

Mini Joystick with Fire Button

by [gzip](#) on September 16, 2009

Table of Contents

License: Attribution Non-commercial Share Alike (by-nc-sa)	2
Intro: Mini Joystick with Fire Button	2
step 1: Gathering the Parts	2
step 2: Prepare the Switches	3
step 3: Mount the Switches	3
step 4: Solder the Mounting Leads	4
step 5: Solder the Connections	5
step 6: Disassemble the Pen	5
step 7: Thread the Wire	5
step 8: Solder the Fire Button and Cap It	6
step 9: Test the Circuit	7
Related Instructables	7
Advertisements	8

Intro: Mini Joystick with Fire Button

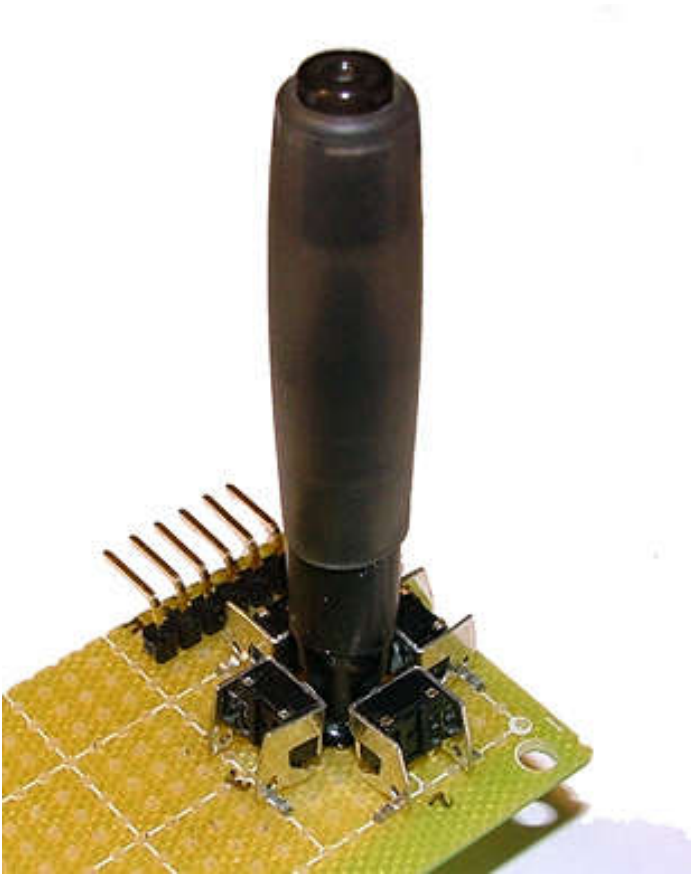
This is a miniature joystick made from a few switches and a ballpoint pen. An optional fire button can be added if your pen is the clicker type. The action is very smooth and responsive. A bit of back story follows so feel free to skip it and get right into building.

Most projects start with an idea and then you source components to build it. This one started from a simple component which turned into an idea.

I had made a purchase from the Electronic Goldmine and got a free **surprise box** with my order. The box contained around 50 **right angle switches** amongst a lot of other goodies so I started thinking about what I could do with them.

It didn't take long before I came up with the idea of mounting four of the switches around a center point and using something to control them like a joystick. But what to use as the joystick? I rummaged through my junk pile and found half of an old pen, perfect.

I prototyped it out and it worked okay. The first thought was that it would be cool to have a button at the top of the joystick. I needed a better pen, the retractable type with a clicker. I built another version with the same electronics and a new pen. It was close but there were still some issues to work out. The third time was a charm and I'm very happy with the results. So let's get started.



step 1: Gathering the Parts

What we'll need:

- 1) A pen, preferably the retractable type but just about any pen will do.
- 2) Four right angle push button switches.
- 3) A long screw, the smaller the diameter the better, and a nut to match. I used a 4-40 at 1-1/2 inches long. A 2-56 at the same length would be even better but I couldn't find one at the local hardware store.
- 4) A small piece of proto board.
- 5) Some hook up wire. The thinner the better.
- 6) Headers of some sort.
- 7) A small grommet (optional).
- 8) A round push button switch (optional, not pictured).

