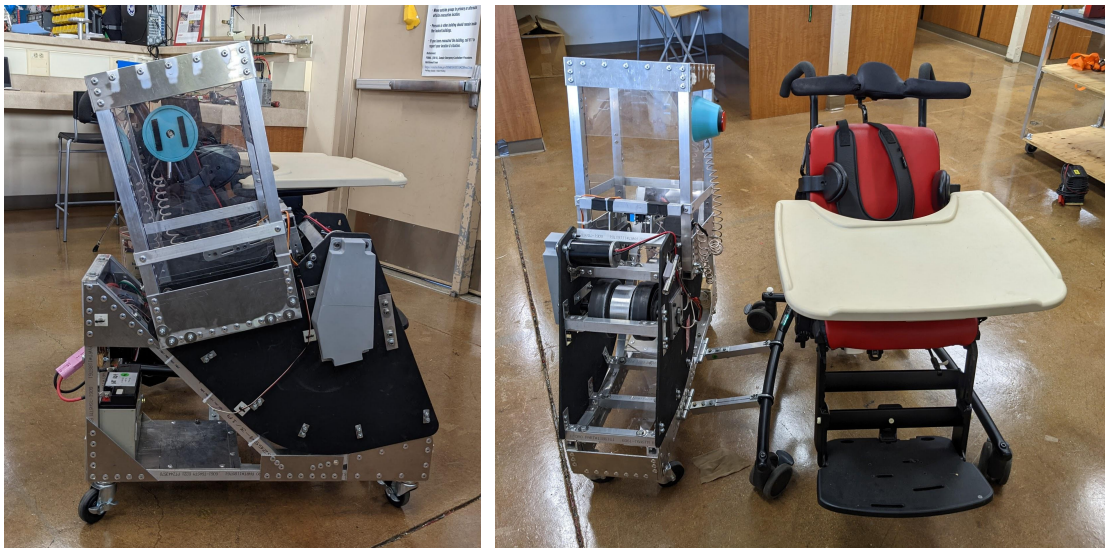


GRT SoccerDuck Attachment User Guide

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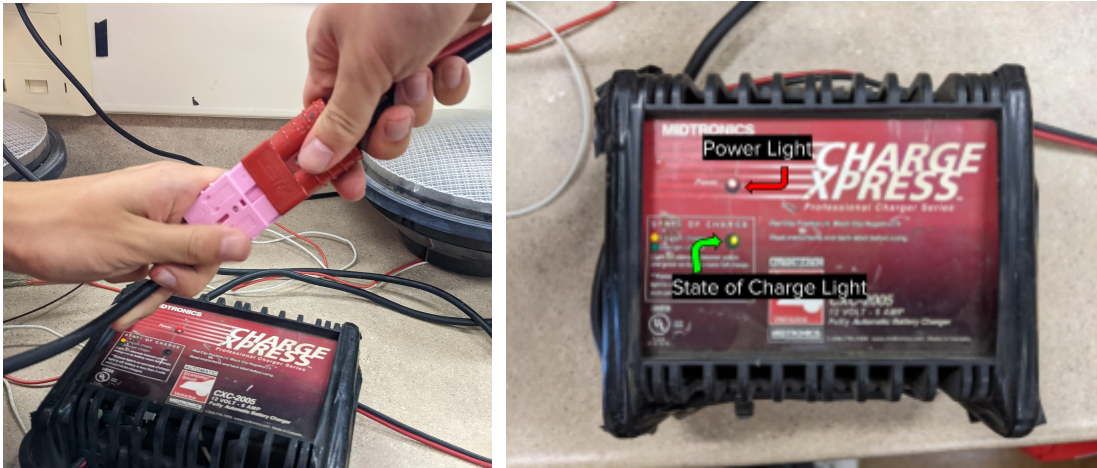


The SoccerDuck is a soccer ball shooter designed by students on the Gunn Robotics Team (GRT). It features a flywheel shooter, 4 maneuverable wheels, a 2-ball storage chute, and a laser pointer. The Duck is designed to attach and travel with a wheelchair that has been properly set up.

