DIY Magic Mirror

Building the Magic Mirror Sensor Hub Board Version 3.0

Part List

See http://diymagicmirror.com/hardware.html for recommended places to buy the parts.

Part	Manufacturer Part No	Mouser Part No	Qty	Description
Arduino Board	http://arduino.cc		1	Arduino Diecimila, Duemilanove, and Seeeduino have been tested
DIY Magic Mirror Custom PCB			1	2 Layer PCB Layer Board: 3 inches x 2.70 inches
10K Linear Potentiometer (PCB Mount)	BI Technologies P160KN-4QC20B10K (preferred if available) or P160KNPD-4FC20B10K	P160KN-4QC20B10K (preferred) or 858-P160KNP4FC20B10K	1	16mm Pot, Linear Pot, 20mm shaft length, teeth kurl shaft type, 41 detent preferred but 21 or 11 detent also ok, PC pins (not Long Pins or Rear Adjust PC Pins)
10K Linear Potentiometer	Alpha RV120F-10-15F-B10K	313-1210F-10K	1	Panel Mount Potentiometers Linear D-Shaft 10K, for exernally mounted POT
5mm LED Blue			1	
Male DB9 Connector - PCB Right Angle Mount	Kobiconn 152-3309	152-3309	1	Must have same PCB footprint as this part, Male
40-Pin Header	Tyco Electronics 4-103239-0	571-41032390	1	
220 Ohm 1/4 watt resistors	Xicon 291-10K-RC	291-10K-RC	5	Project needs 4 resistors but added one extra
10K Ohm 1/4 watt resistors	Xicon 291-220-RC	291-220-RC	6	Project needs 5 resistors but added one extra
Proximity Sensor	Maxbotix EZ-1		1	The LV-MaxSonar EZ-1 detects objects from 0 to 21 feet (6.45 meters)
SPDT Slide Switch	APEM MMS1208		1	SPDT slide switch ON-ON with .1" spacing
RJ45 Jack (PCB Mount) - Black	Molex 8/8 MOD JACK R/A	538-95009-2881	2	

Part	Manufacturer Part No	Mouser Part No	Qty	Description
3 ft Cat-5e cable - White (Stranded UTP, T568B wiring convention)	Emerson / AIM-Cambridge 73-7776-3	601-73-7776-3	1	Must be Stranded and T568B Wiring Convention One end of the cable will plug into the DIY Magic Mirror PCB board and then other end will be cut-off and the user will connect the sensors to the corresponding wire per the wiring diagram
3 ft Cat-5e cable - Black (Stranded UTP, T568B wiring convention)	Emerson / AIM-Cambridge 73-7771-3	601-73-7771-3	1	Must be Stranded and T568B Wiring Convention One end of the cable will plug into the DIY Magic Mirror PCB board and then other end will be cut-off and the user will connect the sensors to the corresponding wire per the wiring diagram
JST 2 Pin Jack			1	
JST 2 Pin Power Connector			1	
USB Cable			1	Mini-USB cable if using Seeeduino
Red Stranded Wire 24 AWG			1	Length will depend on how much wire is needed for your installation
Black Stranded Wire 24 AWG			1	Length will depend on how much wire is needed for your installation
White Stranded Wire 24 AWG			1	Length will depend on how much wire is needed for your installation

Tools

- Soldering Iron
- Solder
- Wire stripper (for stripping 24 gauge wire)
- Wire cutters (flush edge if you have one)
- Panavise PCB holder (not required but helps if you have one)

Building the Magic Mirror Sensor Hub

Background

Figure 1 shows the logical architecture of the DIY Magic Mirror. The sensors communicate with the Arduino micro-controller which then sends serial data to the serial server running on the Computer. The serial server then forwards this data to a network port which the DIY Magic Mirror Software reads.

