Mounting a Smapler v0002 step by step

by **dcuartielles** on January 5, 2009

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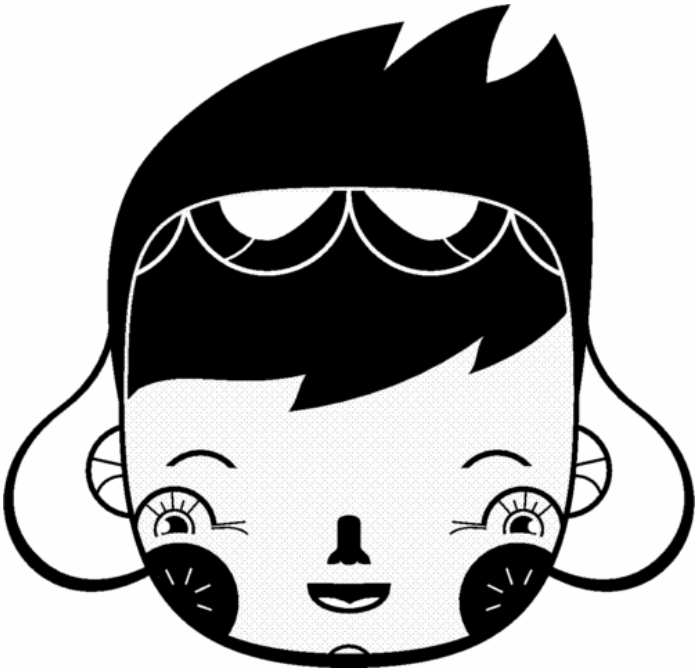
intro: Mounting a Smapler v0002 step by step

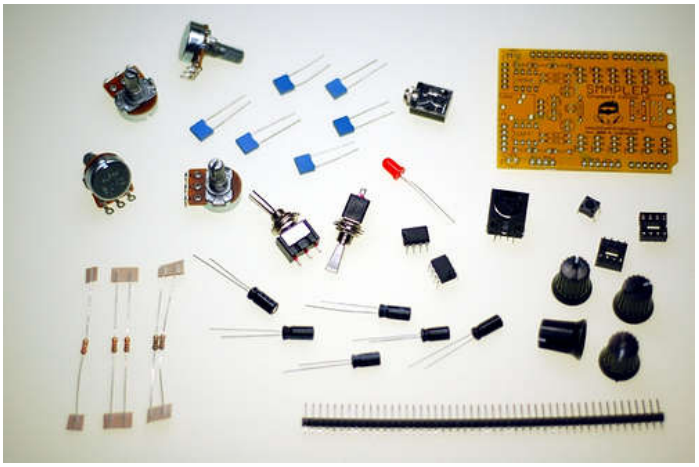
A Smapler is a circuit dedicated to the production of generative sound created by David Cuartielles and Ino Schlaucher from BlushingBoy.org. The Smapler v0002 -aka Singapore edition- is nothing but an Arduino shield to be used for playing funky stereo sounds.

As an extra add-on the Smapler v0002 circuit includes a PS2 connector for you to recycle any kind of PS2 keyboard or mouse as an interface to Arduino.

This Instructable is a guide on how to mount the Smapler v0002 step by step. The circuit comes as a DIY kit that requires between 20 and 50 minutes of your time to mount, depending on your skills.

The design is open source (CC-SA-NC), you can download the schematic, board file, and BOM from here, if you are interested in the original eagle files, you should visit BlushingBoy.org





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step 1: Gear

The tools needed to mount the Smapler are the classic ones for soldering and cutting wires. I am using RoHS soldering tin, a metallic "sponge" to clean the soldering tip, a nice and powerful JBC 26W soldering pen and -just in case- some desoldering bride.

