TOUCH SENSITIVE LIGHT PAINTER — JAMECO PART NO. 2170513

Experience Level: Beginner | Time Required: 2 Hours

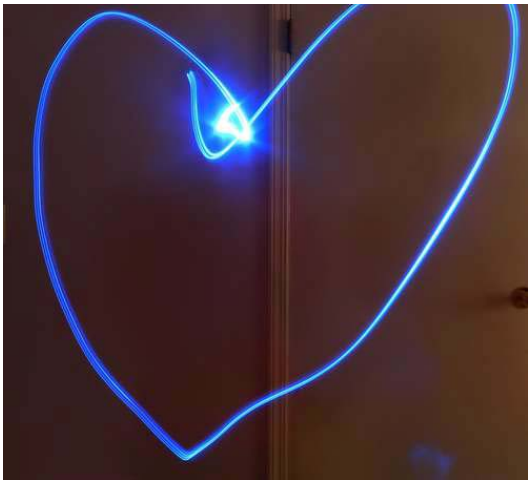
Light painting is a photographic technique used to create special effects at slow shutter speeds. A flashlight is usually used to "paint" the images. You can build your own light painter with touch switches that is very simple to build.

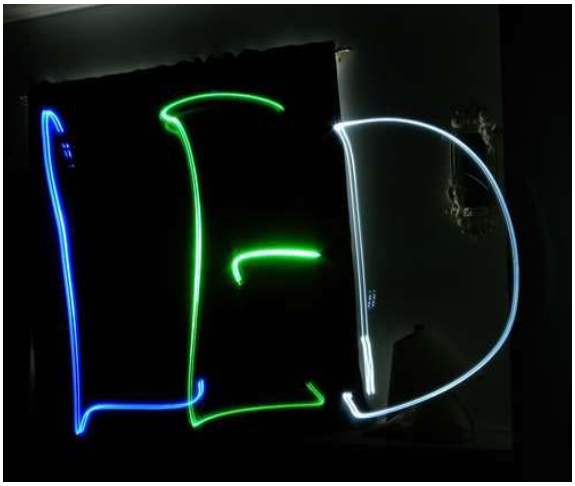
Required tools and parts:

Soldering iron and solder
Wire stripper/cutters
Hot glue gun
Drill
Pen case

Kit Includes:

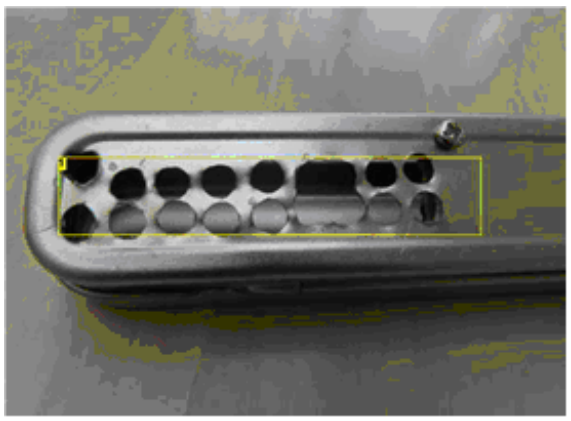
Green LEDs	Transistor,2N7000
Yellow LEDs	9V Energized Battery
White LEDs	Prototype Board
Red LEDs	82Ω Resistor ¼ Watt 5%
Blue LEDs	9V Battery Snap
20Ω Resistor ¼ Watt 5%	10MΩ Resistor ¼ Watt 5%



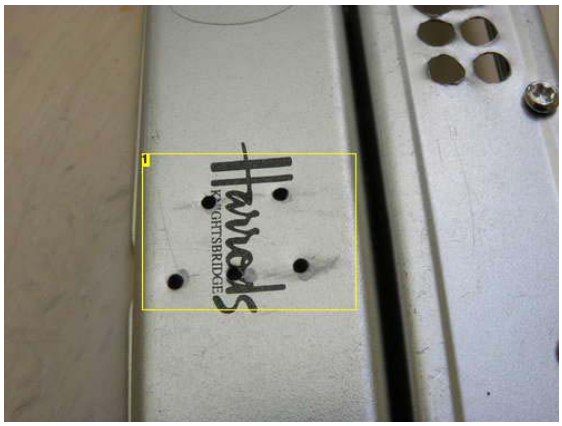


Step 1 - Drill Holes on the Case

Decide where you want the touch switches and LEDs to be. Use four red, four yellow, two green, two blue, and two white LEDs. Using one LED per color will allow you to use a smaller case and create more solid lines. If you use RGB LEDs, you can produce a wide range of colors by varying the resistor's values.



