

Nerf Rival Nemesis Wheelchair Mount



W A U K E E

A P E X

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The Goal:

The finished project should be a wheelchair-mountable Nerf Blaster that is accessible for people of differing levels of mobility. The easy press design should allow the user to have full control of the blaster while the mounting should keep it securely in place.



Instructions:

Materials we used:

Nerf Rivals Nemesis	Nerf Rival Nemesis MXVII-10K, Red: Toys & Games	\$99.99
Mounting Straps	AIRNIX 4pc 22" x .75" Hook and Loop Nylon Cinch Straps. Reusable Fastening, Securing, Cable Straps	\$7.75
Wire	Nano Shield Hook-up Stranded Wire 22 AWG with UL3132, 6 Colors (23ft Each) Flexible 22 Gauge Silicone Wire Rubber Insulated Electrical Wire, 300V Tinned Copper Electric Cable for DIY	\$16.99
Limit Switch (only need 1)	HiLetgo 10pcs V-156-1C25 Lead Limit Switch SPDT Switch Silver Base Contact Roller Swing	\$6.49
Light Switch	Legrand® radiant® 15-Amp 1-Pole Light Almond Rocker Light Switch	\$1.67
Nuts, Bolts, and other Fasteners	This depends on where you buy them. You can go to your local hardware store and get these low-cost.	\$2 - \$5
3d Printed parts	The main mounted parts can be downloaded as .STL files which can be fed and printed with a 3d printer. If possible, this would be a cost-effective option.	< \$5
3d printing service	If you don't have access to a 3d printer, you can use an online 3d printing service like Craftcloud or Shapeways	~\$20

Important note about the STL files and printing:

Before sending a file to print (or to an online service) , be sure to check that the print is set at the right scale. Check the scale of the pieces before printing or ordering the pieces. The default settings for some websites and printers are in millimeters while the print should be in centimeters. To confirm the physical dimensions, you can reference them below:

- **button_mount_v6:** 8.99 x 3 x 13.08 cm
- **light_switch_mount_v4:** 12.5 x 4.5 x 5.5 cm
- **(optional) rear_panel_mount_v1:** 1.13 x 5.5 x 10.75 cm

Tools we used:

- Drill
- Screwdrivers
- 3d printer (you can order the 3d printed parts online if necessary)
- Soldering Iron + Solder
- Wire Strippers
- Needle Nose pliers

For our approach to this project, we looked at it in 3 sections. There's the mounting, the wiring, and the controls/3d modelling.