I designed the pads to be extra-wide, what makes soldering very easy. This also makes the PCB more robust to desolder components with the bride.

step 2: From Resistors to Jumpers in 10 steps

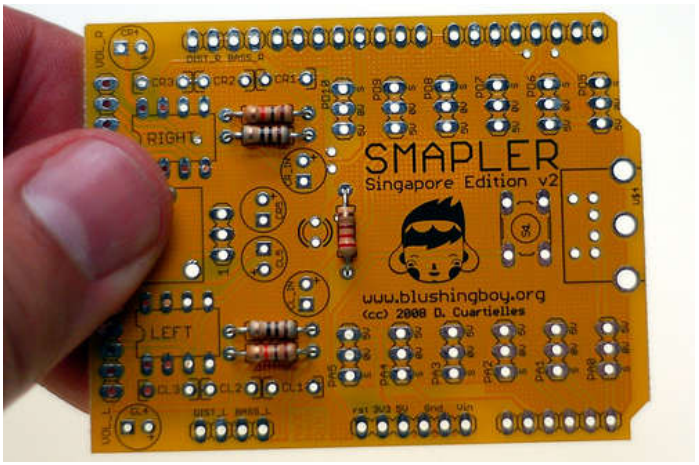
When working with through-hole components the rules for soldering are easy to remember:

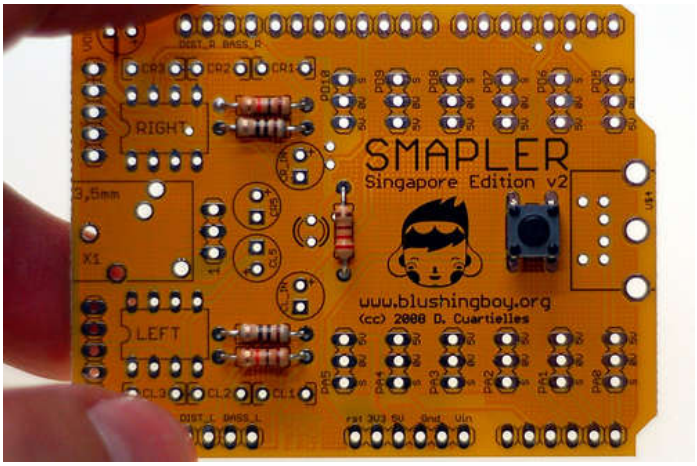
- mount components according to their size (smaller first)
- heat the soldering pad with the pen and place the tin on the pad as well, letting it flow and distribute uniformly over the connection
- less is more: be a little conservative with your use of tin, it is enough to have filled the small hole where the component is connected, you don't need to add a mounting of tin, won't work better, just the same

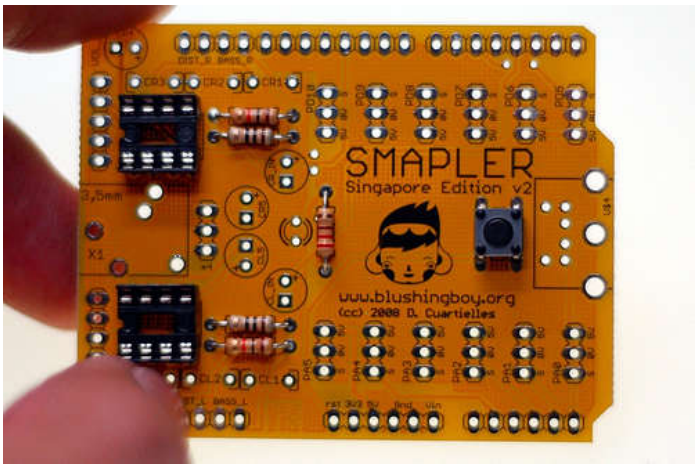
The order is then:

1. resistors
2. pushbutton
3. IC sockets
4. sound jack
5. polyester capacitors
6. LEDs
7. electrolytic capacitors
8. PS2 connector
9. pin headers
10. jumpers

Be very careful with the way you connect the electrolytic capacitors. The through-hole caps are always having the (-) negative pin marked, but the PCBs are always showing the (+) positive one.



