

Integrating Technology Into Enrichment: Hands-On Workshop

*Jose Dominguez and Andy Milluzzi,
Disney's Animal Kingdom®*



Who are we?

Jose Dominguez

Behavioral Husbandry Technician

15 years in the Zoo field

Passion for enrichment

Design enrichment in partnership
with keepers.

Andy Milluzzi

No experience in the Zoo field

Engineer

Builds robots

Is a doctor, but not the type that
can help you (or animals)



Agenda

Enrichment Development Group
Partnerships

Cheetah Ball story

Partnerships in your area

Hands On Workshop



Enrichment Development Group



Develop

Enrichment Development Group

We are seeking applicants for a new small group of diverse, innovative, talented individuals ready to make ground breaking ideas a reality.

Skillsets

- Engineering
- Tech savvy
- Electronics
- Construction or Building
- Woodworking
- Metal work
- Artistic
- Creative

Traits

- Open minded
- Positive member of their team
- Good with time management
- Demonstrates personal initiative
- Ability to complete assigned projects
- Cultivates good teamwork
- Working knowledge of animal behavior

Cheetah Enrichment Example

- Review natural history to select goal behavior
- Brainstorm ways to encourage goal behavior
- Write up an enrichment plan
- Test initiative, evaluate and adjust



Enrichment!

April 29, 2020
Cheetah Training Team
Enrichment Brainstorming Session

Enrichment Goal:
Movement

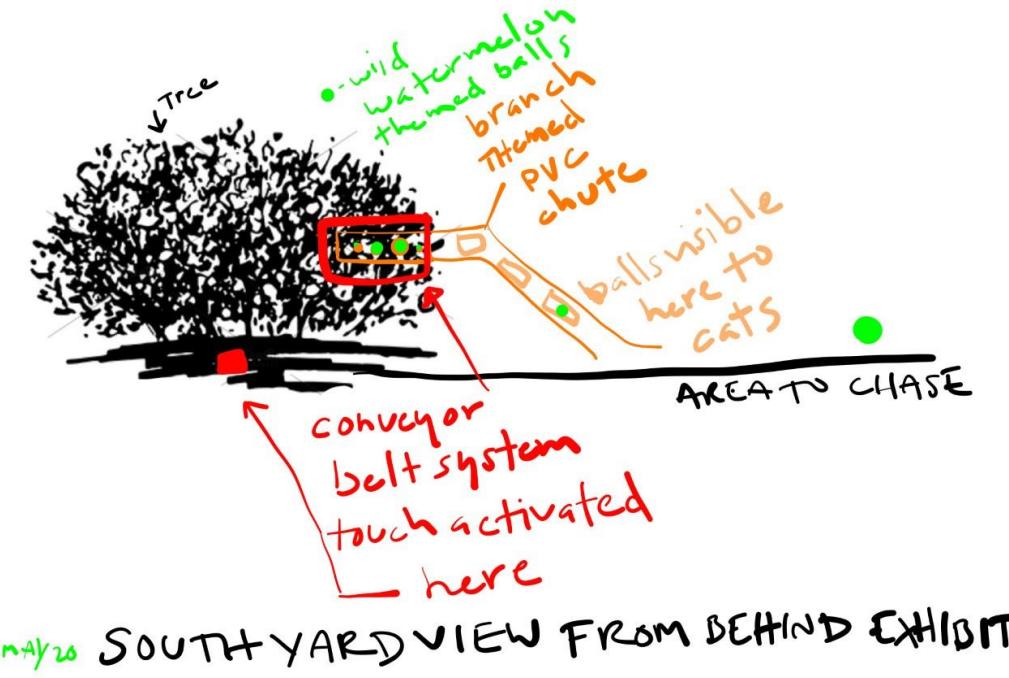
Brainstorming Outcome:
The Cheetah Training Team will be splitting up to approach "movement" in 2 different ways.
1. Training a "Retrieval" behavior, for the Cheetah Training Team to utilize to 'exercise' the cats.
2. Create an enrichment item that can be used by any member of the East Savanna Team to enrich the cats.

"Retrieval" Team

Kelsey
Jess
Caitlin
Andrea

"Build" Team

Robyn
Nicole
Katie



Self Activated Ball Chute

For East Savannah Cheetah





Technology Partnership for Cheetah Ball

Enrichment
Development
Group



Walt Disney
Imagineering



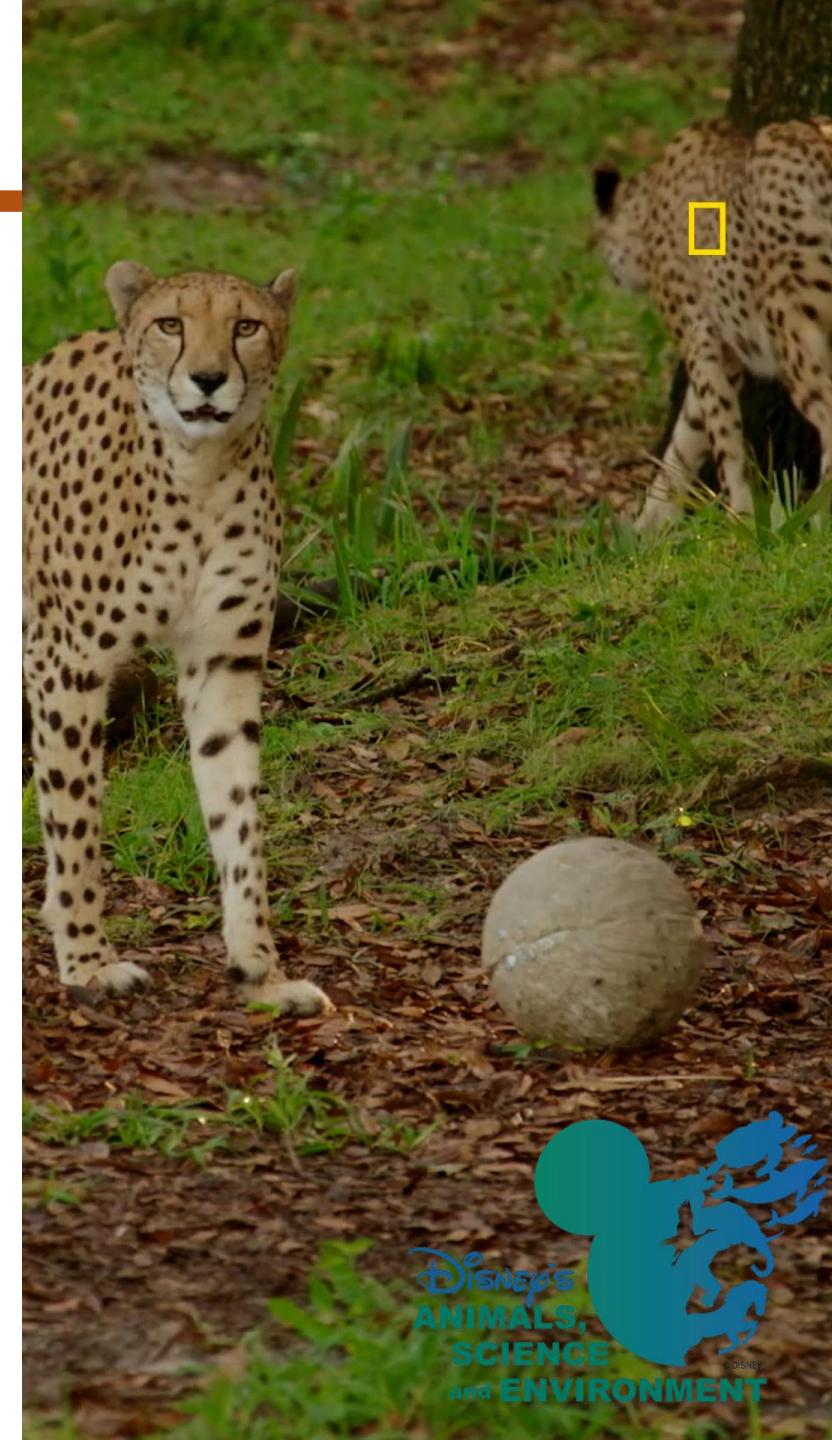
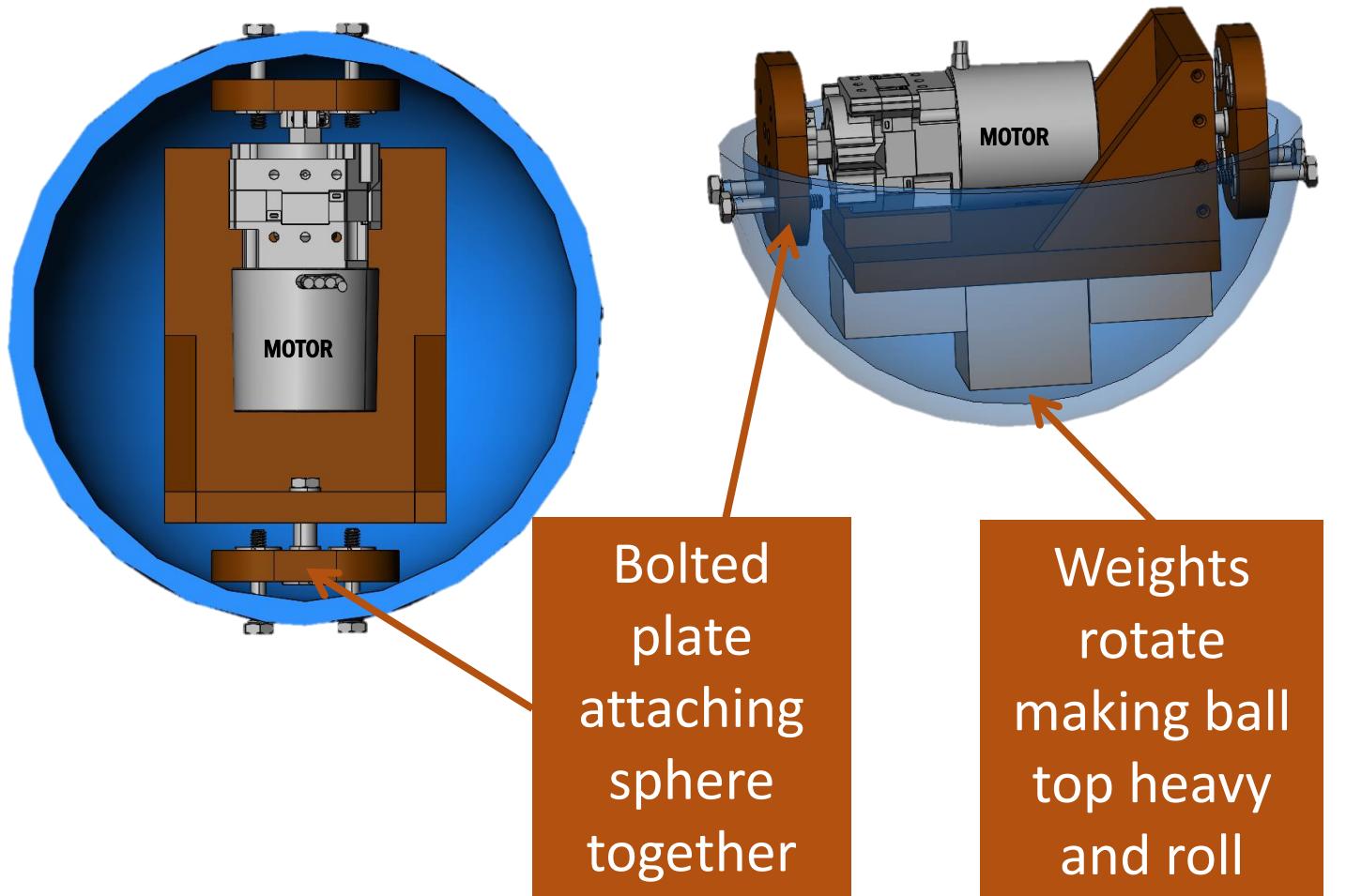
East Savannah
Animal Keeper



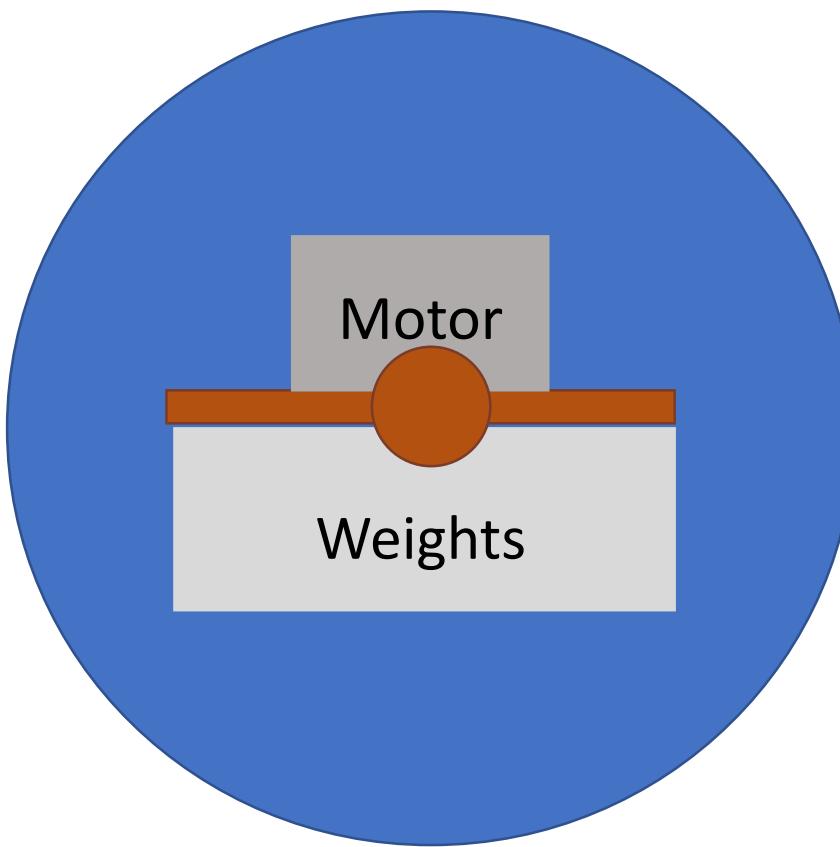
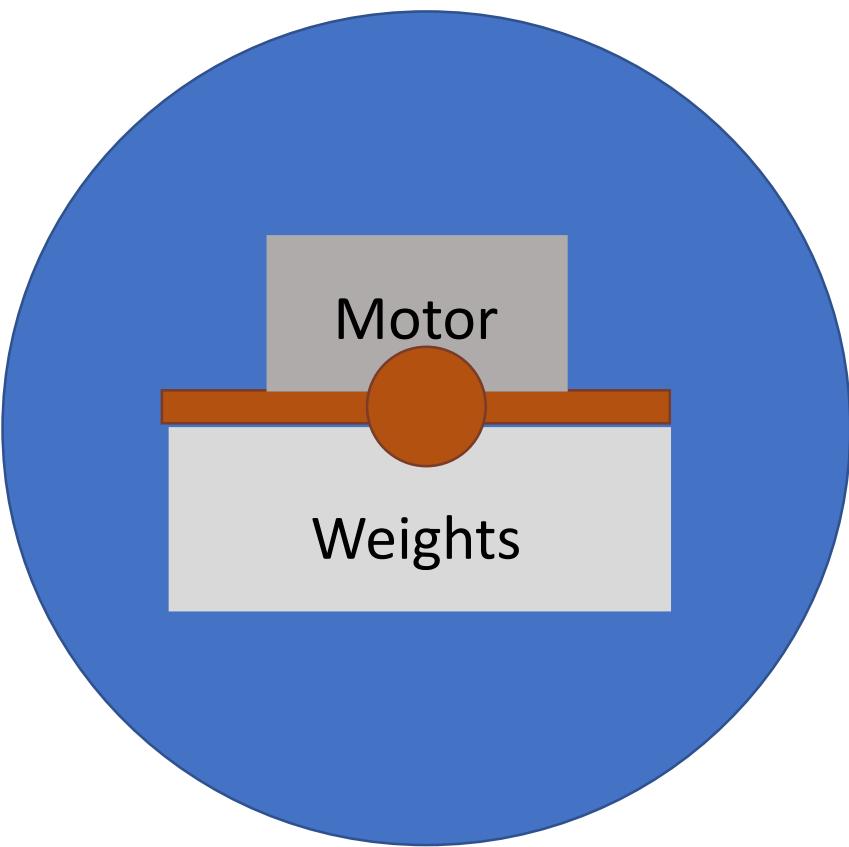
Engineering