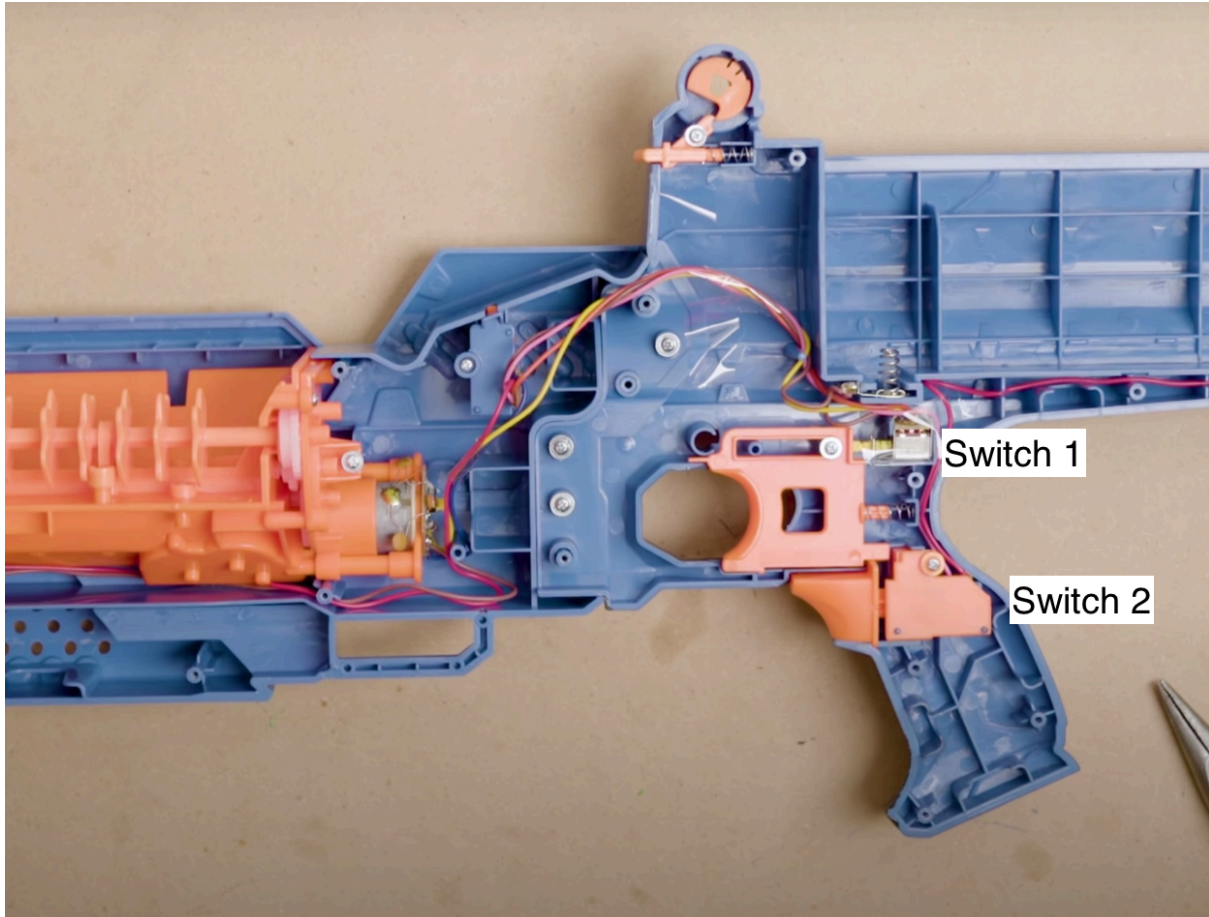
Intro: Before We Begin

To start off you will want to:

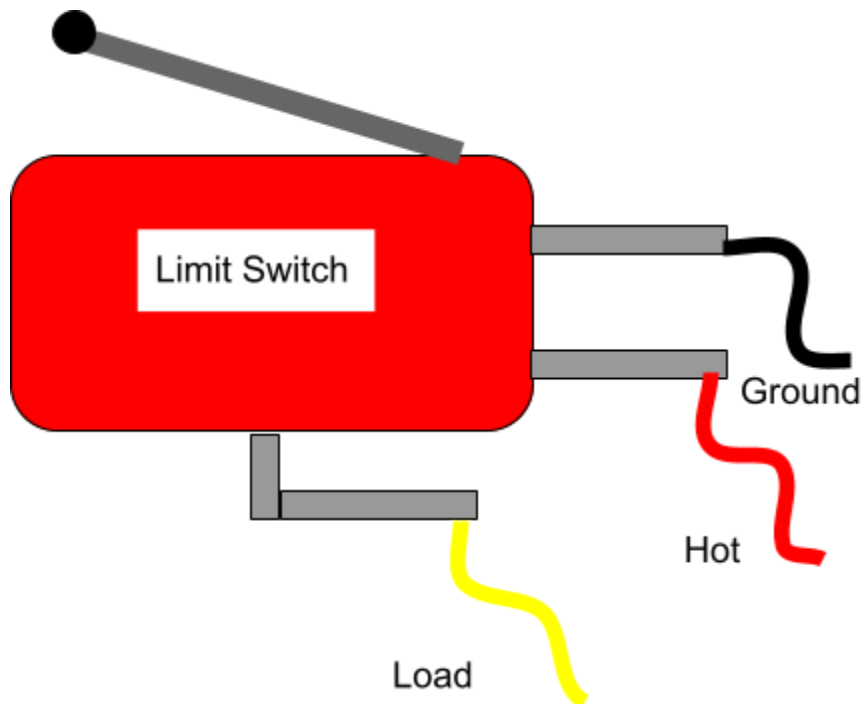
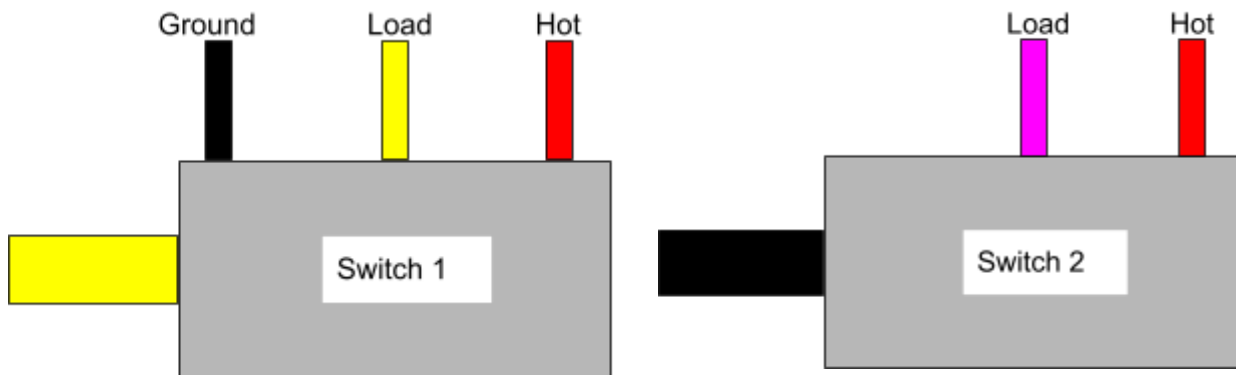
- Make sure the batteries and ball hopper is out
- Carefully unscrew all of the screws in order to separate the 2 halves of the blaster.
- Keep the screws in a bag or a box and put them off to the side
- Take the side that has all the wiring and put a hole about 5/16" diameter, around 3 inches above the top of the trigger
- Put a hole in the stock the same size

