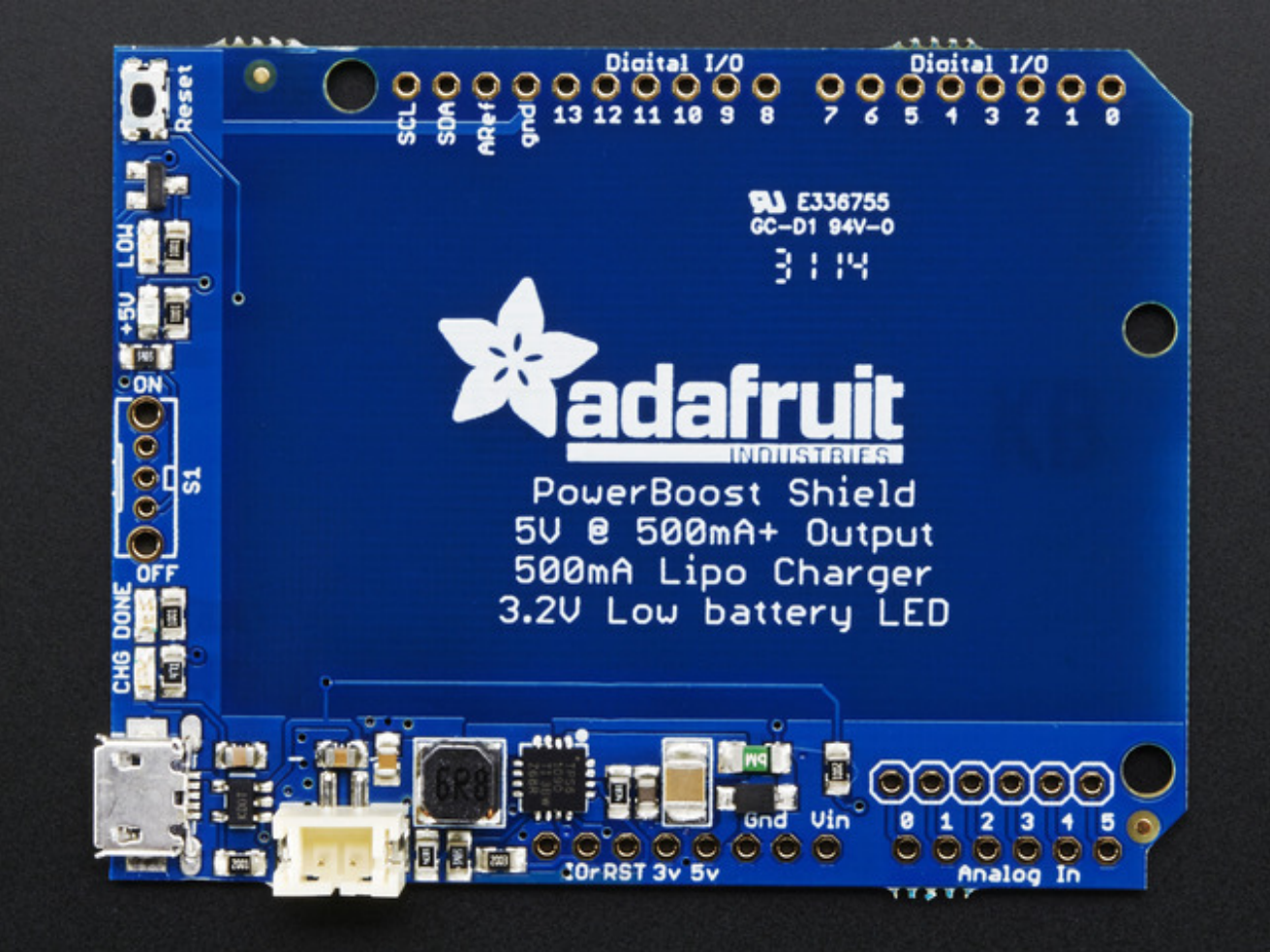


The shield comes as a kit of parts! **Battery is not included, but you can pick one up in the shop** (again, we suggest our 1200mAh battery but you can use any 500mAh+ size you like) There's even an optional switch. If you choose to solder it in, it will let you turn the shield and Arduino power on/off.