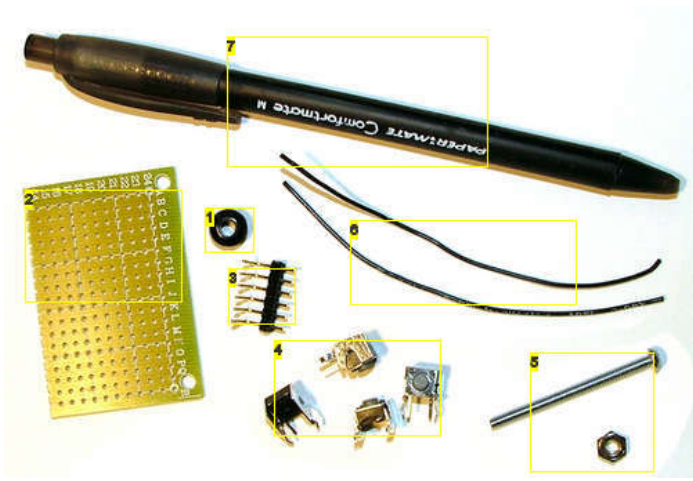


Image Notes

1. A small grommet. This is optional and could be replaced with a small washer or something else.
2. We only need half of this size. Two joysticks could fit on this one or there's plenty of room for a few more push buttons switches to make a gamepad.
3. The headers could be any type. These make the joystick more modular and easy to hook up. Right angle male headers are used here.
4. Right angle switches,
5. A nut and bolt about 1-1/2 inches long.
6. Some hook up wire.
7. The Comfortmate came out particularly nice but whatever u have laying around should work.

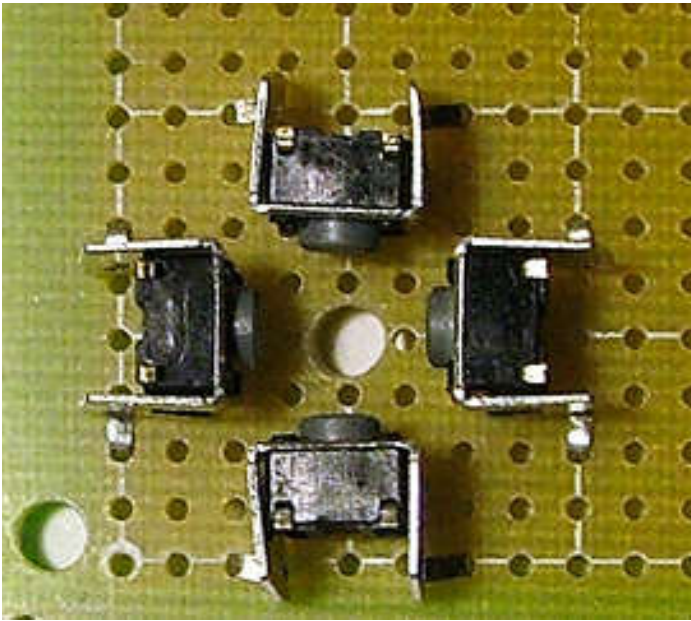
step 2: Prepare the Switches

The switches don't quite fit in the protoboard in their default configuration but that's easily fixed. We just want to bend the mounting leads out and then down into a right angle. The leads already have a slight bend in the correct place.



step 3: Mount the Switches

We want to mount the four switches facing in around a center point. Then drill a hole just slightly bigger than your bolt.



step 4: Solder the Mounting Leads

Next we'll flip the board over and solder the mounting holes along with the headers.

