GoBabyGo Build Report – Trexton – Fall 2018

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Tools and Materials Used

Materials

- ride-on car with remote control
- car seat
- large throttle button
- toggle switch
- ~5’ 18-gauge wire
- 3’x3’ (minimum) sheet of 1/4” plywood
- 3’x3’ (minimum) sheet of 1/2" wood or plywood
- ~15’ ¾” PVC pipe
- 4x 90-degree PVC pipe joints
- 4x PVC open T-joints
- 9x PVC clamps
- various lengths of ¼” bolts and nuts
- ~3 yds black pleather
- 7x metal L-brackets
- wire connectors
- staples
- hot glue
- programmable LED light strip
- upholstery nails
- electrical tape
- PLA 3D printing material
- contact cement



















Tools

- reciprocating saw

- rotary tool

- standard wrenches, screwdrivers, and ratchet and socket sets

- router

- jigsaw

- 80 grit sandpaper

- drill and bit set

- staple gun

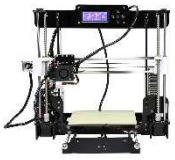
- table saw

- soldering iron and solder

- hot glue gun

- sewing machine

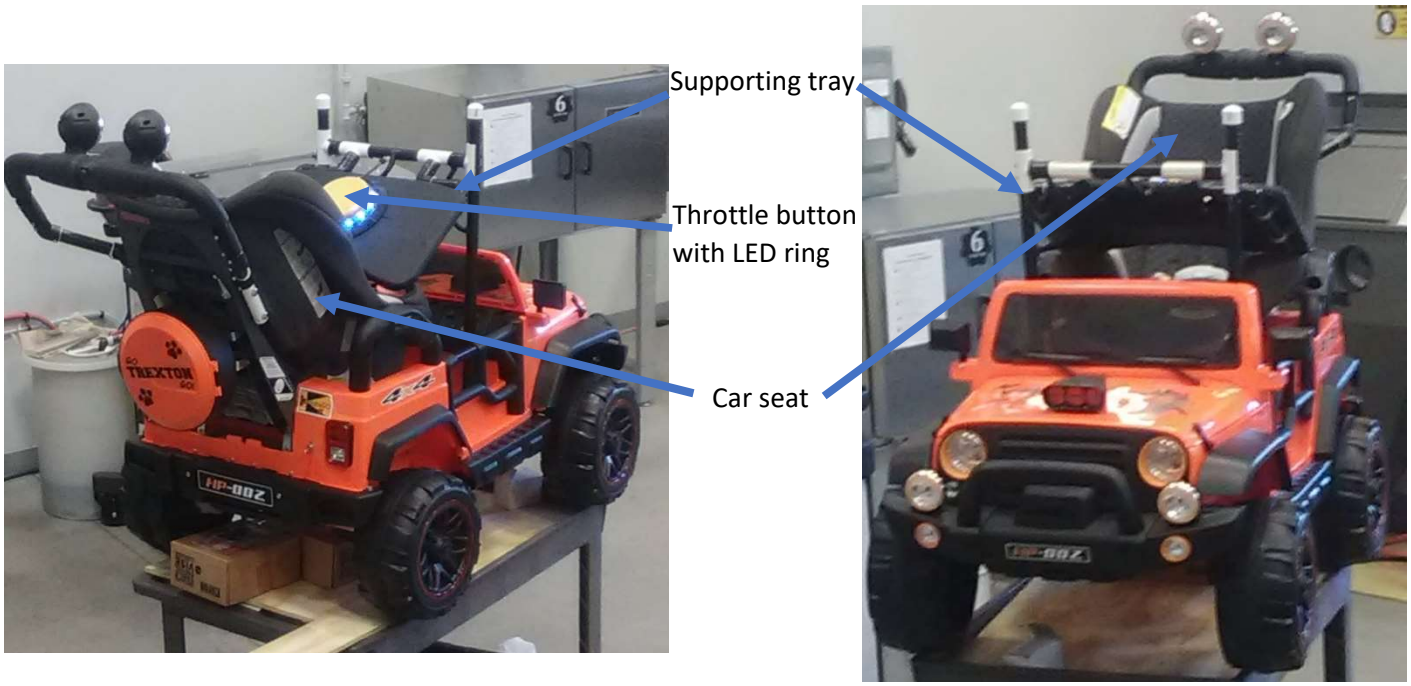
- 3D printer



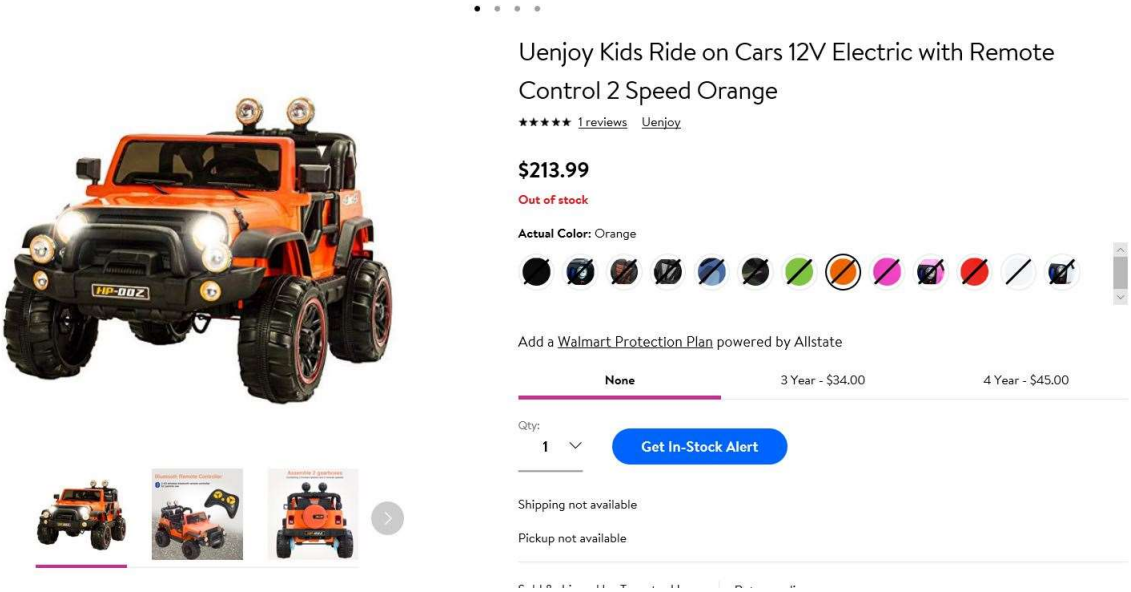
Build Summary

This electric toy car was modified for Trexton, a four-year-old boy with athetoid cerebral palsy. His condition significantly limits motor function and, in turn, reduces his ability to support his own weight. Thus, operation of a stock toy vehicle would be extremely challenging. This build was focused on providing Trexton with the extra body support he needs to remain safe and comfortable behind the wheel while at the same time offering a simple and attractive throttle option relocated into Trexton's line of sight.