1. Getting Started

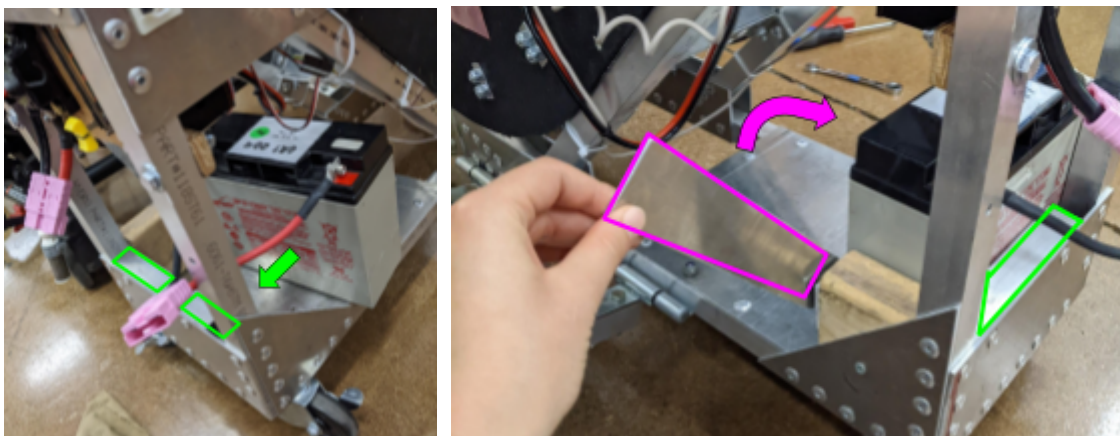
1.1 Battery

Make sure to charge the battery fully before each use by plugging the battery charger into the wall and then attaching it to the battery as shown in the image. The red Power Light indicates successful connection. When the State of Charge Light has turned green, charging is complete.

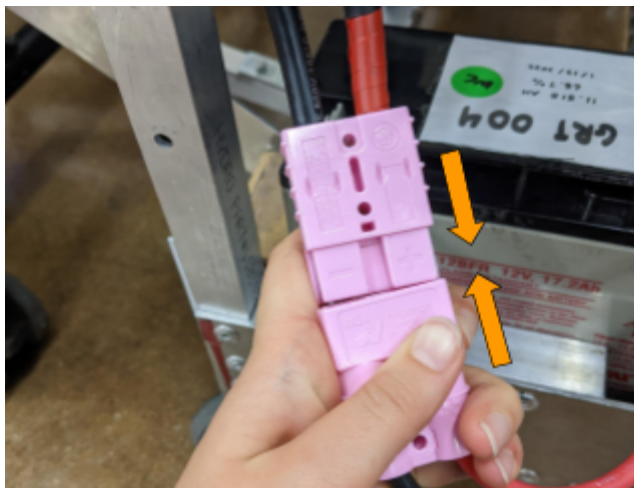


Charging process for the battery with Power Light and State of Charge Light labeled.

When ready to use the Duck, slide the battery into the rear right opening and push it as far back towards the rear (outlined in green) as possible. To secure the battery in place, rotate the metal bar (outlined in pink) downward. Once you have secured the battery, connect the two pink leads.



Processes for sliding in and securing battery with rear outlined in green and metal bar outlined in pink.

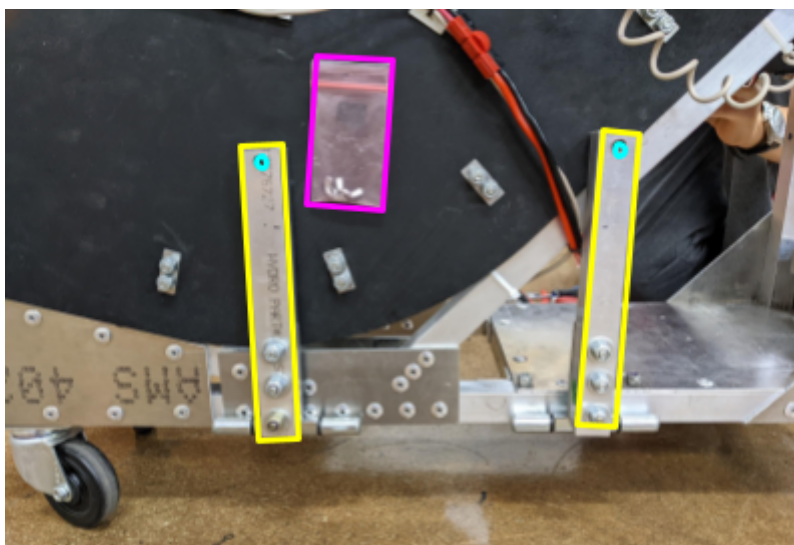


Pink leads from the battery and the Duck with orange arrows indicating direction to slide.

Running the battery all the way down can damage the battery, so **use the Duck for 45 minutes or less** before swapping in a fully-charged battery. If you notice the motor slowing suddenly, turn the Duck off immediately and charge the battery.