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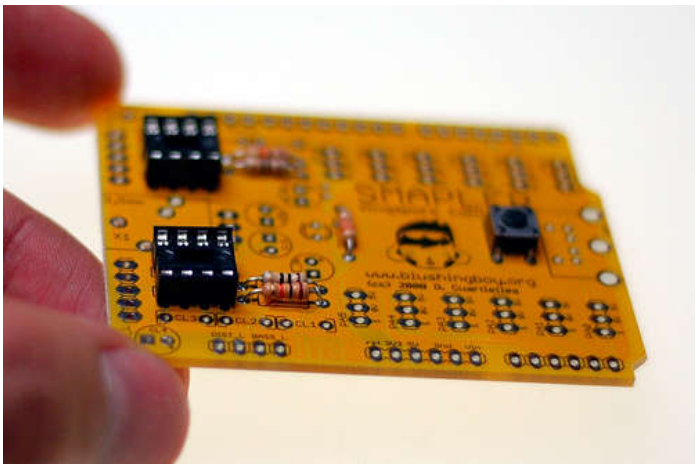

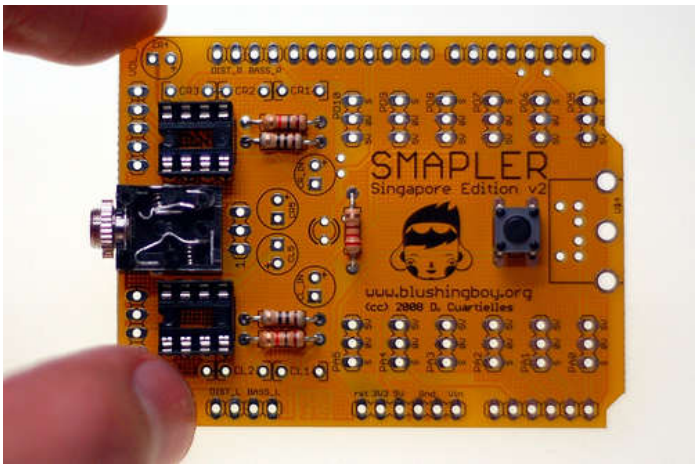
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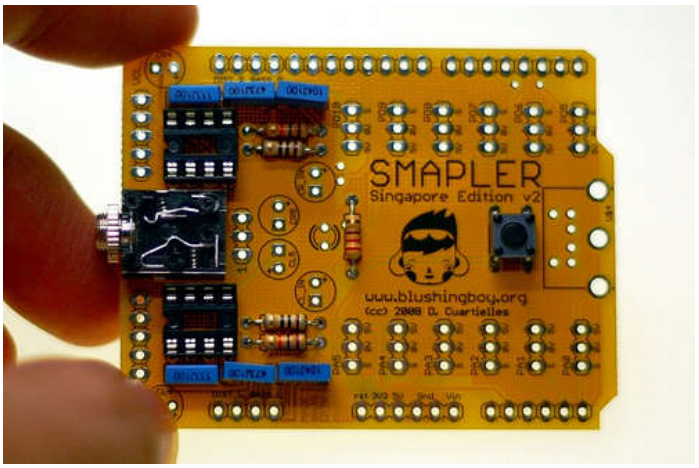