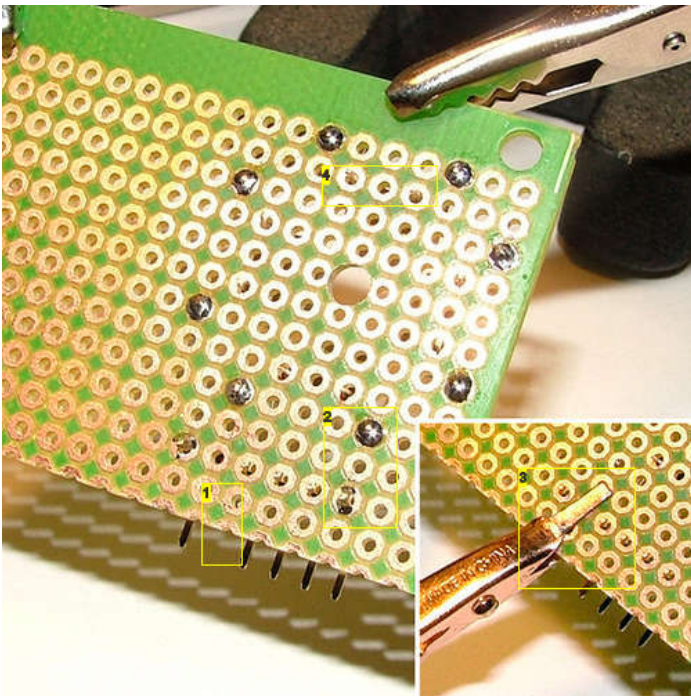


Image Notes

1. I started out without a fire switch so there should be a pin here if you want one to include that switch.
2. You should only solder the mounting leads and the outer header pins to keep everything in place. Leaving the other pins open will make it easier to solder the connecting wires.
3. This is how I hold headers in place while soldering them. Much easier and more accurate than bending the leads.
4. The button leads are left unsoldered at this point.

step 5: Solder the Connections

Now we're going to connect the switches to the headers. One leg of each switch will connect to a single header (white wire) while the other legs will connect to a single common signal pin (black wire). The signal pin can be connected to a voltage or ground depending on your application.

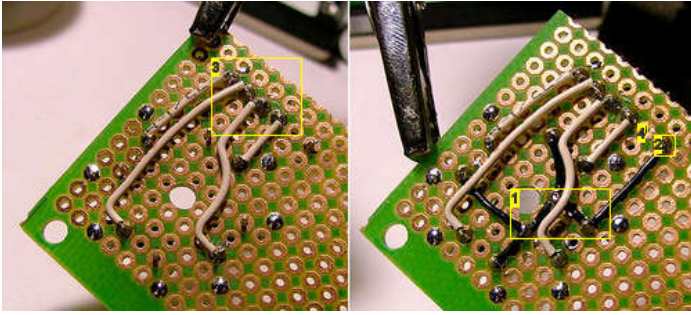


Image Notes

1. All the switches are connected to a common pin via the black wire.
2. Signal pin.
3. Each button gets its own pin.
4. Guess what's gonna go here later.

step 6: Disassemble the Pen

Time to take apart the pen. Disassemble it completely and make a few cuts with a razor blade to prepare the joystick. I found it a bit hard to cut a right angle with the razor blade so ended up sanding the ends to straighten them out.

Put the two smaller pieces back together and hold on to the larger piece for later.



Image Notes

1. Keep this.
2. Keep this.
3. Keep this for later.
4. We'll use the spring later.
5. Put these two pieces back together. I used a light tap of the hammer since it was a tight fit on the cut end which tapered a bit.
6. Make sure the bolt fits with a little wiggle room to fit two wires.
7. This will be the business end of the fire switch,
8. We don't need this.
9. Don't need this. Maybe it'll be useful in another project.

step 7: Thread the Wire

There are a handful of steps here but only a few photos. Make sure you have a switch that will fit in the pen body before proceeding. Otherwise you can skip to the last paragraph.

The first step is to cut off one end of the grommet so that it lays flat. Then punch a few small incisions on either side of it using a small flathead screwdriver or a razor. The grommet serves as a cushion for the joystick and prevents the pen tip from catching in the hole.

Next, run each wire through the grommet and through one of the holes in the perfboard (preferably not the large hole we drilled out earlier). The holes will probably need to be widened slightly depending on the gauge of the wire.

Next we want to solder each of the wires. Like the buttons before, the white one connects to its own header and the black one to the common signal pin.

Now take bolt and flatten each side using a cutoff wheel or grinder. We need to make enough room for the two wires and the bolt within the pen body. The end result is that the bolt should be more rectangular than round. The bolt will still be able to screw on if we leave enough thread.

Lastly we want to thread the bolt and two wires through the body of the pen. This step can be a little tricky depending on the width of the bolt, gauge of the wire, and the diameter of the pen. Be patient if you don't get it on the first try, it took me several tries to get it right. Once the both makes it through you can put the spring and bolt on.