1.2 Attachment to Wheelchair (Optional)

To attach the Duck to the wheelchair, first remove two wing nuts from the pink ziploc bag (outlined in pink). The bag is Velcroed on the side of the Duck and can be removed/replaced.



Attachment side of the Duck with wing nut bag outlined in pink, attachment bars outlined in yellow, and bolts outlined in blue.

The two metal attachment bars (outlined in yellow) are stored upright with their bolts (outlined in blue above) held by holes in the black wooden wall. Pull the attachment bars out from their storage positions so that they are in alignment with the wheelchair brackets (outlined in purple).

Stick the threads of the attachment arm bolts through the holes in the brackets. Secure this connection with the wingnuts from the plastic bag.



Processes of connecting an attachment bar to its bracket, with attachment bar outlined in yellow and bracket outlined in purple.

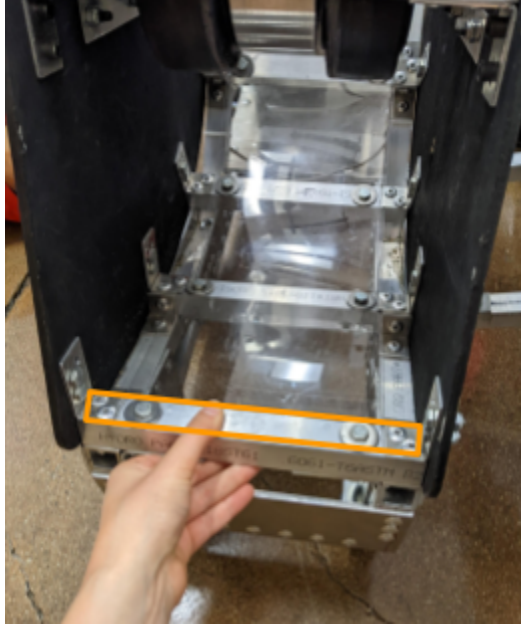


Final attachment setup with both bars secured.

1.3 Transportation

When you're ready to take the Duck with you to the park or another open space, it can be transported in a car trunk. Transport the Duck separated from the wheelchair. It is very heavy, so get two people to help with lifting it.

Once the Duck is attached it will move with the wheelchair. You may need an extra set of hands to push the Duck on bumpy terrain. If you encounter very big bumps, lift the front bar (outlined in orange on the next page) to free the front wheels. Concrete, grass, turf, asphalt, linoleum, etc. all work well for the Duck, but avoid overly rocky surfaces.



Front view of the Duck, with the front bar outlined in orange. Lift the Duck by the front bar to pass over bumpy terrain.

2. Operating

2.1 Powering On

To power on the SoccerDuck, activate the **main breaker** (outlined in blue), located on the back (controls) plate, by pushing the plastic breaker arm (outlined in orange) firmly upwards as far as possible; if you don't hear a click, it might not be fully engaged. **Before powering on, make sure there are no soccer balls in the storage chute.** After powering on the mechanism, the flywheel will begin spinning and the storage chute arm will move to its upward position.



The back (controls) plate with the main breaker outlined in blue and the breaker arm outlined in orange with an arrow indicating how to power on.

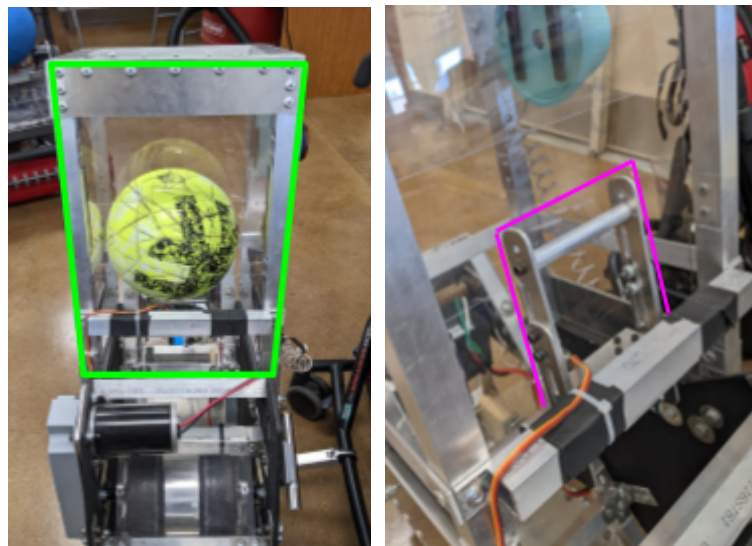


Manufacturer's image of the circuit breaker with the breaker arm (highlighted in yellow) in the down position (off) on the left and the breaker arm in the up position (on) on the right.

