Adafruit Proto Shield for Arduino
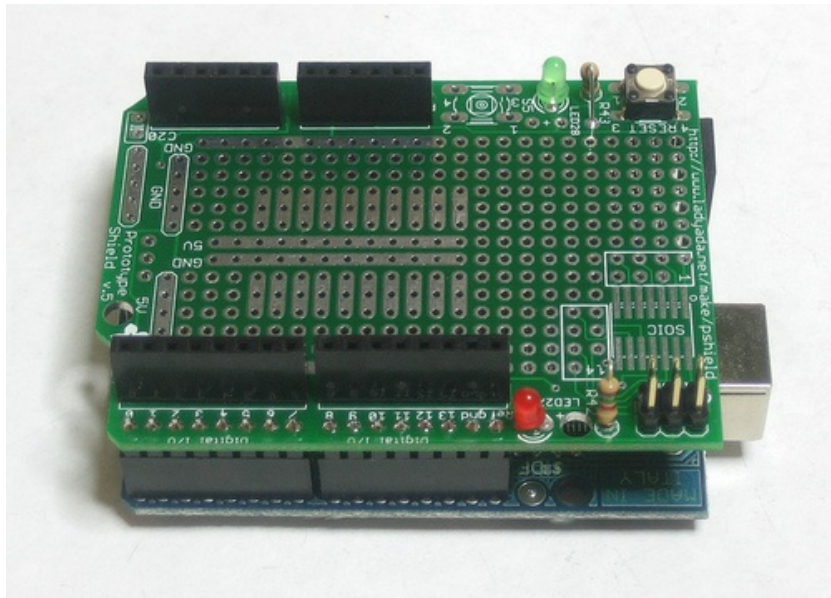
Created by Jeff Donaldson
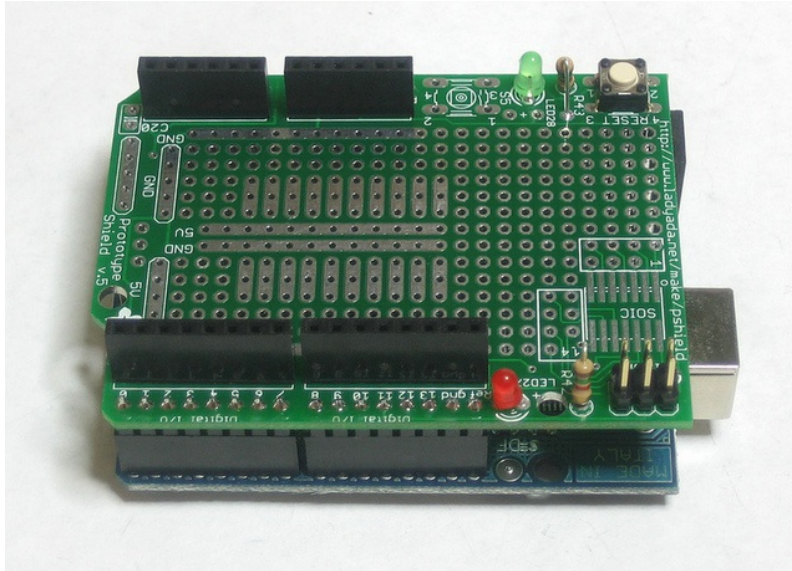

Last updated on 2013-08-06 05:00:28 PM EDT

Guide Contents

Overview

Arduino prototyping

This is a design for an open-source prototyping shield for Arduino NG/Diecimila. It has tons of cool features, to make prototyping on your Arduino easy.