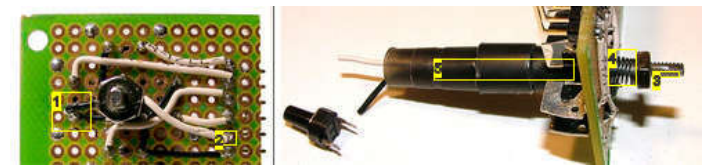
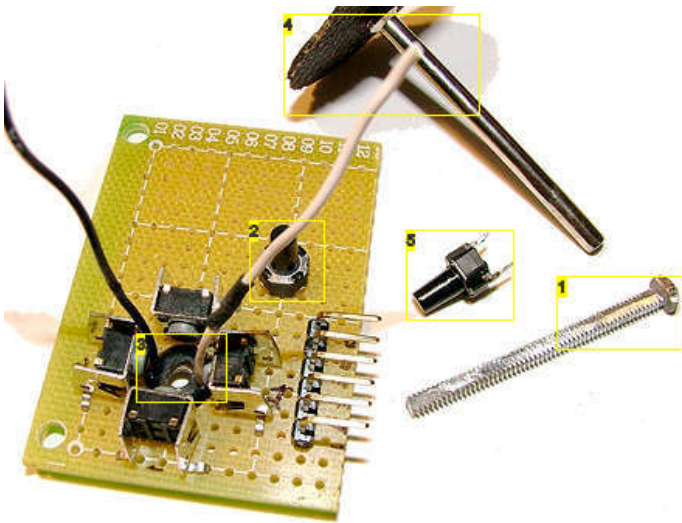


Image Notes

1. Not exactly planned.
2. The fire button gets it's own header pin.
3. The bolt is pretty flat to allow the wire through as well but there's still enough thread to attach a bolt.
4. The spring keeps the joystick in an upright position and gives it nice response when moving it.
5. The wires and bolt are sandwiched in here.

Image Notes

1. This should be flat all the way across on both sides without a lip at the head end.
2. We only need one of these switches, this is just to show what it looks like from the top.
3. The wires are threaded through the wall of the grommet and through one of the smaller perf holes.
4. A cutoff wheel used to flatten out the bolt.
5. I was lucky to have this switch laying around since it fit in with a little force.

step 8: Solder the Fire Button and Cap It

We're almost done. Now it's time to solder each of the wires the the button's leads. Once that's done give the wires a twist or two to pick of the slack and force the button into the end of the pen. Then put a stopper in the pen to provide a solid clicking surface and put the end on to seal it all up.



Image Notes

1. It helps to lightly clamp the wires in the correct spacing while soldering.

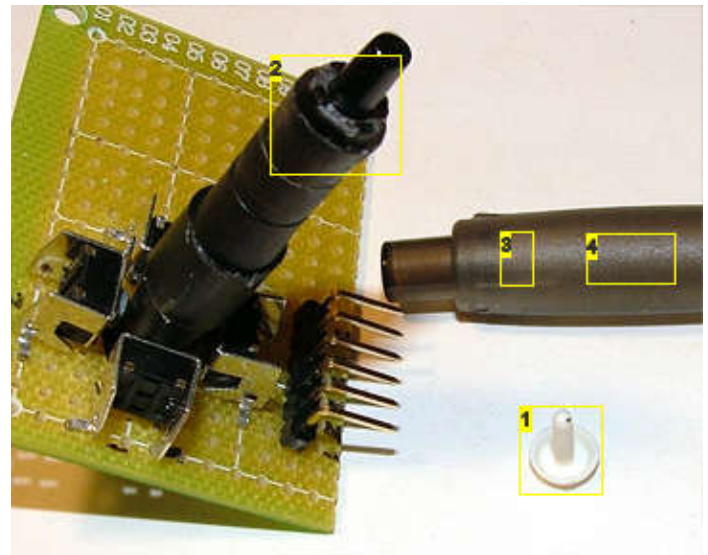


Image Notes

1. Some plastic piece I had laying around. Any small disc will do. The flat end makes contact with the button.
2. This is a pretty tight fit so I had to apply some force to get the button in.
3. Plastic stopper goes here.
4. The button will end up around here once you put the end on.

step 9: Test the Circuit

The joystick is now done so it's time to test it out. This test circuit connects each of the LED anodes (the long lead) to each of the button pins. The cathode of each LED (short lead) is connected to the signal pin.