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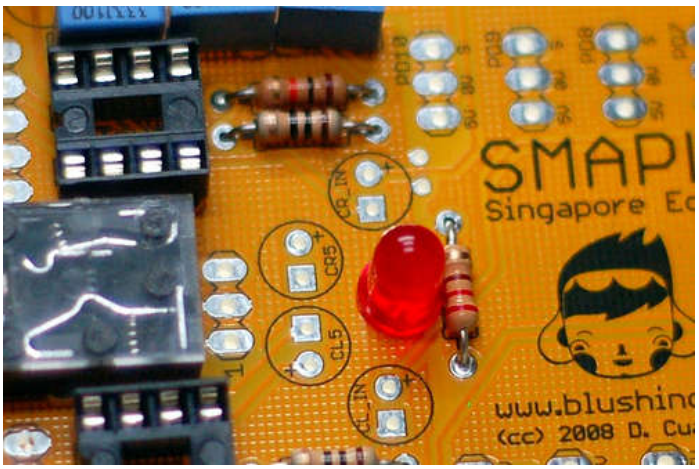
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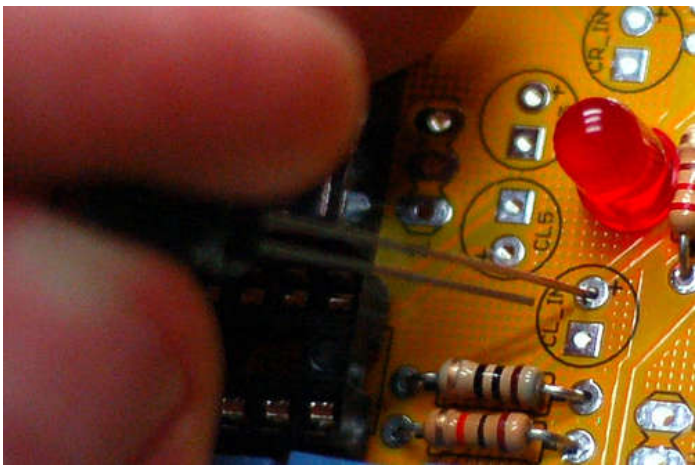