- Compatible with NG, Diecimila, Duemilanove and any Arduino-clone in the 'classic' shape and pinout.
- Reset button up top
- ICSP header
- Lots of GND and +5V rails.
- DIP prototyping area makes it easy to add more chips.
- SOIC prototyping area above USB jack for up to 14-pin SOIC chip, narrow medium or wide package.
- Use 'mini' or 'medium' breadboard.
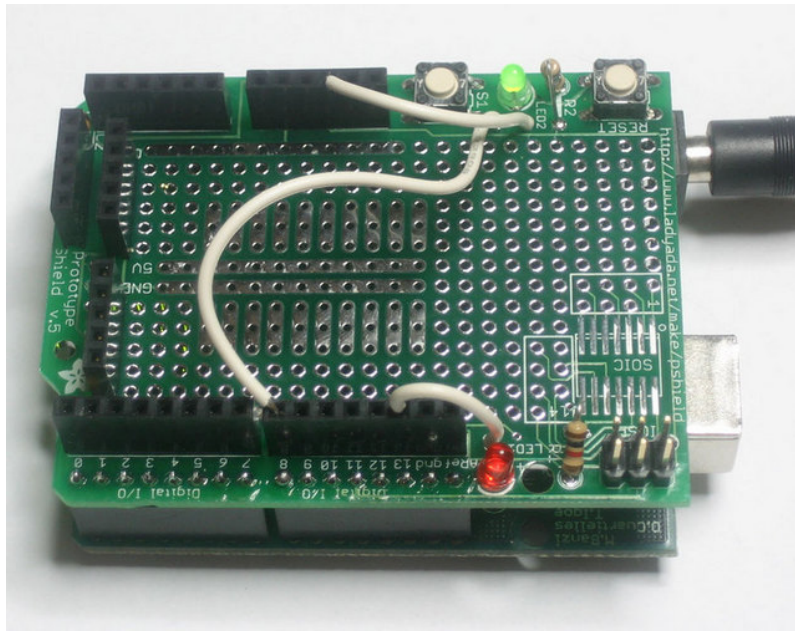- Two 3mm LEDs with matching resistors.
- Extra 6mm button

Ideas for use
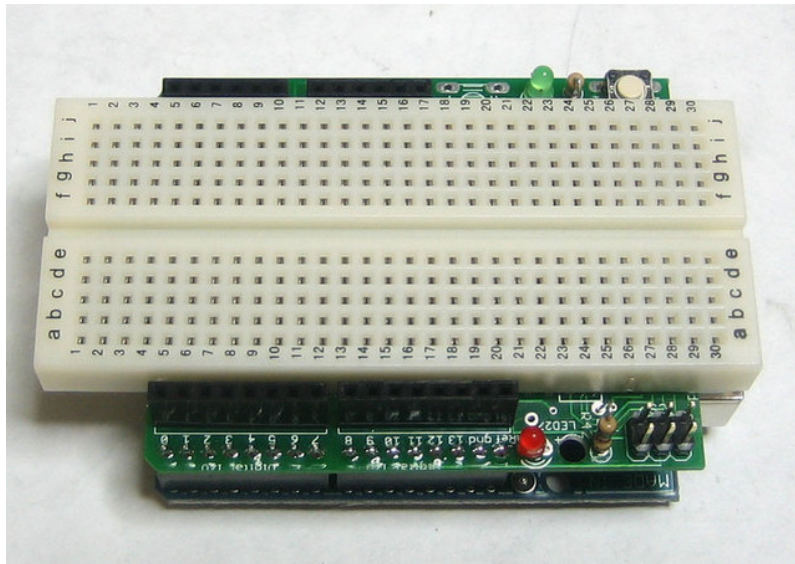
Larger breadboard for tons of working space!
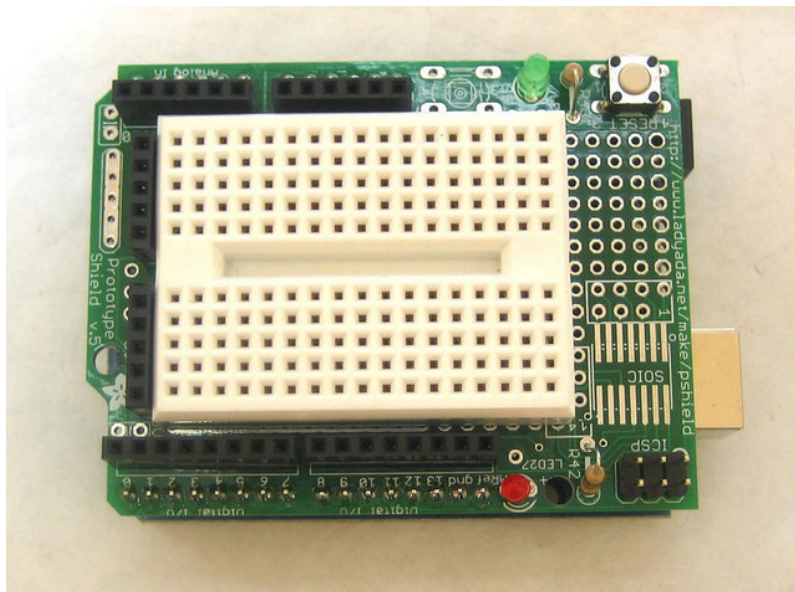
Tiny breadboard fits nicely on top.

2 LEDs and one button are availble for general purpose use!

Make it!

Lets go!

This is a vey easy kit to make, just go through each of these steps to build the kit.