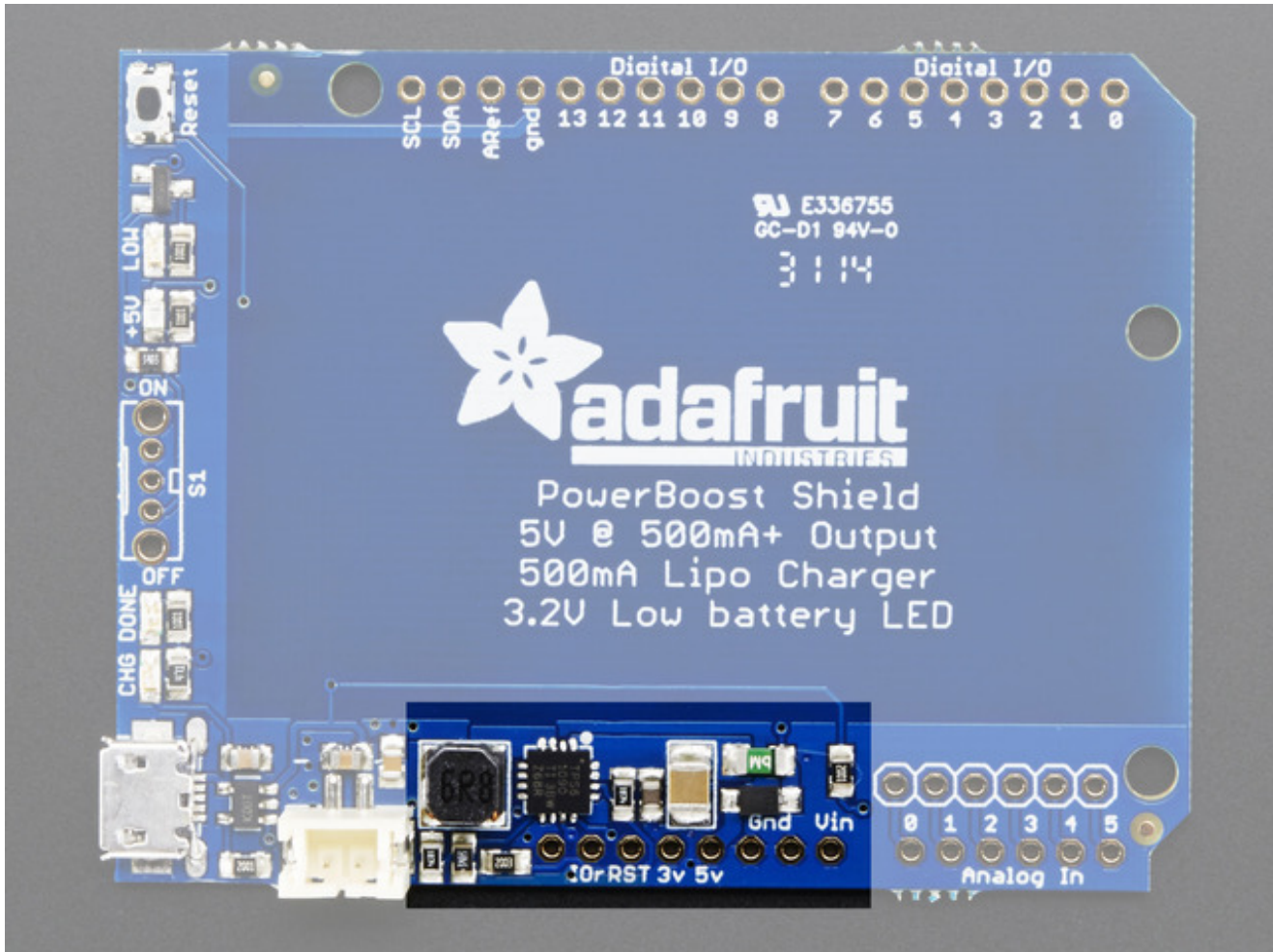
Pinouts

The PowerBoost shield is fairly easy to use, and is mostly plug-&-play. Here's a quick review of what you can find in your shield



DC/DC Boost section

This is the workhorse section of the shield. It takes the 3-4VDC in from the Lilon/LiPoly battery and **boosts** it up to 5.2V DC. This section includes the control chip, inductor, some resistors, and output capacitor/fuse/diode.

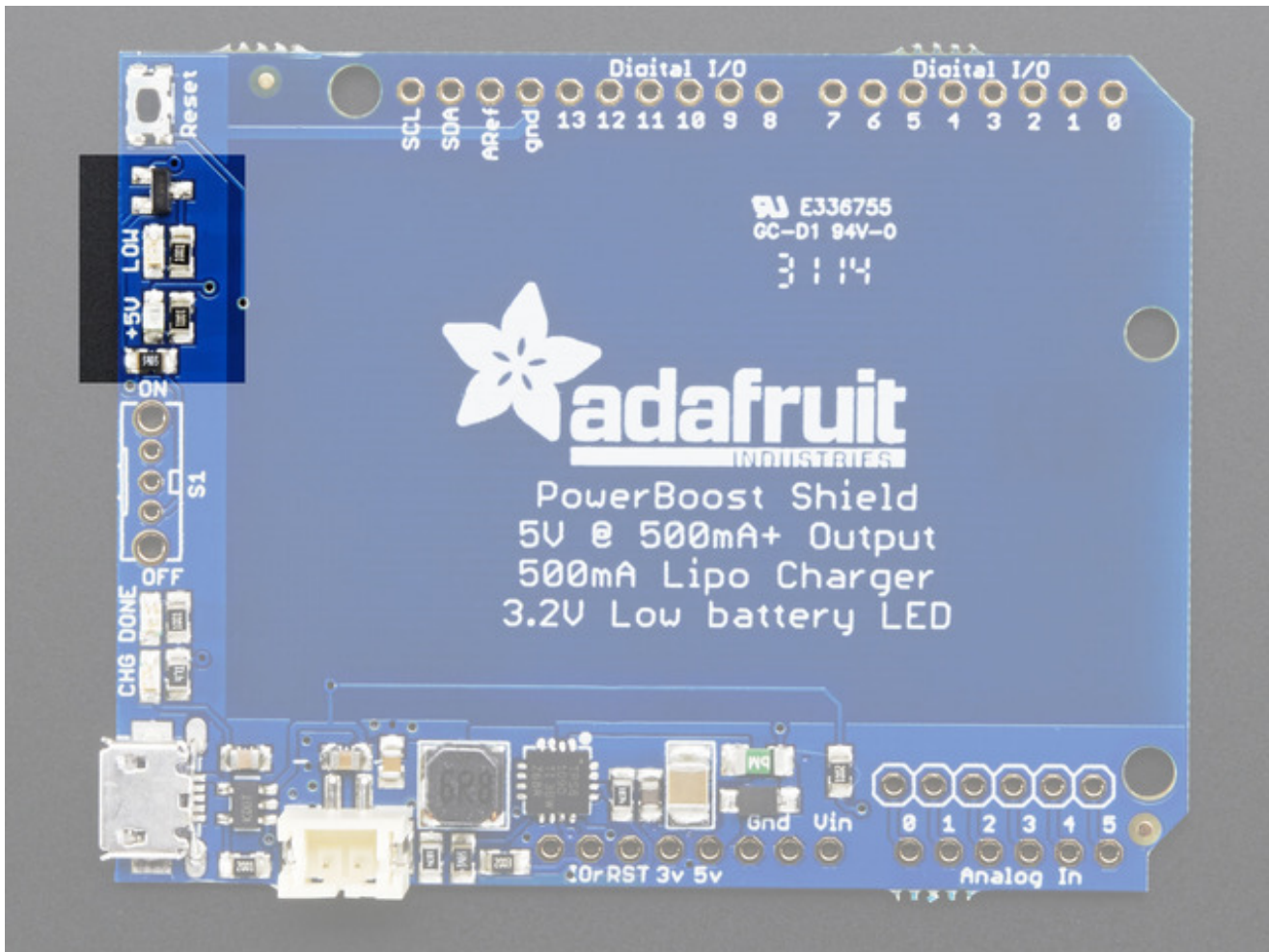


To protect the booster and battery, we put a 500mA fuse on the output of the boost section. The fuse will trip when a continuous current higher than 1A is detected.

There's also a Schottky diode on the output, which will drop the 5.2V from the booster to about 5V. (It can dip down to 4.8V when over 1A is drawn!)