These needs were met through several key features. These features include: 1. a car seat mounted in place of the stock seat at a 30-degree recline to keep Trexton firmly in place while operating the vehicle, 2. a large tray mounted perpendicular to his car seat and spanning the width of the vehicle to provide Trexton's arms with a supporting structure on the way to the throttle switch, and 3. a hand-operated throttle button in lieu of the standard foot-operated pedal encircled by a ring of bright LEDs to increase its appeal to Trexton by contrasting with the plain black covering of the tray. These features are indicated in the image below.



The vehicle selected for modification was a “Uenjoy Kids Ride on Cars 12V Electric with Remote Control 2 Speed Orange” purchased for approximately $215. This vehicle was selected for its having several desirable features from the factory. These include remote operation capabilities, high and low speeds, a large weight capacity (88lbs), and a large cabin space to accommodate the tray and car seat (49.2” x 31.5” x 31.5”). The vehicle before modification is shown below.



Kill Switch Wiring

A standard toggle switch (figure 1) was mounted to the back of the vehicle, just inside the right taillight to serve as an easily accessible kill switch. When the switch is in the 'off' position, power to the car is cut off and it cannot move. When the switch is flipped to the 'on' position, normal power levels are restored and the car regains full functionality. The switch's terminals were spliced into the positive wire off the main battery just downstream of the charging circuit so that the switch need not be 'on' for the vehicle to charge. Note that approximately 2.5 feet of additional 18-gauge wire had to be added to the splice in order to reach the desired switch location.

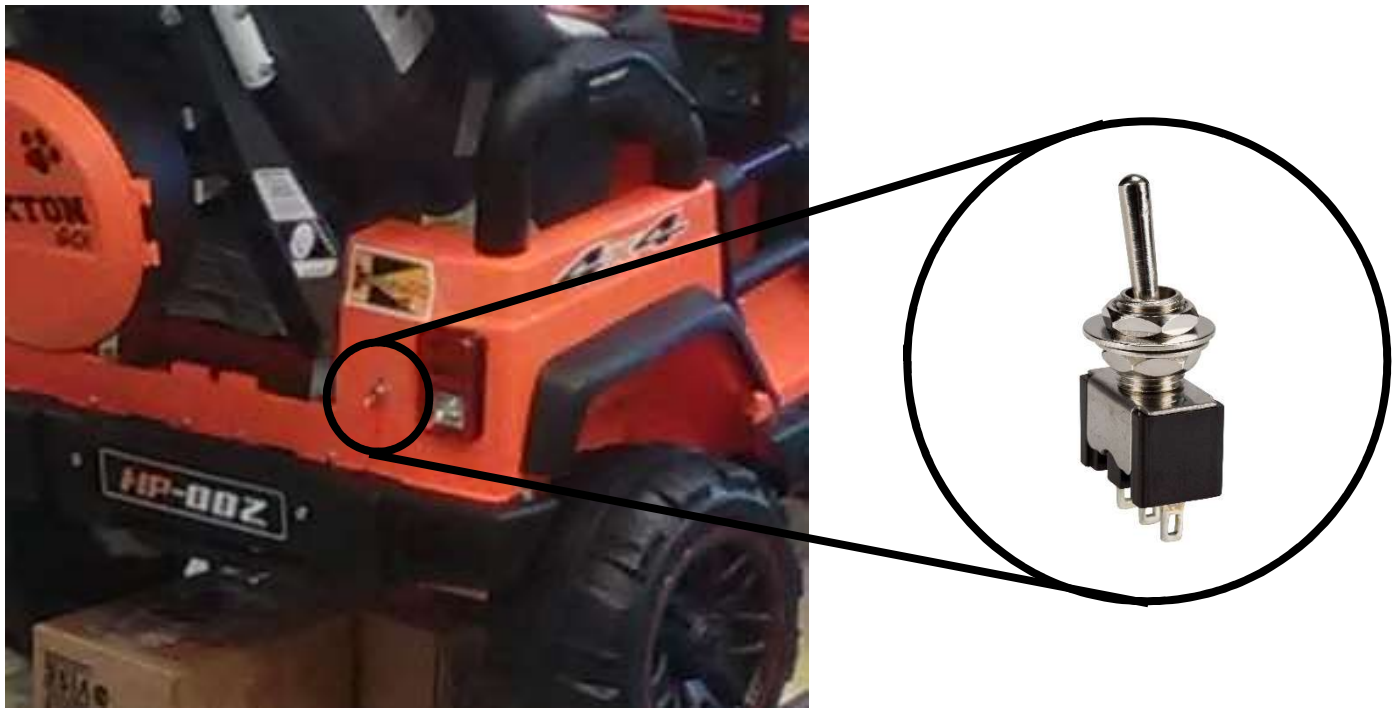


Figure 1

Car Seat Mounting

A reciprocating saw was used to cut away the trunk area of the car to accommodate the car seat (figure 2). The space between the internal and external surfaces of the body just beneath the cut was filled with 2 short lengths of 2x4 board stacked and secured with two ~6-inch long bolts.