1. Tools and preparation (http://adafru.it/aZW)
2. Check the parts list (http://adafru.it/aZX)
3. Solder it (http://adafru.it/aZY)

Preparation

Prep

Learn how to solder with tons of tutorials! (http://adafru.it/aTk)
Don't forget to learn how to use your multimeter too! (http://adafru.it/aZZ)

Tools

There are a few tools that are required for assembly. None of these tools are included. If you don't have them, now would be a good time to borrow or purchase them. They are very very handy whenever assembling/fixing/modifying electronic devices! I provide links to buy them, but of course, you should get them whereever is most convenient/inexpensive. Many of these parts are available in a place like Radio Shack or other (higher quality) DIY electronics stores.

Soldering iron

Any entry level 'all-in-one' soldering iron that you might find at your local hardware store should work. As with most things in life, you get what you pay for.

Upgrading to a higher end soldering iron setup, like the Hakko FX-888 that we stock in our store (http://adafru.it/180), will make soldering fun and easy.

Do not use a "ColdHeat" soldering iron! They are not suitable for delicate electronics work and can damage the kit (see here (http://adafru.it/aOo)).

Click here to buy our entry level adjustable 30W 110V soldering iron (http://adafru.it/180).

Click here to upgrade to a Genuine Hakko FX-888 adjustable temperature soldering iron. (http://adafru.it/303)

Solder

You will want rosin core, 60/40 solder. Good solder is a good thing. Bad solder leads to bridging and cold solder joints which can be tough to find.

Click here to buy a spool of leaded solder (recommended for beginners) (http://adafru.it/145).

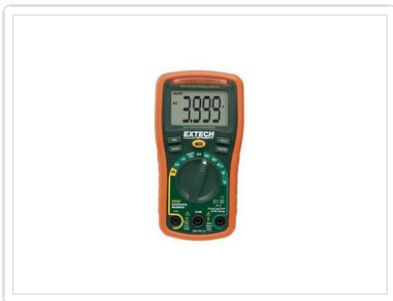Click here to buy a spool of lead-free solder (http://adafru.it/734).

Multimeter

You will need a good quality basic multimeter that can measure voltage and continuity.

Click here to buy a basic multimeter. (http://adafru.it/71)

Click here to buy a top of the line multimeter. (http://adafru.it/308)

Click here to buy a pocket multimeter. (http://adafru.it/850)

Flush Diagonal Cutters

You will need flush diagonal cutters to trim the wires and leads off of components once you have soldered them in place.

Click here to buy our favorite cutters (http://adafru.it/152).

Solder Sucker

Strangely enough, that's the technical term for this desoldering vacuum tool. Useful in cleaning up mistakes, every electrical engineer has one of these on their desk.

Click here to buy a one (http://adafru.it/148).
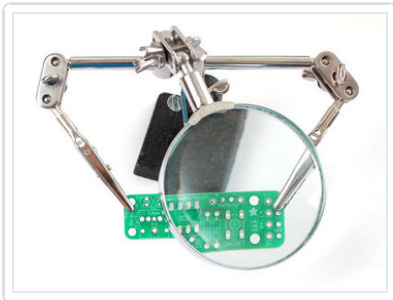
Helping Third Hand With Magnifier

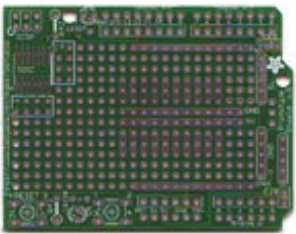Not absolutely necessary but will make things go much much faster, and it will make soldering much easier.