How it Works

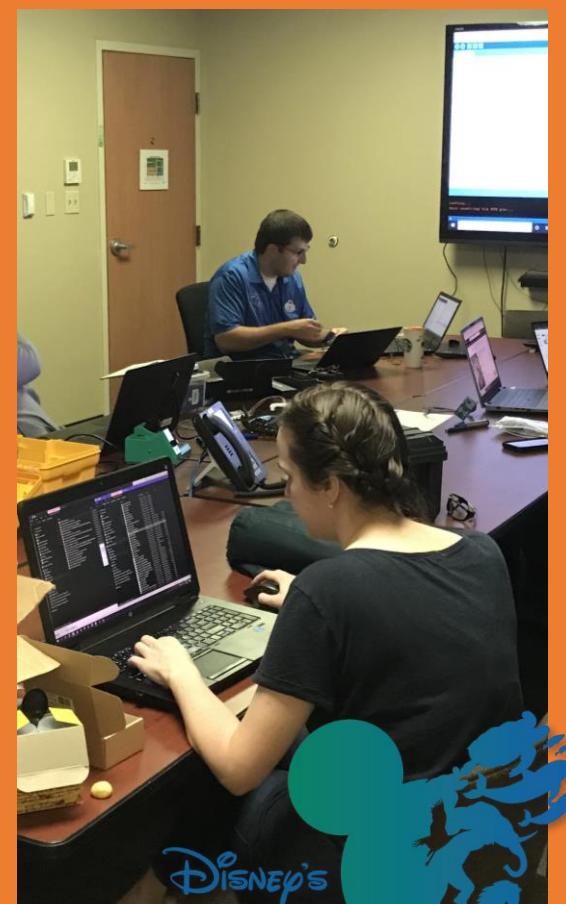
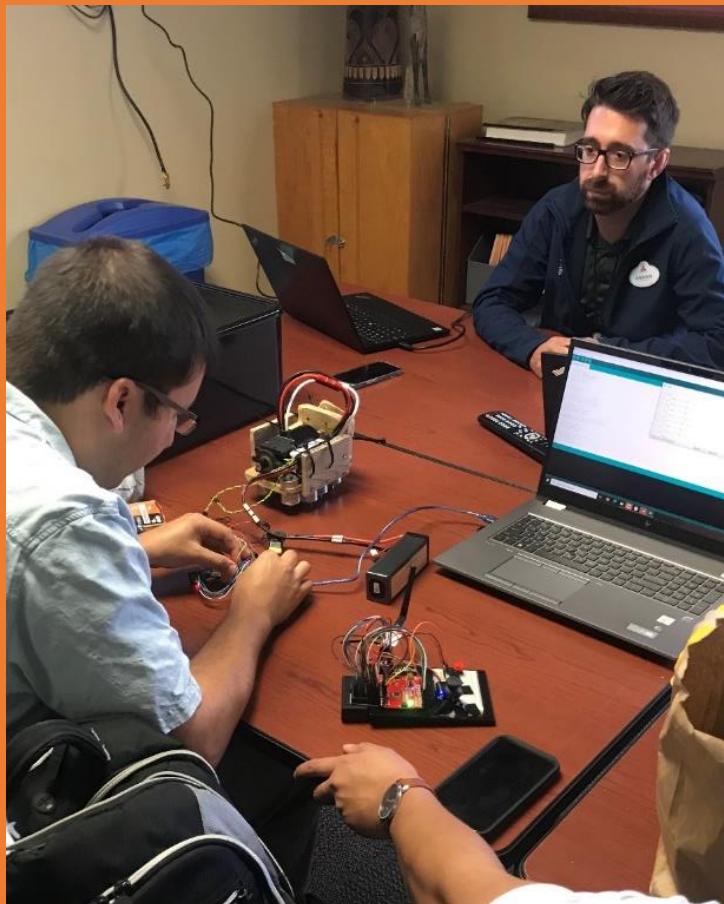


How Will it Move?



Motor turns weighted plate between 45-90 degrees and gravity does the rest.

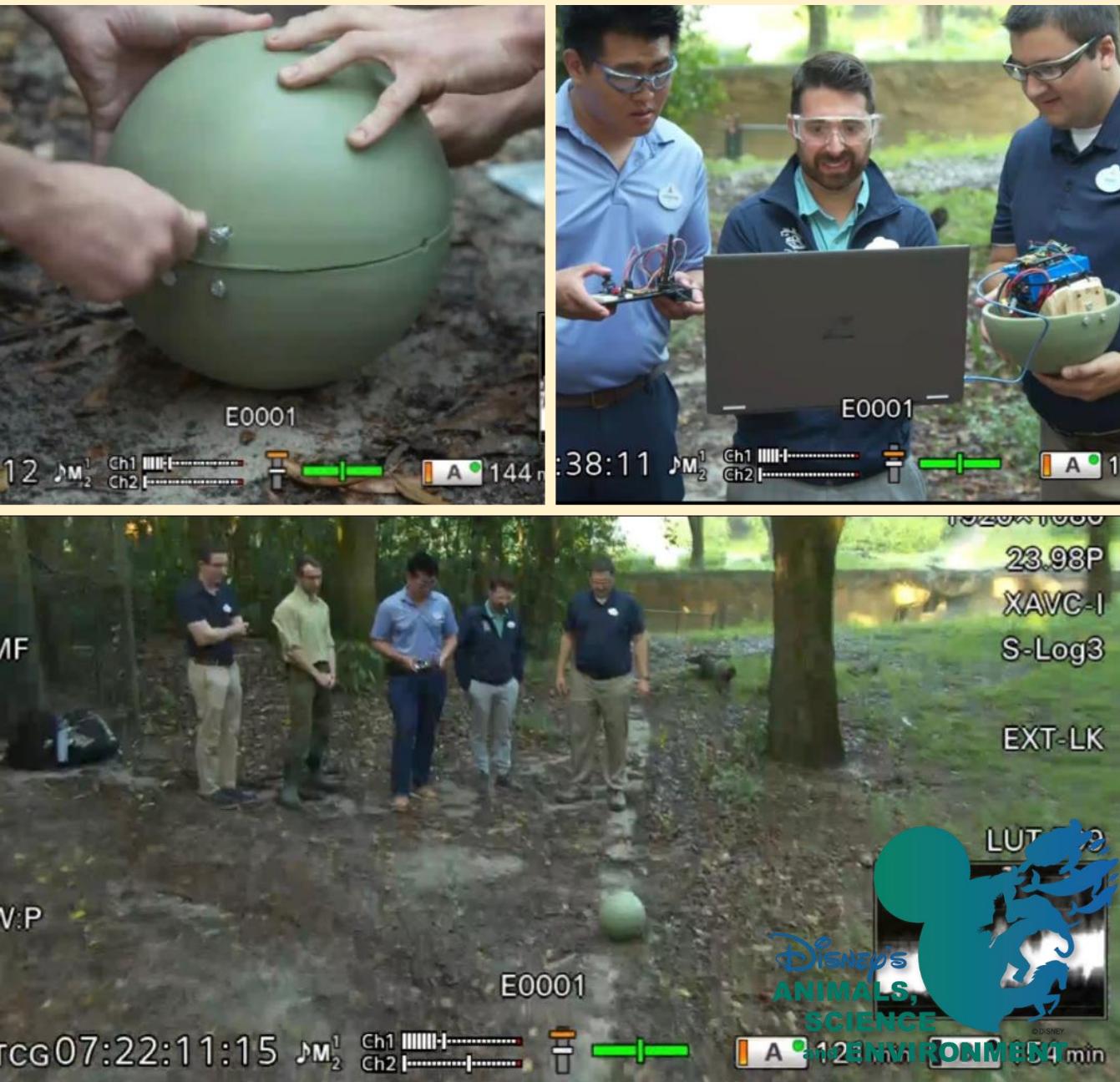
Software Coding and Building the Device



Setting geo-fence in cheetah habitat



Testing movement in cheetah habitat



What we learned...





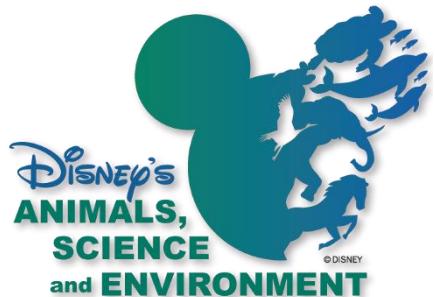
Next Version



- Incorporated tread into ball
- Larger diameter
 - 3d print
 - Cast & Mold

Partnerships in your area

- Engineering University's
 - Senior projects
- High School tech clubs
- Zoo/Aquarium volunteers
- Libraries
- Maker spaces



Examples of Zoo Partnerships



Cincinnati Zoo & Botanical Garden®

TICKETS PLAN YOUR VISIT EVENTS ANIMALS SAVING WILDLIFE EDUCATION GARDENS SUPPORT

Recent Posts



It's Time for Zoo Babies!

May 2, 2023



Mai Thai's 50th Birthday!

May 1, 2023



Penguin Chick Named Larkin

April 28, 2023



Now Hiring Aerial Guides

April 27, 2023

3D Printing Technology Helps Meerkats Mimic Wild Behaviors

Posted May 28, 2020

Engineering meets zoology in a novel collaboration between the Zoo and GE Additive

CINCINNATI, OH – 28 May, 2020 – Cincinnati Zoo & Botanical Garden is home to 2,000 animals, including world-famous hippo Fiona, and is committed to providing each one with excellent care. Thanks to a novel partnership with GE Additive, known for pushing the boundaries of industrial 3D printing (often referred to additive manufacturing), some of the animals are getting meals from a fabricated feeder that encourages natural foraging behaviors.

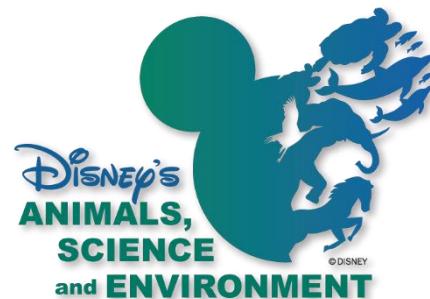
@UGAResearch



ANIMAL HEALTH | MAY 8, 2019

UGA builds 'termite mound' for Zoo Atlanta gorillas

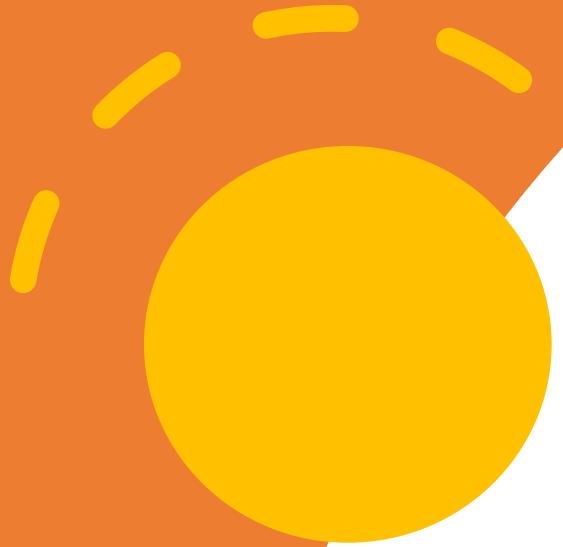
By James Hataway



Hands on workshop

Creating your own mini “Cheetah” Ball





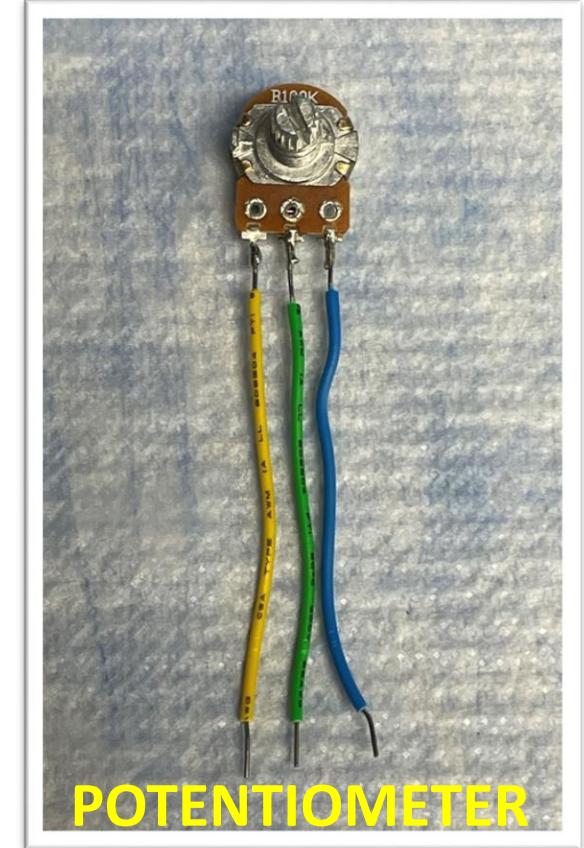
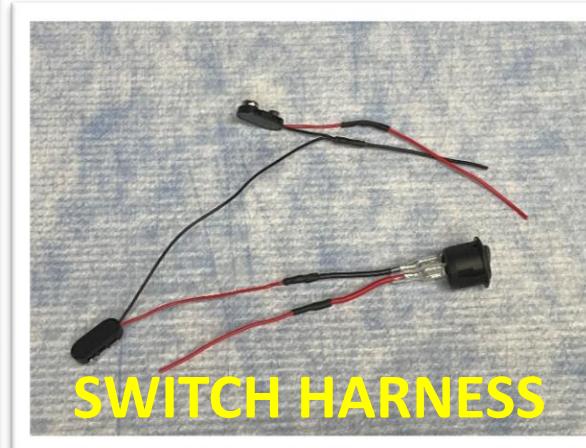
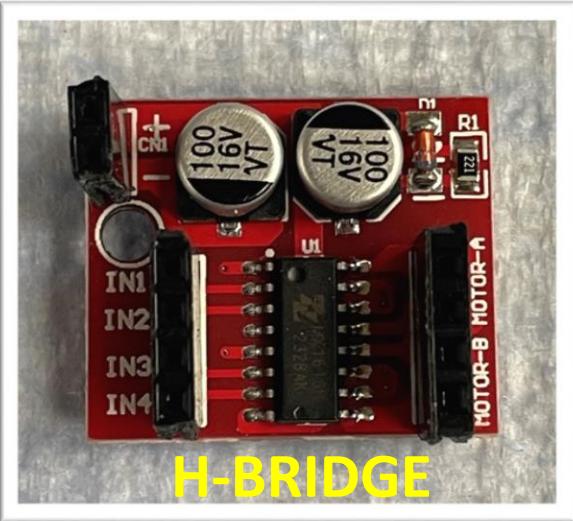
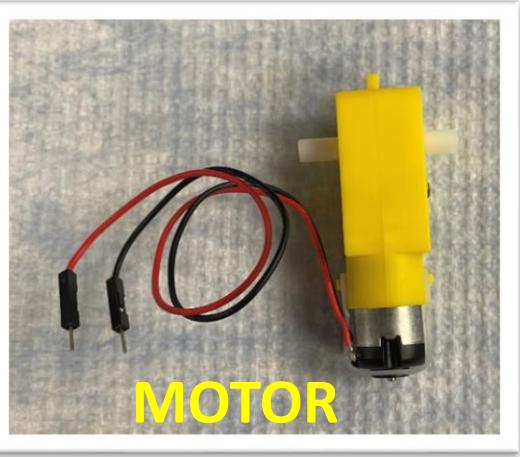
Enrichment Disclaimer

