Assembly Instructions for Motion-Activated LED Strips

These instructions outline the assembly of a 4' long LED strip with 4 LED's. The items listed below will be needed to assemble the strip. Items in **bold** are included in a kit available on the Jifa-Tronics store on Tindie. ***3D printed*** items are optional in the kit: shipping costs are cheaper without them as all other items are envelope-flat.

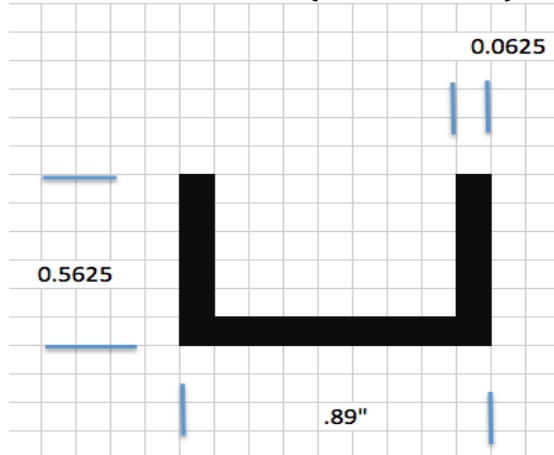- 4' Aluminum channel (sold at Lowes) with the following dimensions:

Figure 1: Dimensions for Aluminum Channel

- 4' strip of ¾" x 1/8" thick Aluminum (also available at Lowes)
- Drill Press
- 1/8" drill bit
- 5/16" drill bit
- 11/64" drill bit
- Countersink drill bit
- Step bit capable of 3/8", 13/32" and 7/16" holes
- Thermal epoxy to connect LED boards to standoffs
- 22AWG wire for power input and intra-LED wiring
- Power supply (max voltage = 15V) THIS is a good option
- **Main PCB to run lights**
- **Barrel Jack to power Main PCB**
- **4x LED PCB**
- **4x LED reflector**
- **4x 4-40 x 5/16" hex standoff for LED mounting**
- **4x 4-40 x 1/2" hex standoff for channel – strip mounting**
- **4x 4-40 x 5/16" pan-head screw for channel – strip mounting**
- **8x 4-40 x3/8" countersunk screw for hex standoff mounting**
- **4x 4-40 x 1/2" countersunk screw for PCB mounting**
- **4x 4-40 lock washer for PCB mounting**
- **4x 4-40 nut for PCB mounting**
- **4x SRS-1-3MM standoff for PCB mounting**
- **Thermally conductive strip for under-PCB mounting**
- ***3D printed drill jigs for aluminum strips and PCB mounting***
- ***3D printed end caps for channel***

Assembly Instructions:

1. Preparing Aluminum channel/strip

This section will outline preparing and drilling the two aluminum pieces so they can then be assembled into the LED strips

The 4' long strips are usually not exactly 4' long. To prepare the strip for drilling, measure the exact length and place a mark in the center of the strip. Then, using the center mark as a reference, place marks at 5", 7.25", 20.75", 21.75" and 23" away from center on either side. An easy way to do this is to mark a scrap piece of wood at 5", 7.25", 20.75", 21.75" and 23" from the end and use this as a reference to make the marks, as shown in the picture below.

Figure 2: Marking Aluminum Strip at set distances away from center

Once the strip has been marked (11 marks in all: 1 in the center and 5 on either side of center), use the 3D printed drill jigs to align the channel and the strip as shown in the Figure 3 below.
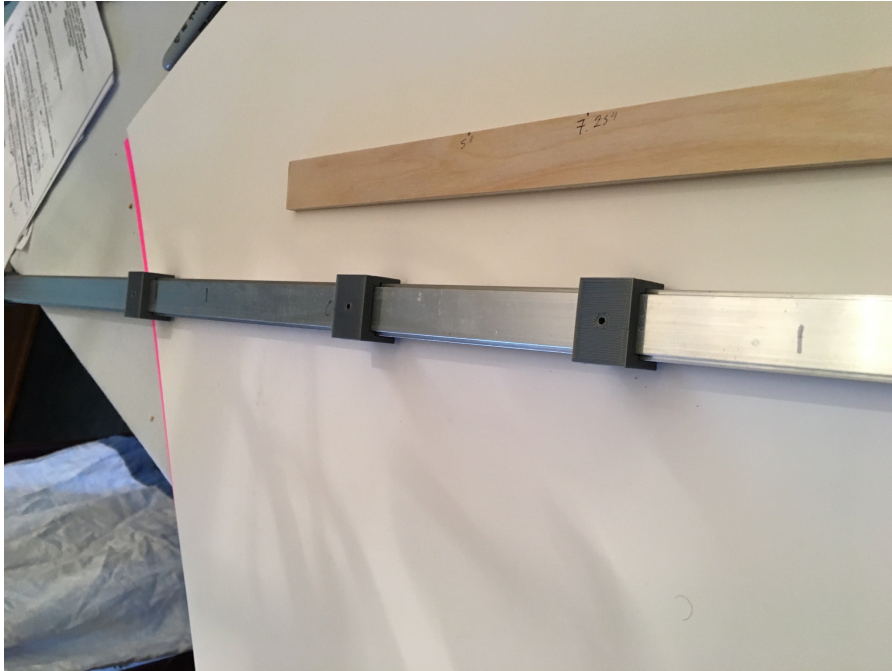
Figure 3: Drill Jigs snapped onto Strip and Channel to align them together