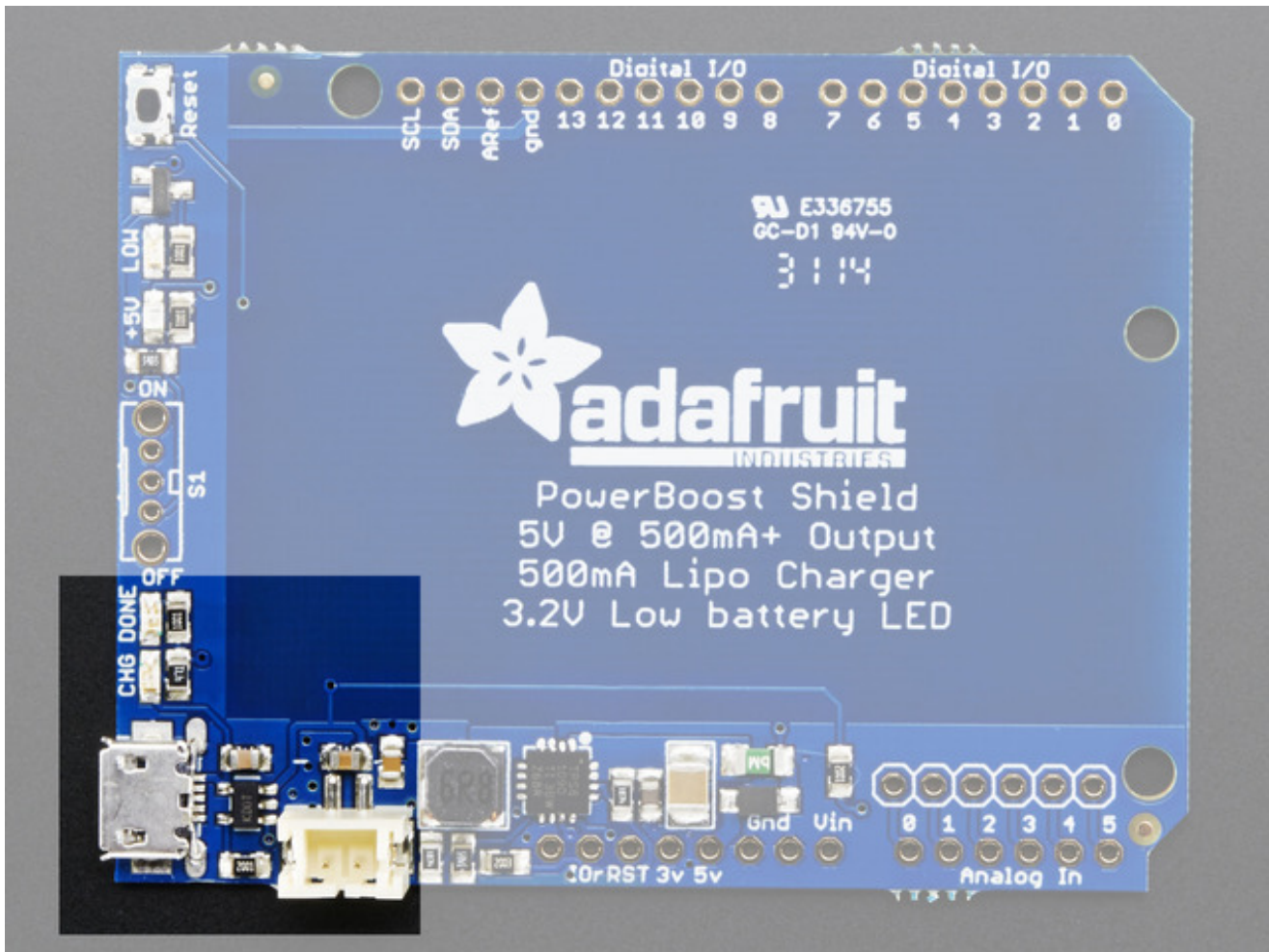
Indicator LEDs

There's two booster indicator LEDs. The blue +5V LED lets you know that the booster is running. The red LOW LED tells you that the LiPoly battery is at 3.2V or lower and may need to be recharged or replaced



Charging section

The charging section is how you can recharge the battery. You can only charge the battery via the microUSB jack. Plugging the Arduino into USB won't charge the battery. Use any computer or wall adapter. The charge rate is up to 500mA (but may vary based on the battery state)