For X-10 control, the DIY Magic Mirror Software sends lighting commands to the Arduino which then forwards these commands to the X-10 Firecracker CM17A.
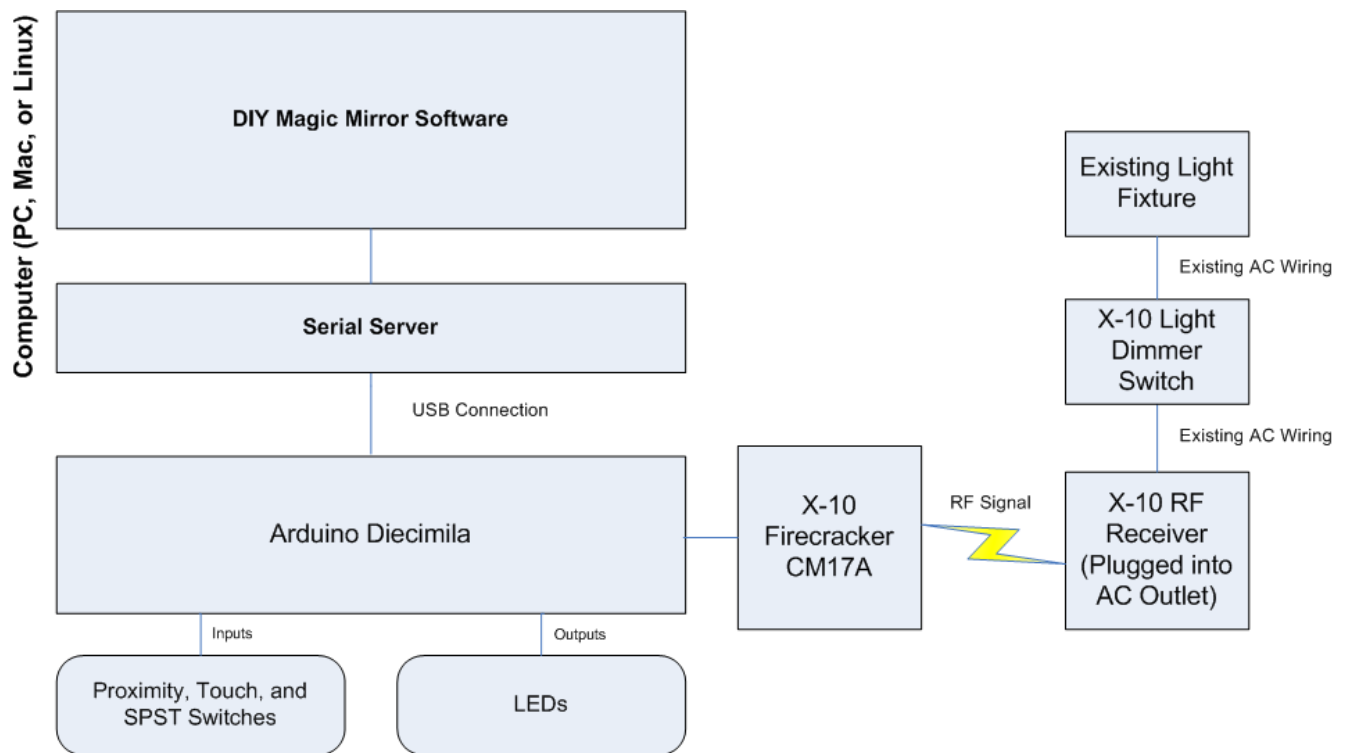