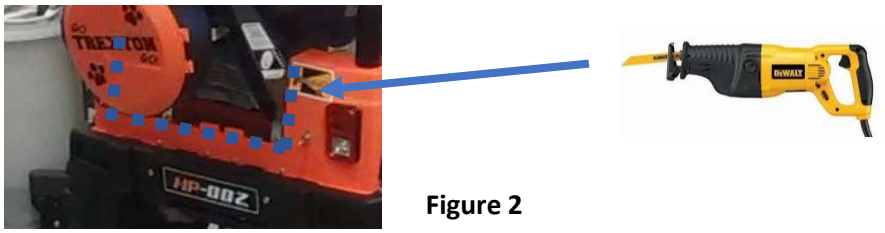


Figure 2

A plywood platform was then cut using a jigsaw to serve as a mounting point for the car seat. The wood was cut to fit the contour of the car and covered with black vinyl fabric (figure 3). The edges and corners of the platform were hand sanded before covering to prevent tearing of the fabric. The seat was then mounted to the platform using 7 metal brackets as shown. L-brackets from the hardware section of any major retailer would be sufficient; however, the brackets pictured were sourced from scrap shop material.

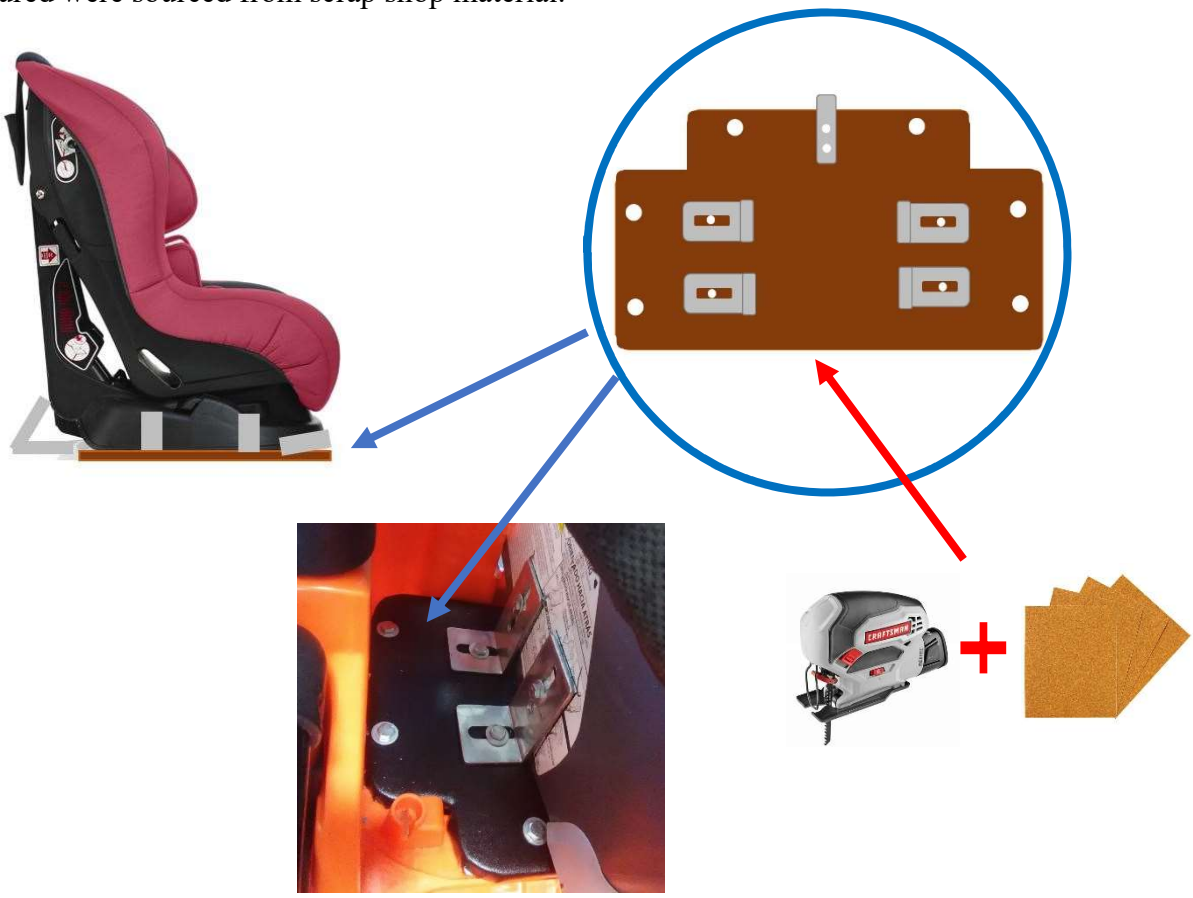


Figure 3

Building the Tray

The tray was constructed from 1/2" wood sourced from an old tabletop (figure 4). First, the general 'kidney' shape was cut from the wood sheet using a jigsaw. A router was used to smooth the top and bottom edges. Then, a small pilot hole was drilled in the center of the tray and the adjustment slot cut with the jigsaw, starting in the pilot hole. Then, the area immediately around the adjustment slot was recessed on the back of the tray ~1/4" using the router equipped with a cutting bit. Finally, a shallow outline was cut around the recess using the router set to ~1/8" depth to accommodate the plastic cover.

The cover was 3D printed from standard PLA material set to 3mm layer height with 100% infill (figure 5). Two straps were fabricated from the black vinyl material and attached on one end with wood screws and washers. The straps were fitted over each side of the plastic cover and attached on the other end with the Velcro-style Command strips. The strips on the tray side were additionally secured with two staples each while the strap side was further secured using hot glue. The tray was then covered on the front side using satin black pleather while the back was covered with vinyl. The front material was secured using contact cement around the adjustment slot and multiple staples on the back side. The staples were hidden by the backside material that was also secured around the adjustment slot using contact cement but then secured around the edges using upholstery nails.

The throttle button was mounted on a 3D printed bevel (3mm layer height; 30% infill) (figure 6) that allows for a single bolt passing through a hole in its center to be used to secure the button to the tray through the adjustment slot. A wingnut was used on the back of the tray to allow for easy lateral adjustment of the button.

Finally, the battery case for the LED light strip was secured to the back side of the tray using a 3D printed case (figure 7). The case was custom made to fit the battery case with slots for the power switch and power cables to be accessed from the outside. It was secured to the tray using four wood screws, one of which was shared with one of the vinyl straps for the plastic slot cover.