1. Drill holes for LEDs

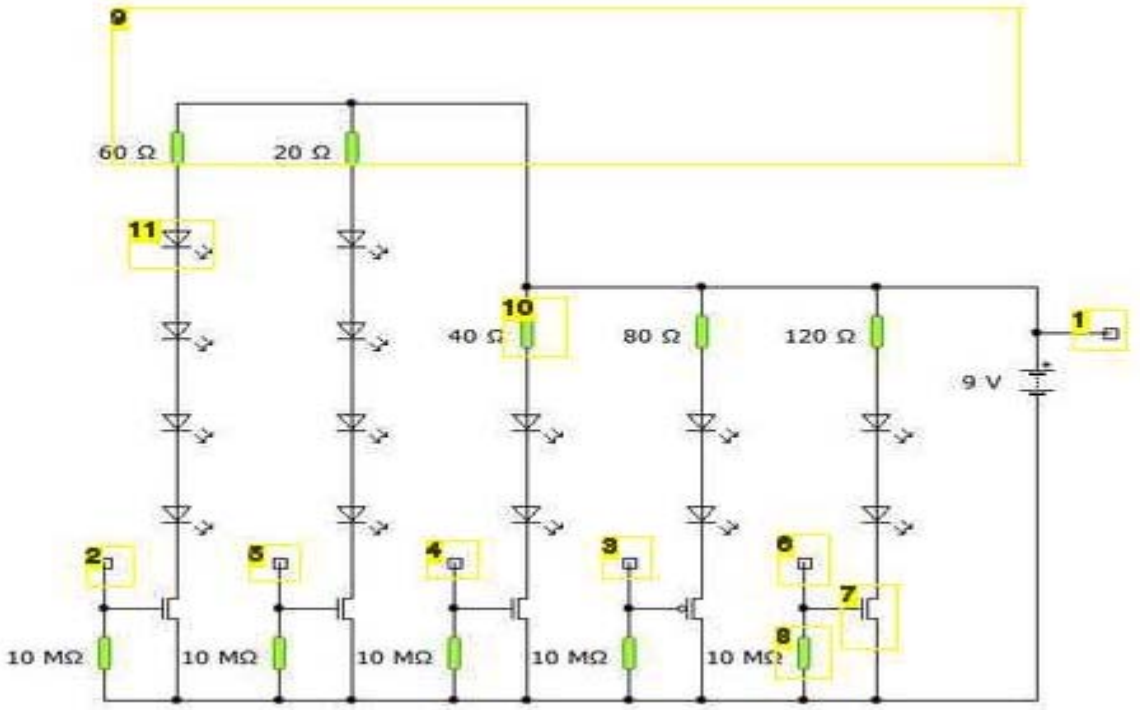


1. Drill holes here

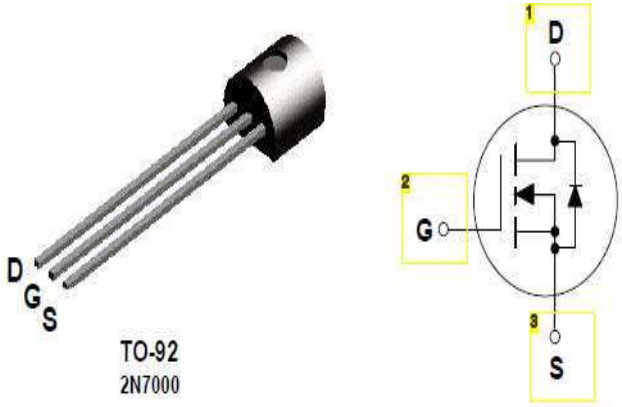
1. **LED**
2. **Touch Switch**

Step 2 - Touch Switch

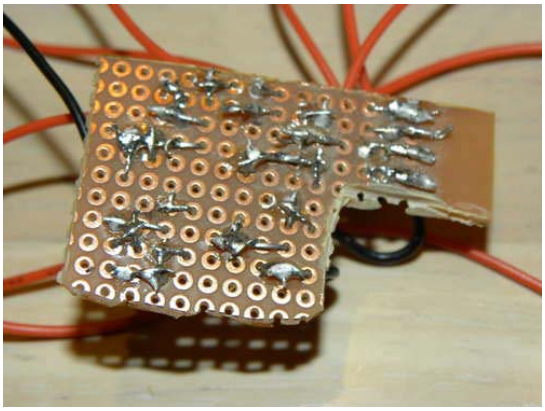
The touch switch here is a momentary switch. It uses N-channel MOSFETs. When you touch the anode (+ terminal) and gate, it will turn ON. Compared to mechanical switches, touch sensitive switches respond instantaneously and allow you to use multiple colors at the same time. In this circuit, there are six wires which are the electrodes. Since MOSFETs rely on charging their internal Capacitors to turn ON, they need to be discharged before it will turn OFF. The 10M resistors discharge them. Since the enclosure may be very small, you should keep the circuit board small. Hence, solder the MOSFETs, wires, and 10M resistors to it. For metal cases, insulate underneath the PCB with