To power off the Duck, press the red button on the main breaker all the way in firmly. This releases the breaker arm, powering down the entire mechanism.

2.2 Inserting Soccer Balls

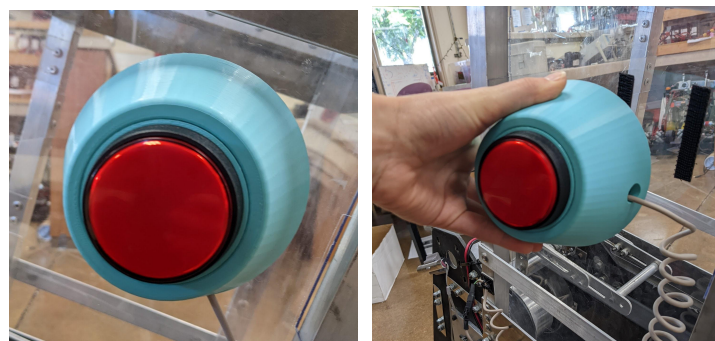
Once the Duck is on, soccer balls can be inserted via the storage chute (outlined in green) on the top. Soccer balls can be loaded into the Duck at any point only while it is powered on, and up to two soccer balls can be stored in the storage chute at once. If a ball is in the chute when the Duck powers on, the storage chute arm (outlined in pink) will be damaged when it attempts to force itself upwards.



Storage chute outlined in green and storage chute arm (inside the chute) outlined in pink.

2.3 Shooting

The hopper (ball storage system) is controlled by the **red button** Velcroed to the left side of the Duck for ease of storage. The button can be detached from the Duck and held or placed on the wheelchair tray for easier access.



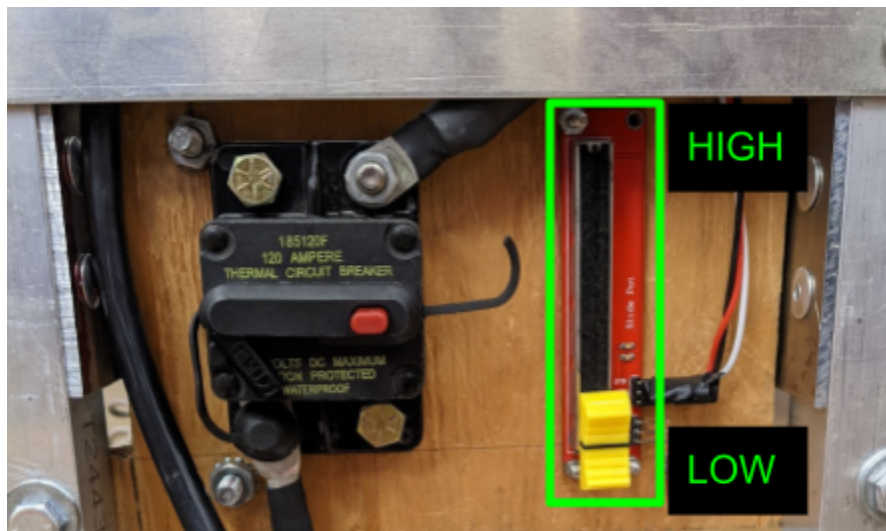
The Big Red Button and how it attaches to the side of the Duck.

While the Duck is powered on, pressing the red button will cause the hopper to drop a stored ball into the flywheel, shooting it out of the front. **Make sure no one is close in front of the Duck when pressing the button, or they may be hit by a high powered soccer ball.** The chute arm will only release one ball at a time, and takes around ~0.3 seconds to reset after a button press, so there is some delay when trying to shoot two balls in rapid succession.

After use, the red button can be stored by reattaching to the Duck using the Velcro. Make sure to press against the button from the other side of the polycarbonate chute wall when reattaching the button, as dual lock (Velcro used) requires more force to press together than standard Velcro.

2.4 Speed Control

The power at which the Duck shoots a soccer ball is controlled by the **slider** (outlined in green) on the back plate. The speed of the flywheel is lowest at the slider's bottommost position and highest at the top. The speed can be changed at any point during operation by moving the slider, but it may take a few seconds for the flywheel to spin at the new setting.



The back (controls) plate with the slider outlined in green. The high and low power ends of the slider are labeled HIGH and LOW respectively.