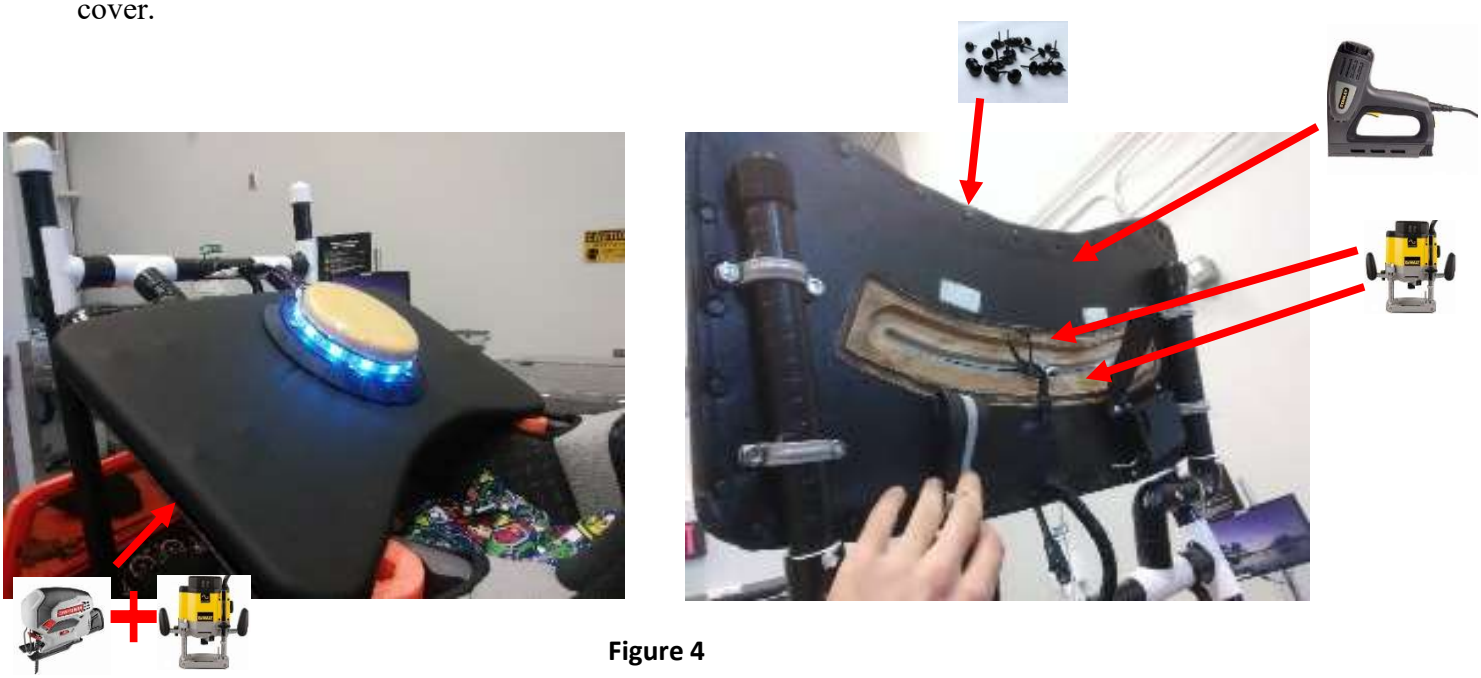


Figure 4

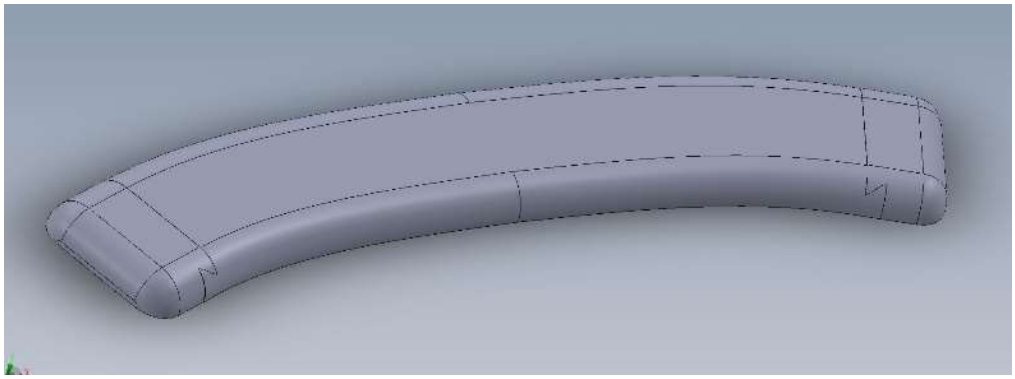


Figure 5

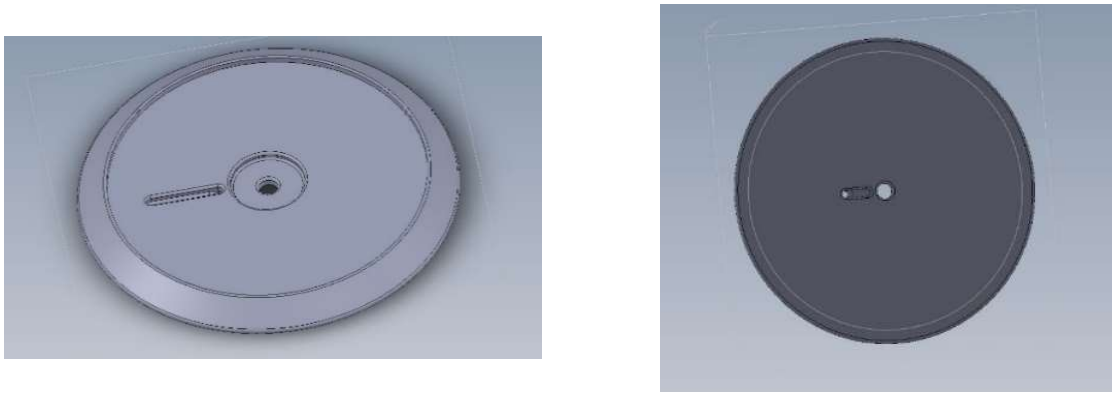


Figure 6

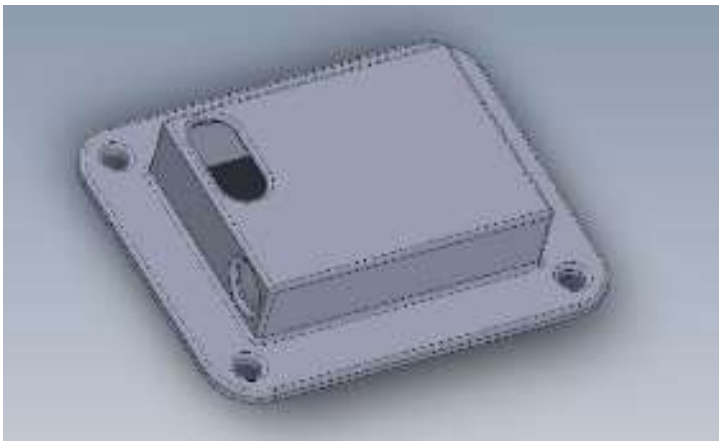


Figure 7

Building the Tray Frame

The frame for the tray was constructed primarily from ¾" PVC pipe and associated connectors. The frame's primary mounting points were at 5 locations under the floorboard of the car. These mounting locations are seen in figure 8. The pipe was secured to the plastic