Using the marks made earlier for a reference, drill a 1/8" hole through both the channel and the strip, using the drill jigs to keep them aligned. Drill the first hole in the center and work outward from there, using a 4-40 screw and nut to lock the two pieces together after removing the drill jig. This will ensure that the two pieces do not move between holes and cause a misalignment. See Figure 4 for details.
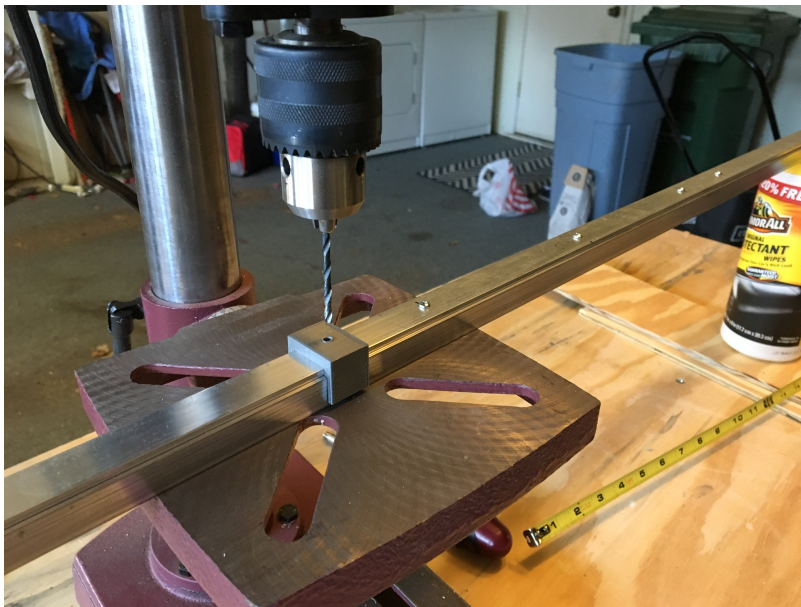

Figure 4: Drilling 1/8" holes through both aluminum pieces using drill jig to help center the holes. Note the screws through previous holes to ensure alignment is maintained.

After drilling the 11 holes in the previous step, mark the exposed side of the aluminum strip as 'INSIDE' to prevent it being flipped and misaligning any holes.

Figure 5: Mark exposed side of Strip to prevent it being flipped cauing a misalignment

Secure the PCB drill jig to the center hole in the Strip/Channel assembly, using the hole marked 'B' (for button). Use the drill jig as a guide to make a hole through both the strip and the channel in the 'P' (for Passive InfRared) hole. See Figure 6 below.
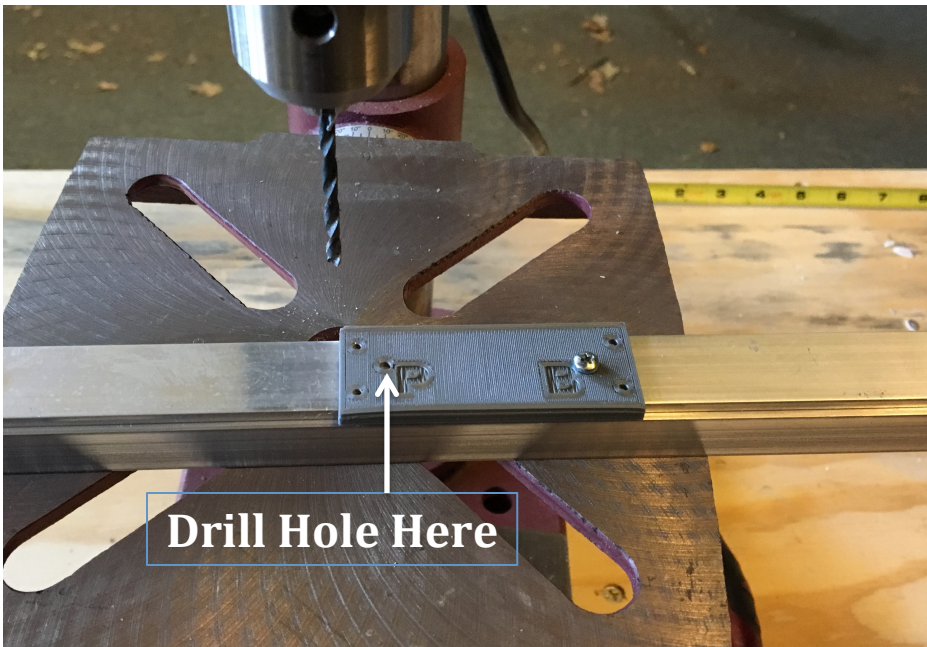