a sheet of plastic. You can get them from plastic bottles. If you are grinding the PCB, wear a fiberglass safety mask and goggles. Always wear eye protection while soldering.

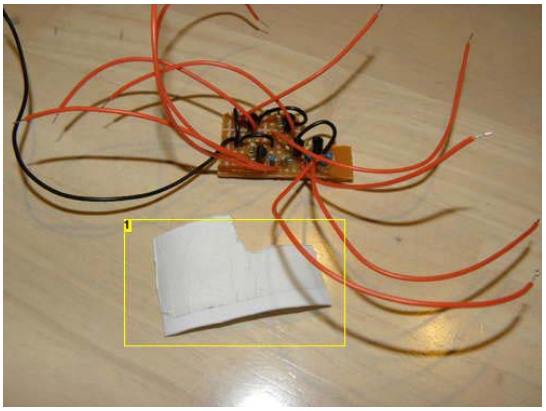


1. Common anode (solder wire here)
2. red (on) electrode
3. blue (on) electrode
4. green (on) electrode
5. yellow (on) electrode
6. white (on) electrode
7. 2N7000
8. 10M discharge resistor
9. Touch switch circuit
10. Current limiting resistor.
11. LEDs

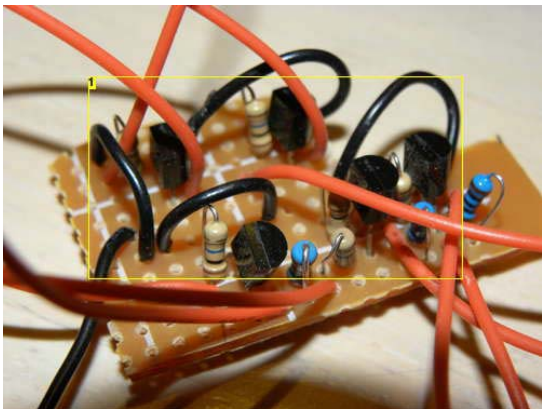


1. drain
2. gate (solder here)
3. source





1. Plastic from bottle as insulator



1. Circuit board for the touch switches

Step 3 - Attaching LEDs to the case

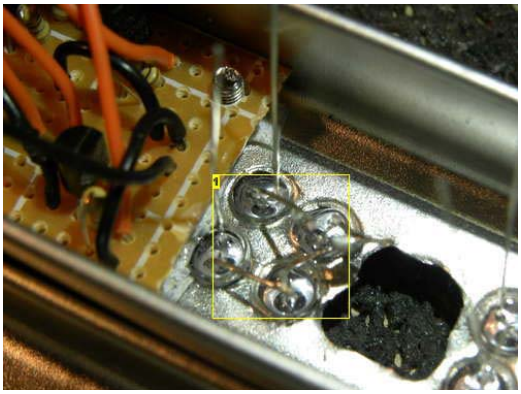
To attach the LEDs, line up the LEDs with long pins (anode) facing the short pins (cathode) and glue them into the drilled holes with epoxy. Allow them to set before soldering them.