body of the car at each of these locations using ¾" PVC pipe clamps and two ¼" bolts. The stability of the frame was increased using 3D printed brackets (figure 9).

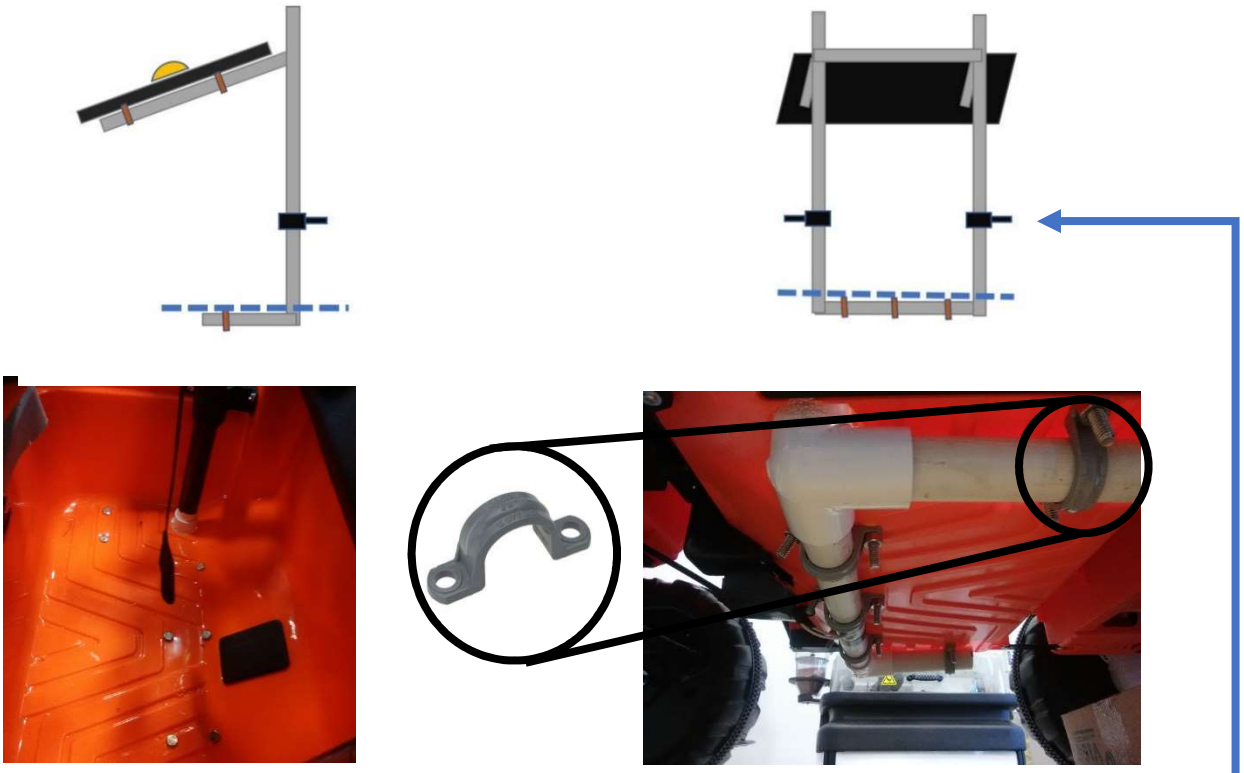


Figure 8

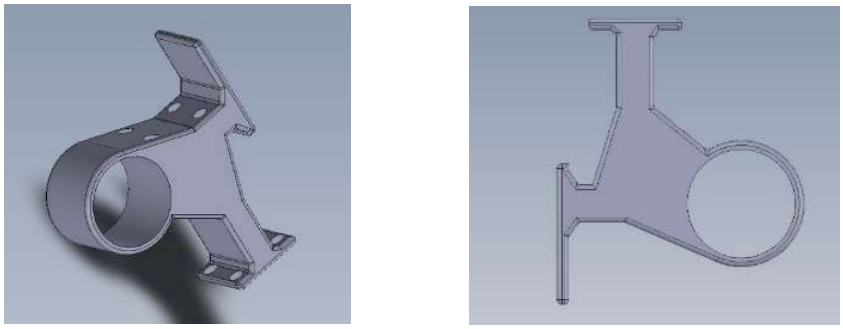


Figure 9

Mounting the Tray

The frame was attached to the tray using the same clamps and ¼" carriage bolts (installed before covering the tray with fabric). The tray was then allowed to hinge upward using two half T-joints (figure 10).