Drill Hole Here

Figure 6: Drill a hole through both aluminum pieces through the guide hole marked 'P'

Separate the Strip from the Channel, and keep the PCB drill jig mounted to the Strip in the 'B' hole. Use the PCB drill jig to drill 1/8" holes in each of the 4

Drill four corners after removing Channel from Strip

Figure 7: Drill 4 PCB Mounting Holes

After drilling the 4 holes for PCB mounting, remove the PCB drill jig and use a countersink bit to countersink all 4 PCB mounting holes, and the holes at 5", 7.25", 20.75" and 21.75" away from center. Ensure that the countersink bit is on the OPPOSITE side as what was earlier marked INSIDE. Ensure that the countersunk screws will be flush with the back of the Strip. See Figures 8 and 9 below.

Figure 8: Countersink holes for PCB and Standoffs

Figure 9: Ensure that screws are flush with the Strip
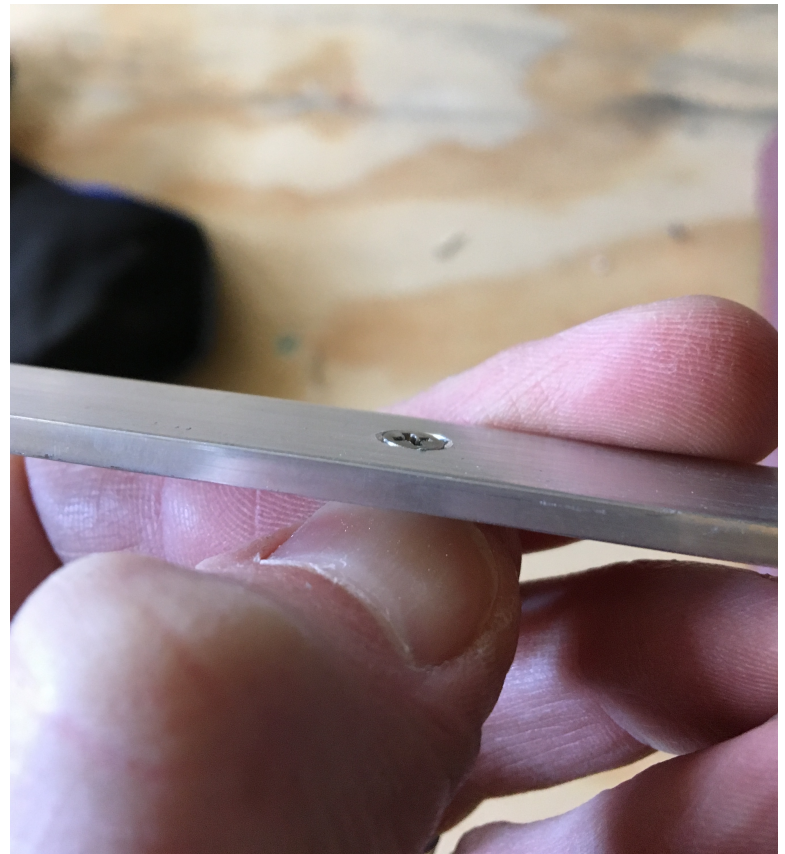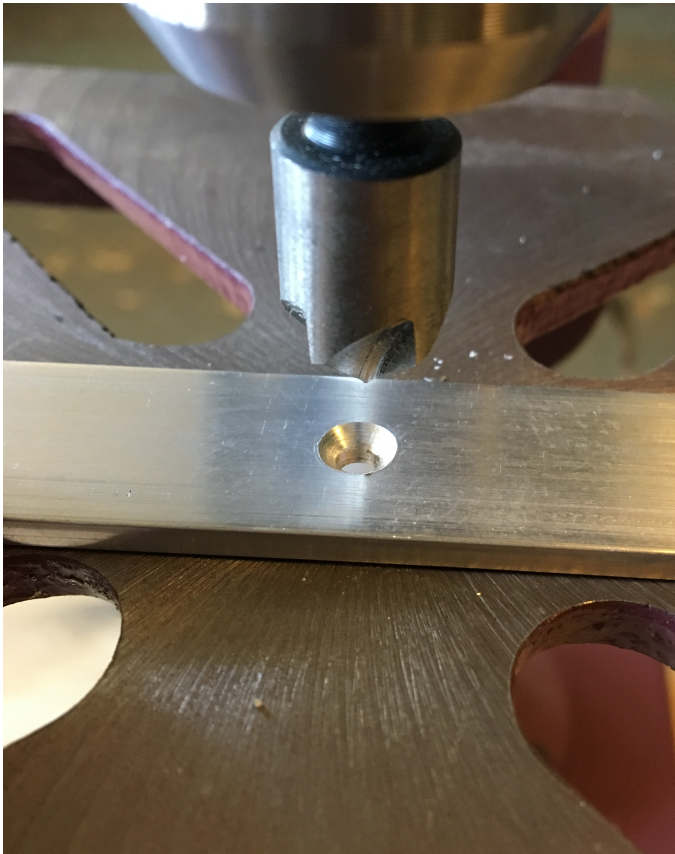
Use an 11/64" drill bit to drill out the holes at 23" away from center. These will be used to secure the strip to the under-side of the cabinet. Clean up any burrs or rough edges along the Strip, and set aside.