Figure 1 – DIY Magic Mirror Logical Architecture
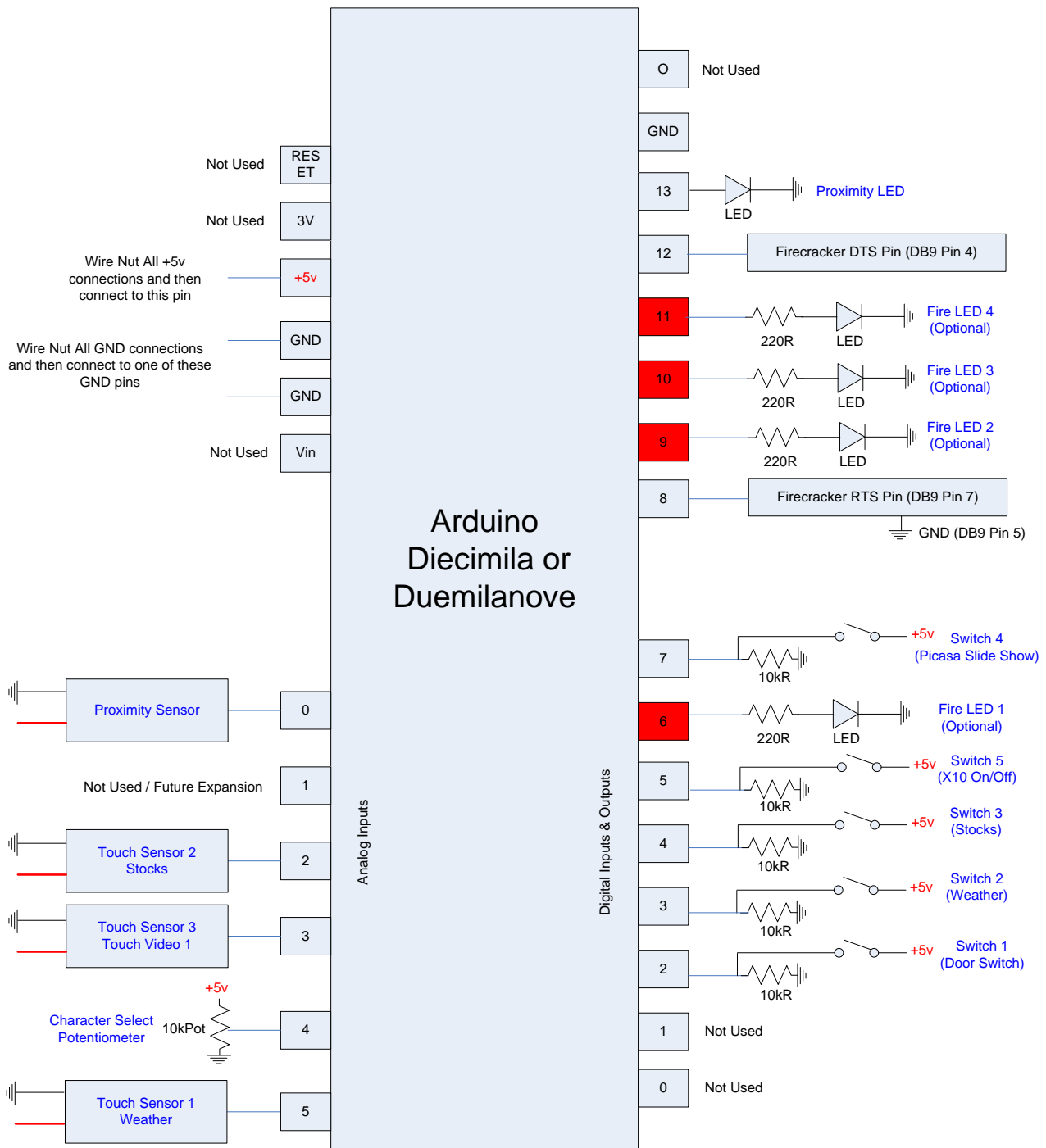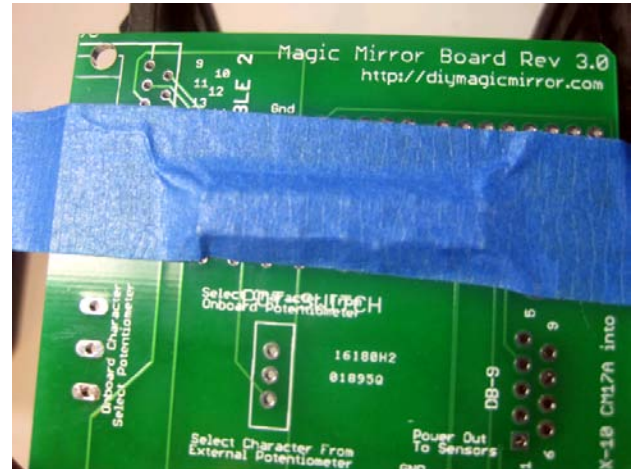
Figure 2 – Magic Mirror Sensor Hub Schematic
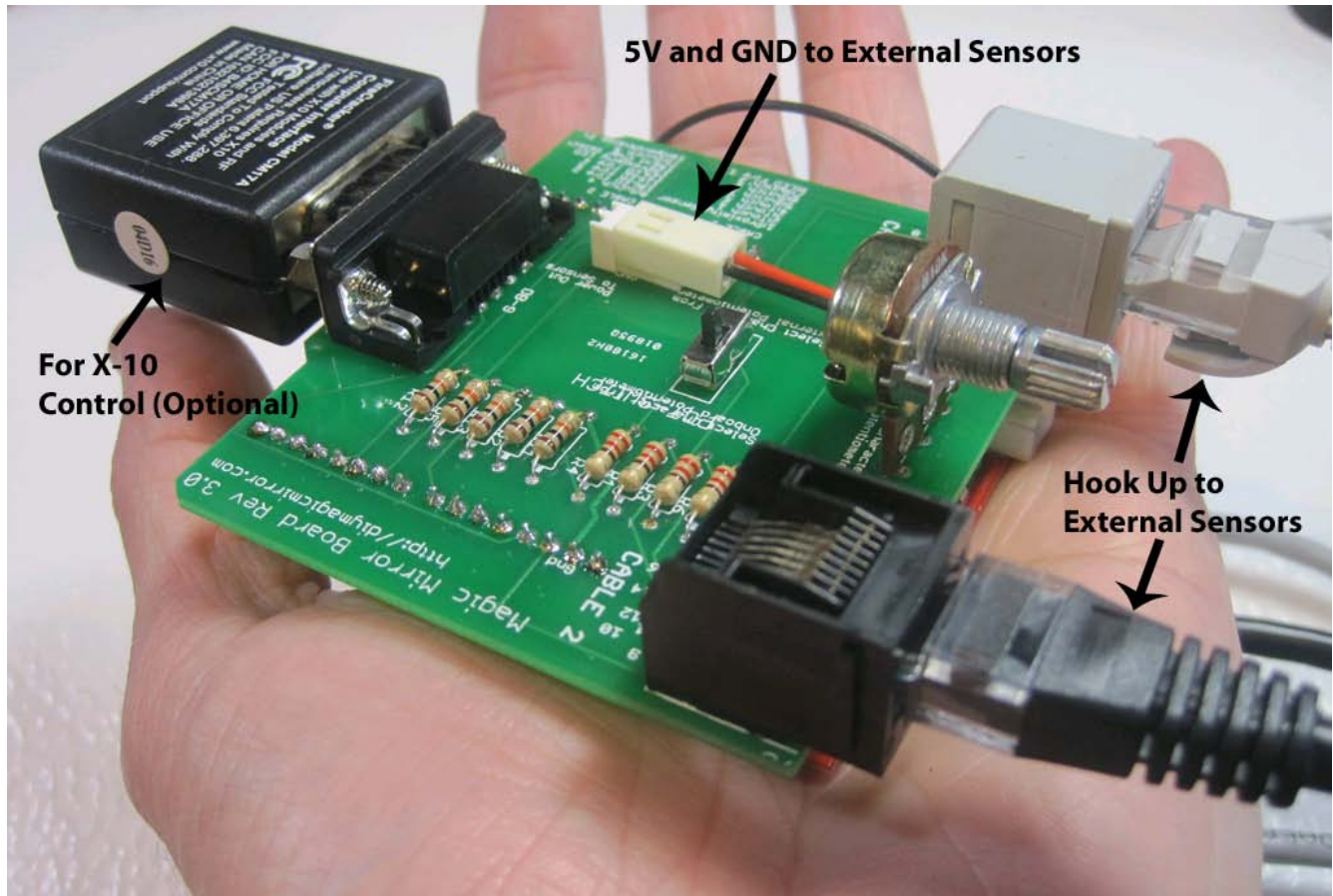