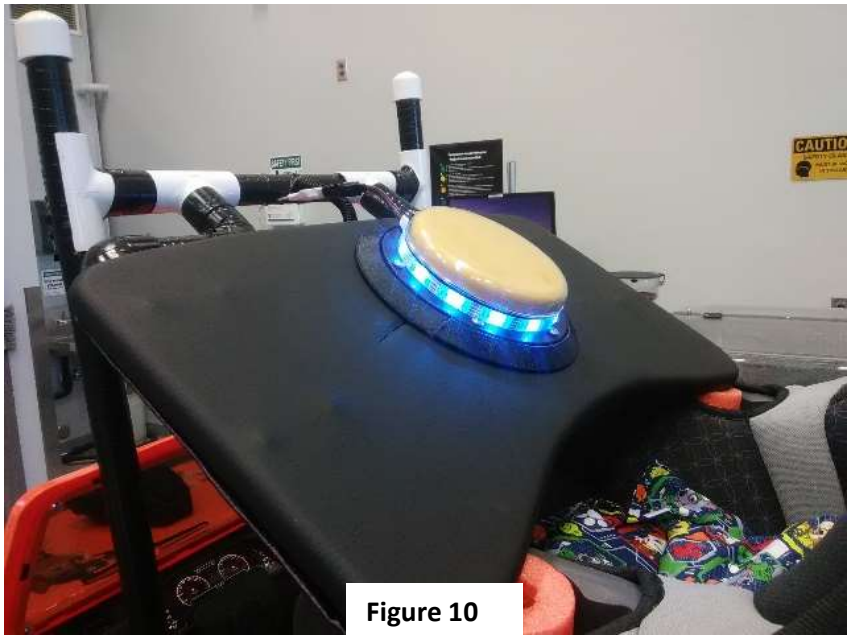


Figure 10

Wiring the Throttle Button

To wire the throttle button correctly, the original connector at the end of the button's wires was removed. The two wires were then pulled apart from each other several inches from the end. The original throttle switch located under the gas pedal was removed and the two leads connected to the switch severed. All four exposed wires were then stripped. Then, the two leads of the throttle button were twisted into the two leads originally off the pedal switch. The connections were capped and covered with electrical tape. The throttle button's wires were routed as shown in figure 11. The wires were made to run under the tray, into the PVC frame, and out through a small hole drilled in the bottom of the frame. Note that extra wire was spliced into the system to relieve stress on the wires and allow for adjustment of the tray height and button position.

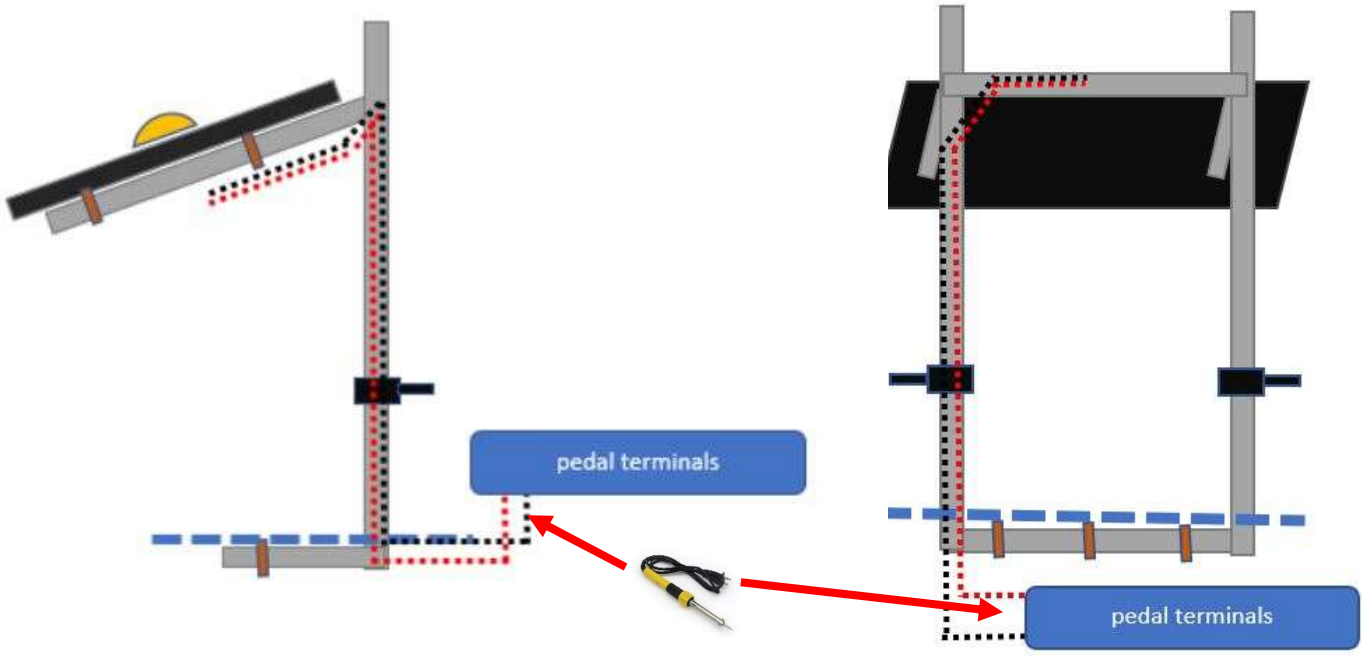
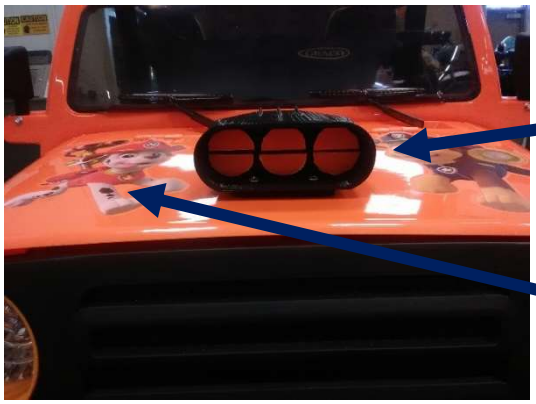


Figure 11

Aesthetic Features



3D printed hood scoop

"Paw Patrol" stickers

Custom-mounted roll bar with lights (bar was originally displaced by the car seat)

Custom-mounted spare tire storage container (originally displaced by the car seat) with custom "Go TREXTON Go!" decal