Focusing on the Channel, use a step bit to drill out the following holes:

- Holes for the LED's (7.25" and 21.75") to 3/8".
- Holes at very end of Channel for mounting (23") to 7/16"
- Hole next to the Center hole for the Passive InfraRed sensor to 13/32"

See Figure 10 below.

Figure 10: Use a step bit to drill holes for LED, PIR sensor and end caps

Use a 5/32 bit to drill out the hole in the center, which will be for the button.
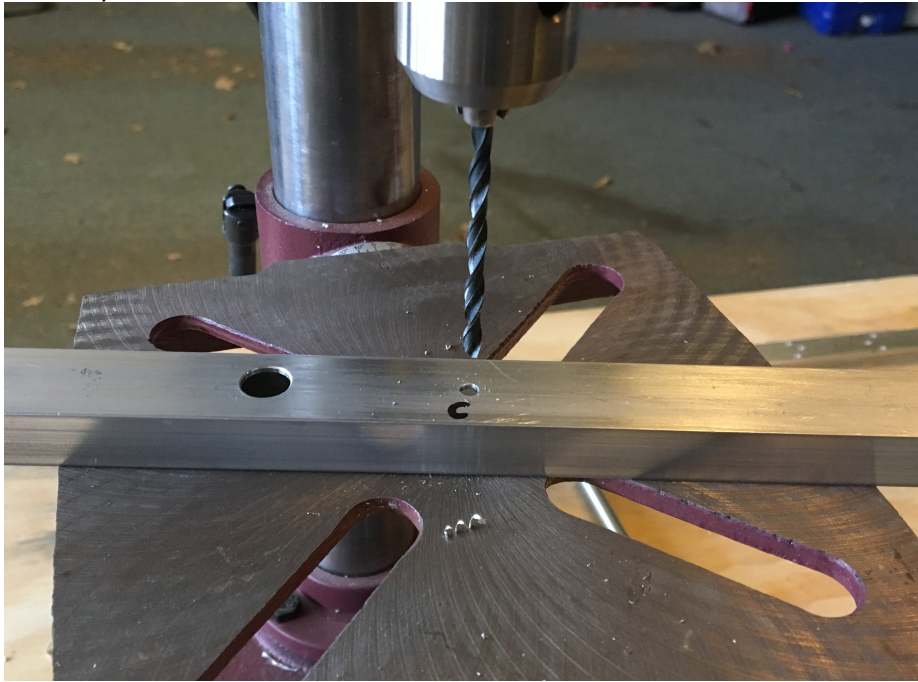

Figure 11: Drill out center hole to allow button to pass through

Make a mark on the side of the Channel, roughly 2.5" away from the center hole, away from the PIR sensor hole. Drill a 1/8" pilot hole here and then follow it through with a 5/16" bit. This will be used to mount the barrel jack for powering the assembly. See Figure 12 below.

Figure 12: Make mark 1/4" away from the open edge of channel, roughly 2.5" down from button hole. Drill a 1/8" pilot hole followed by a 5/16" hole for power jack entry

Once all of the above holes have been drilled and any jagged edges cleaned up, this completes the required drilling/cutting. A picture of the completed Channel is below in Figure 13. Next is assembly and wiring.

2. Mechanical Assembly/LED Mounting

Using 8x 4-40 x 3/8 countersunk screws, secure the ½" standoffs to the Strip at the 5" and 20.75" holes, and the 5/16" standoffs to the 7.25" and 21.75" holes as shown in Figure 14 below. If available, put a small amount of low-strength Loc-Tite on the screws to prevent them backing off.

Figure 14: .5" and 5/16" strandoffs connected to Strip

Gather the LED boards together and place them on top of the 5/16" standoffs. Place the Channel over the Strip so that the LED reflectors are nested in the 3/8" holes drilled in the Channel. See Figure 15 below.