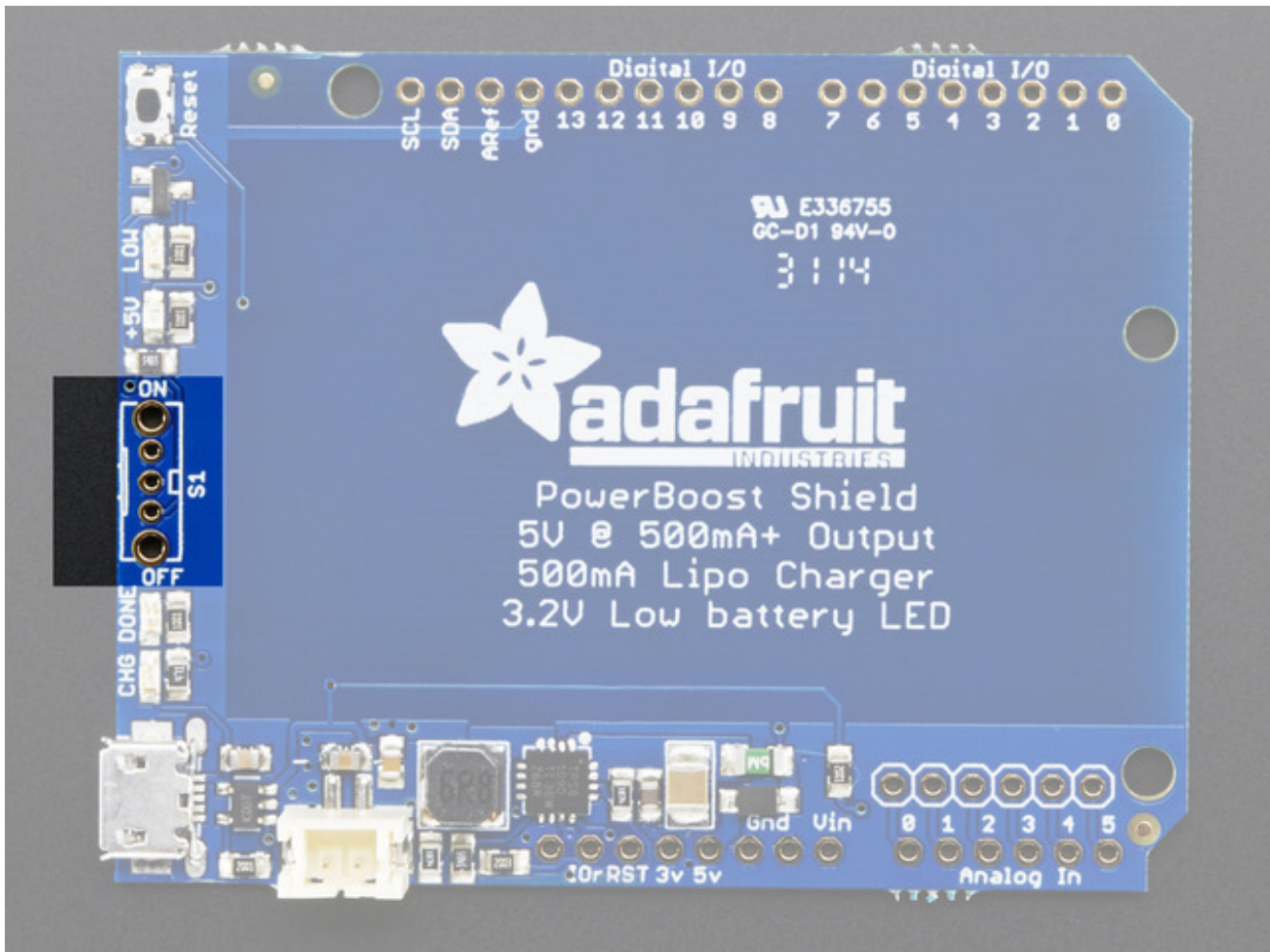


There's two LEDs next to the microUSB jack which will tell you how charging is going. If the CHG LED is on (yellow) that means its charging. the DONE LED (green) turns on when the battery is full.

You can charge the shield on or off an Arduino. If you charge the shield while also running the Arduino, it will act like a 'Uninterruptable Power Supply' and the battery will stay topped up as long as the overall current draw is over 250mA or so.

Power Switch

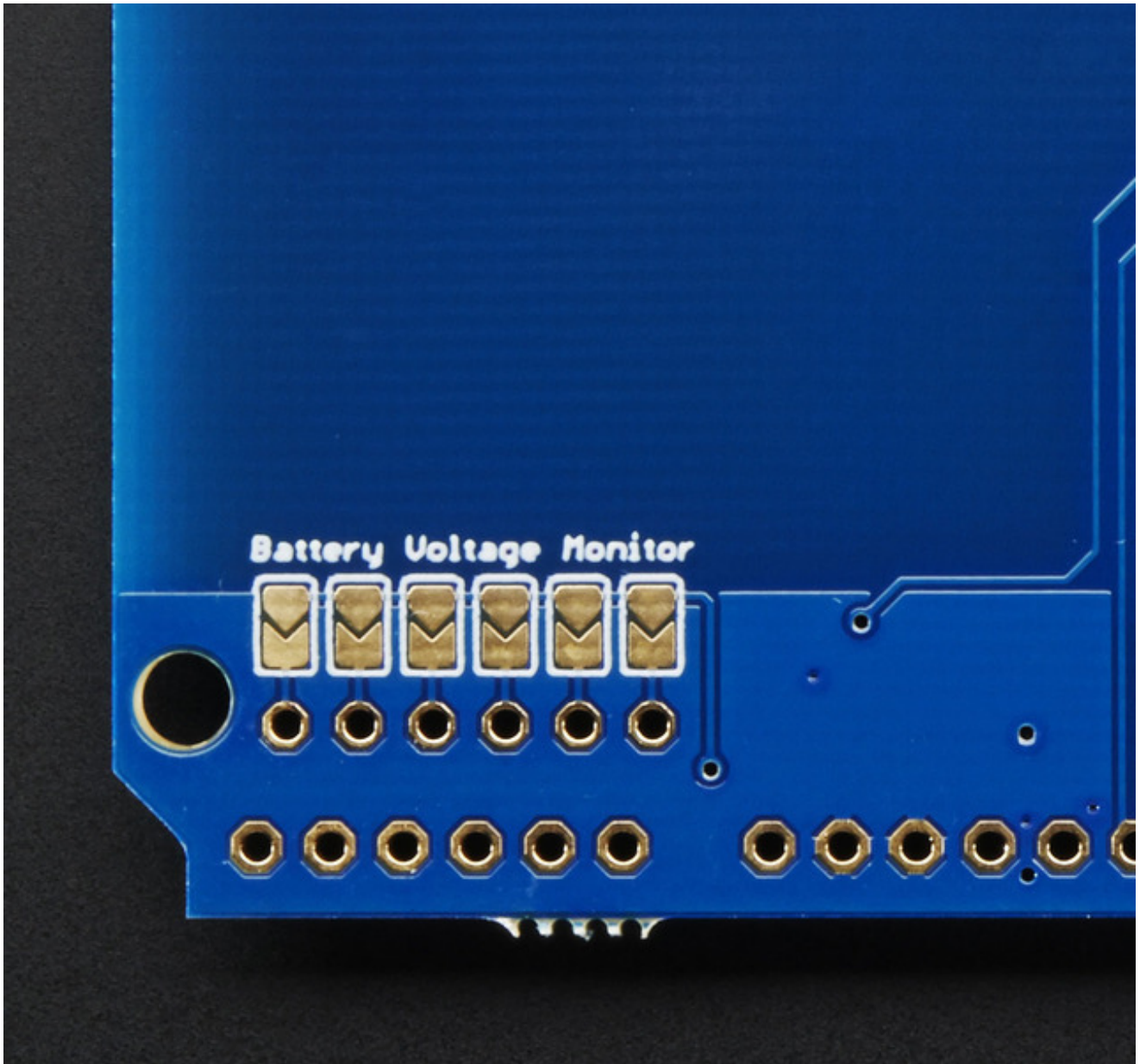
There's a power switch that is optional. If you install it, you can turn the booster on/off whenever you like. If not installed, the shield defaults to on.