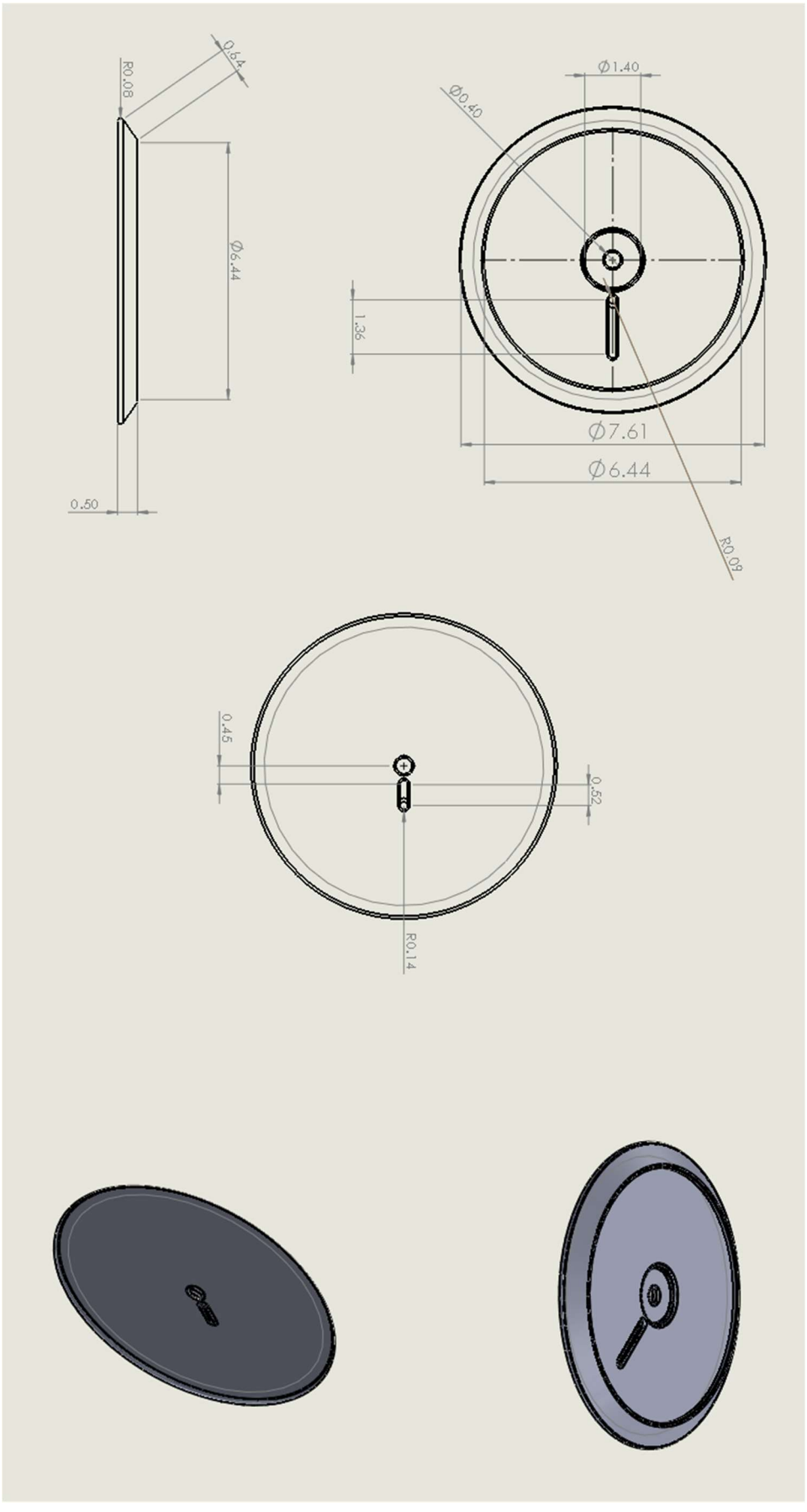
Delivery Day Notes/Observations

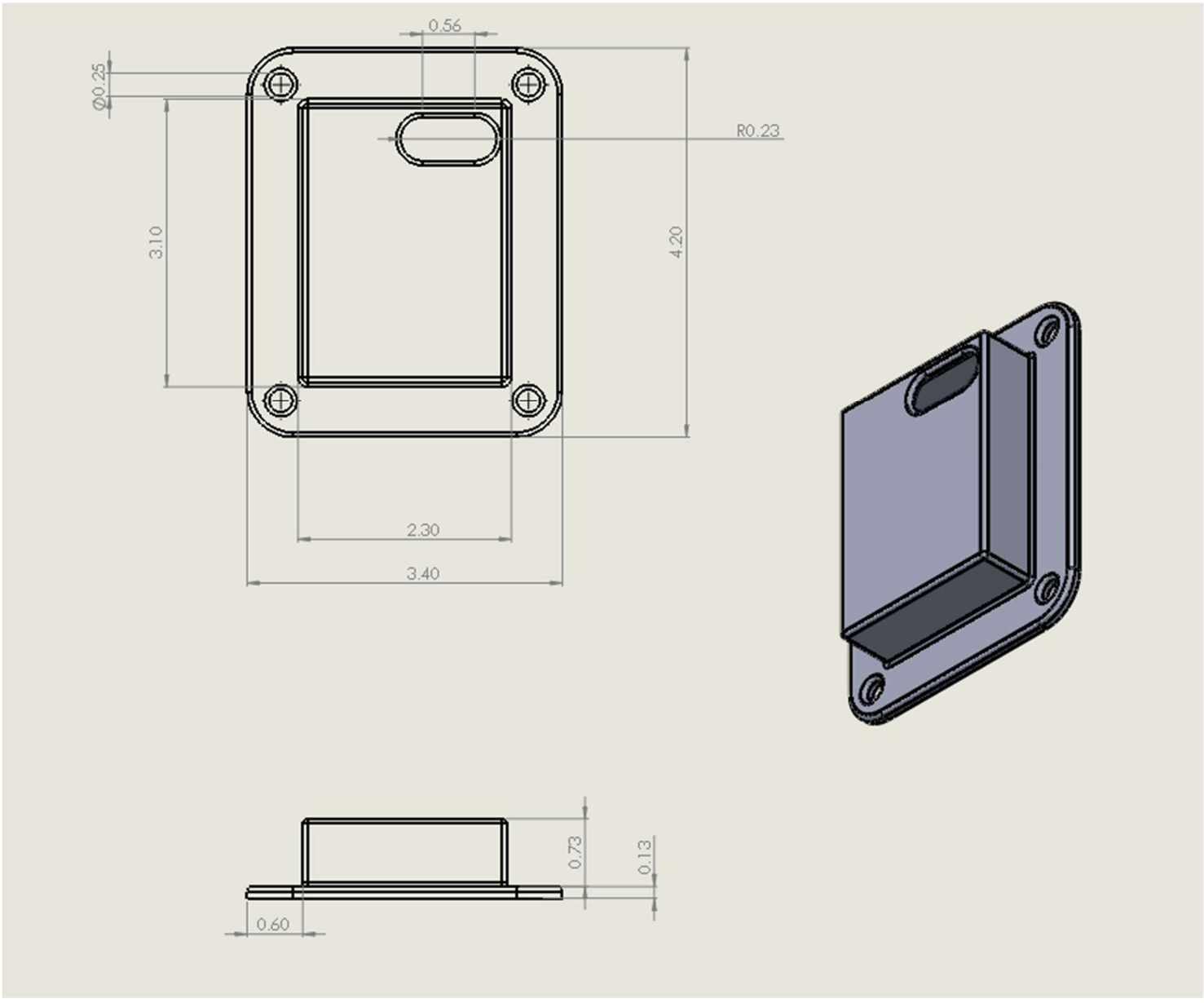
- The seat could have been position further back away from the dashboard. Trexton's legs fit in the space between, but with some difficulty. This led to the added complication of Trexton unintentionally kicking the switch cluster on the right side of the dash. This cluster contains several critical switches including forward/reverse, high/low speed, and power. A cover might have been fashioned to prevent such kicking.