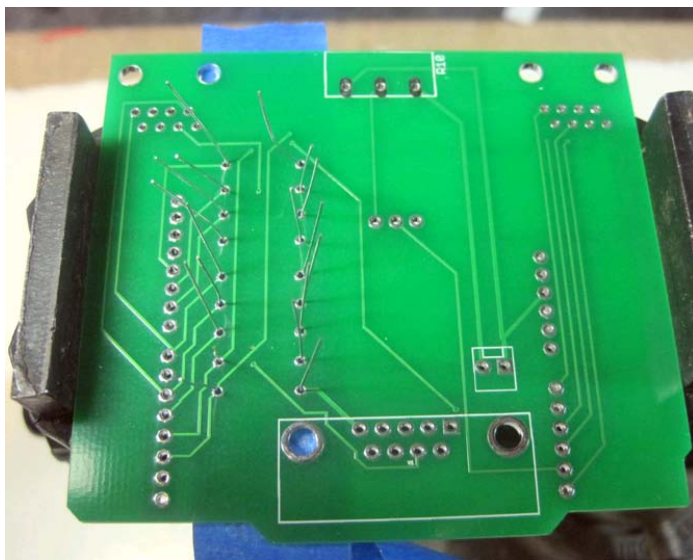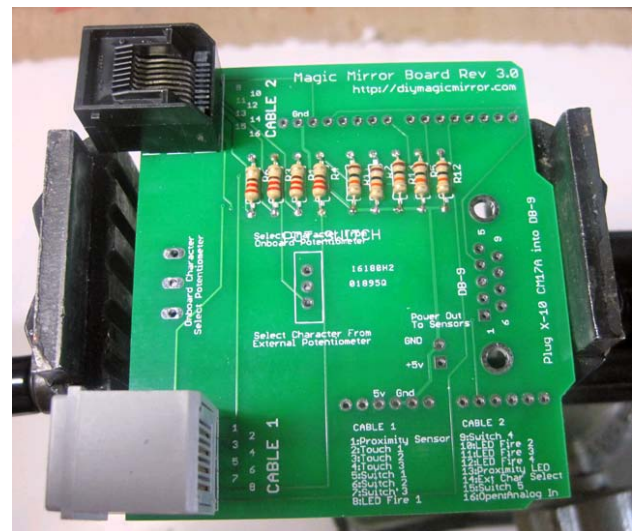Figure 3 - Finished Magic Mirror Sensor Hub
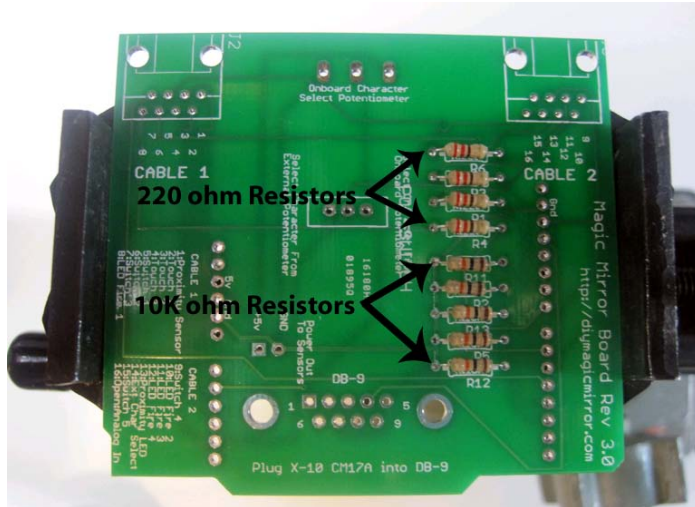
Bend and insert resistors, note on the board where to place the 