Step 4 - Calculate Resistor Values
The resistor values were selected for 20 mA LEDs. You can calculate the resistance values here: http://led.linear1.org/1led.wiz. 1/4 watt works fine.

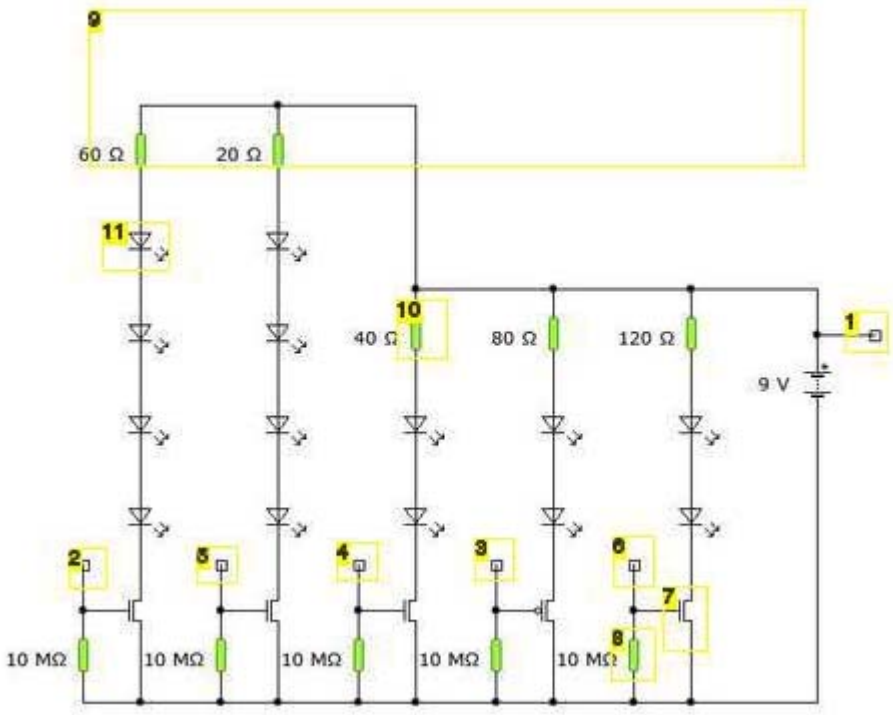
The forward voltages of the LEDs were:
Red: 1.7V
Yellow: 2.0V
Green: 3.8V
Blue: 3.6V
White: 3.6V

The resistor values I used were:
4 x red: 60 ohm
4 x yellow: 20 ohm
2 x green:40 ohm
2 x blue: 80 ohm
2 x white: 120 ohm

Step 5 - Solder the LEDs
To solder the LEDs, bend the leads so that their anodes (long pins) and cathodes (short pins) touch each other. Solder them in series to a resistor.


1. Solder Anodes to Cathodes of LEDs


1. Soldered LEDs to resistors
2. Resistors in heat shrink tubing



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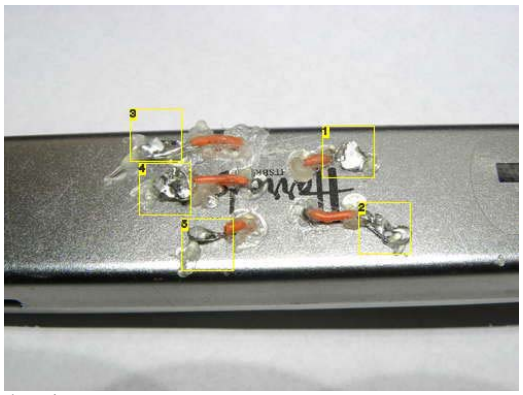
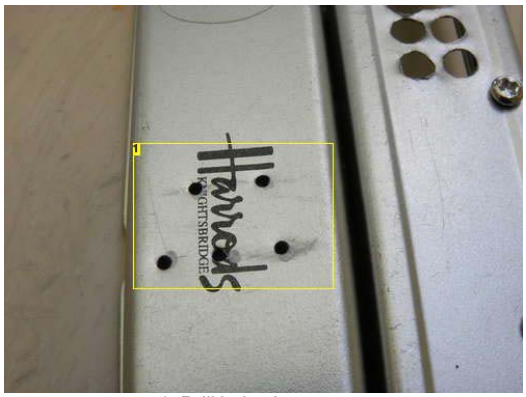
Step 6 - Electrodes for the Switch
To make the switches, cut wires long enough to thread into the holes with the case fully opened. Solder the wires as shown in the diagram. The wires sticking out should be stripped and tinned. To make the contacts larger, you can mold some solder on the wires. Since you will be handling them, **the solder must be lead free.**