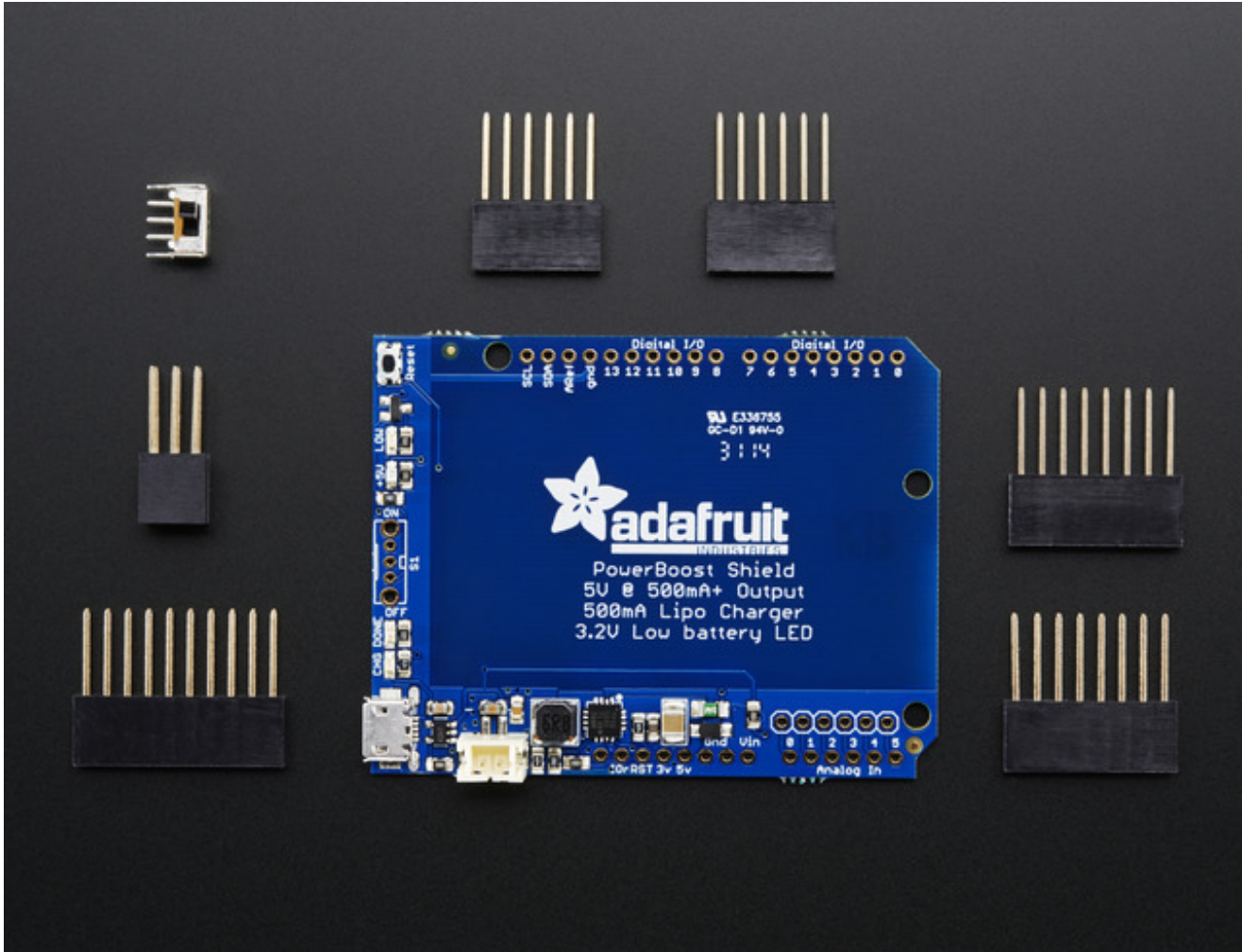
If you would like to custom attach your own switch, solder a switch to the middle pin and the pin right below the middle pin. Any voltage/current rating is fine as the switch is signal, not power, carrying

Monitoring Battery

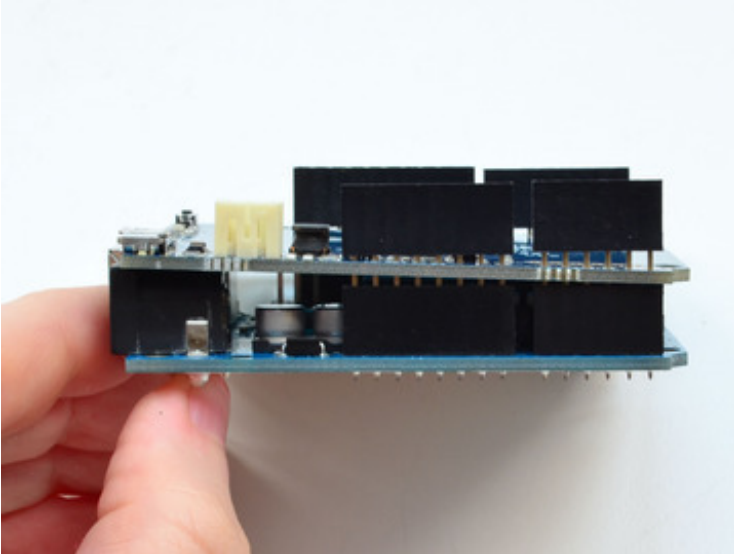
You can use one of the Arduino's analog inputs to measure the battery voltage which can let you know ahead of time when the battery is getting low. Simply solder onto one of the solder jumpers on the bottom of the PCB



Assembly



Start by placing the shield on top of an Arduino (any will do) and



threading the four long stacking headers through so they plug into the Arduino headers.



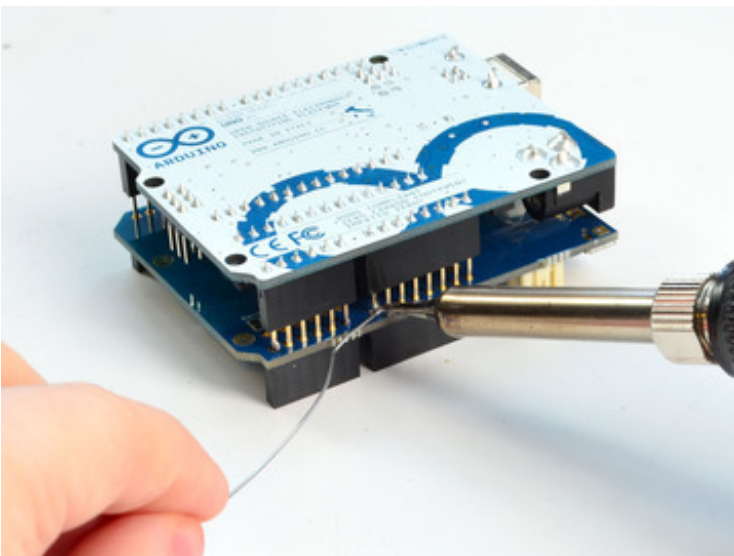
Pull on the shield a bit so that you get a few mm of gold pins showing, then flip it all over and place on a table as shown. It should sit nice and flat



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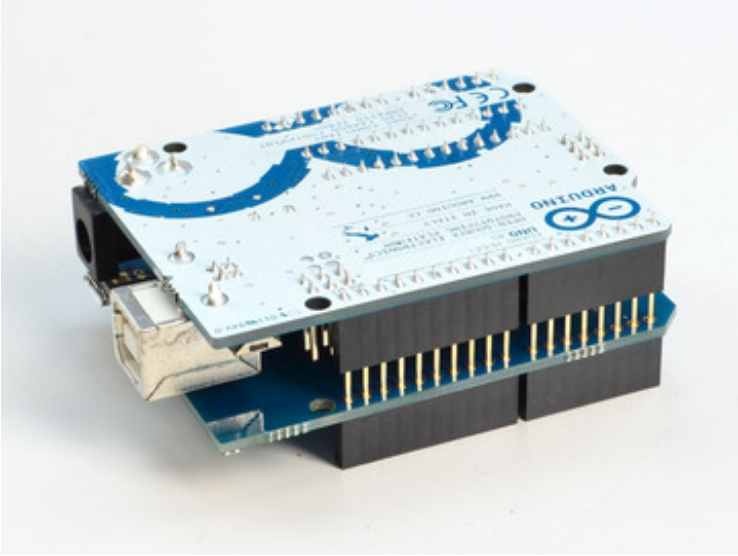
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Tack the outer pins of each stacking header. This way they'll be aligned right.