Pick one up here (http://adafru.it/291).
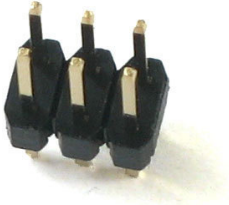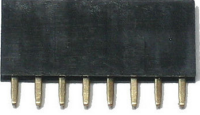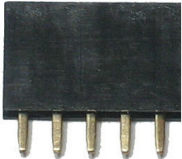
Parts list
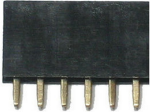
Schematic
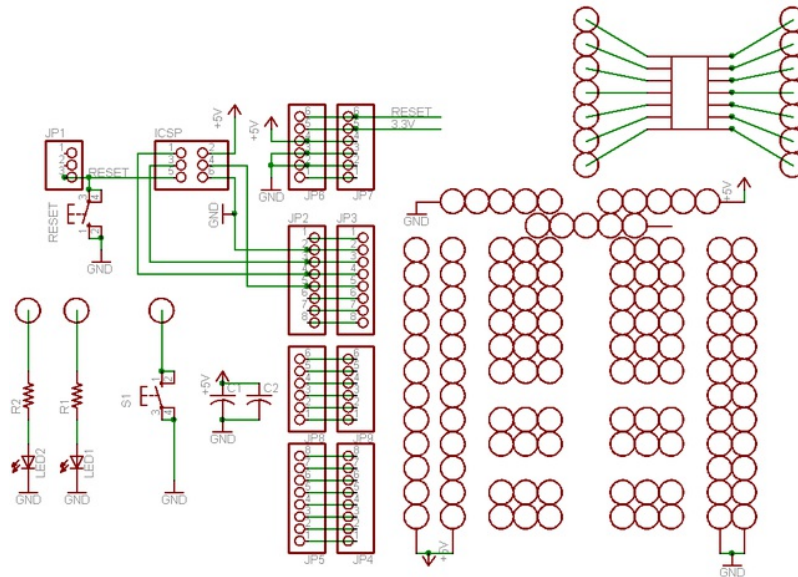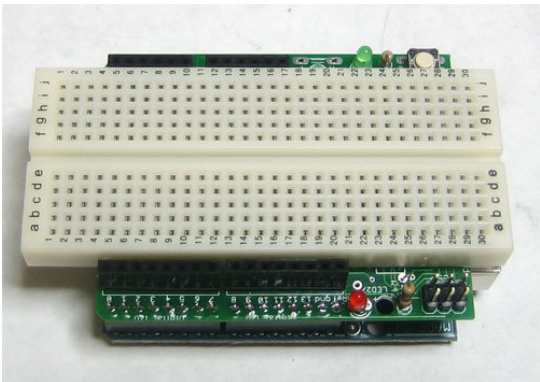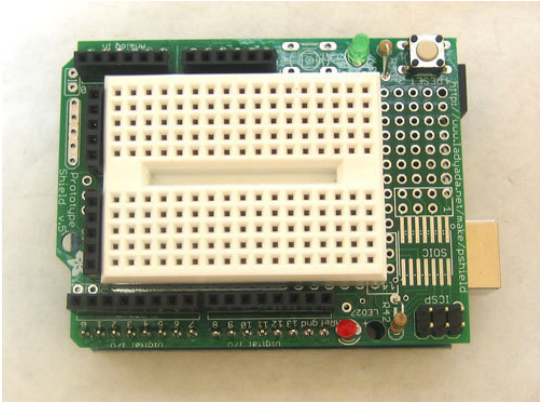
Parts List

Image	Name	Description	Information & Distributor	Qty
		Printed circuit board	Adafruit	1
	LED1	3mm Red LED	Generic	1
	LED2	3mm Green LED	Generic	1

	R1 R2	470-1.0K Resistors for LED Carbon 5% 1/4W	Generic	2
	RESET S1	6mm tact switch	Generic	2
	C1 C2	0.1uF 50V ceramic capacitor	Generic	2
	ICSP	6 pin male 0.1" header (2x3)	Generic	1
		8 pin female 0.1" header (1x8)	Generic	2

Image		Description	Distributor	
		6 pin female 0.1" header (1x6)	Generic	2
		5 pin female 0.1" header (1x5)	Generic	3
		36 pin male 0.1" header (1x36)	Generic	1

Optional parts

Image	Description	Distributor
	Small breadboard (300 tie points). This is a little more practical than the larger 'standard' ones.	Adafruit
	Tiny breadboard (170 tie points). Also, 5 pin female header (1x5) for use with 'tiny' breadboard as 'end rails.' These are pricey but you can 'make it yourself' by cutting a larger breadboard down with a hacksaw!	Adafruit

"Stacking" female header allows 'stacking' of shields. Our pack has all the parts you need

Adafruit

Solder it!