The ball we are working with today is NOT designed to be used with cheetah but will give some introductory knowledge to some of the skills used to make a self-propelled ball.

Enrichment should be evaluated for safety and approved through your facility approval process before being used.



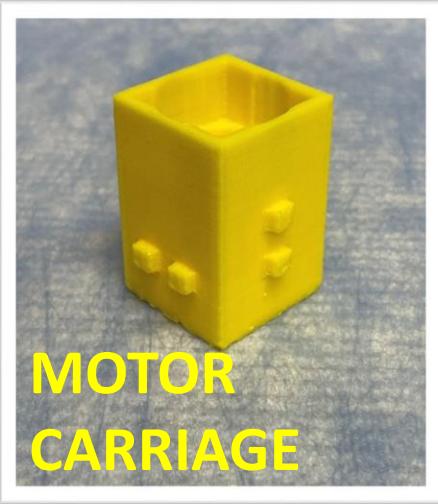
Parts List: Electronics



Parts List: 3D Printed Parts



MOTOR CAP



MOTOR CARRIAGE



BATTERY CARRIAGES
x2



ARDUINO
MOUNT



CAP DISC

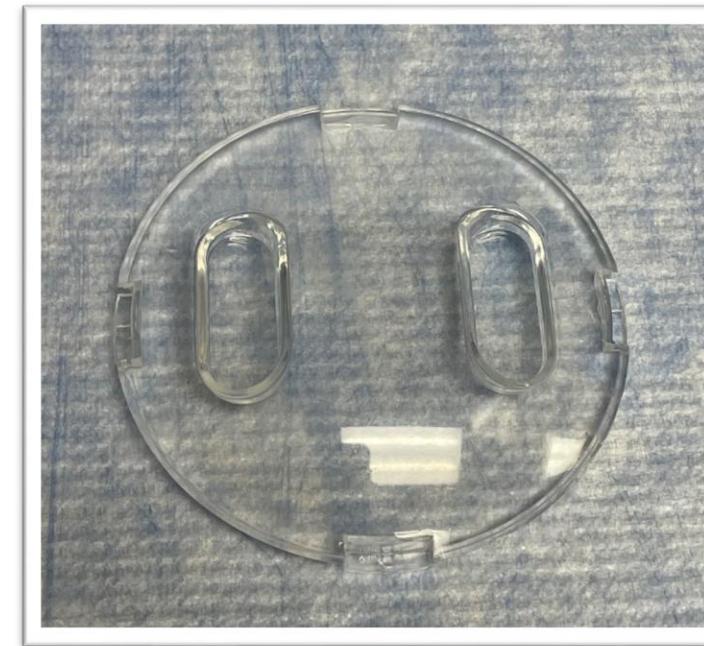


H-BRIDGE
MOUNT

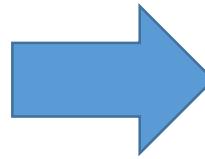
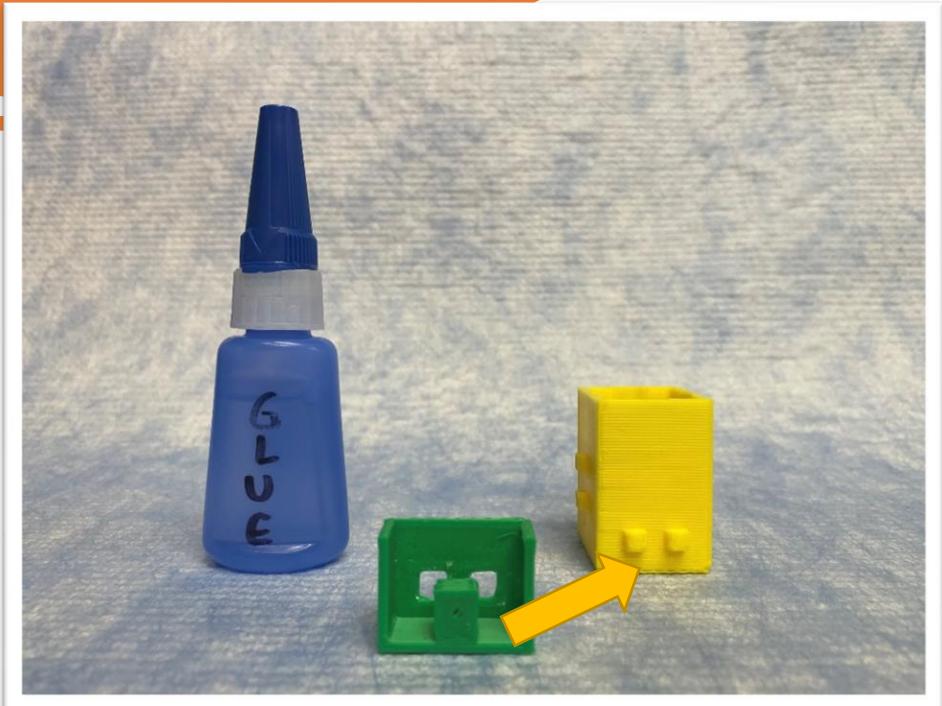


BALL DISC

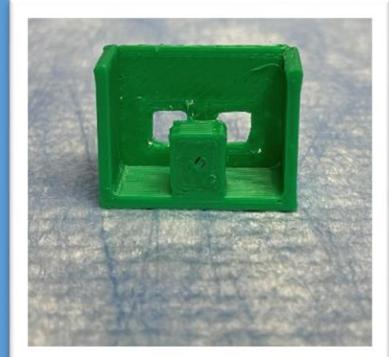
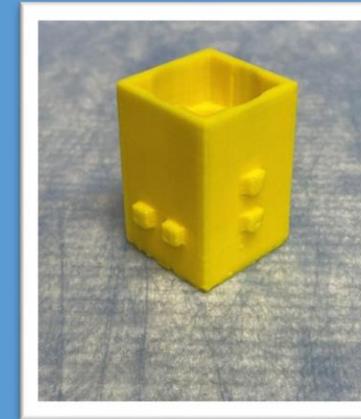
Parts List: Other Parts



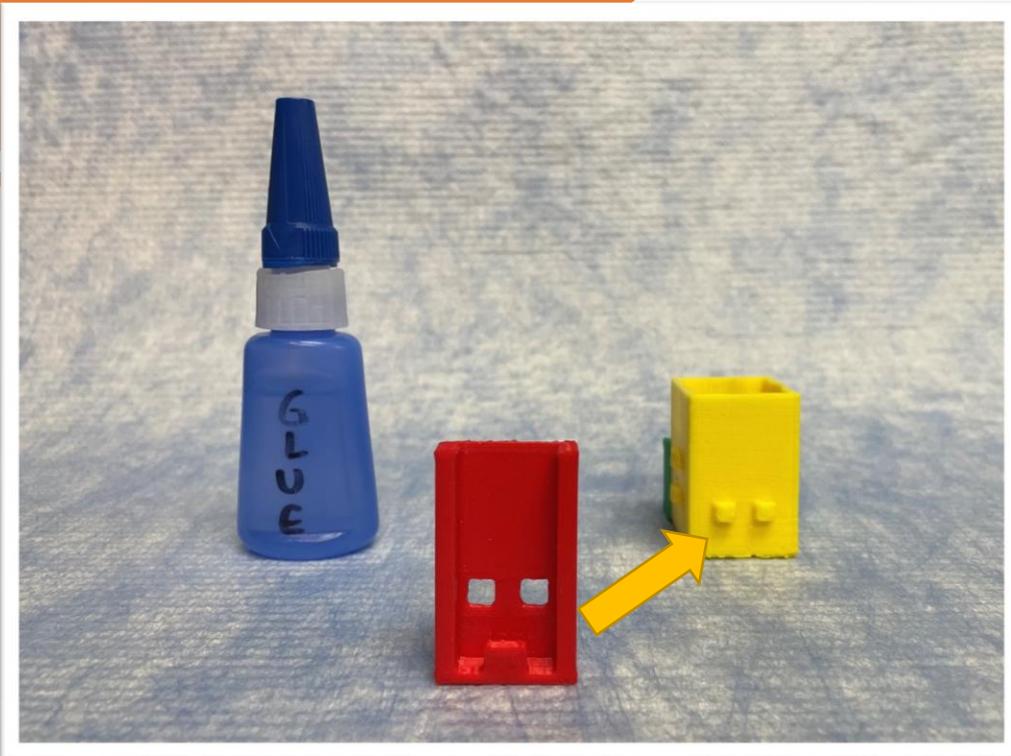
Step 1: Glue H-Bridge Mount to Motor Carriage



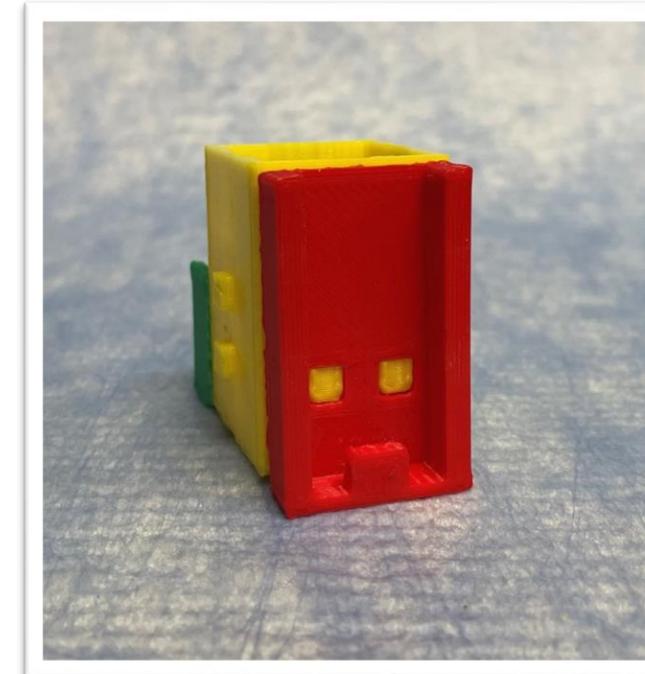
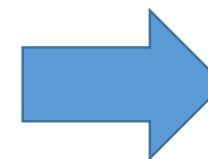
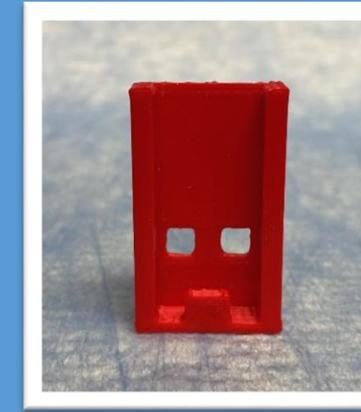
Parts Needed:



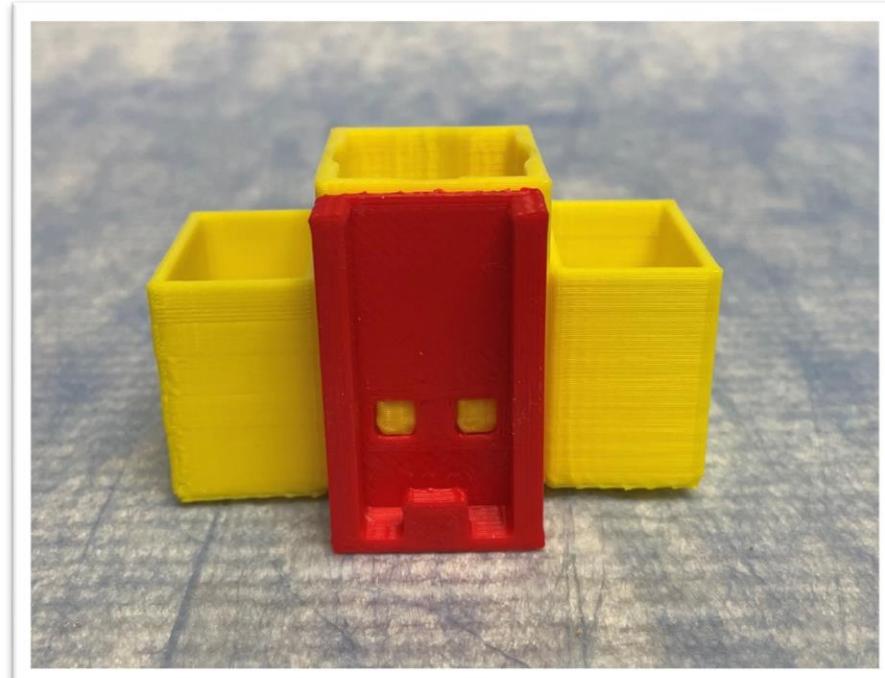
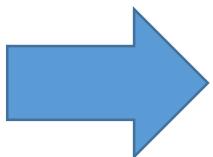
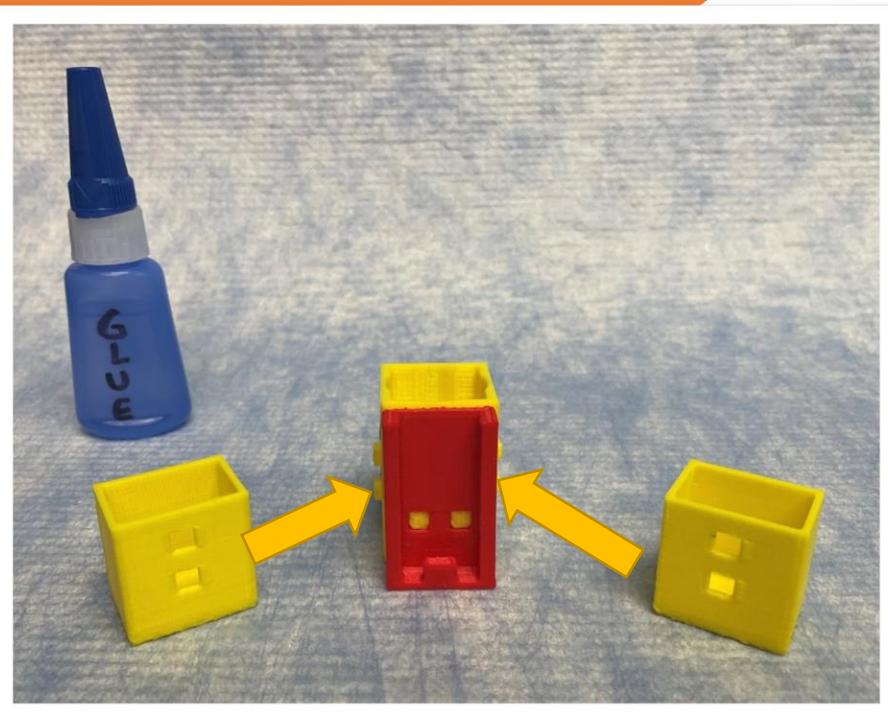
Step 2: Glue Arduino Mount to Motor Carriage