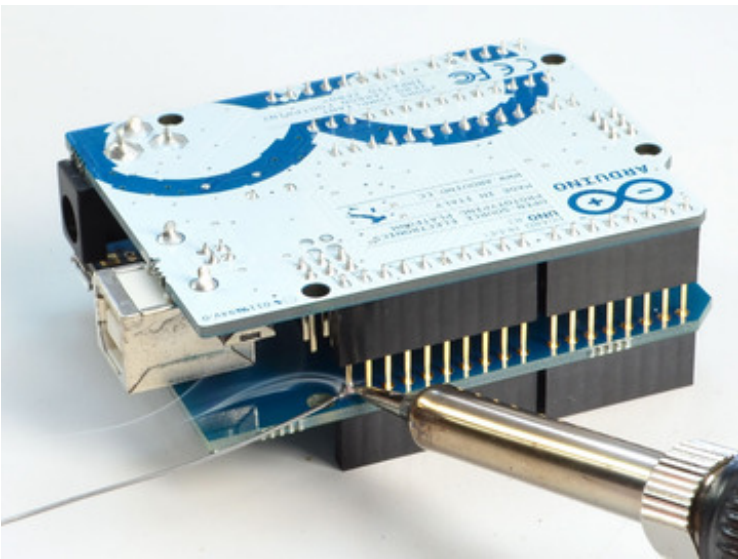
You do not have to solder all the pins! Just do 2 pins per header



Check your work by looking to make sure the pins are soldered



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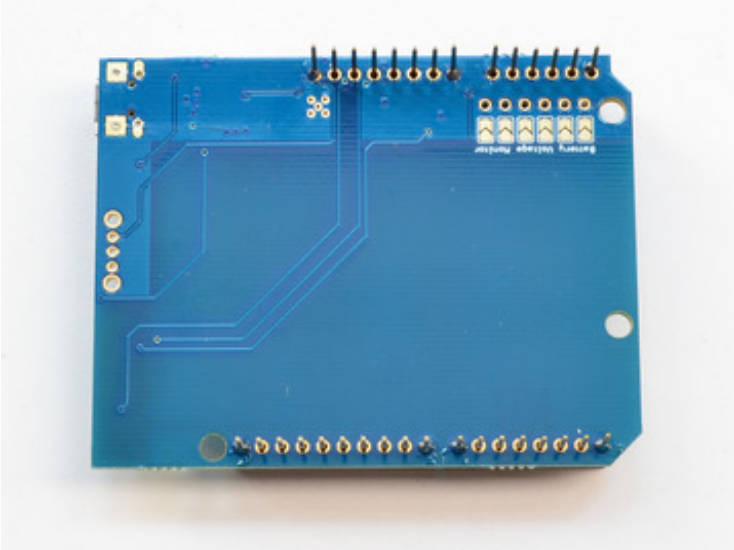
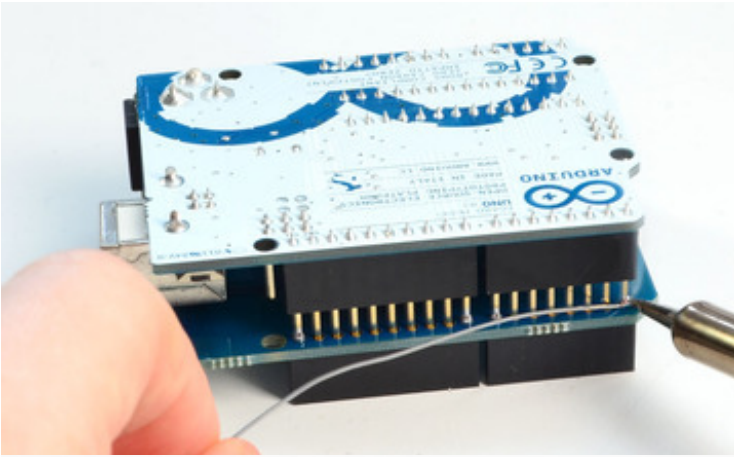


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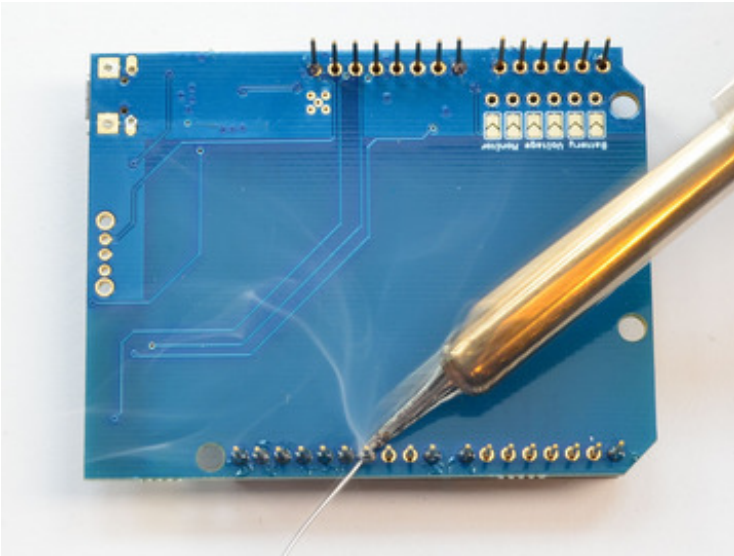
Then continue to the other side