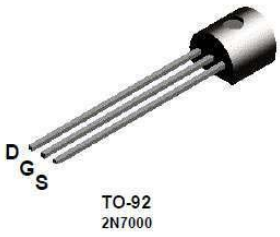
Tip: If you have spent solder, this is where you can use it. They will stick to tinned wires.
Hot glue the wires to the case. If the case is conductive, you may use hot glue to insulate it from the wires. Avoid coating the electrodes with hot glue.

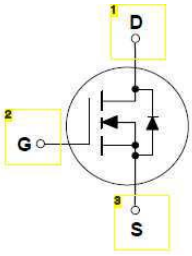


1. red
2. yellow
3. green
4. blue
5. white



1. Drill holes here





1. drain
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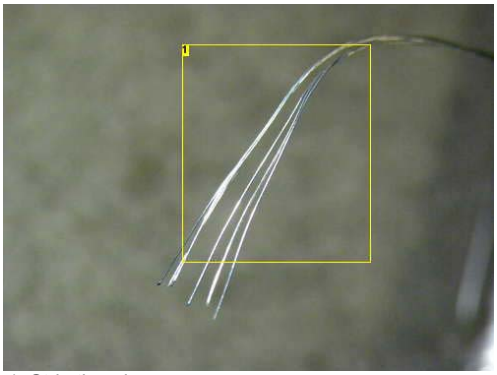
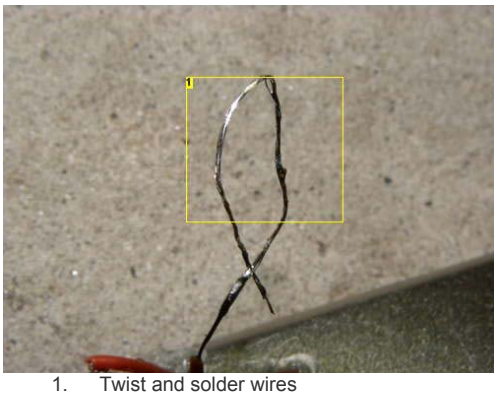
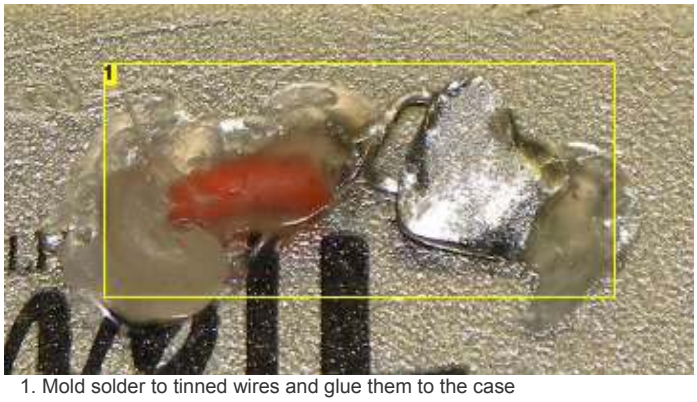
3. source



1. Strip the wire



1. Twist and solder wires



1. Mold solder to tinned wires and glue them to the case

1. common anode

Step 7 - Mount the PCB

To mount the PCB, you can either use hot glue or bolts.

Step 8 - Light Painting

To light paint, set the shutter speed to long exposure. Mount your camera onto a tripod. Using a timer may be useful.
The photos below were taken under slow shutter speed (10 seconds). The longer the exposure, the better.