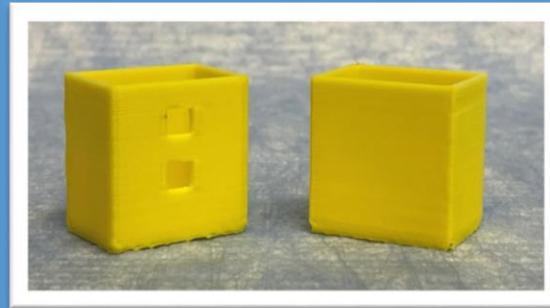
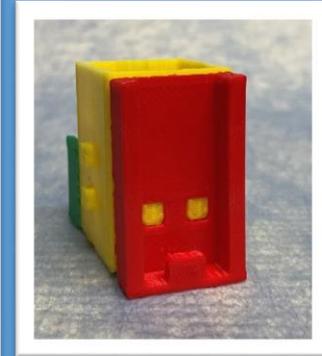
Parts Needed:



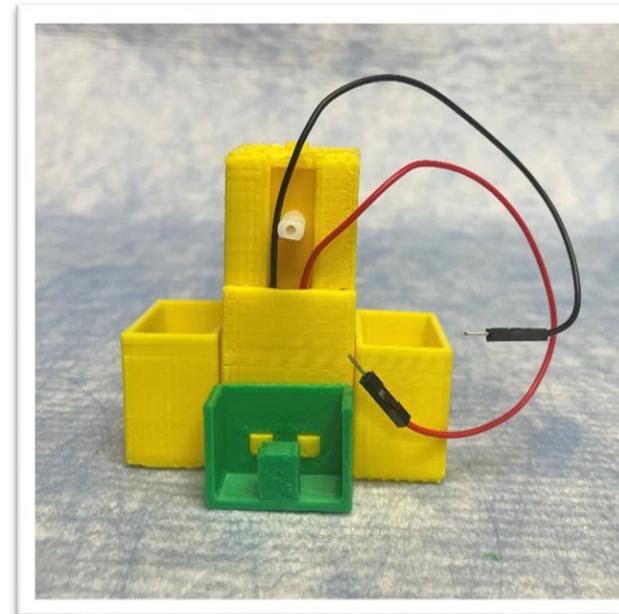
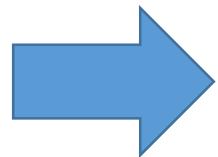
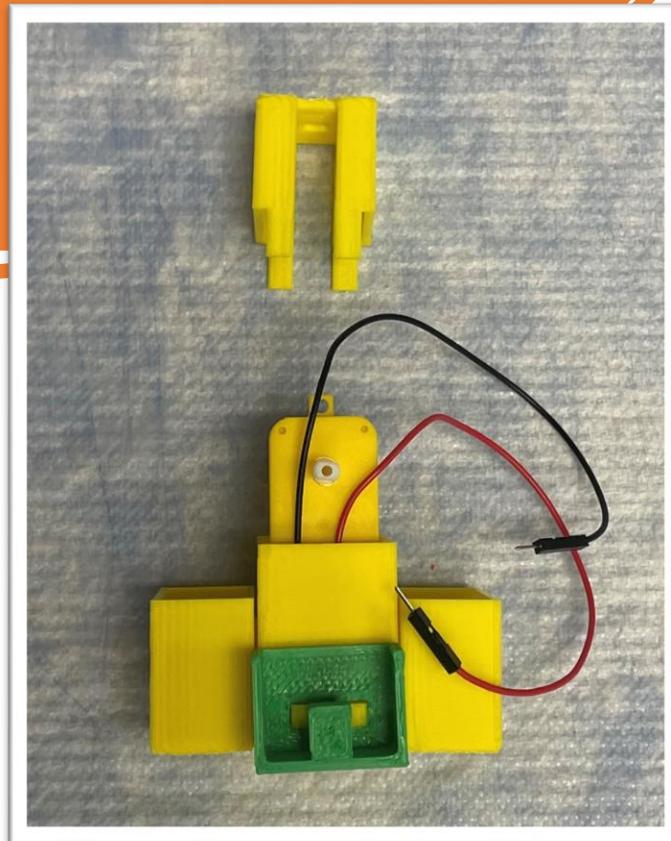
Step 3: Glue Battery Carriages and Motor



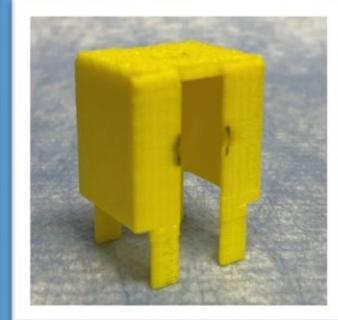
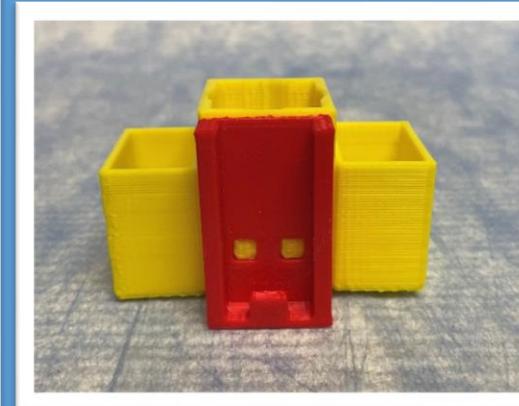
Parts Needed:



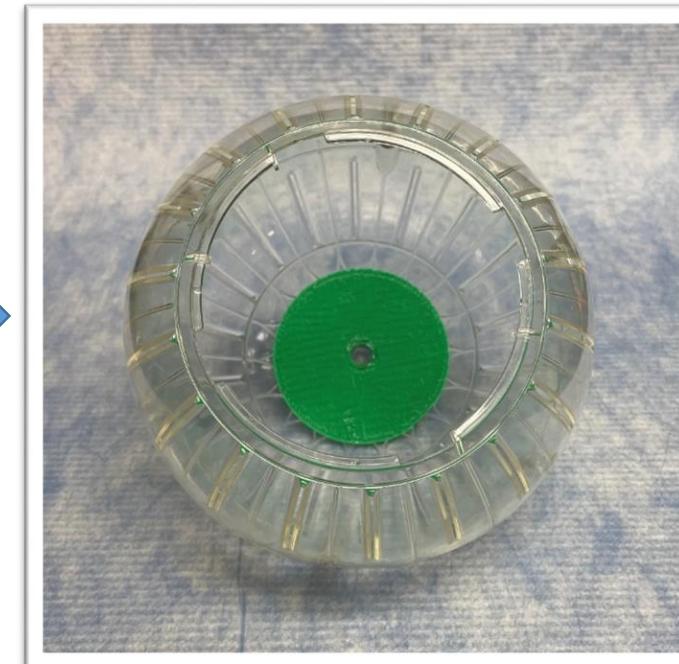
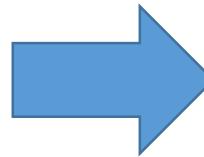
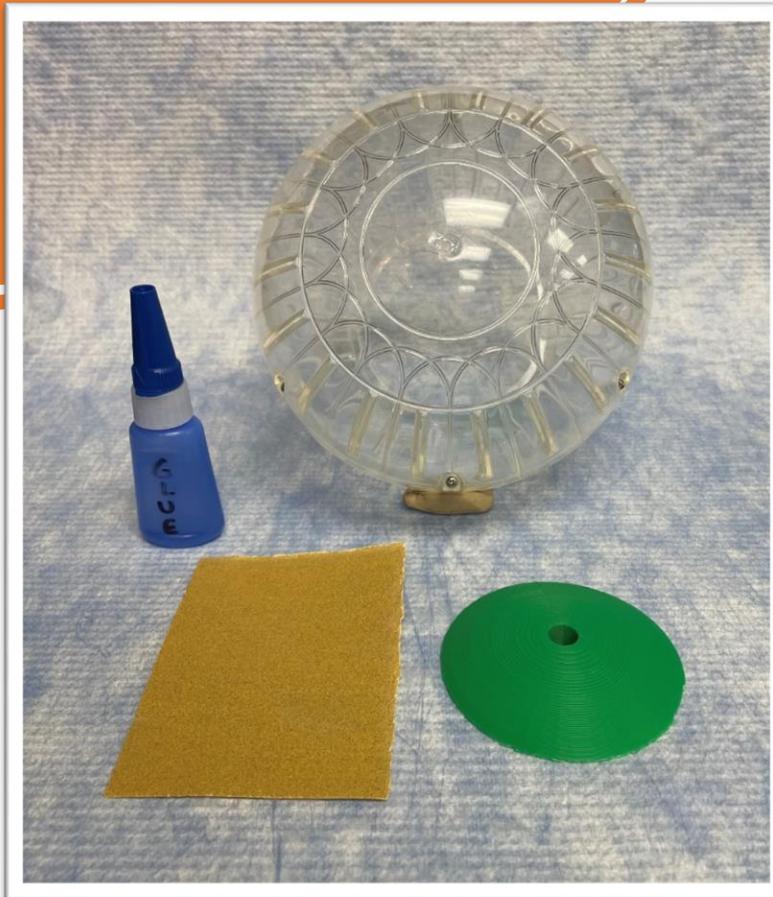
Step 4: Insert Motor and Glue Motor Cap



Parts Needed:



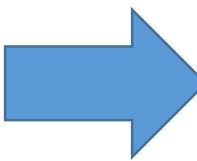
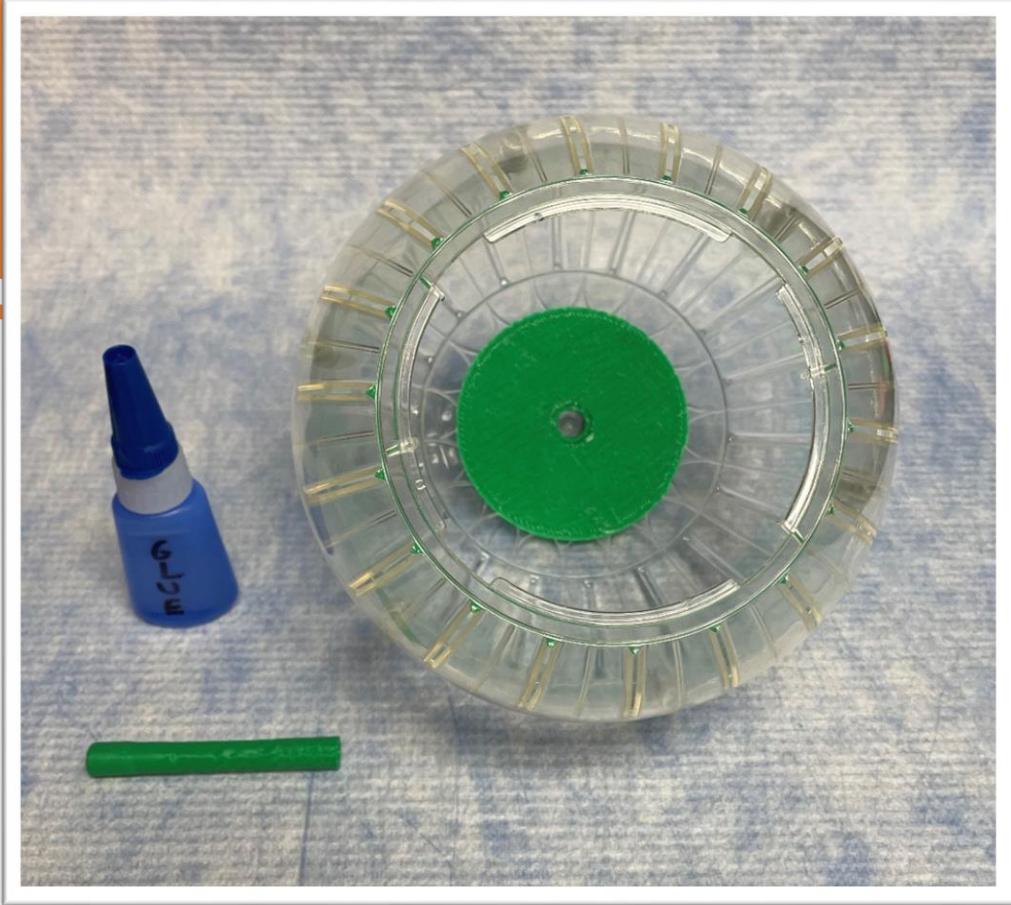
Step 5: Sand & Glue Disc to Inside of Ball