Figure 15: Channel set on top of LED. All 4 LEDs should look like this at this point

Use a piece of masking tape (blue painter's tape works well) to secure the LEDs to the Channel. This will enable moving the channel while keeping the LED's in their locations. See Figure 16 below.
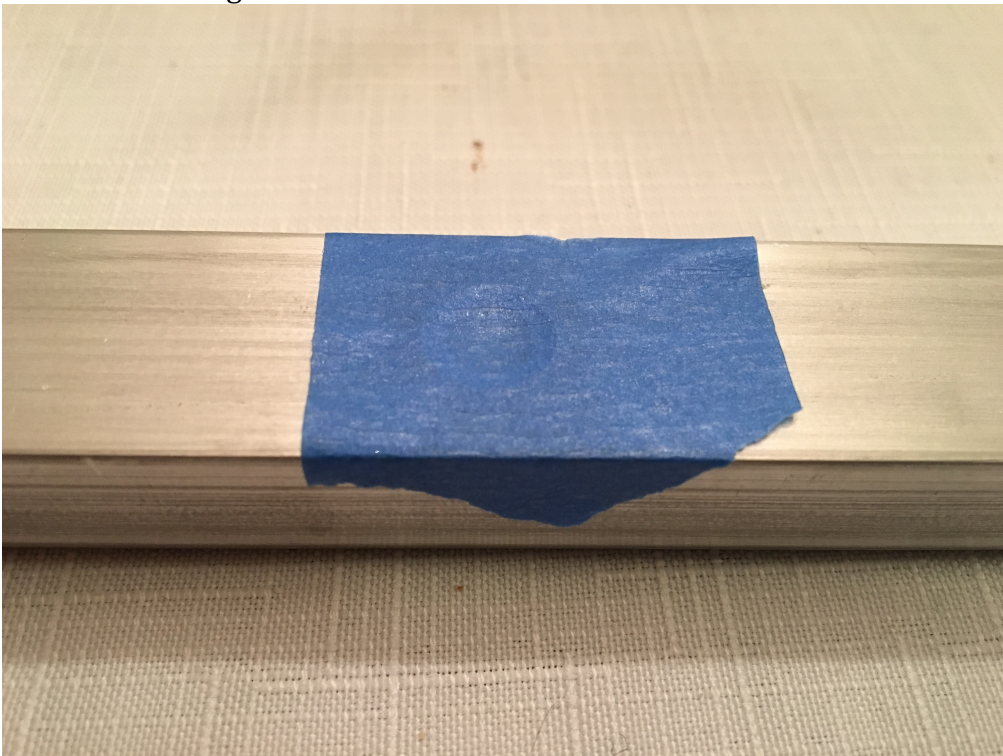

Figure 16: LED secured to Channel with painter's tape

Ensure that the LED's are secured to the Channel and gently remove the Channel from the Strip and set aside. Mix the thermal expoxy that will secure the LED PCB's to the 5/16" standoffs. It is necessary to use thermal epoxy to conduct very hi heat generated by the LED's into the aluminum Strip. Mix the epoxy as per manufacturer's instructions and apply to the 5/16" standoffs on the Strip. See Figure 17 below.
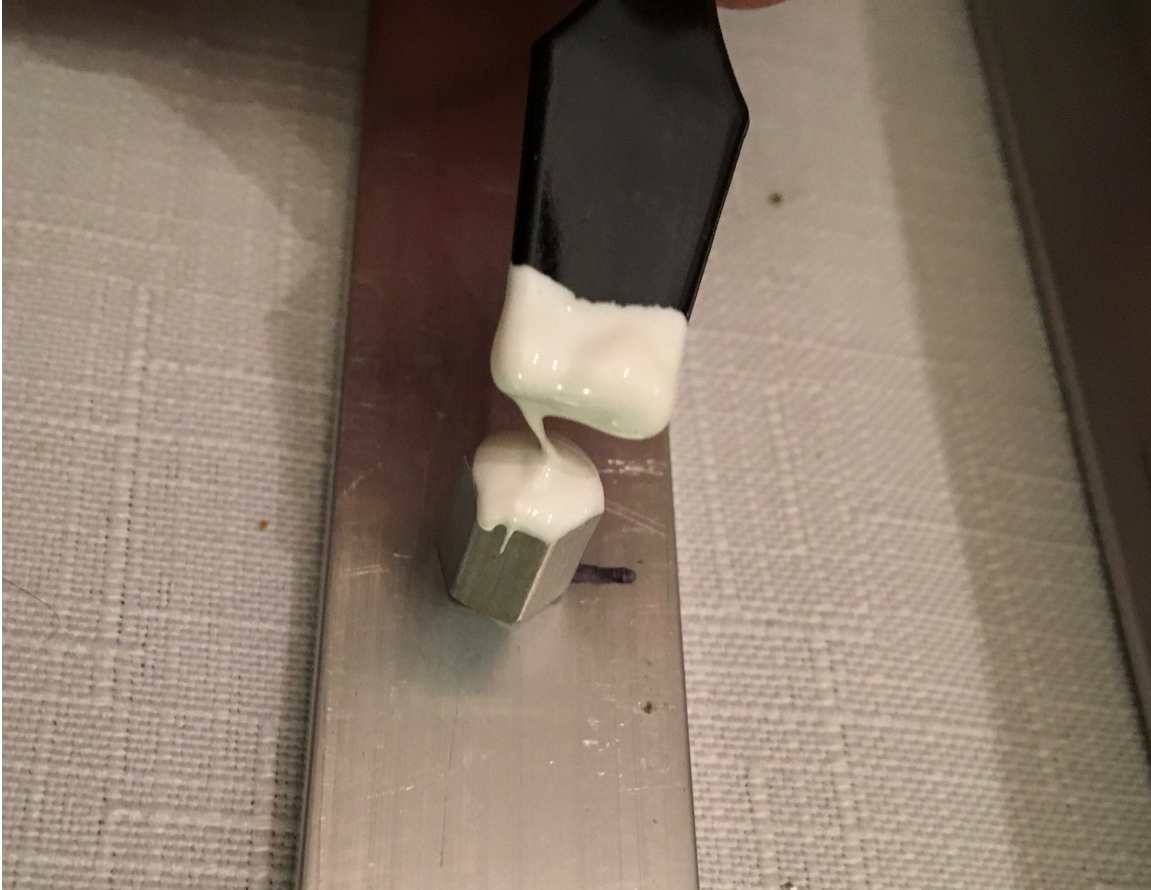