1: The Wiring

The main modifications to the wiring take place in two locations. The end goal here is to have the wind-up switch wired up to the light toggle switch and the main trigger wired to the top mounted limit switch.



Identifying the wires:



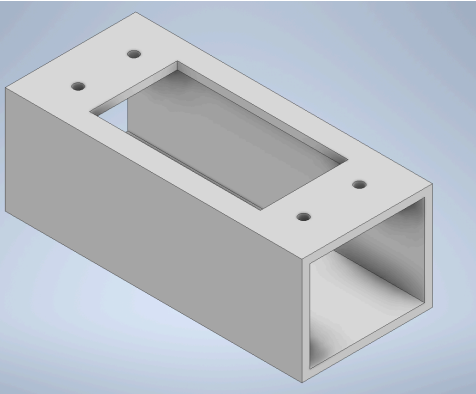
- You need to take the wires off of switch 1, and pull them out of the hole you made on the right side of the blaster. If the wires aren't long enough you may need to solder on extensions. Here is a link showing how to extend wires.
<https://www.youtube.com/watch?v=qxqZJH3SfN4>.
- You will now want to put the metal strands through the holes on limit switches connectors and solder them on. **IF YOU BOUGHT DIFFERENT SWITCHES THE LOAD, HOT, OR GROUND COULD BE IN DIFFERENT SPOTS.** A wiring diagram may

be provided on the internet if you search “*insert product name* wiring diagram” or “*insert product name* manufacturer datasheet”

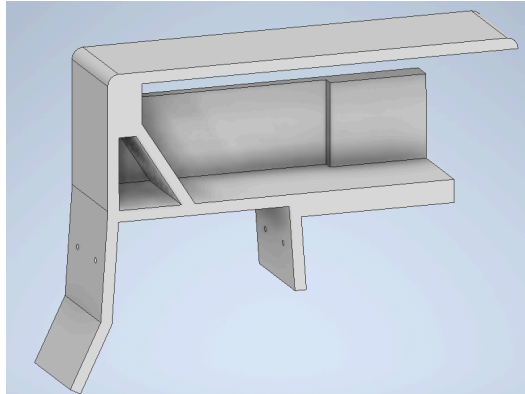
- Now take the wires off switch 2, you will need to extend these wires, refer to the video above.
- Once long enough, the wires will need to go to the stock of the blaster, pull it out of the back of the blasters, and attach the ends to the bottom of the light switch (detailed in the next stage). It does not matter in which order those go.