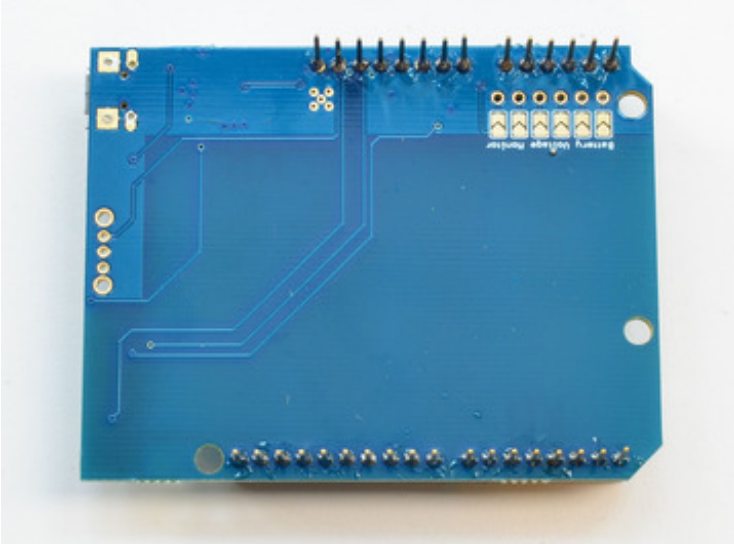
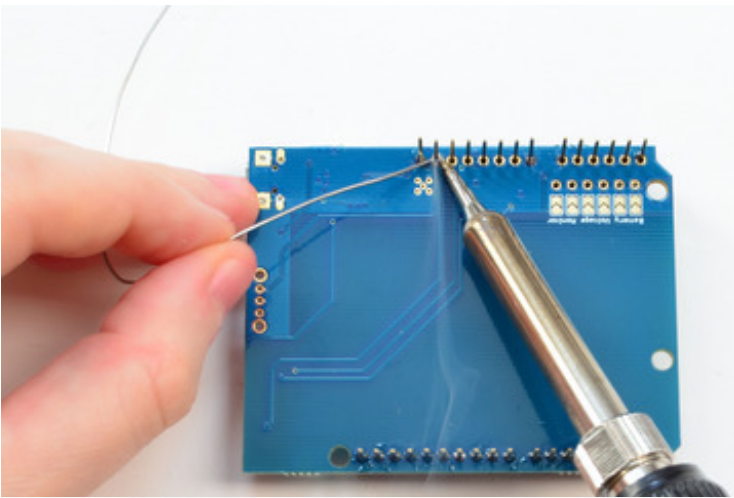
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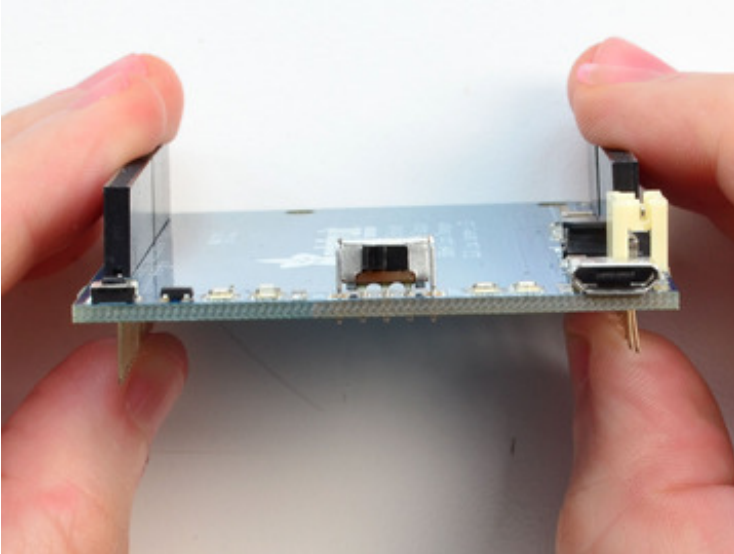
Carefully remove the shield from the Arduino and place flat on the table, long pins sticking up



Now you can solder the remaining header pins!

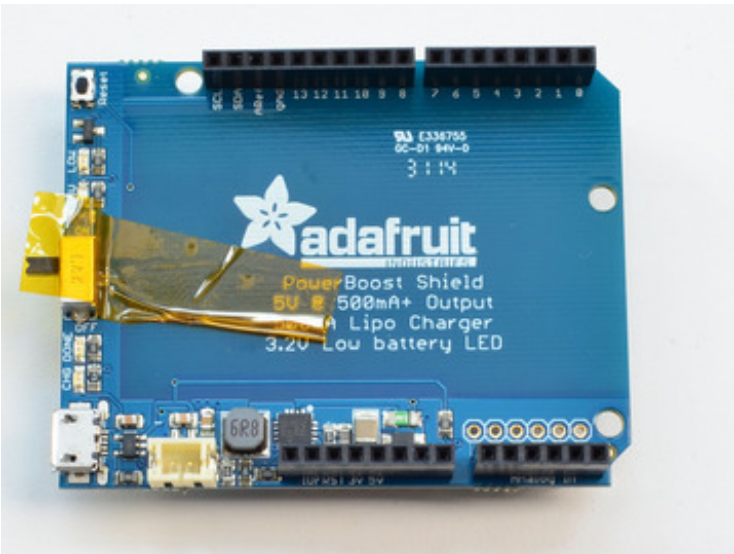


Check your work, especially the power (5V) and GND pads! Make sure there's no bridged solder connections



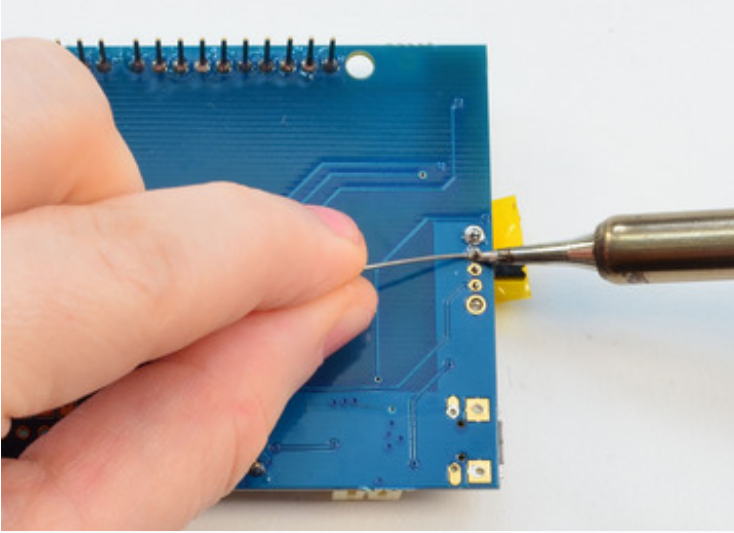
If you want to add the on/off switch, place the switch in the slot in the middle of the PCB