Figure 17: Apply thermal epoxy to 5/16" standoff

After epoxy has been applied to all 4 standoffs, gently place the Channel on top of the Strip. Be careful to ensure that the LED's are still secured to the Channel and that the Channel and Strip are aligned as the Channel is lowered onto the Strip. Use the 4-40 x 5/16" pan head screws to secure the Channel to the Strip via the ½" standoffs mounted to the Strip. See Figure 18 below.
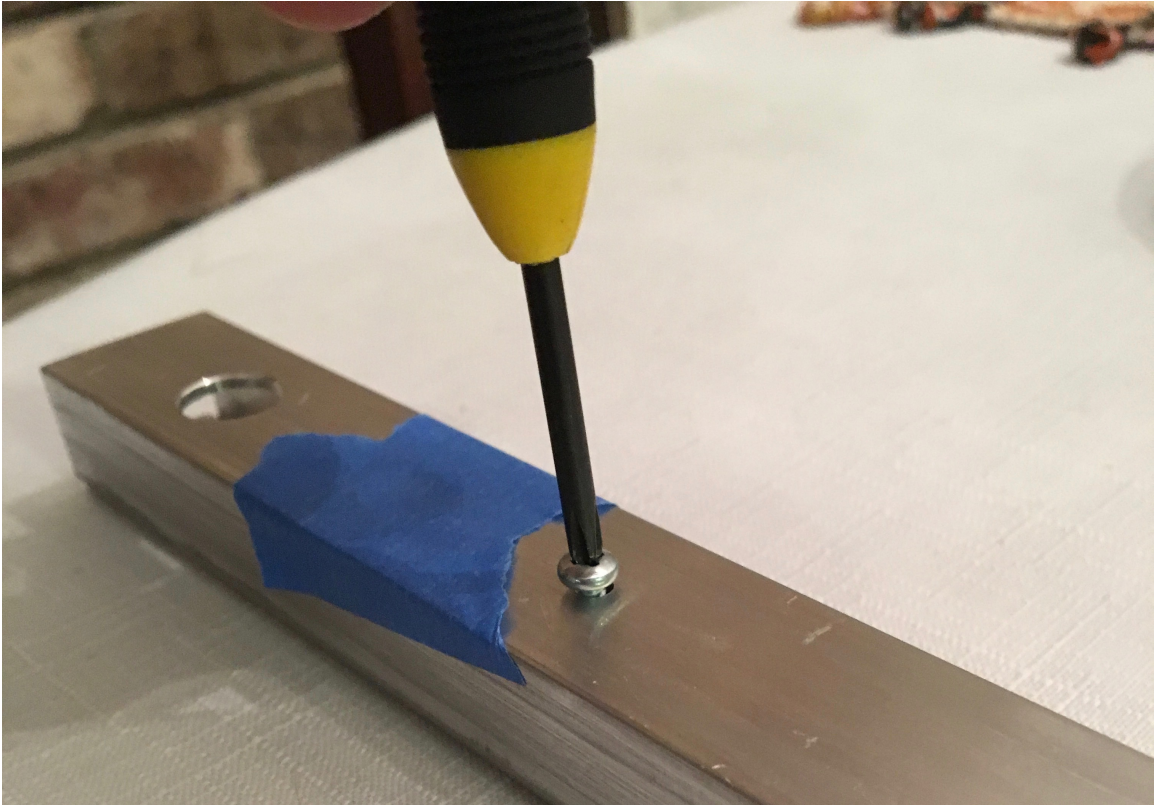
Once the two parts have been secured with screws, set the assembly aside and allow the epoxy to cure as per manufacturer's instructions (overnight is a good rule to ensure a thorough cure)