Time to solder the kit together! If you've never soldered before, check the Preparation page for tutorials and more. (http://adafru.it/aZW)
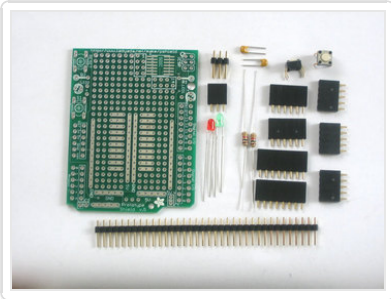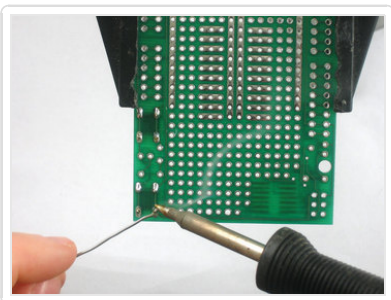
First, check that you have all the parts! Look over the parts list here (http://adafru.it/aZX) and shown on the left.
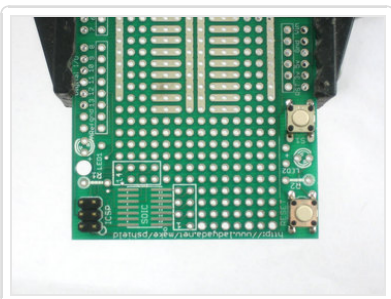
**(NOTE we do not include the 3pin female header anymore since it was only used for very old NG Arduinos!)**
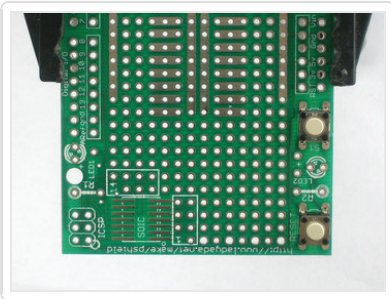
Put the two small buttons in. They will snap in and should be flush with the PCB. The buttons are symmetric so don't worry about putting them in backwards!

With your soldering iron, solder each of the 4 points on each switch.

Next, place the 6 pin ICSP header. If you're never planning to use an external programmer you can skip this step!
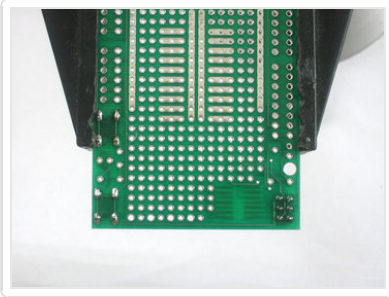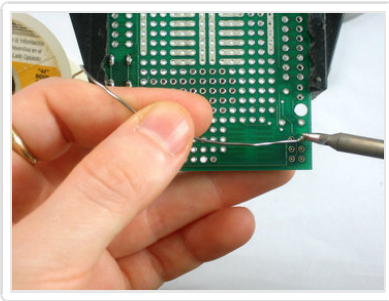
Solder all 6 pins. You may have to tape or hold the part in place or it'll fall out!
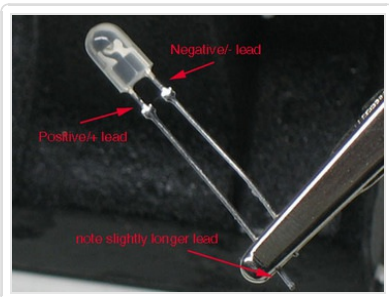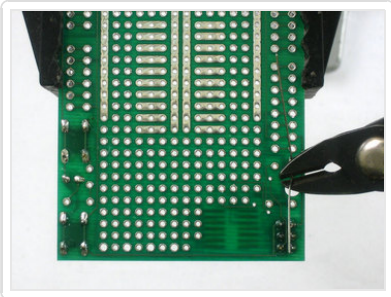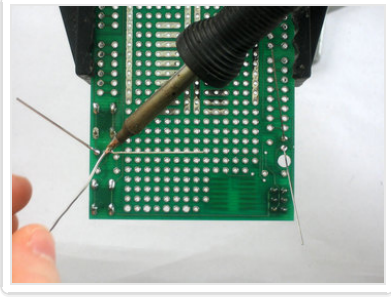

Next it's time to place the two 3mm LEDs. LEDs are directional, and if you put them in backwards they wont work.