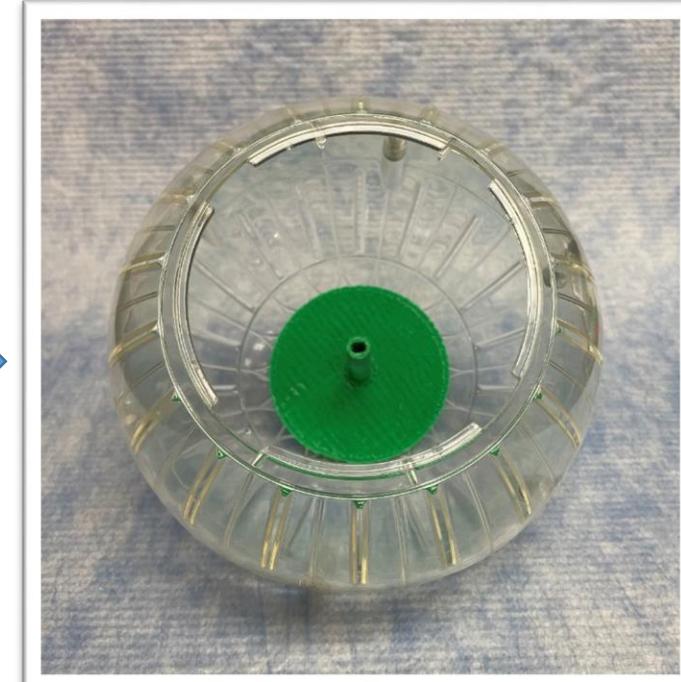
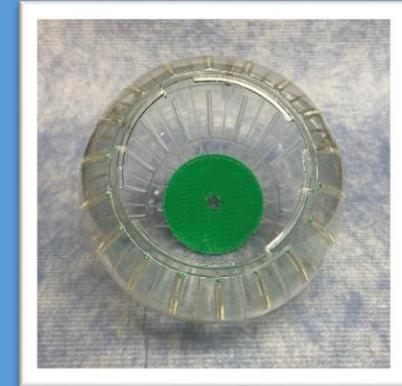
Parts Needed:



Step 6: Glue Axel to circle (green)

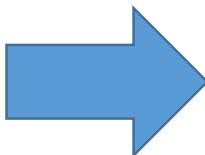
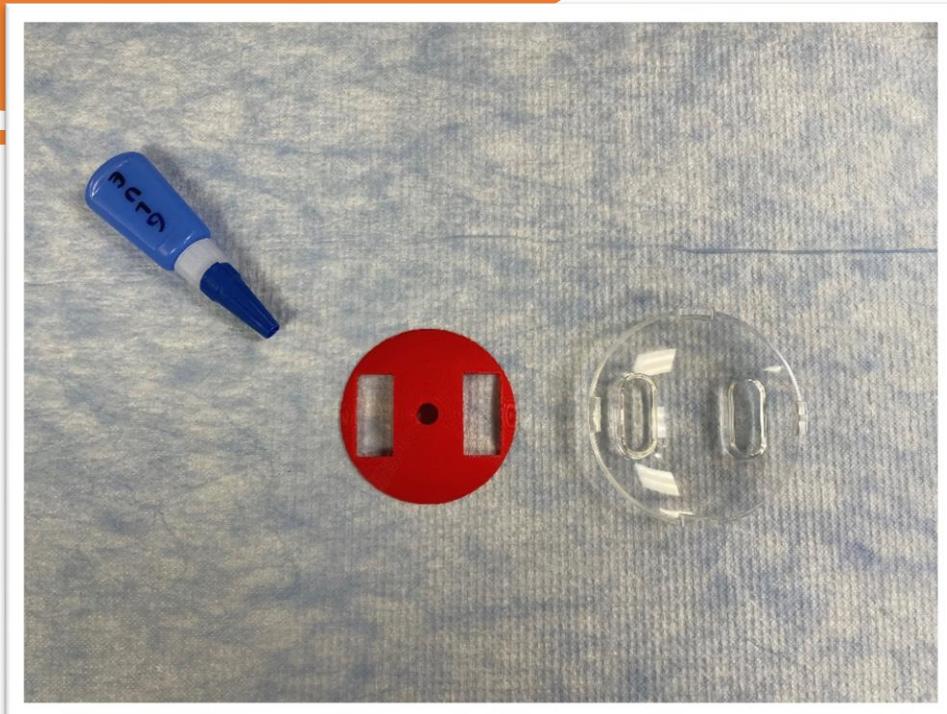
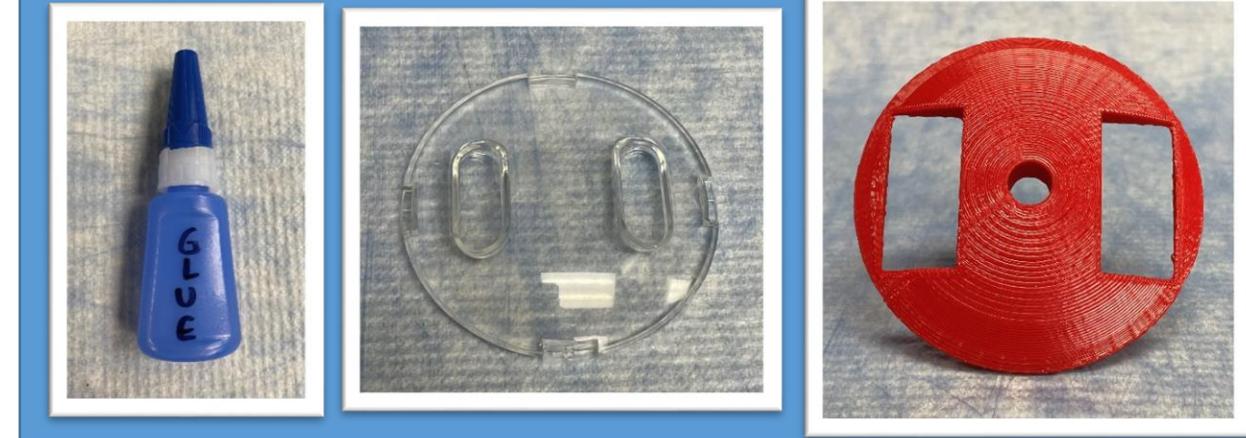


Parts Needed:



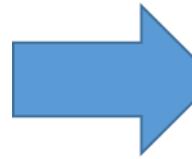
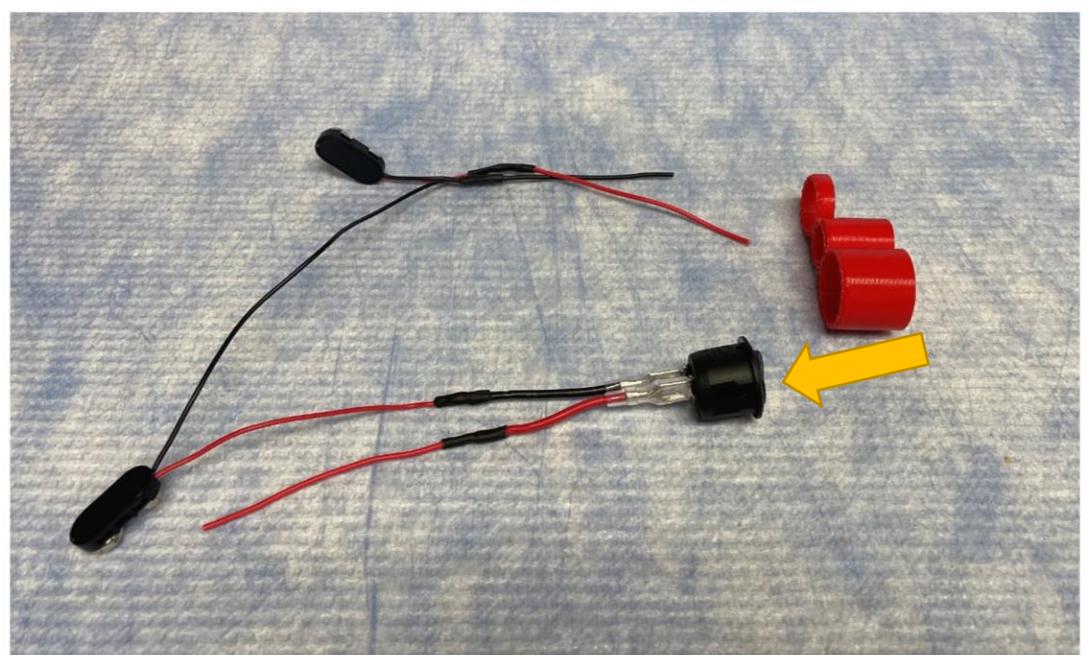
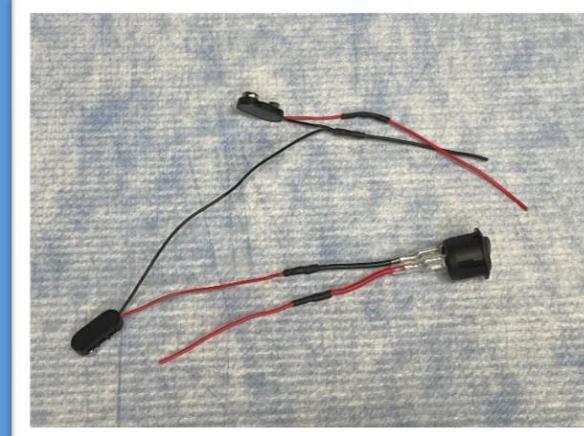
Step 7: Sand & Glue Circle to Cap Disc

Parts Needed:

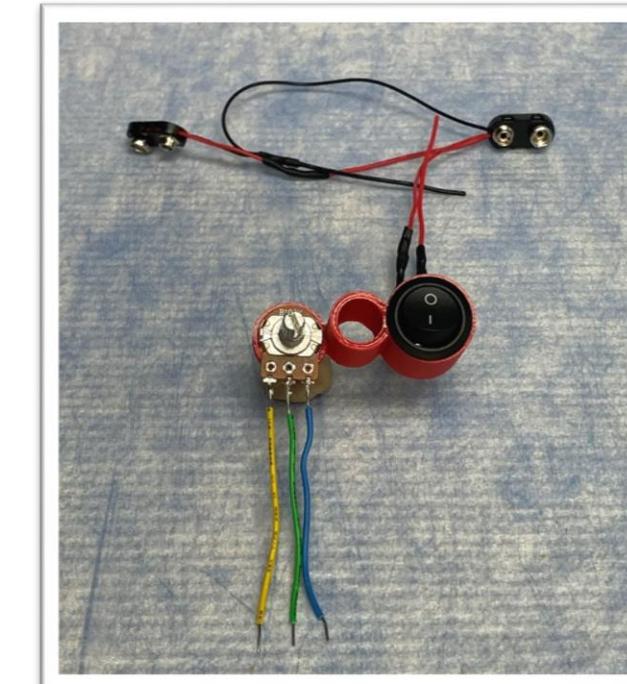
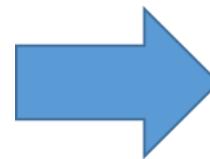
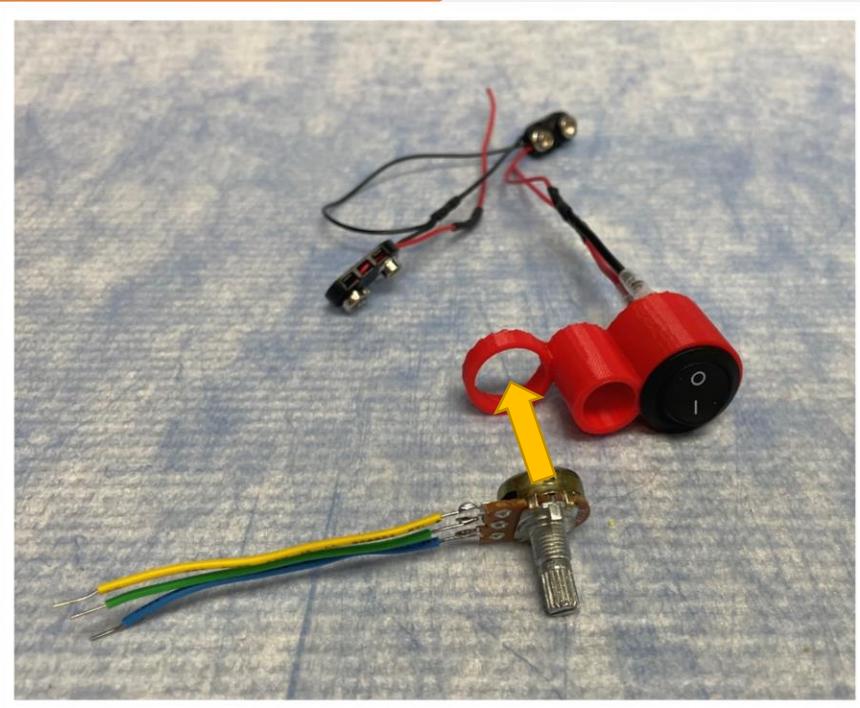


Step 8: Add Spinner to Switch

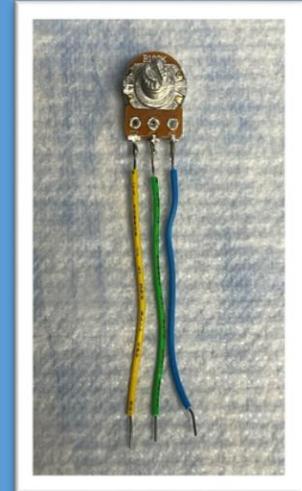
Parts Needed:



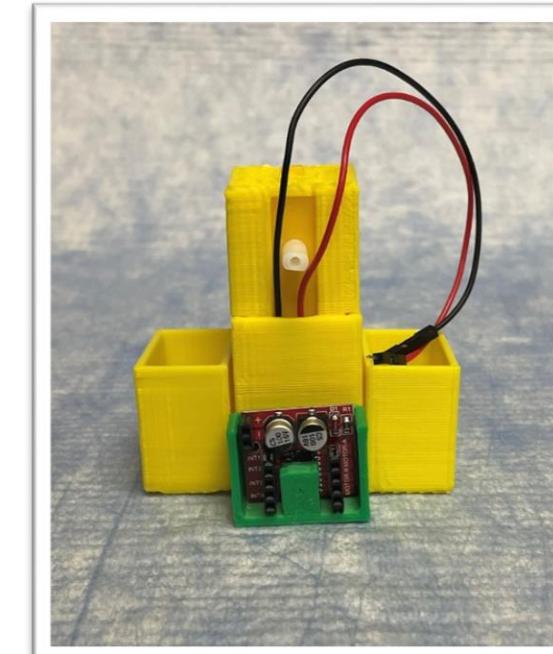
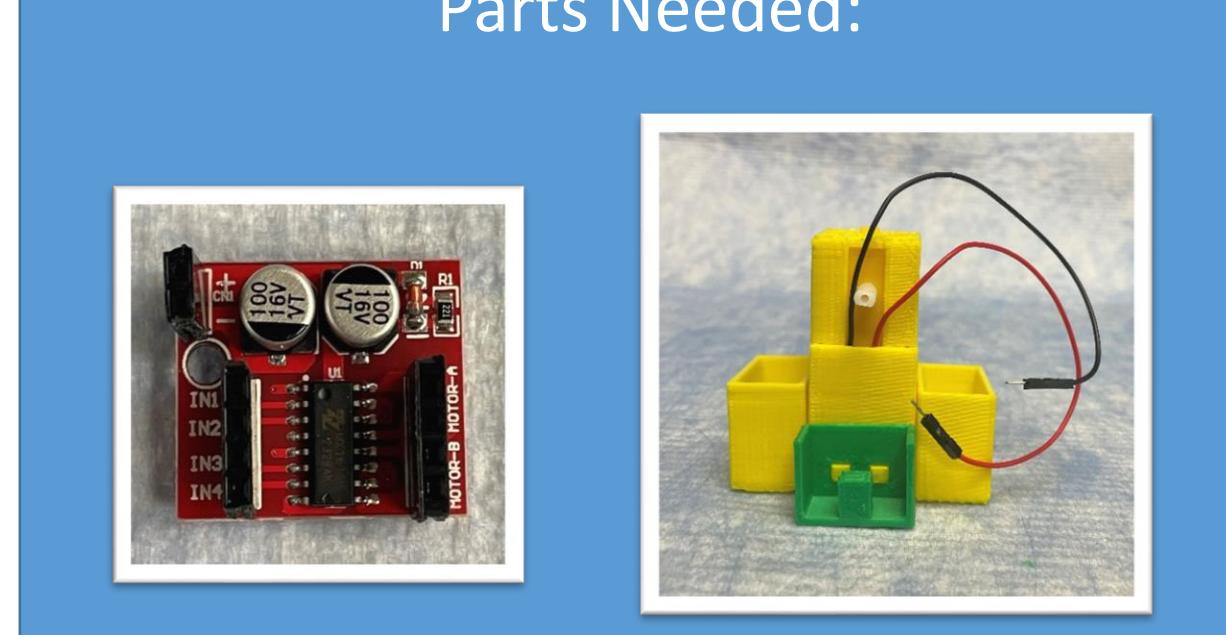
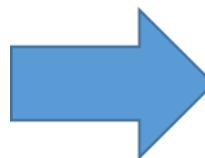
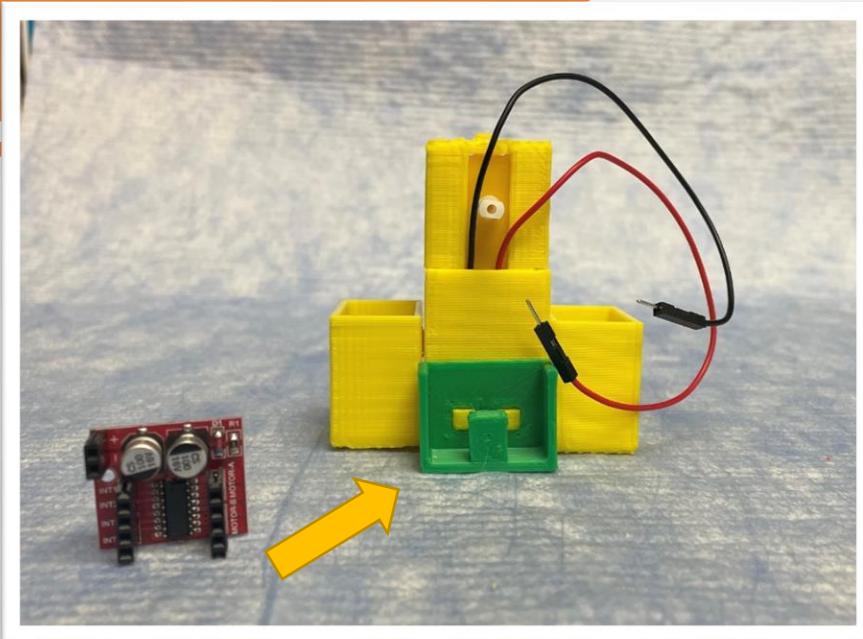
Step 9: Add Potentiometer to Spinner



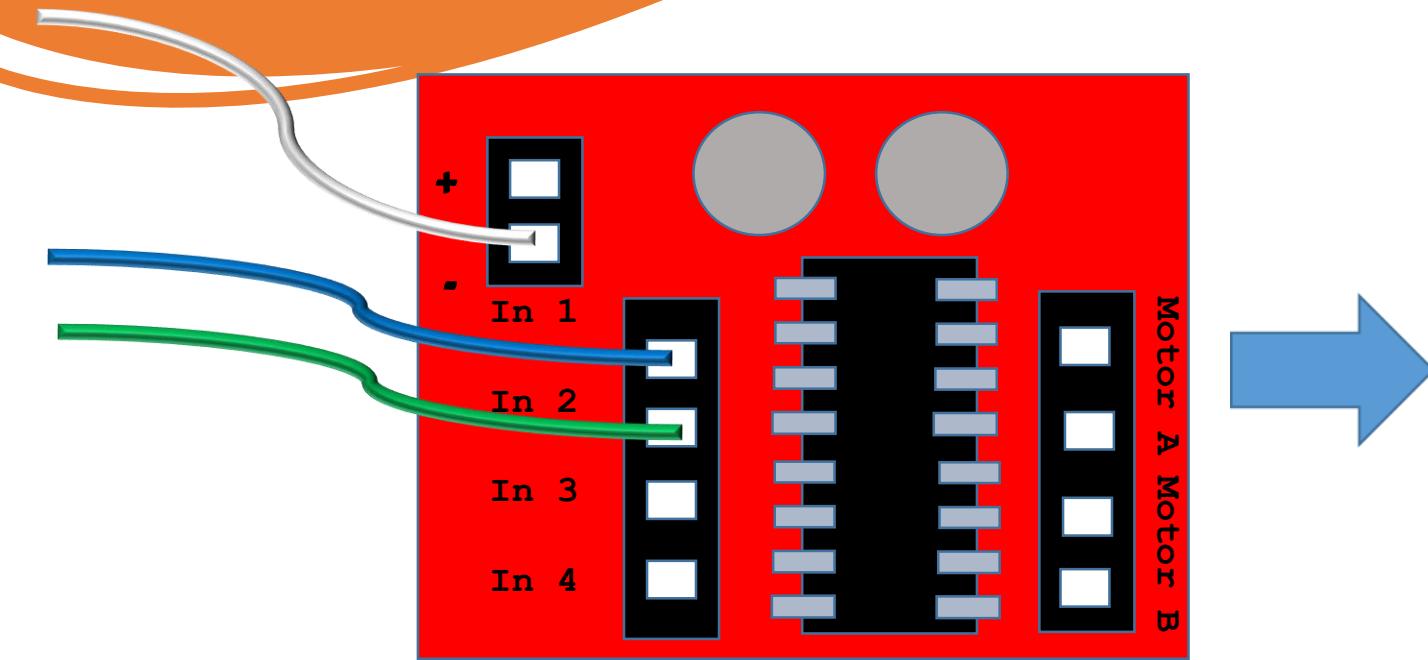
Parts Needed:



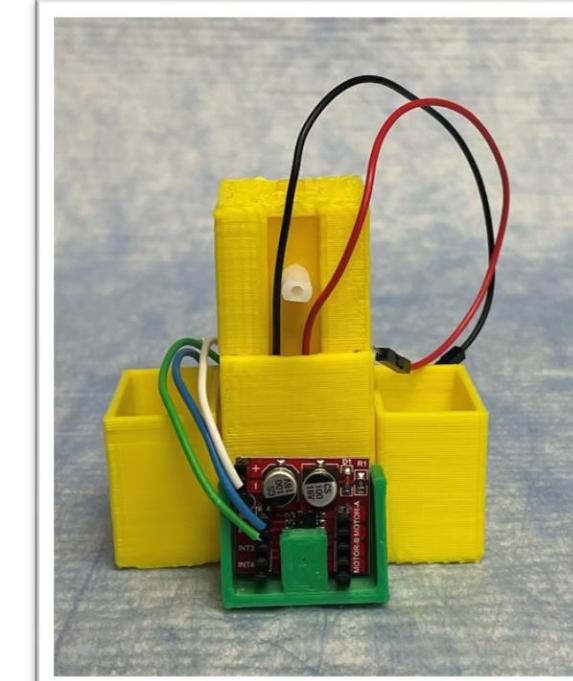
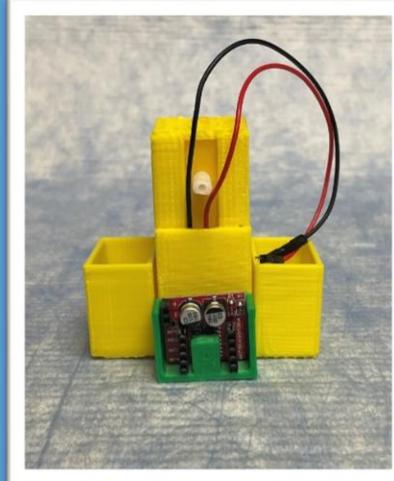
Step 10: Insert H-Bridge Chip into Holder (green)



Step 11: Wiring the H- Bridge

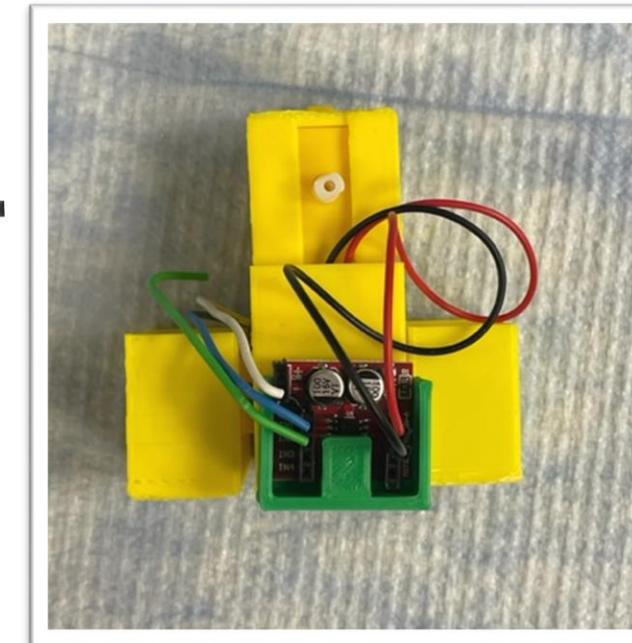
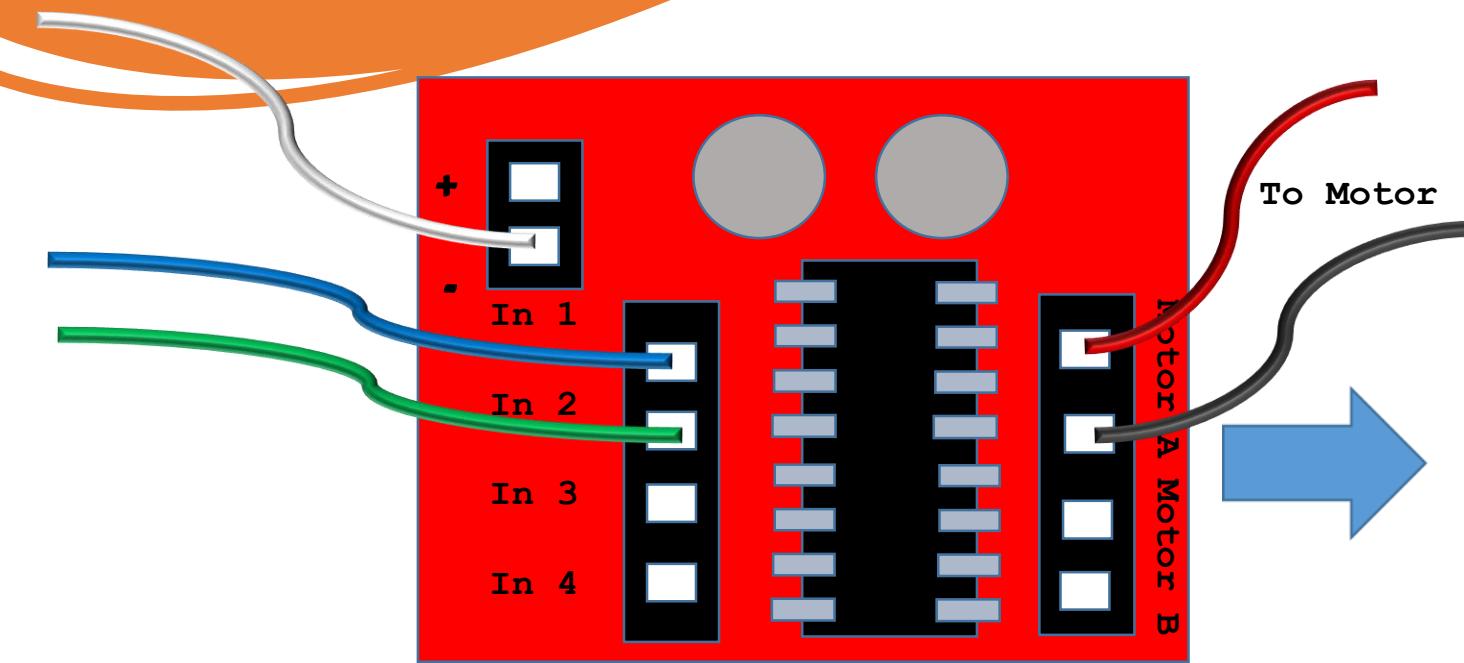
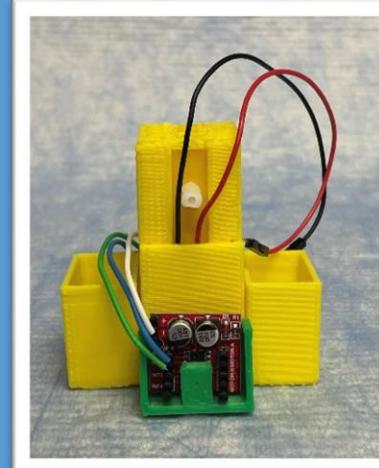


Parts Needed:

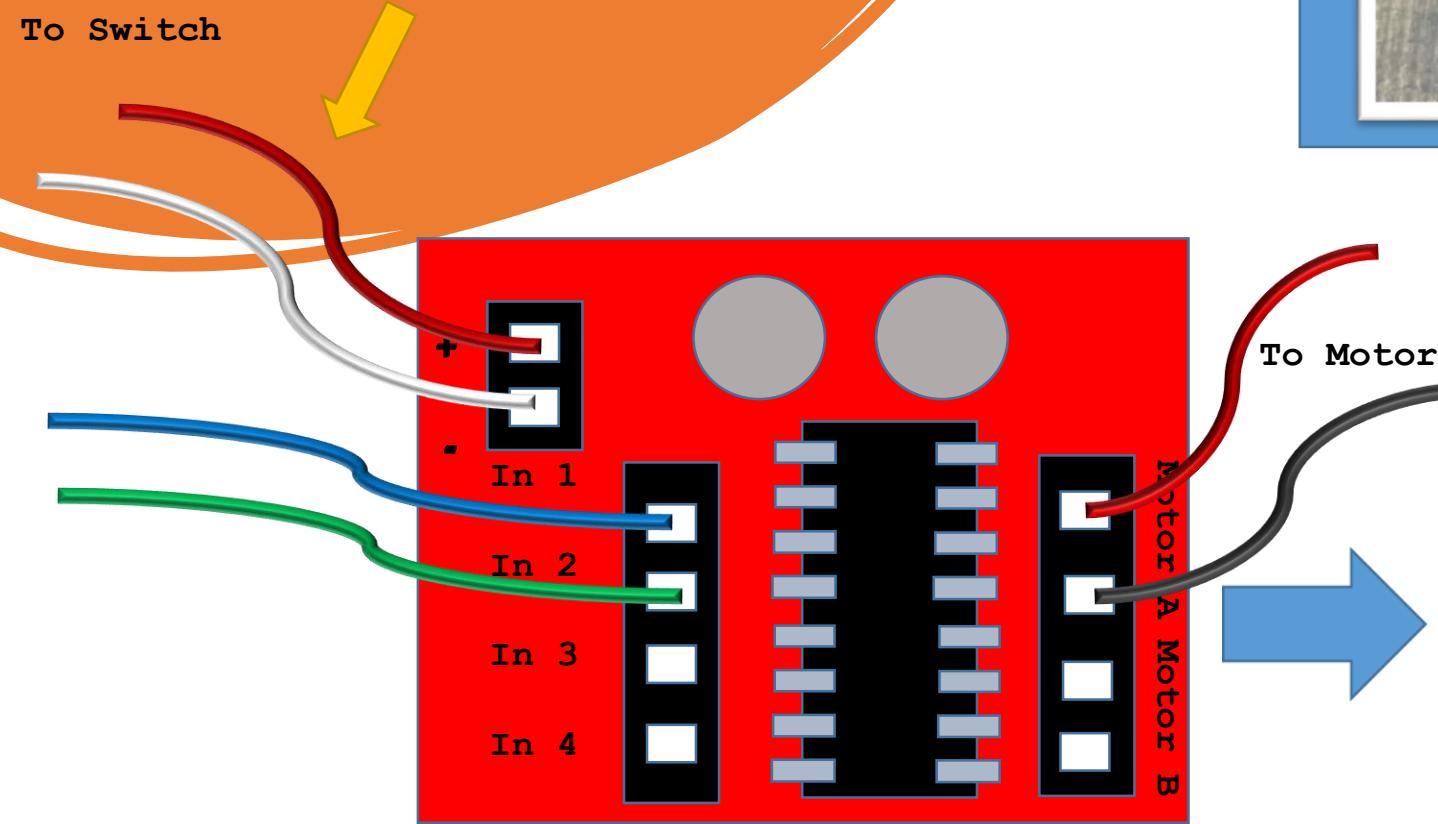


Step 12: Wire Motor to the H-Bridge

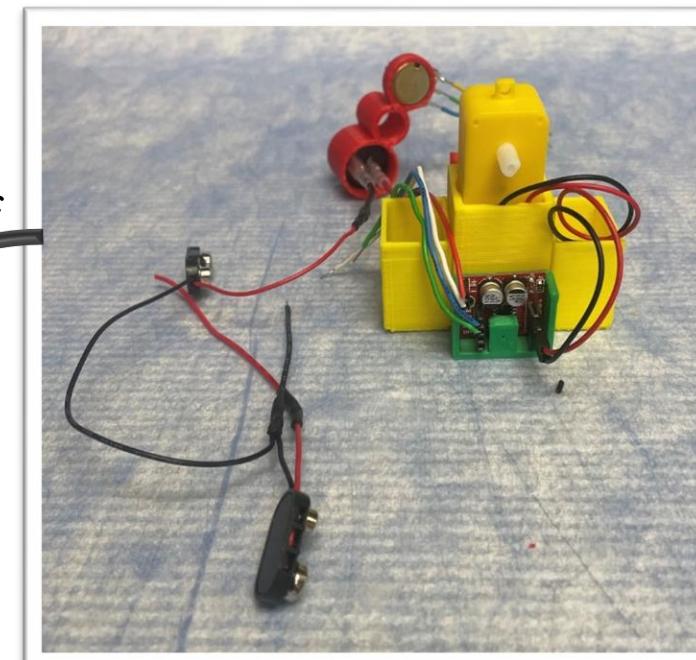
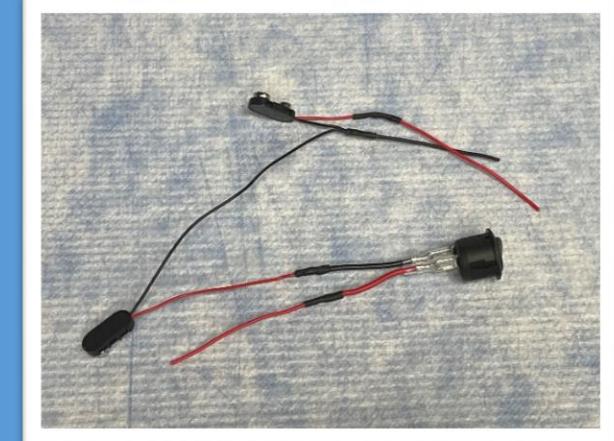
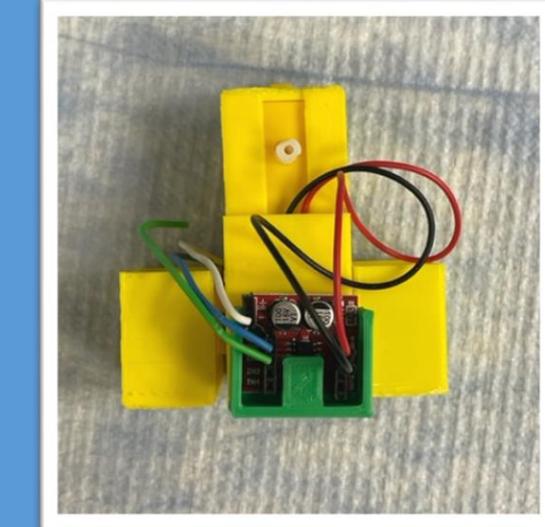
Parts Needed:



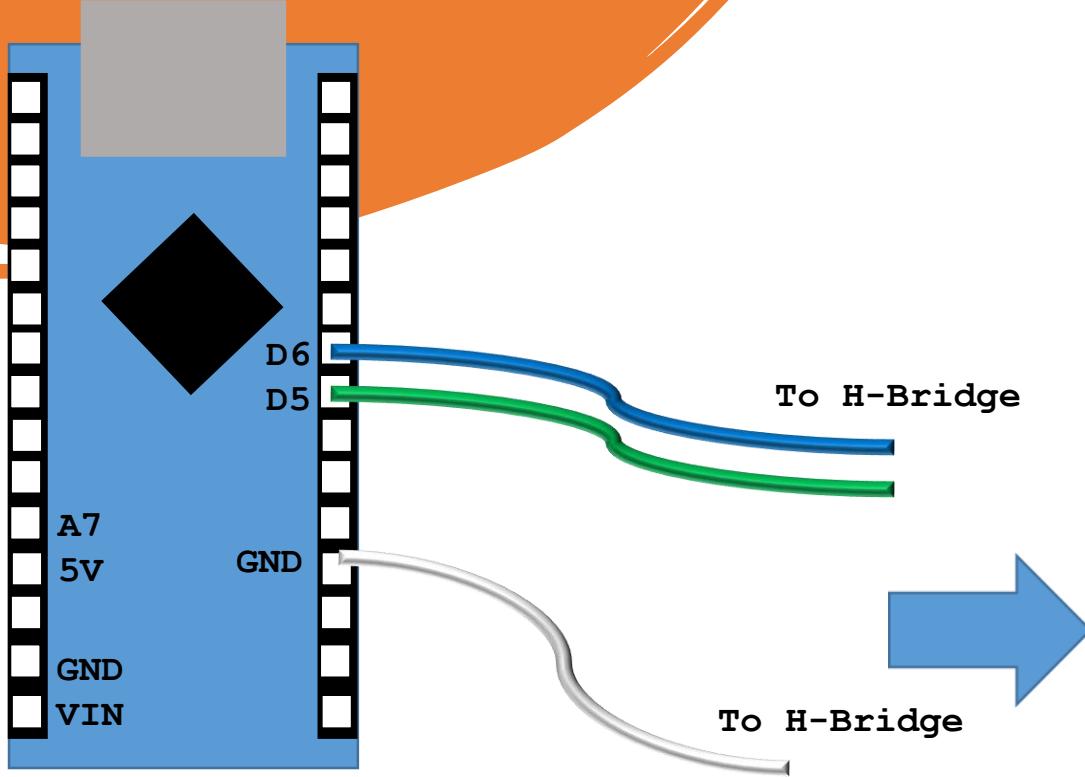
Step 13: Add Switch to the H-Bridge



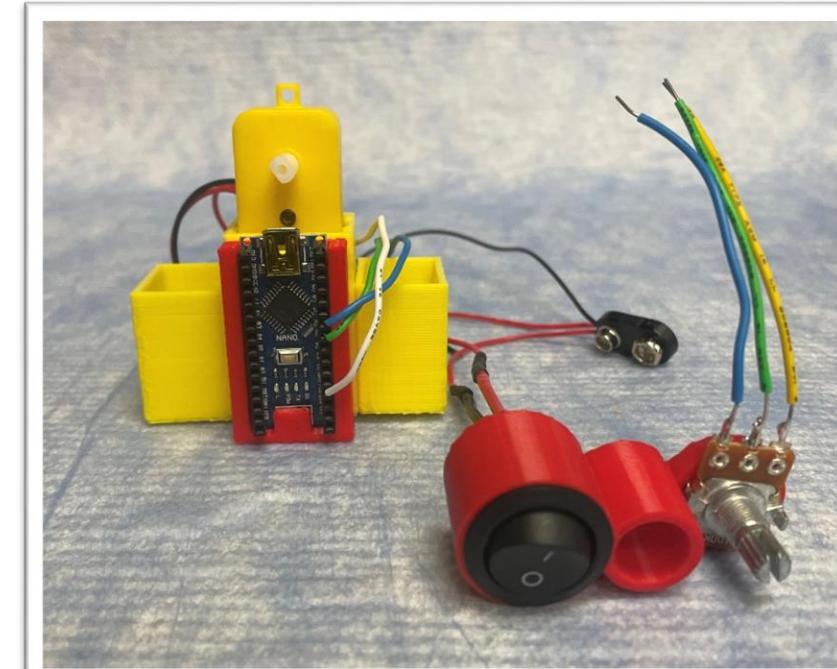
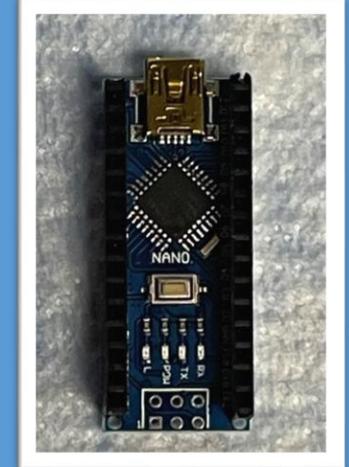
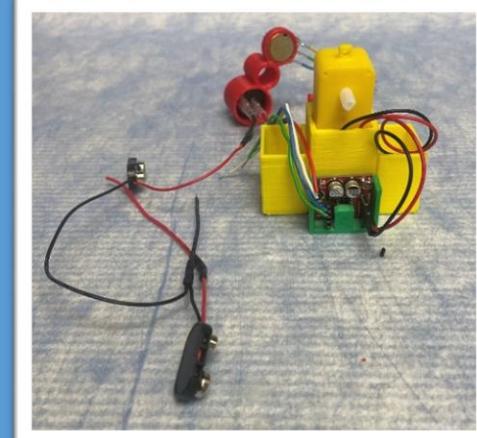
Parts Needed:



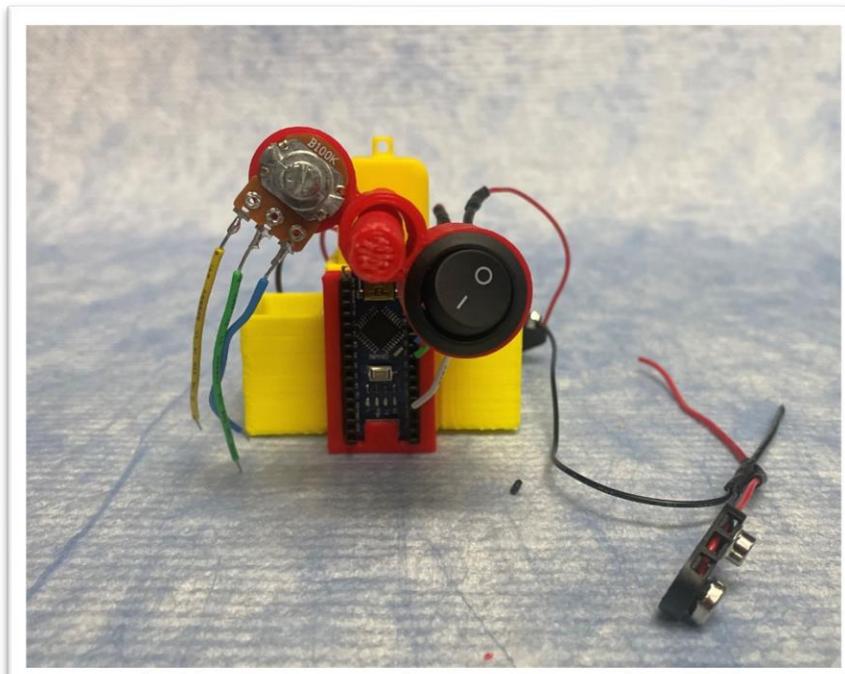
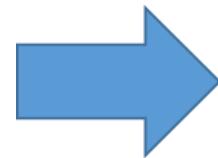
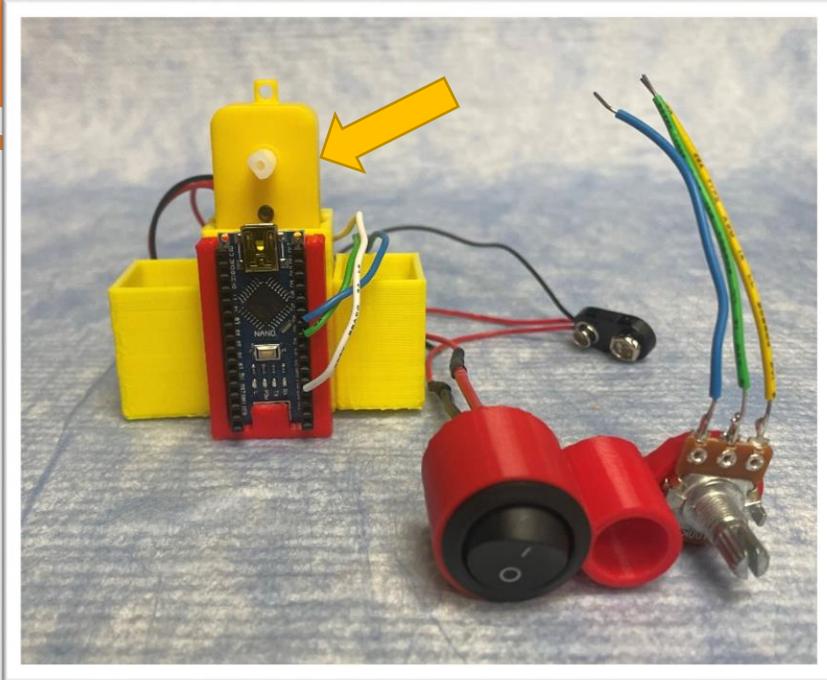
Step 14: Wire the Arduino