3. Board Mounting/Wiring the Strip

Connect roughly 60mm wires to the V-IN and GROUND test points near the button on the board. Connect the other ends to the barrel jack, paying careful attention to polarity to ensure that V-IN goes to positive voltage and GROUND goes to ground. **There is no reverse voltage protection on the board, and getting this backwards WILL do damage. Use some heat-shrink on the barrel jack contacts to ensure the contacts don't short out against the aluminum chassis. Connect wires to the LED_OUT and LED_RET points on the board, which will connect to the LED's. The assembly should look like Figure 19 below.
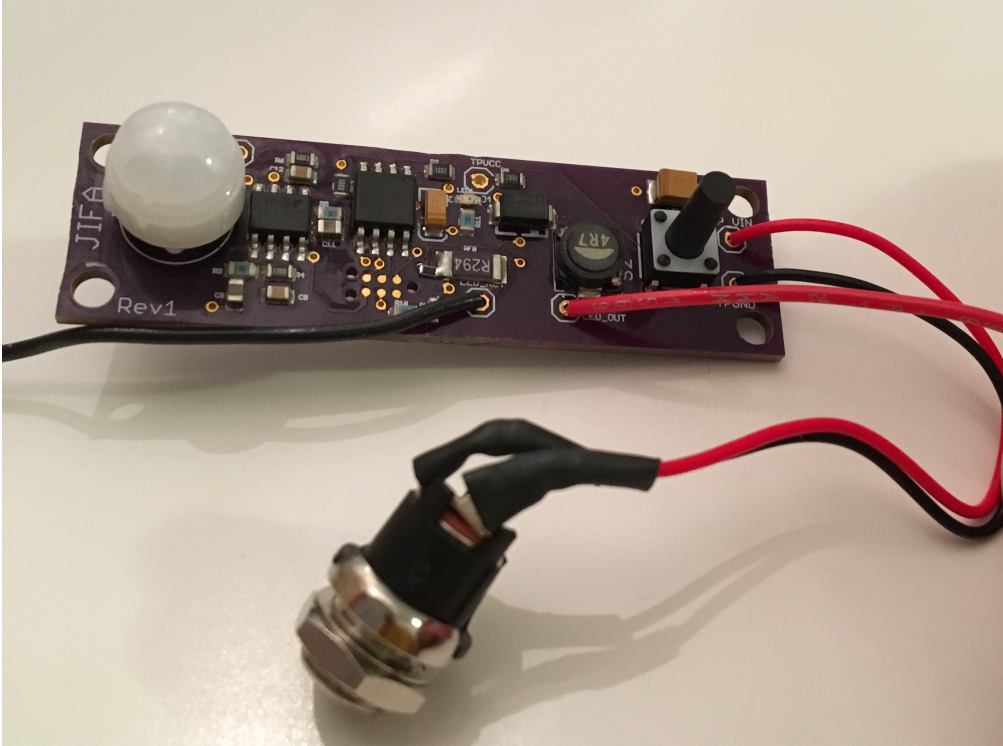
Figure 19: Board with power connector wired and wires connected for LED's

Returning focus back to the Strip, insert 4 x 4-40 x ½" countersunk screws into the 4 holes that were drilled for PCB mounting. Place a 3mm standoff over each screw, and then slide the PCB over the 4 screws. While not totally necessary, placing a 16mm x 50mm thermal pad under the board will help get some of the heat out of the LED driver and LDO and may prolong the life of the assembly.

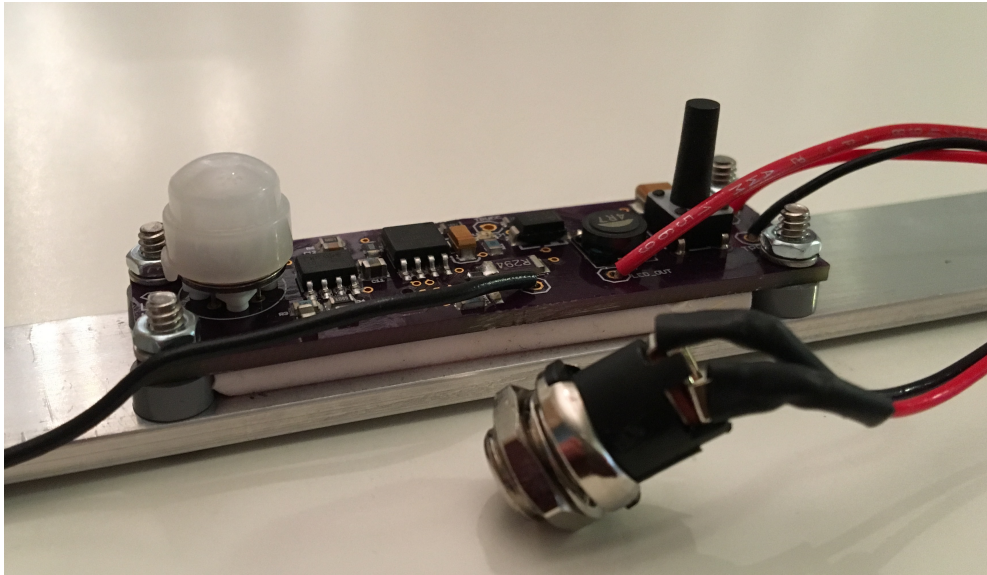Figure 20: Screws and Standoffs ready for board mounting