220 ohm resistors (4) and the 10K ohm resistors (5)
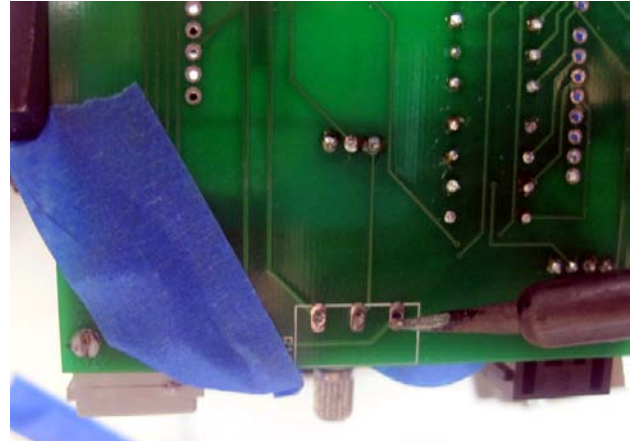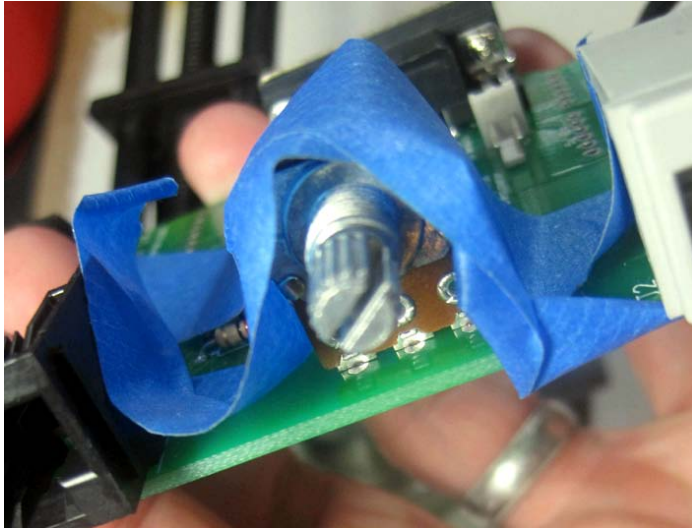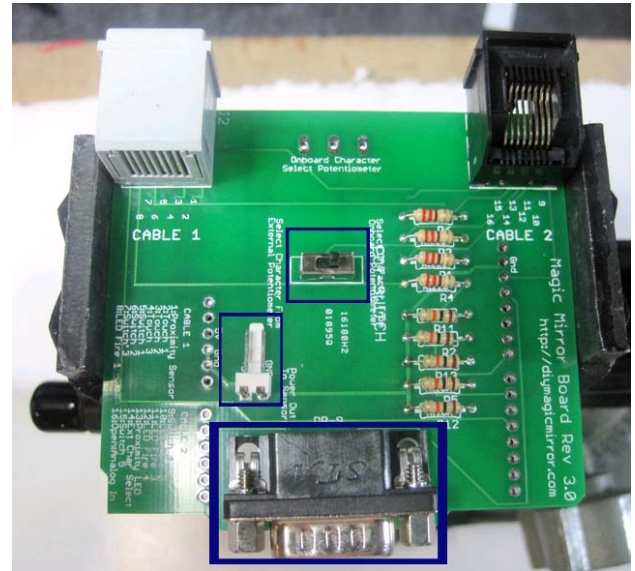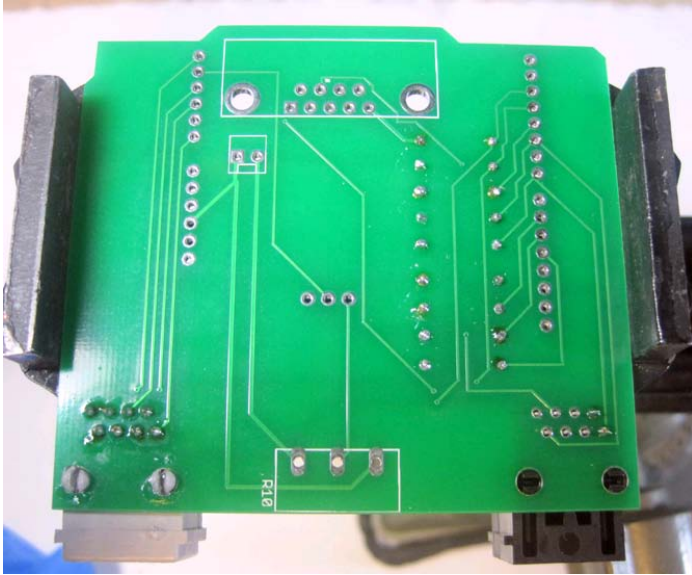