LEDs have a positive lead and a negative lead. The positive lead is longer. On the Protoshield PCB you will see a small + sign next to the LED silkscreen pictures. That's the side you should put the positive lead in.
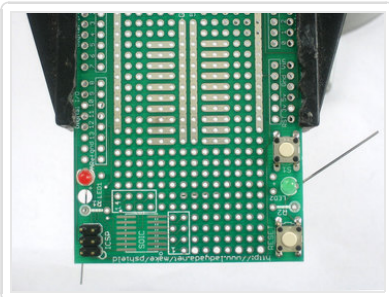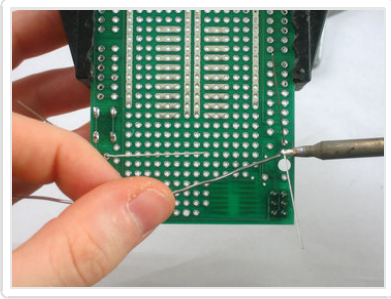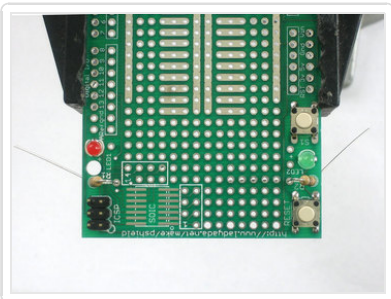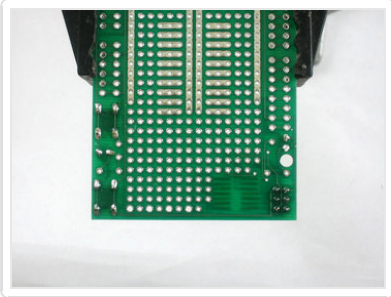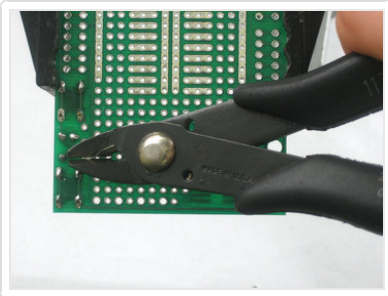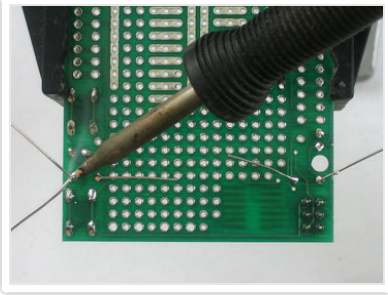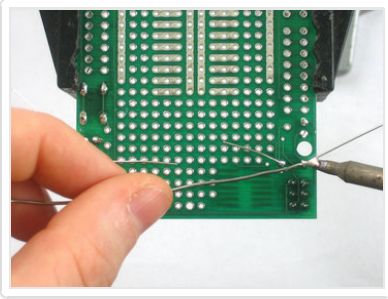
Solder both LEDs in place.

Use diagonal cutters to snip off the long legs so that they are about as long as the legs of the buttons or ICSP header.
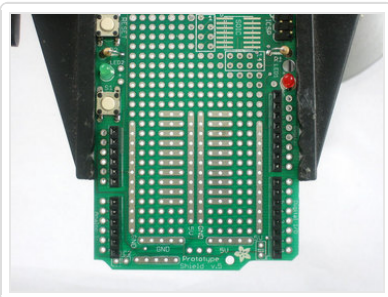
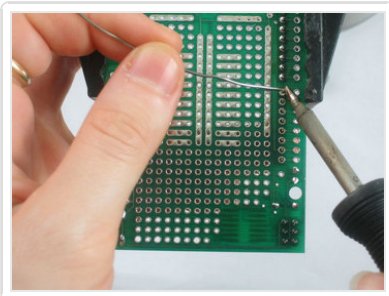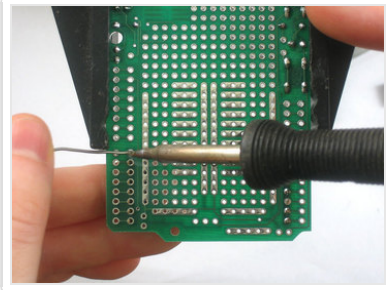Next place the two resistors for the LEDs. Resistors don't have a direction so you can put them in either way.
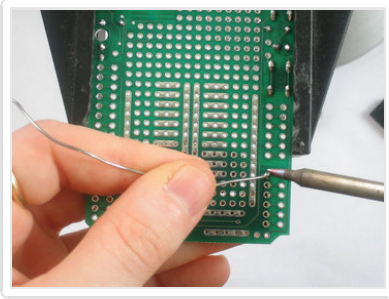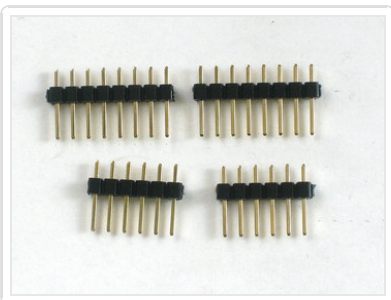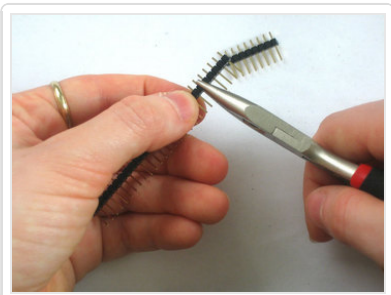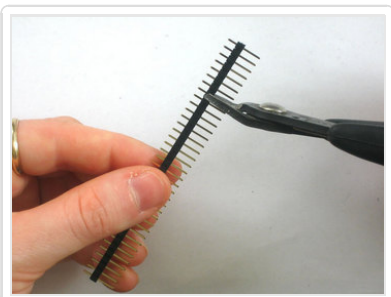
Solder in the resistor legs and clip them short.