2.5 Laser Pointer

The Duck comes with a laser pointer Velcroed to the left wall. The laser pointer has 4 modes: **OFF**, **LASER**, **BLACK_LIGHT**, and **FLASHLIGHT**. DO NOT point the laser into anyone's face as it can cause eye damage.

- In **OFF**, the laser pointer is off.
- In **LASER**, the laser pointer shines a red laser in front of the Duck to act as an aim guide.
 - The laser pointer also has a black dial on its underside, which changes the design of the laser.
- In **FLASHLIGHT**, the laser pointer acts as a regular flashlight.

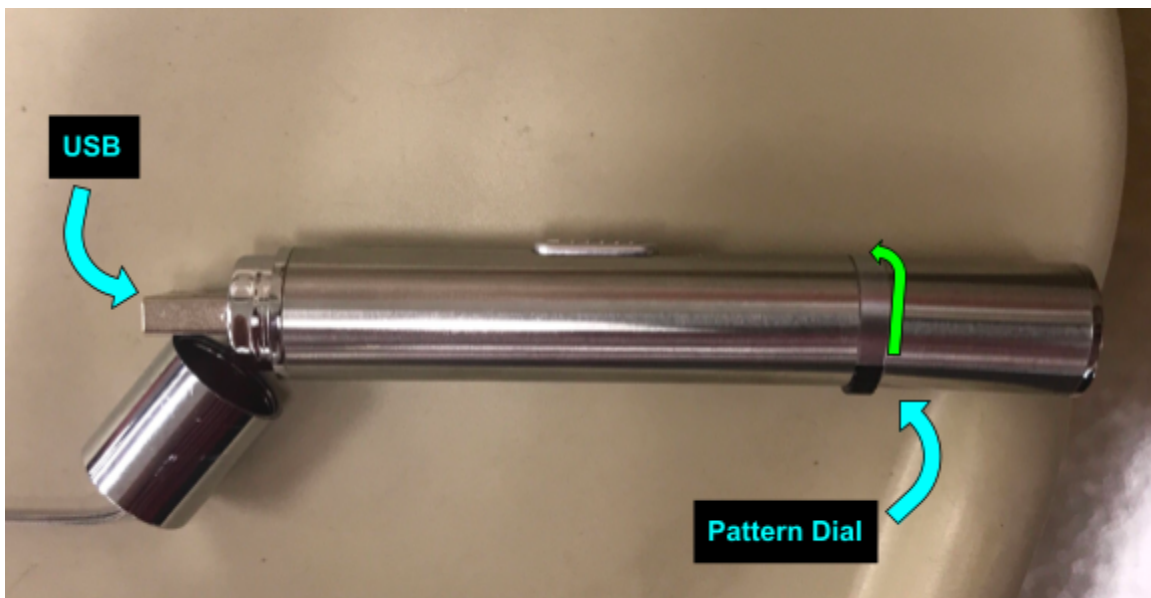
- In **BLACK_LIGHT**, the laser pointer acts as a black light flashlight.

The modes can be toggled using the switch on the top of the laser pointer.

The laser pointer snaps in and out of the plastic holder and the back cap can be removed to charge the laser pointer via USB.



The laser pointer in the LASER, BLACK_LIGHT, and FLASHLIGHT modes respectively. Full right on the switch corresponds to OFF.



The laser pointer with male USB charging plug and laser pattern dial labeled. Green arrow indicating direction to turn the dial.

3. Safety

The flywheel can spin at high speeds, so do not touch the wheel while the Duck is on. Do not shoot a soccer ball when anyone is standing directly in front of the Duck as balls will travel at high speeds.

When powered on, the Duck's flywheel can catch on anything dangling above it. To stay safe, follow the following guidelines while the Duck is on:

- Put long hair in a bun and out of the way
- Tuck in dangling strings (like on a hoodie)
- Avoid very loose shirts, long jewelry, or anything else that may get caught

In addition, do not wear headphones while using the Duck so you can hear any sudden changes in sound which could indicate damage. If the user is sensitive to noise and requires headphones, make sure there is someone nearby paying attention to the sound. Only receive balls shot by the Duck while wearing protective close-toed shoes.

If you experience any breaks or issues, please contact GRT at gunnrobotics192@gmail.com

Most importantly, have fun with the Duck!

Appendix

Included Parts

1. The SoccerDuck main body
 - a. A laser pointer
 - b. The big red button
 - c. 3 wing nuts (including a spare)
2. 2 brackets attached to the wheelchair
3. 2 batteries
4. A battery charger