At this stage do not close the blaster, you will need it open for the next stage.

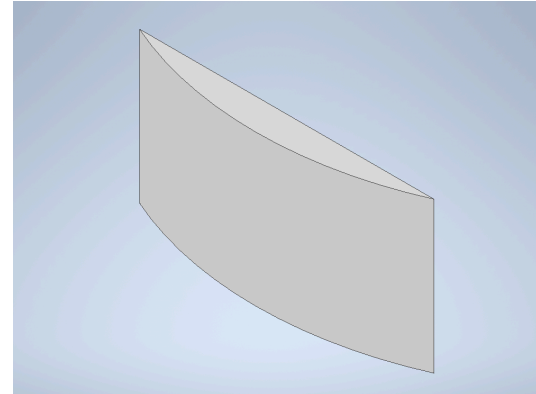
2: Switches and External Modifications



Light Switch Mount



Button Mount



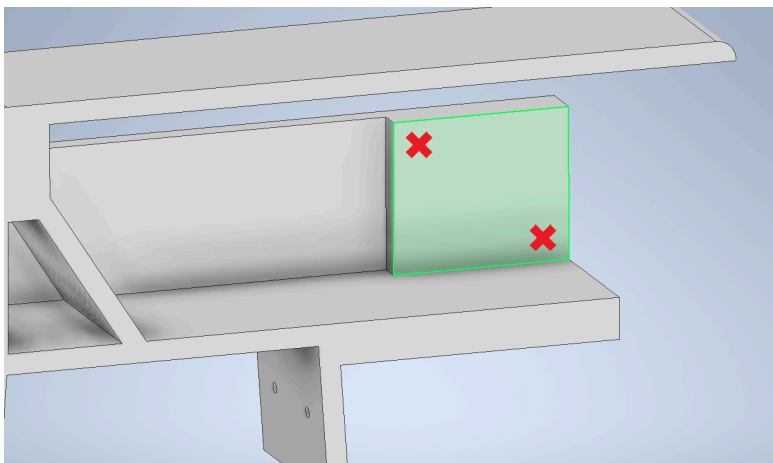
Rear Panel
(Optional)

This section includes all of the outside mounted 3d printed parts and switches. After you wire up and solder the internals and the connection to the limit switch, the next step is to attach the modelled parts and switches to the shell of the blaster.

Limit Switch:

For the limit switch to be easily mounted and pressed, we have printed the **button mount**.

- First, mark and drill holes in the mount for the limit switch to screw into



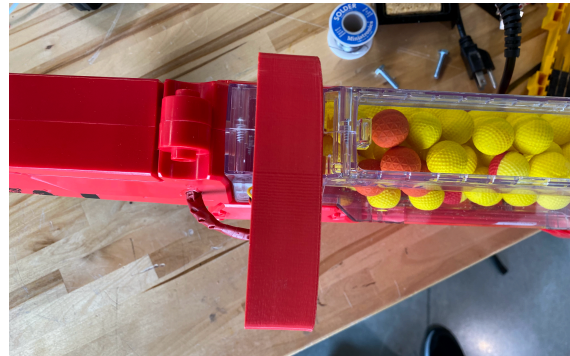
Drill screw holes into here (use limit switch to mark specific points)

- We used a 5/64" drill bit and put some simple screws in to hold the switch in place

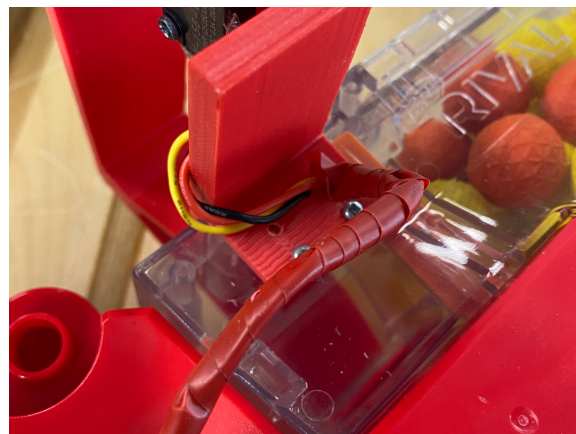


Next comes mounting the **button mount** onto the blaster.