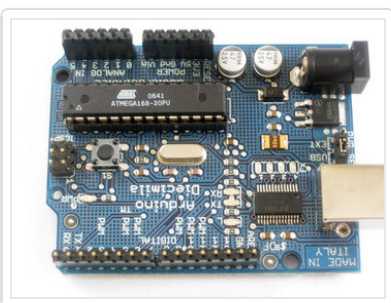Next, place the 4 8-pin and 6-pin female headers as shown.

Turn the board over and solder them in, you may have to hold the parts or tape them to keep them from falling out!
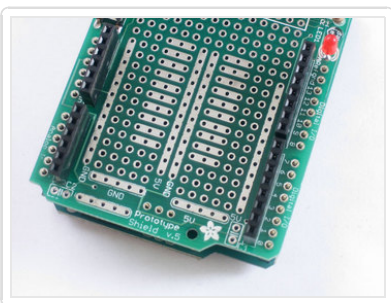
Next its time to make the male headers from the long strip. use diagonal cutters or pliers to clip off 4 parts, 2 6-pin and 2 8-pin, as shown.

If you have a Diecimila (2008), Duemilanove (2009) or newer Arduino, put the long ends of the male header in to the female header on the Arduino, as shown.
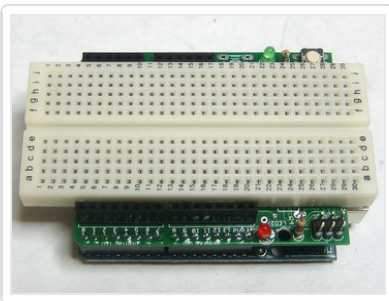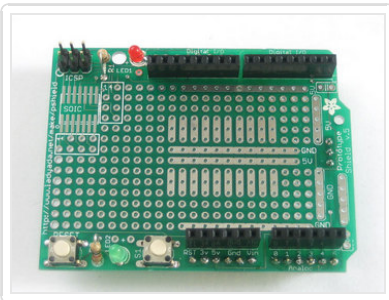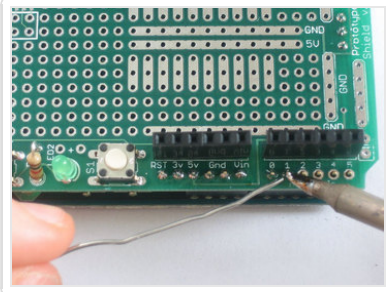
Put the proto shield on top of the Arduino, so that the male header aligns with the solder holes.
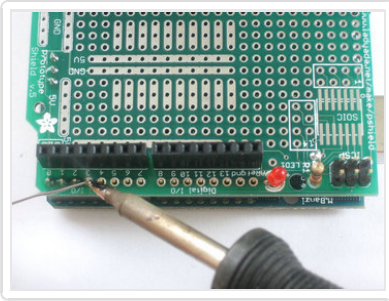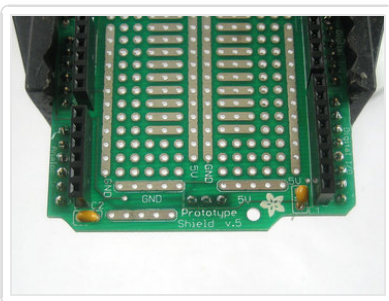
Solder every pin of the male header.
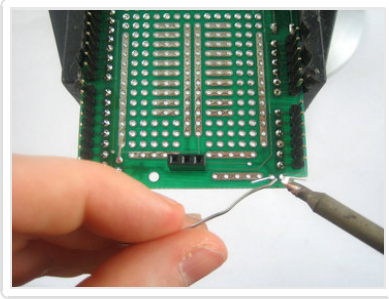Keep the shield on the Arduino to make
the job easy.

Once you're done, you can remove the
shield from the Arduino.