Secure with tape so they do not move when the board is flipped over for soldering

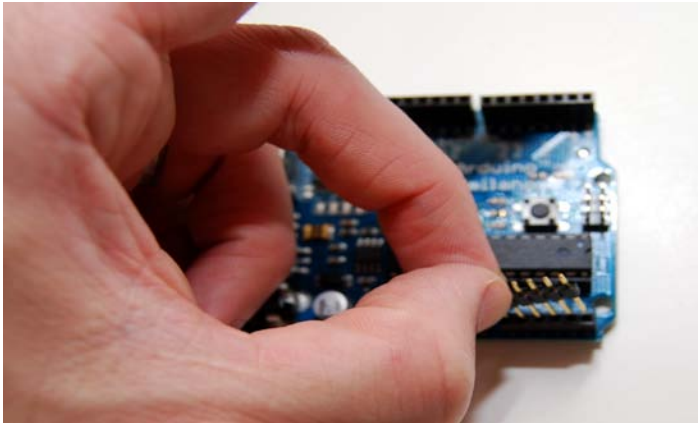Solder and then clip excessive leads

Snap in RJ45 connectors

Flip over and solder RJ45 connectors

Insert DB-9, power connector, and slide switch. Tape the power connector and slide switch before turning the board over and solder.

Insert potentiometer and secure with tape

Flip board and solder potentiometer
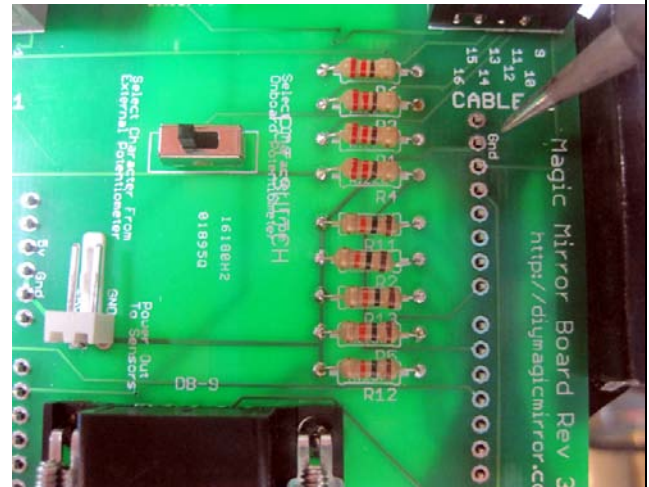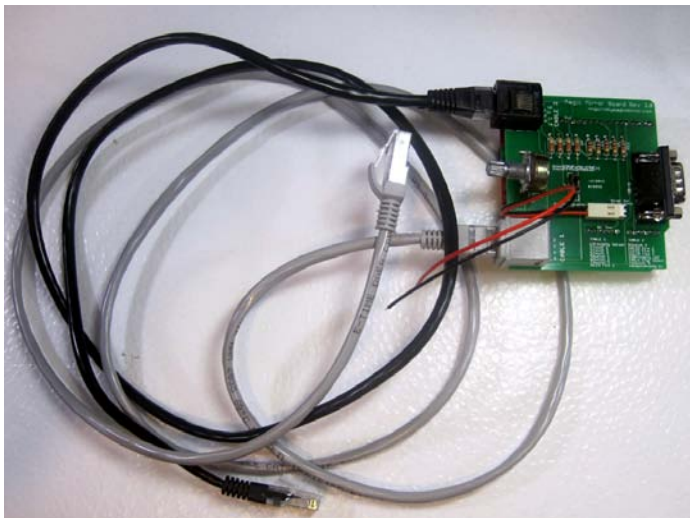
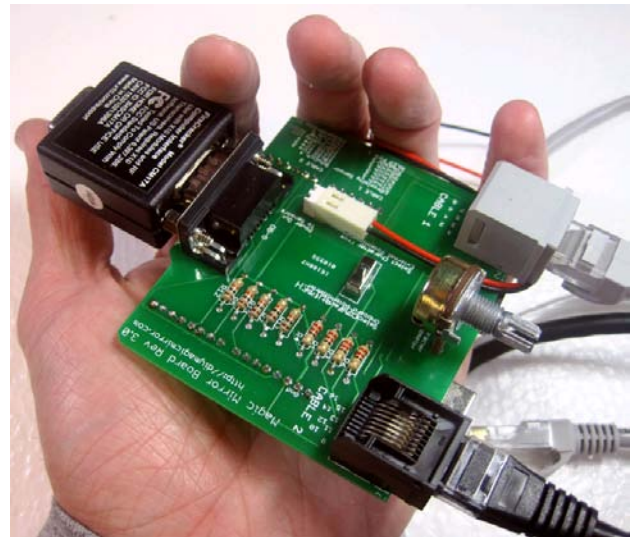Take the 40-pin header breakaway and use your pliers to clip into 4 sections consisting of 2 sections of 8 pins and 2 sections of 6 pins and then plug the long end of the pins into the Arduino

Set the Magic Mirror Shield on top of the Arduino lining it up with the pins and solder


Plug in Cat5e cables and connector external sensor power cable

If using the X-10 control feature, plug in the X-10 Firecracker module (CM17A)

If you are planning on using an externally mounted potentiometer to dynamically change the Magic Mirror character as opposed to the onboard potentiometer, move the slide switch on the Magic Mirror board towards the "Select Character from External Potentiometer" position. The default position is "Select Character From Internal Potentiometer" as shown in the picture below.
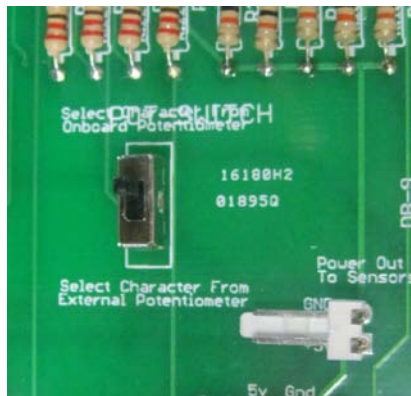
Important: The wiring assumes the Cat5e cables use the T568B wiring convention (as opposed to the T568A convention). Ensure your Cat5e cable uses the T568B wiring convention and preferably has stranded wire as opposed to solid wire.