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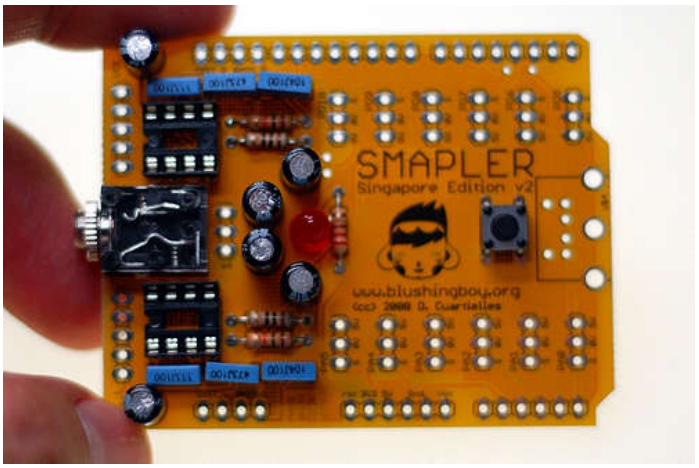
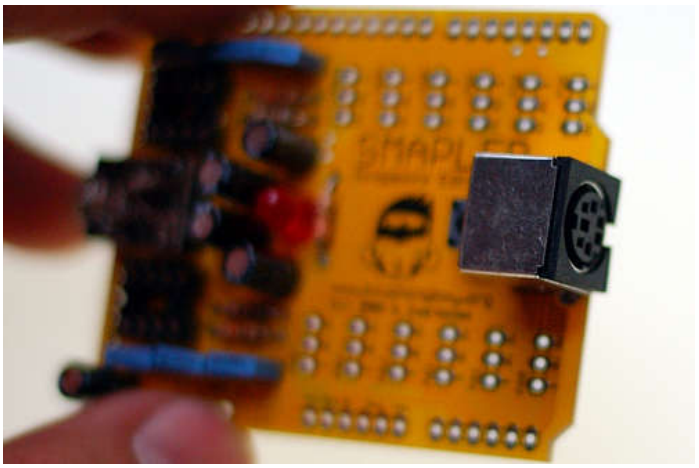
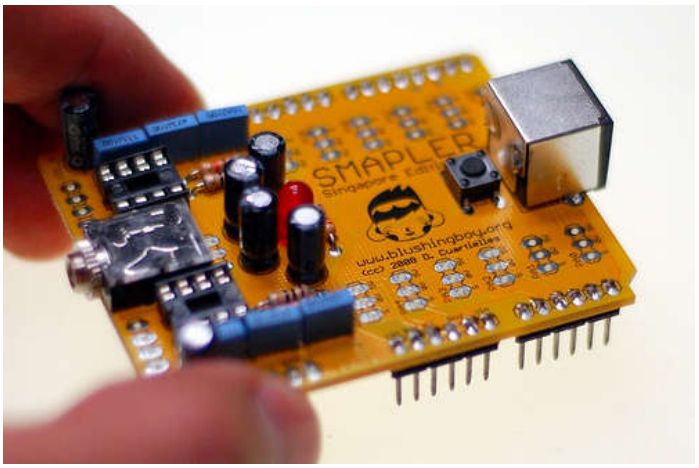
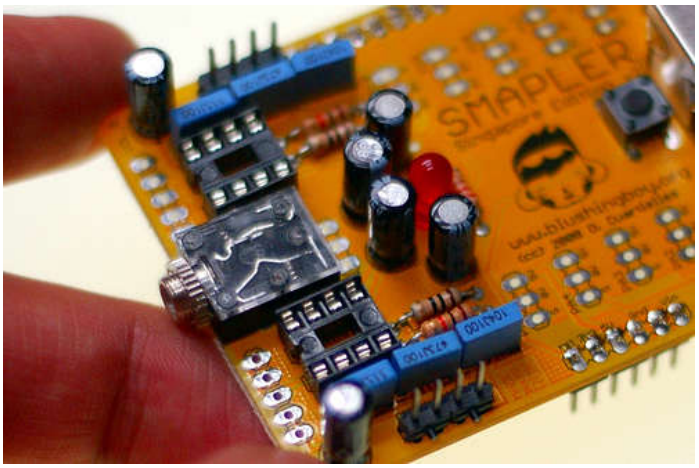