Figure 21: Board mounted to standoffs with thermal pad underneath

Wire up the assembly by connecting the LED_OUT wire to the ANODE of the first LED in the strip. Connect the CATHODE of the first LED to the ANODE of the second LED. Continue this until the CATHODE of the last LED is connected to the wire routed to LED_RET. If the thermal epoxy has thoroughly cured, the LED boards will be more than secure enough to solder on the wires without disturbing the board.
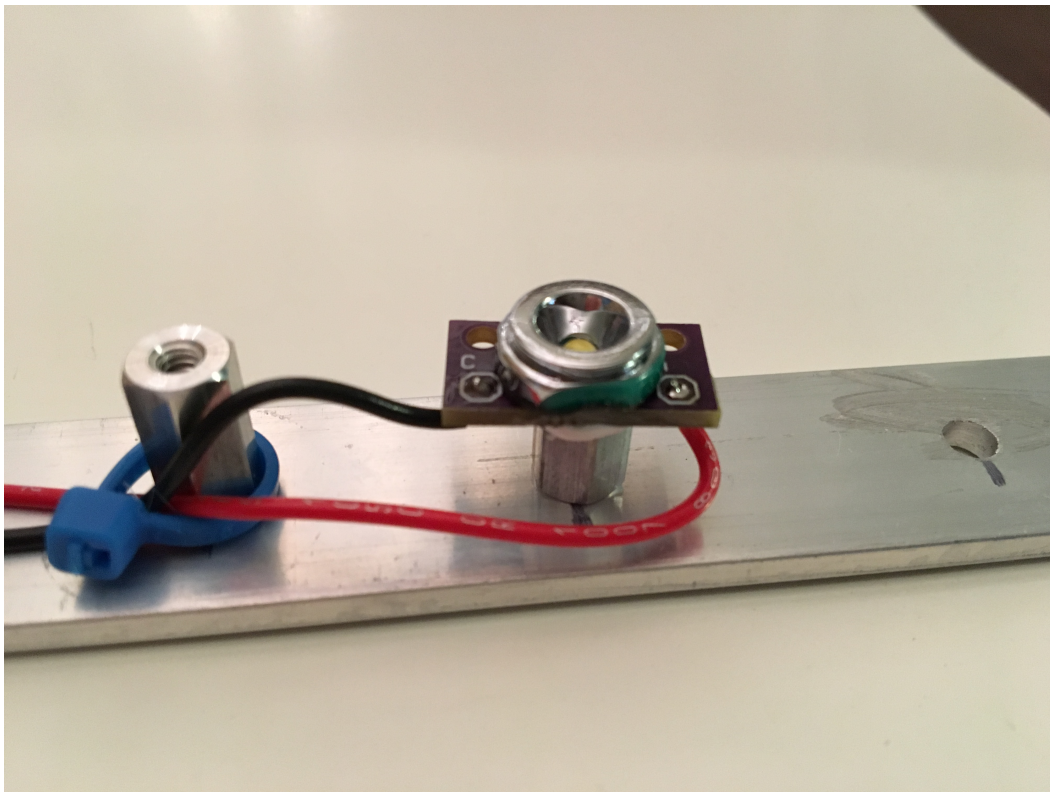

Figure 22: Wires routed to LED. Note the zip-tie to aide in wire management

Once all of the LED's are wired up, plug a DC power supply into the jack and test the assembly. If it is not working, double-check that all LED's are forward-biased as described in the wiring description above.

After the assembly is verified to be working, secure the barrel jack into the hole on the Channel with the included nut and **CAREFULLY** fold the Channel onto the Strip, making sure that everything is aligned and that no wires are pinched. It may be helpful to use a small screwdriver to 'stuff' the wires back inside, being careful not to pinch the insulation. After ensuring that everything is clear, secure the assembly together using the 5/16 pan-head screws.

Insert an end-cap into each end of the strip. The caps are not 100% necessary but they give a clean look to the strips. See Figure 23 below

Figure 23: Insert end-cap into strip

This concludes the construction. Mount, plug in and enjoy!