If you're using a half-sized breadboard
you should stop now as adding the
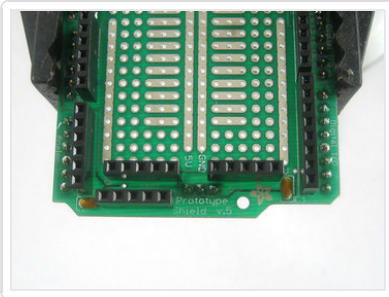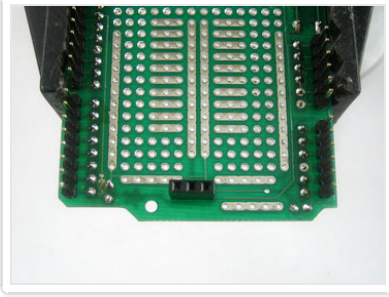remaining parts will make the breadboard
not fit as well.

Place the two ceramic capacitors. They
are symmetric so you don't have to
worry about putting them in backwards.

Solder and clip the capacitors.

(NOTE the image shows a 3pin header but that is not used anymore, ignore it!)

Solder in the 3 5-pin female headers. These are especially useful if you're using a tiny breadboard with the shield.
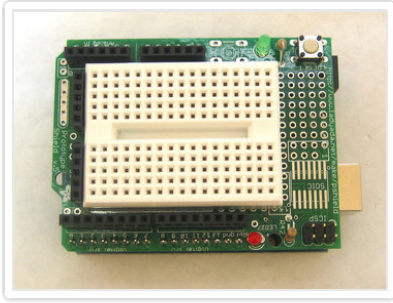
One of the headers is all ground pins, another is all 5V pins. The final one is 'floating', which means you can use a jumper to make it Vin or 3.3V or any other value you need.
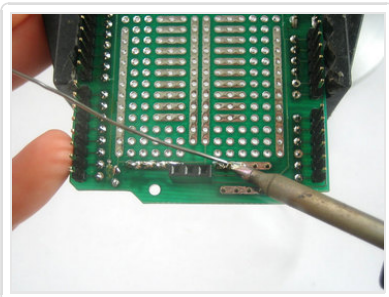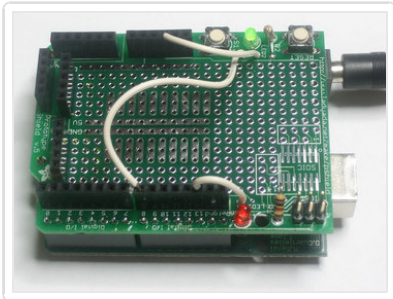
Solder in the headers.

(NOTE the image shows a 3pin header but that is not used anymore, ignore it!)
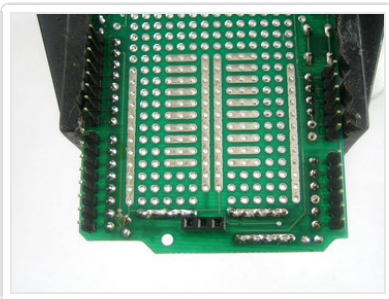
If you are using a tiny breadboard, you can just take off the backing and stick it on! (Or use double sided tape.

If you want to use the red and green LEDs or the general purpose button, simply solder solid-gauge wire (~22awg is good) into the large solder holes near the device. Then you can plug the other end of the wire like a jumper into any of the female headers. The two LEDs are tied to ground through 1K or 1.5K resistors. The button simply connects the jumper to ground when pressed (use an internal or external pull-up). Check the schematic on the download page for specific details.
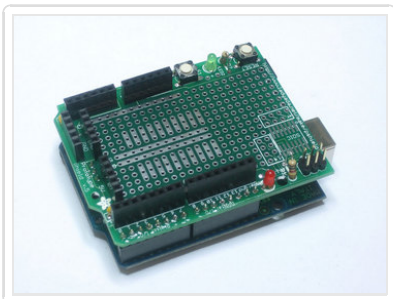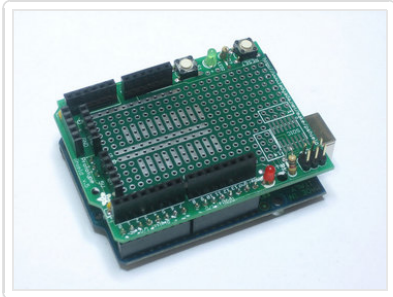
Download

PCB & Schematic

Here's the latest EagleCAD sch (http://adafru.it/cmx) and brd (http://adafru.it/cmy) files.

And the schematic as an image (http://adafru.it/cmz).

Made available under CC 2.5 Share-Alike/Attrib. Have fun kids!

Buy Kit

Buy Kit (http://adafru.it/aK1)

Forums

Forums (http://adafru.it/forums)