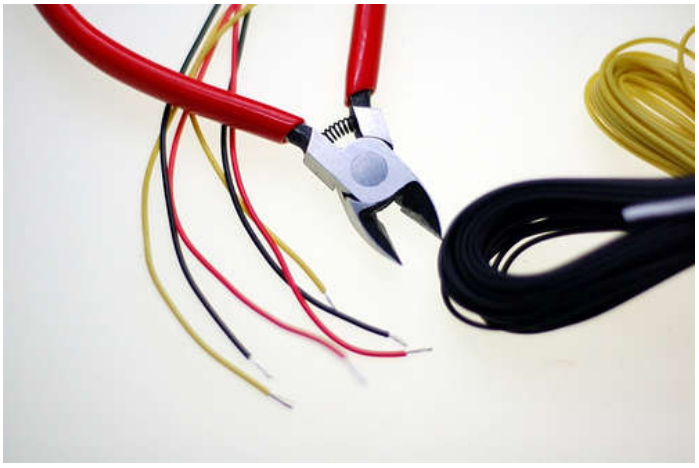


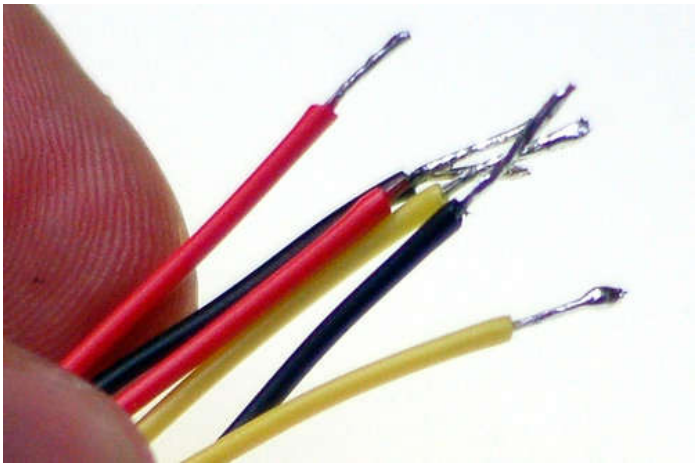


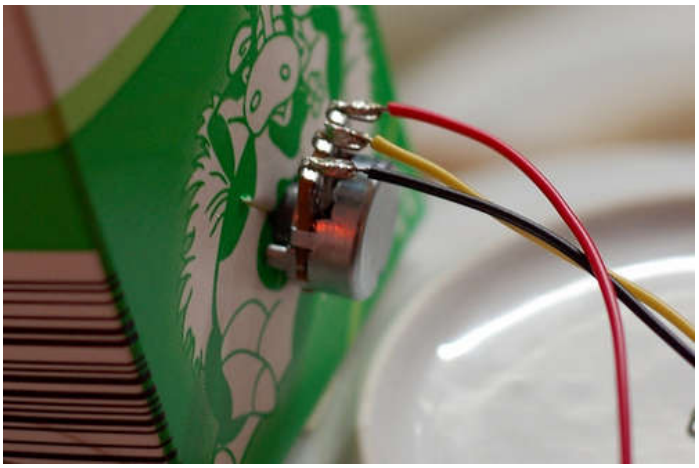
step 3: Preparing the Wires

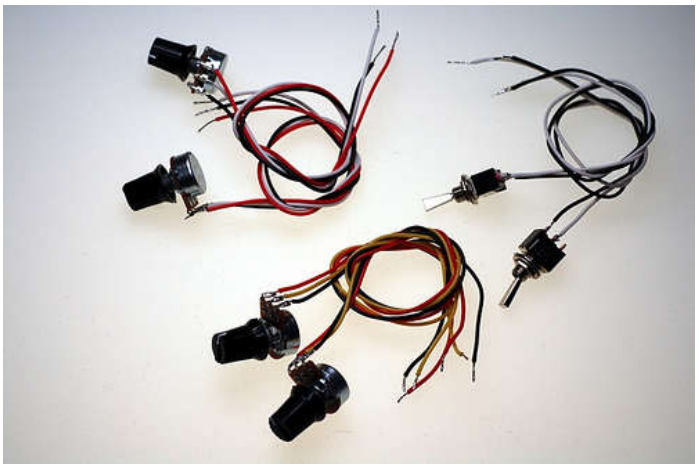
You are going to need some wires to connect potentiometers and switches (as well as whatever other sensors you may be interested in) to your board. I always follow some rules that my dad told me already when I was 9 about how to handle wires:

- if you are planning to connect something to a breadboard, use single-core wires, it will make your life so much easier. This type of wire is weaker, you cannot flex it as much as the other, but it sticks to the breadboard. 0.22mm to 0.28mm are the recommended thicknesses
- if you are making a control panel or something where the components will be moving around a lot, but they won't be ever disconnected from your board then use multi-core wire. It will never break (or not in the device's lifetime). Also recommended for more final projects. Again something in the range of 0.2mm is fine
- when using multi-core wires, put some soldering tin on the cable's tip, just to make it easier to solder to a board or component later on
- after that, solder the wire to the different objects
- if you had e.g. a potentiometer, you should first solder the wires on this component and later hook it to the board. As a matter of fact, you should make all the components first, and then solder them to the Smapler all at once
- when soldering on the components, use some "helping hands" or similar to keep the component fixed, this will avoid accidents. In the picture I am reusing an old milk-carton where I punched the potentiometers to solder the wires one by one