The button pins then connect to the positive terminal of the battery while the signal pin is connected to the negative terminal. Activating each of the buttons will complete the circuit for a single LED.

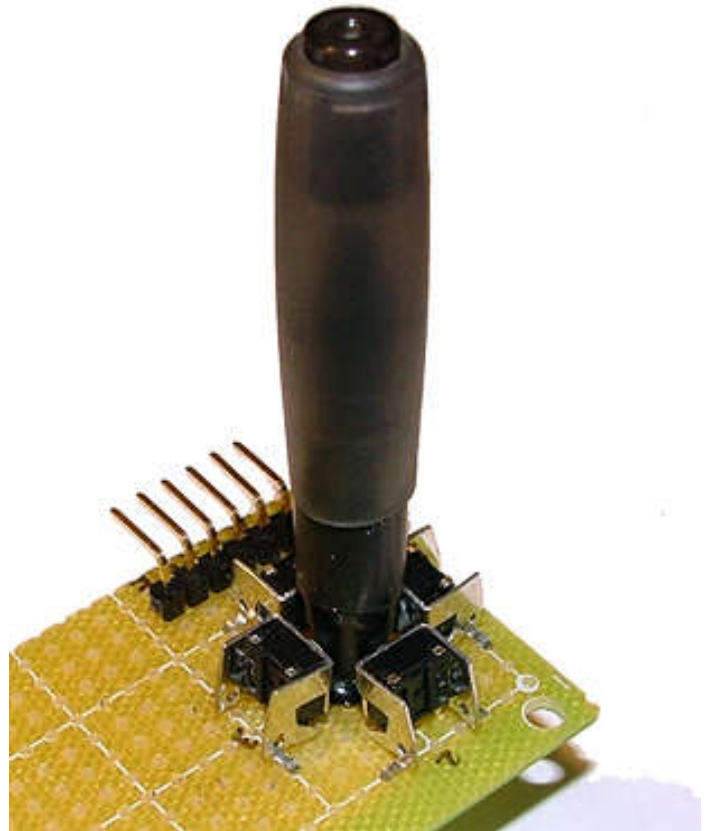
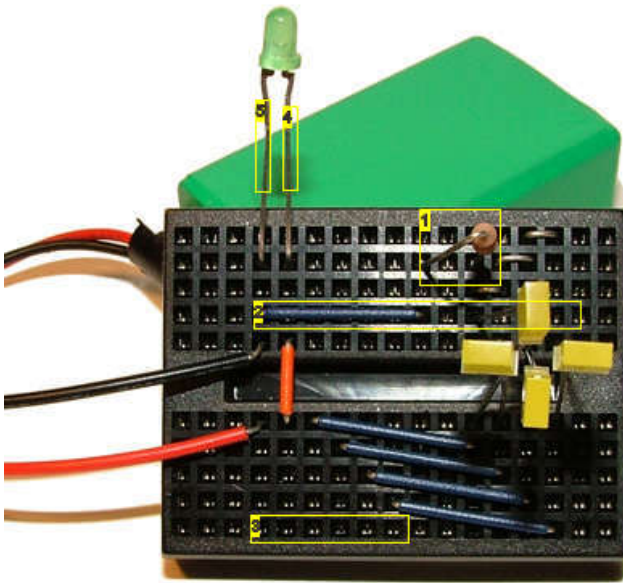


Image Notes

1. A resistor to reduce the current.
2. All the cathodes are connected to the signal pin which in turn is connected to the negative terminal of the battery.
3. The six header pins connect here.
4. Anode.
5. Cathode connected to negative.

Related Instructables



How To Radio Control DC Motors Cheaply
by AI1970



How to build a Nintendo arcade
by russm313



Modify PSX Controller for Vectrex Games Console
by calamitydrains



control arduino using joystick
by everywhere



Punchout Interactive Interface Improved
by samseide



SNES to Parallel Port
by Hungry_Myst