RJ45 Pin #	Wire Color (T568B)	Wire Diagram (T568B)
1	White/Orange	
2	Orange	
3	White/Green	
4	Blue	
5	White/Blue	
6	Green	
7	White/Brown	
8	Brown	

T568B Wiring Convention

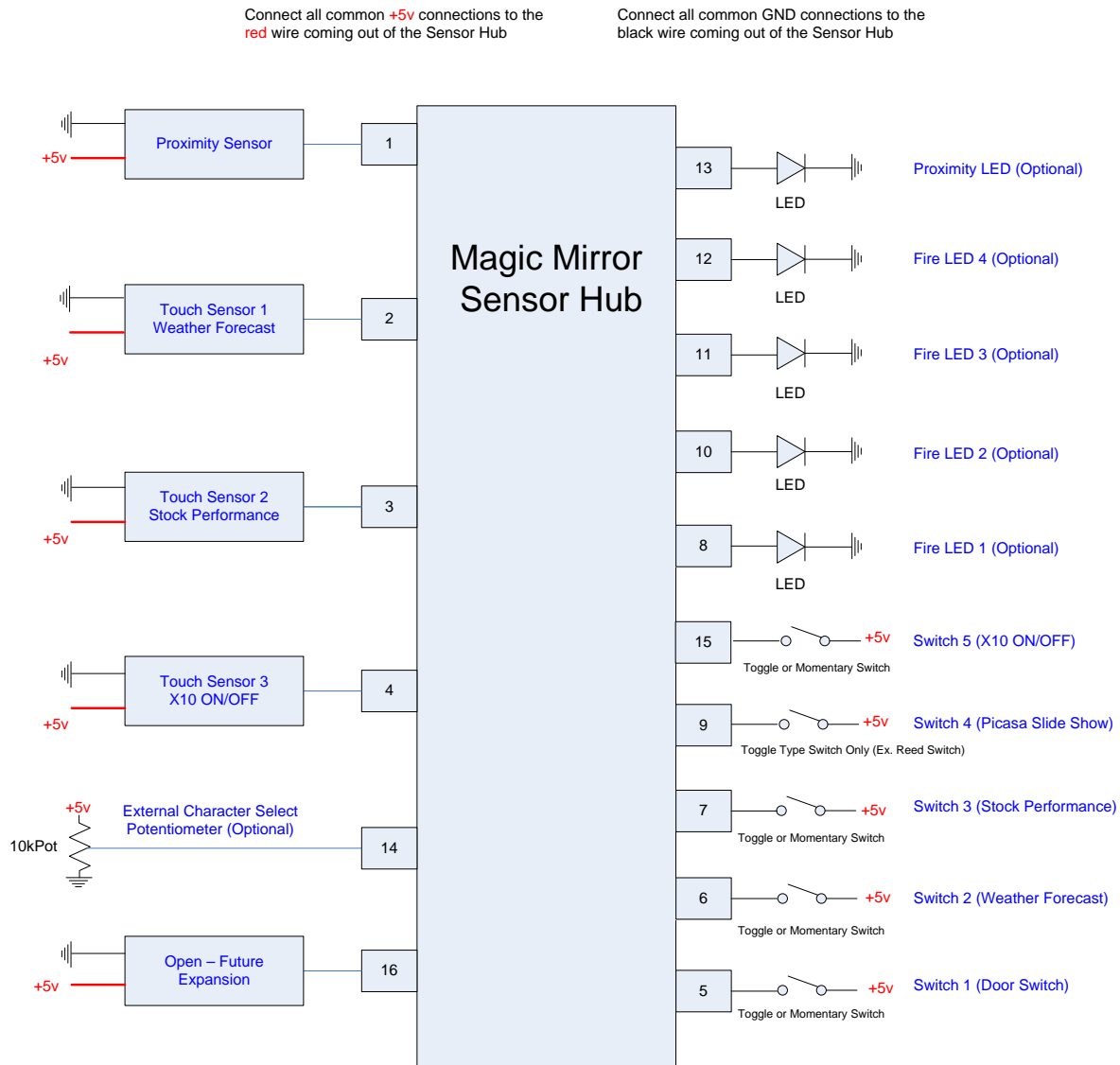You will now need to upload custom firmware to the Arduino called Firmata. Refer to the software installation manual for instructions on how to upload Firmata to the Arduino. Note: Following the instructions in the software installation manual, you will use the Firmata that comes with the DIY Magic Mirror software installation and not the Firmata that comes with the Arduino IDE.