- Place the button mount onto the ball hopper as shown below:



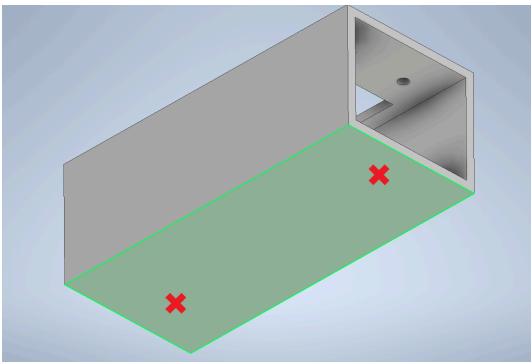
- The 3d model should print with small holes to show where you should drill and screw into once placed on the hopper
- *Please note that these holes are likely too small to directly screw through, and should instead be used as a guide for where to drill
- You can then drill into the button mount and through the side of the ball hopper, and screw in some slightly-larger screws into the side (power tools highly recommended)
- Once you have all 4 screws driven in (2 on each side), the mount should be secure
- After the limit switch is mounted, you can use electrical tape or other similar methods to manage the wires coming from inside the blaster onto the switch



Light Switch Mount:

The light switch mount is what will control the “warm-up” motors for the blaster, which is required to be active before the blaster can be fired.

- For this step, the blaster should still be separated in two pieces so that you can access the inside section of the bolt and fasten a nut onto it.
- To mount this part in, you will need to drill into the rear section of the blaster. We used two bolts to keep this part mounted securely. (There is no specific size that the drill/bolts need to be, just make sure that they aren't too long and that they won't impede on the battery space).
- Drill two holes into the bottom of the light switch mount



- Use those holes to mark where you're going to drill on the rear of the blaster, and drill out the holes on the blaster as well.
- If you're planning on using the rear panel, then line it up with the space created by the curve of the rear of the blaster, and drill holes that line up with the light switch mount.
- The rear panel is an *optional* piece that fills in the round space between the light switch mount and the rear curved side of the blaster. It mainly serves an aesthetic purpose, and **is not necessary** for a secure mounting.
- You can then put the bolts through the light switch mount (and rear panel if applicable) and fasten them until the mount is tight

Next, you'll want to mount the light switch itself onto the light switch mount.

- It's helpful to wire up the light switch before bolting it into the mount. Take both of the wire ends that are left for the toggle, and wrap them around the bottom two “screws” of the light switch
- Once they are tightly wrapped around the light switch screws tighten those screws to secure the wiring
- Next, place the switch inside the light switch mount
- Place bolts through the mount and the switch, and fasten them (we used [8-32X 1/2in. bolts](#))

Now the toggle switch should be ready for use:



Finished Toggle
Switch

After this step is complete, you will be ready to screw the two pieces of the blaster together, and it should be operational once fastened.

3: Mounting

To mount the Nerf blaster, you will need 2 straps to wrap around the blaster and armrest. We found that the straps worked best when wrapped around the stock of the gun where the battery is located and then another on around the hopper where the opening is (see picture below). You may need to add another loop of velcro to the back of the strap if it is too long.



Troubleshooting:

Some common problems we had:

- The blaster seems to be wired together but won't turn on or fire.
 - Possible solutions:
 - Make sure that the ball hopper is mounted and that the slider on the top of the hopper is fully closed. The stock nerf blaster has a built-in safety so that it won't fire when the hopper is open or unmounted.
 - Check that the battery is in
 - Check all of the connection points to make sure all wires are well connected
- The blaster turns on and motors are spinning when the fire button is pressed, but no balls are fired.
 - Possible solutions:
 - Make sure that both halves of the blaster are screwed in securely. The sides of the blaster were designed to put some pressure on the firing mechanism and tighten it to a point where the ball can squeeze into the firing area.
 - Shake the blaster to shift the rounds in the magazine, as they can occasionally get clogged and stop falling into the firing mechanism.