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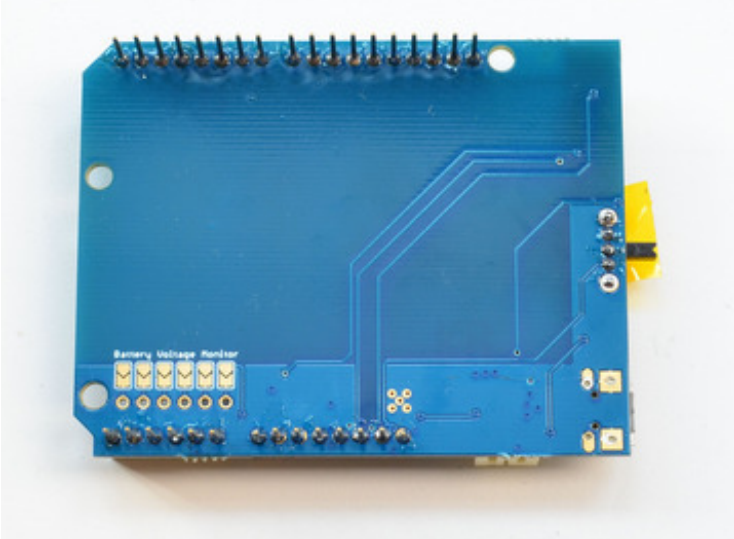


You may want to tape it down so it sits in place while soldering

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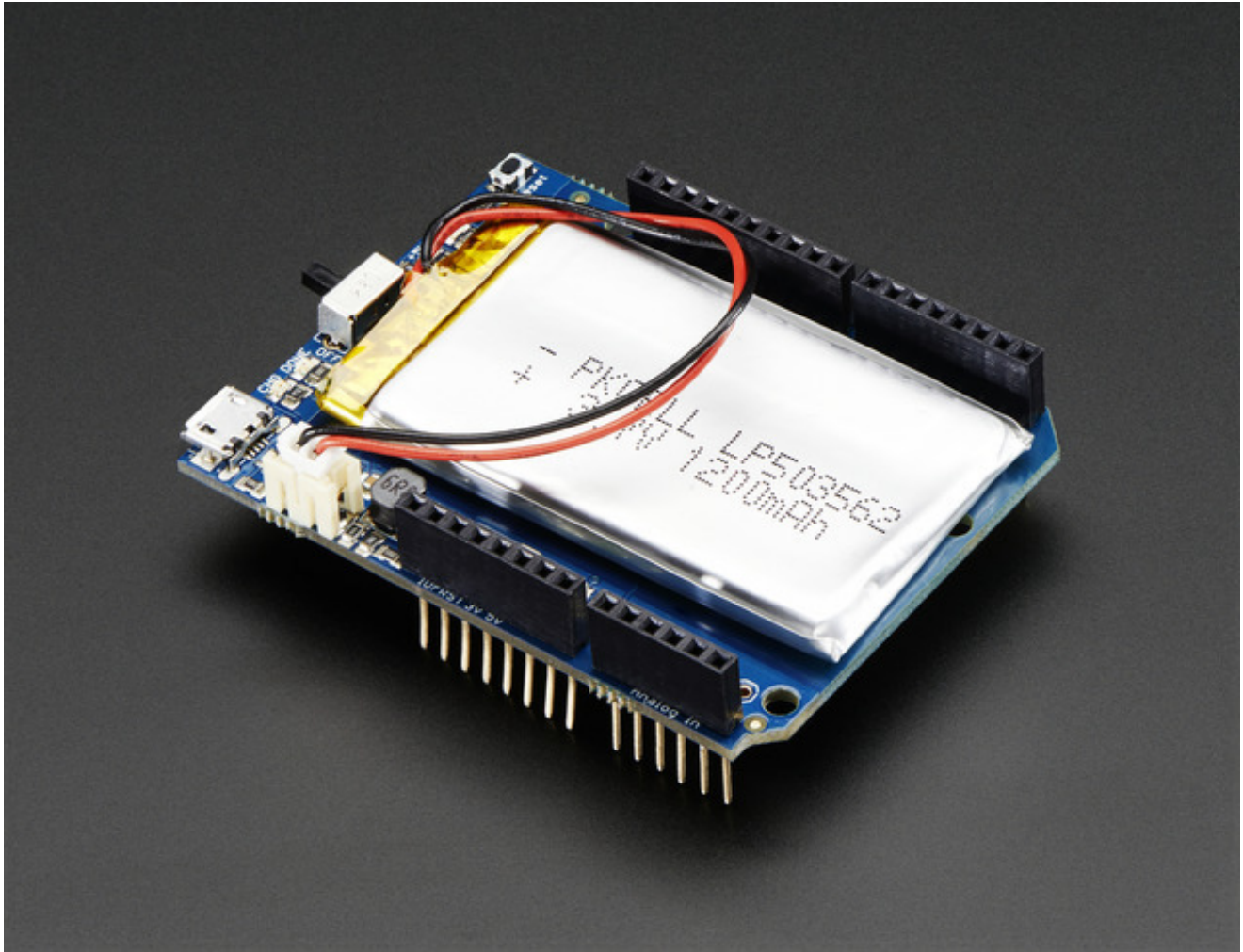


Solder all the pins!



Check your work, there shouldn't be any shorted connections!

Plug in your battery into the JST connection, you're ready to go!





F.A.Q.

Can the PowerBoost Shield be used with the Arduino Yun?

Kinda! The Yun, like the Arduino Ethernet, has some chunky connectors in the way which makes stacking difficult. You can use an extra set of stacking headers to clear the Ethernet connector, however the power supply for the Yun is differently set up than any other Arduino

To make the power boost shield work on the Yun, connect a jumper between the 5V and Vin pin on the powerboost shield.

[We suggest a PowerBoost 500C, which you can use to just power over USB! \(http://adafru.it/dDF\)](http://adafru.it/dDF)

Can the PowerBoost Shield be used with the Arduino Ethernet?

Kinda! The Arduino Ethernet, has some chunky connectors in the way which makes stacking difficult. You can use an extra set of stacking headers to clear the Ethernet connector.

[We suggest a PowerBoost 500C, which you can use to just power over USB! \(http://adafru.it/dDF\)](http://adafru.it/dDF)

Downloads

Datasheets & Files

- [TPS61090 datasheet](http://adafru.it/duS) (http://adafru.it/duS) (the DC/DC boost control chip used)
- [MCP73831 datasheet](http://adafru.it/dvn) (http://adafru.it/dvn) (the Lipoly charger chip used)
- [EagleCAD PCB files on GitHub](http://adafru.it/pAv) (http://adafru.it/pAv)
- [Fritzing object in Adafruit Fritzing Library](http://adafru.it/aP3) (http://adafru.it/aP3)

Schematic