step 4: Hooking up the Pots and Knobs

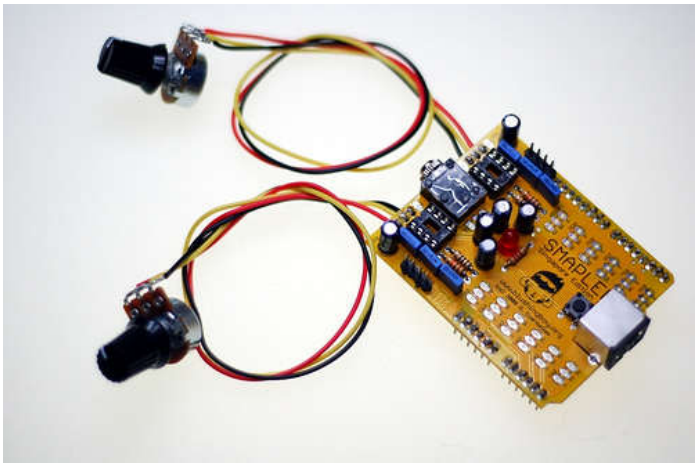
This is an important step. If you were careful with the wiring, you must have been doing a proper color coding of your potentiometers. Note that I always use red for power, black for ground, yellow/white for signals and other colors for other digital bus-like signals.

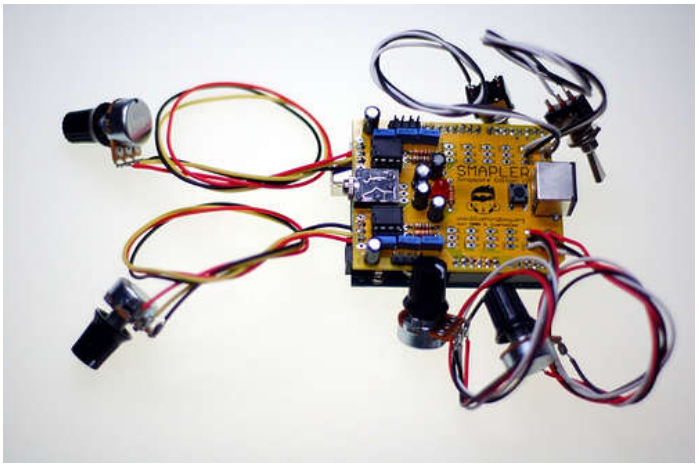
In this Instructable I am using the following:

- red: power, 5V
- black: ground or analog Vref. In the end Vref and ground are connected together at one point in the circuit that makes the digital noise affect as little as possible to the analog sound
- yellow: the gain value for the amplifiers
- white: the analog sensors or the input of a switch

You have to be careful in the Smapler because the potentiometers to control the gain -located at the circuit's front- use a red-yellow-black (power - signal - ground) connection, while the sensors use a white-black-red (signal - ground - power) one. If you happened to connect this wrong, you could burn a potentiometer because of a short-circuit. To check this, you just need to zoom in the picture.

You will also notice that the switches are only using two pins: signal and ground. This is so because we will use the internal pull-up resistors to save some wiring.





step 5:

This video is an early prototype of a Smapler using a computer keyboard shot in Gijon (Spain) after one night hacking some code in August 2008. It was dark and the open movie editor gave its best, but the image quality ended up being a little bad.

Later examples of the objects made with Smapler are the Semla, a collection of 6 unique music instruments controlled by a mouse or a keyboard. They were made by Mattias Nordberg and David Cuartielles at 1scale1.com in Malmo, Sweden. We presented them at the Swedish embassy in Singapore in November 2008.

- Semla pictures (c) 2008 Tony Olsson, from 1scale1.com, also designing for BlushingBoy.org

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Comments

2 comments **Add Comment**

apophene says: Feb 24, 2009. 9:50 AM **REPLY**

Great build guide for the SMAPLER; thanks. Could you maybe add some usage notes about how to work with it, or (even better) some Arduino code? I have to confess, I'm not entirely sure what the little beastie does, even after visiting the BlushingBoy site. Maybe that's a whole other Instructable!

ZrvZ says: Jan 6, 2009. 12:37 AM **REPLY**

nice instructable. :-)