If using the Seeeduino (Arduino Clone), you must set the three switches in the positions below to ensure proper operation.
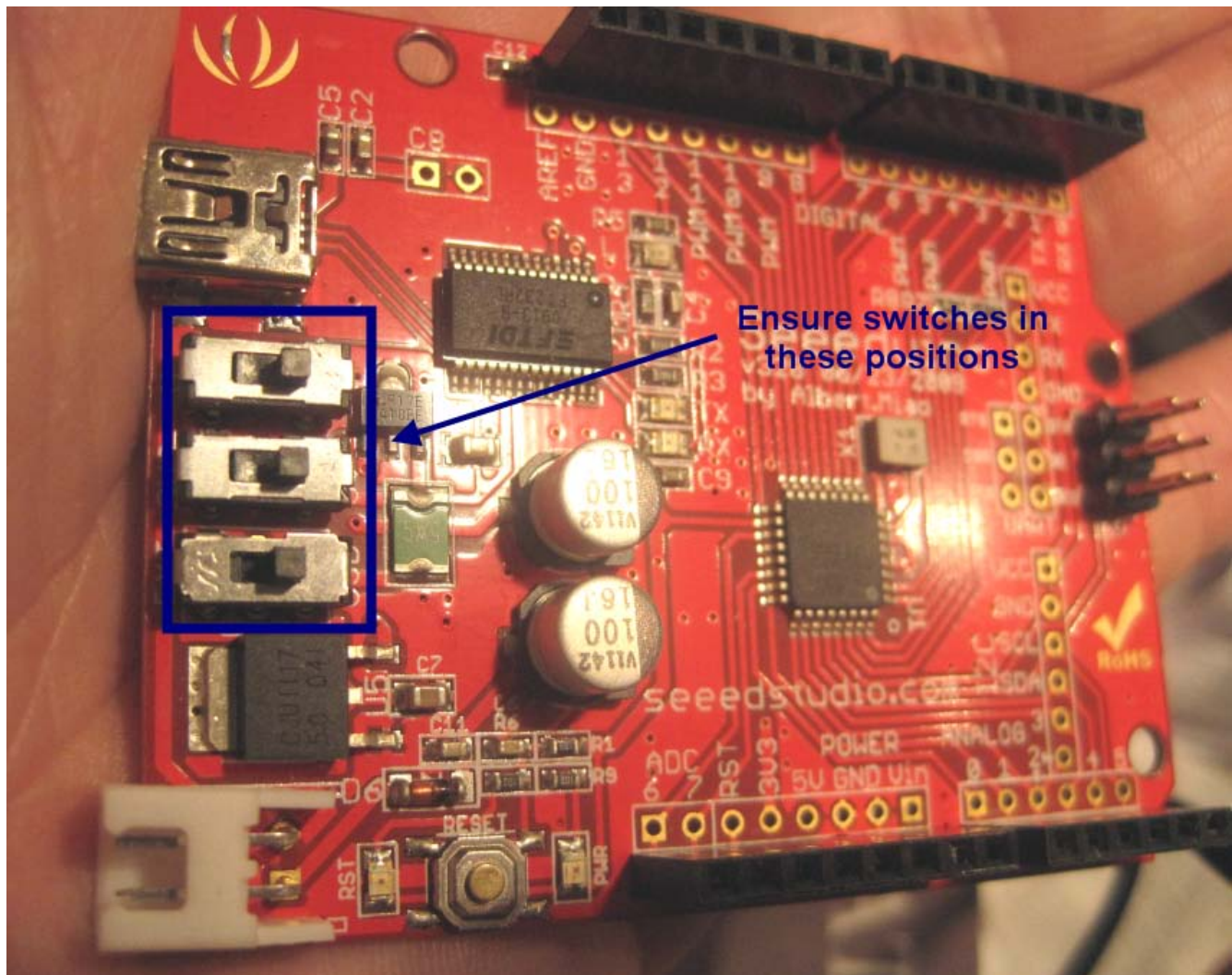
Magic Mirror Sensor Hub Pin Outs

Connect all common +5v connections to the red wire coming out of the Sensor Hub

Connect all common GND connections to the black wire coming out of the Sensor Hub

Pin	Cat 5e Cable 1 (White)
1 - Proximity	Cable 1 – White w/ Orange
2 – Touch 1	Cable 1 – Orange
3 – Touch 2	Cable 1 – White w/ Green
4 – Touch 3	Cable 1 – Blue
5 – Switch 1	Cable 1 – White w/ Blue
6 – Switch 2	Cable 1 – Green
7 – Switch 3	Cable 1 – White w/ Brown
8 – LED Fire 1	Cable 1 – Brown

Pin	Cat 5e Cable 2 (Black)
9 – Switch 4	Cable 2 – White w/ Orange
10 – LED Fire 2	Cable 2 – Orange
11 – LED Fire 3	Cable 2 – White w/ Green
12 – LED Fire 4	Cable 2 – Blue
13 – Proximity LED	Cable 2 – White w/ Blue
14 – External Pot	Cable 2 – Green
15 – Switch 5	Cable 2 – White w/ Brown
16 – Future Expansion	Cable 2 – Brown

IMPORTANT: Cat5e cables must use the T-568B wiring color convention and not T-568A

Once completed, refer to the DIY Magic Mirror Wiring and Operations manual for instructions on how to wire up the sensors to the Magic Mirror Sensor Hub and how to configure the Magic Mirror software.