- A mechanism for holding the tray in the upright position while loading Trexton into the car would have been beneficial. The tray is quite heavy and would risk falling on Trexton without a second person present to hold the tray up. A rope and hook or latching mechanism could have served this purpose.

- A custom "owner's manual" for the car or an information sheet of some kind may have been useful for the Trexton's parents, particularly in the case of this vehicle where the settings of multiple buttons and switches on the dashboard were critical to the correct operation of the car. These buttons could easily be accidentally switched either by Trexton or his parents and returning them to the correct position without knowledge of the underlying build could prove difficult.

Appendix

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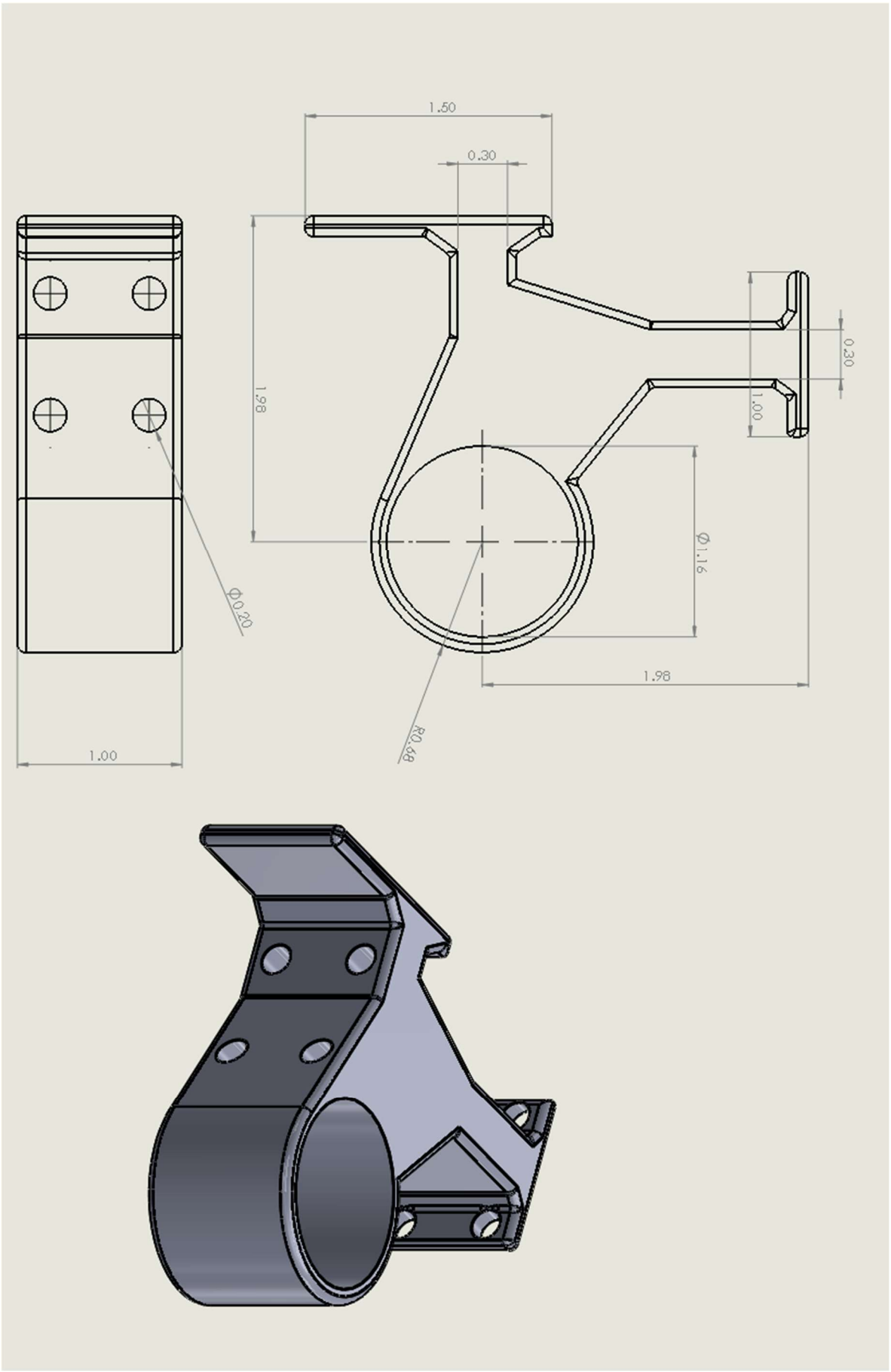
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