Parts Needed:



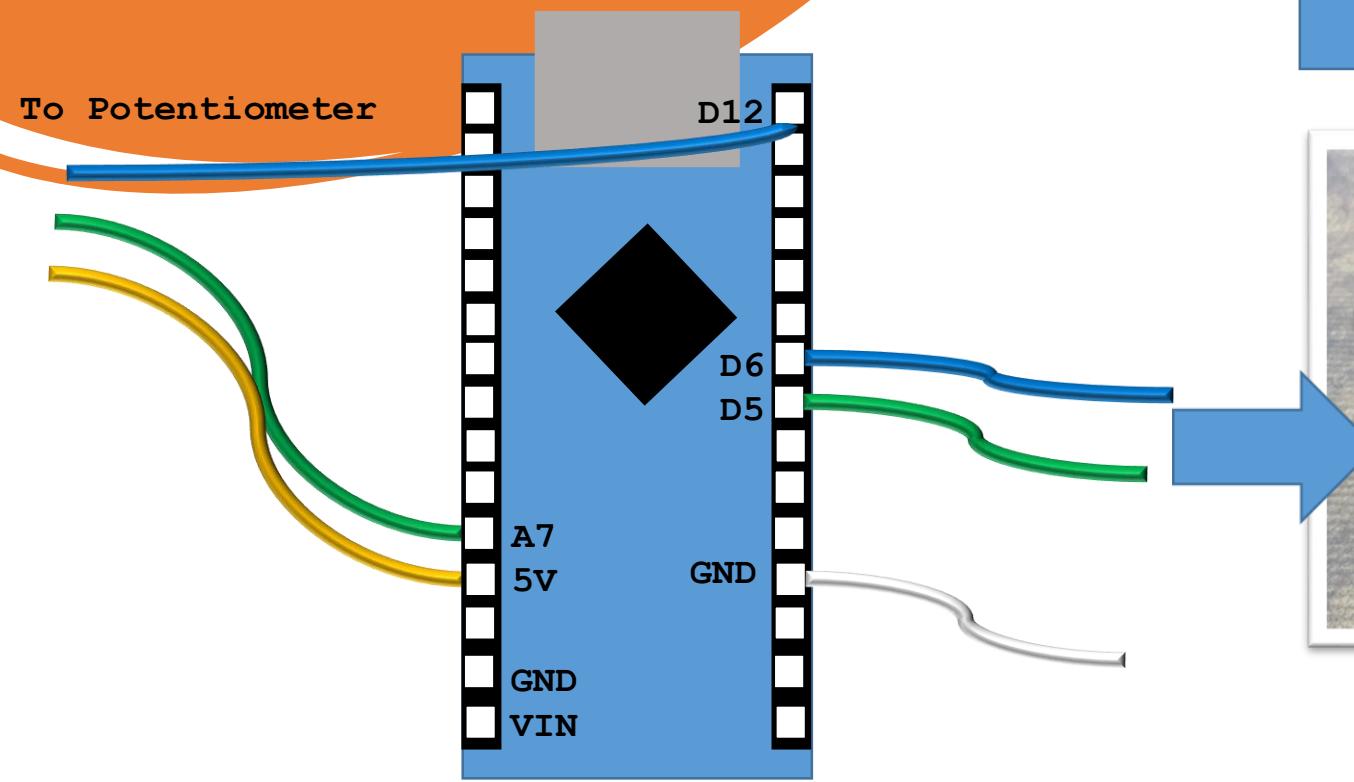
Step 15:
Add glue to axel
and then attach
to motor



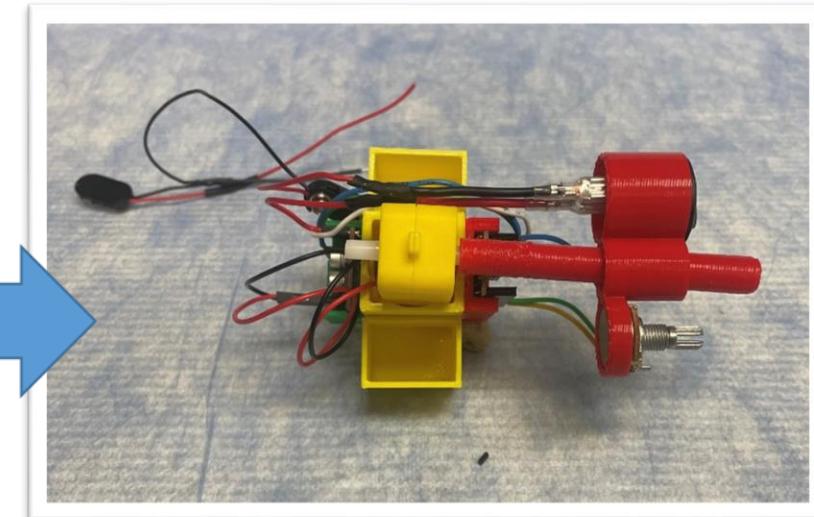
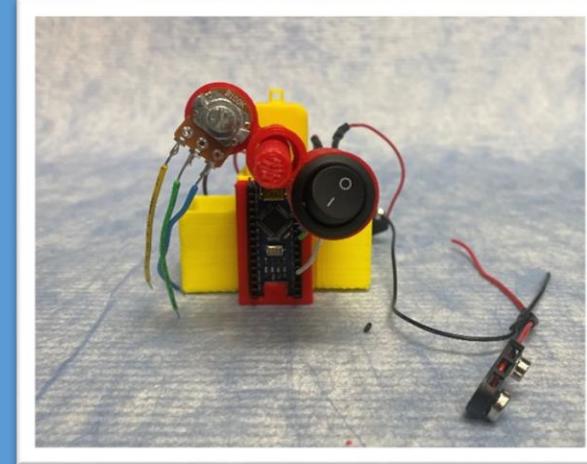
Parts Needed:



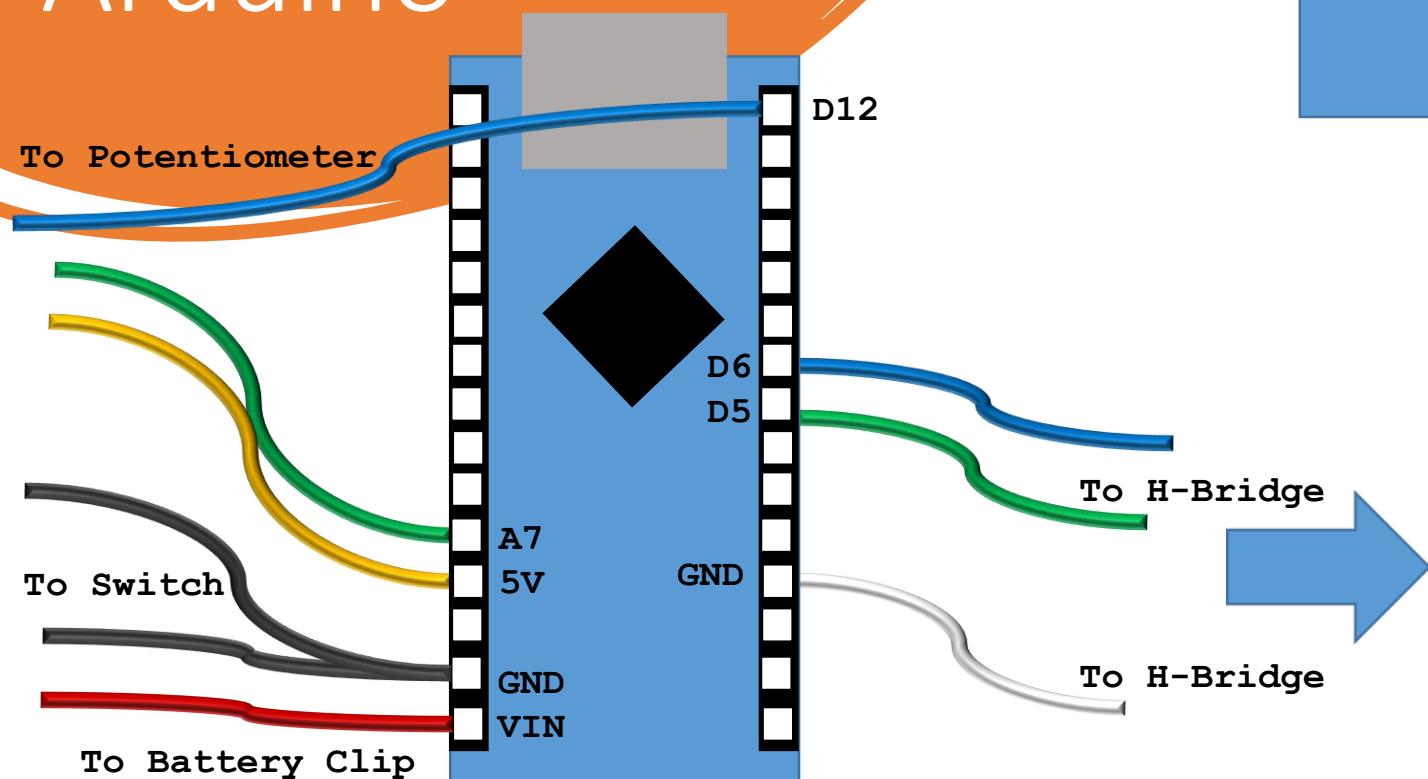
Step 16: Wiring Potentiometer to Arduino



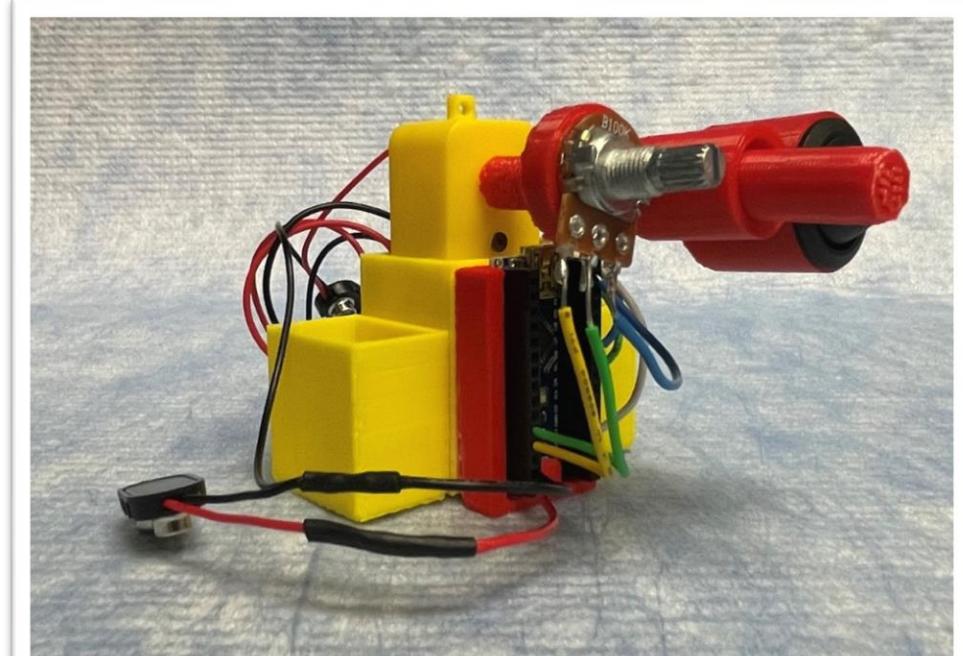
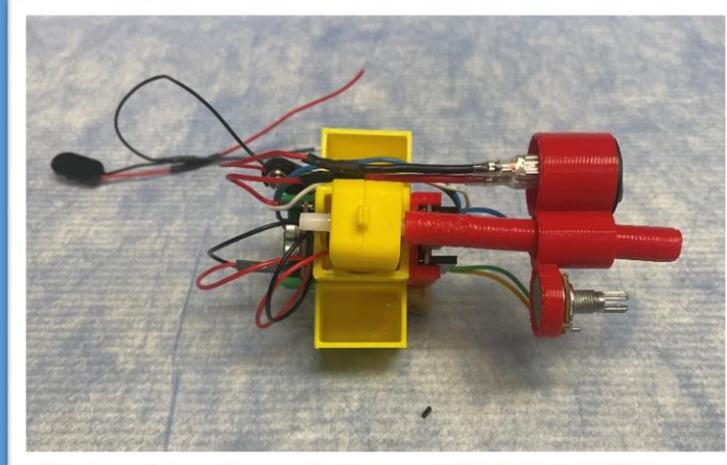
Parts Needed:



Step 17: Wiring Potentiometer to Arduino

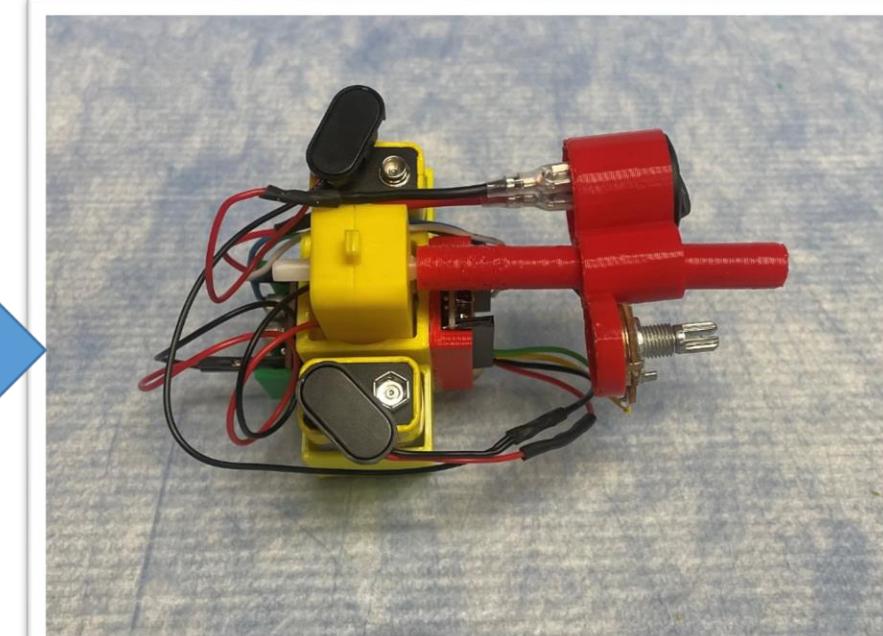
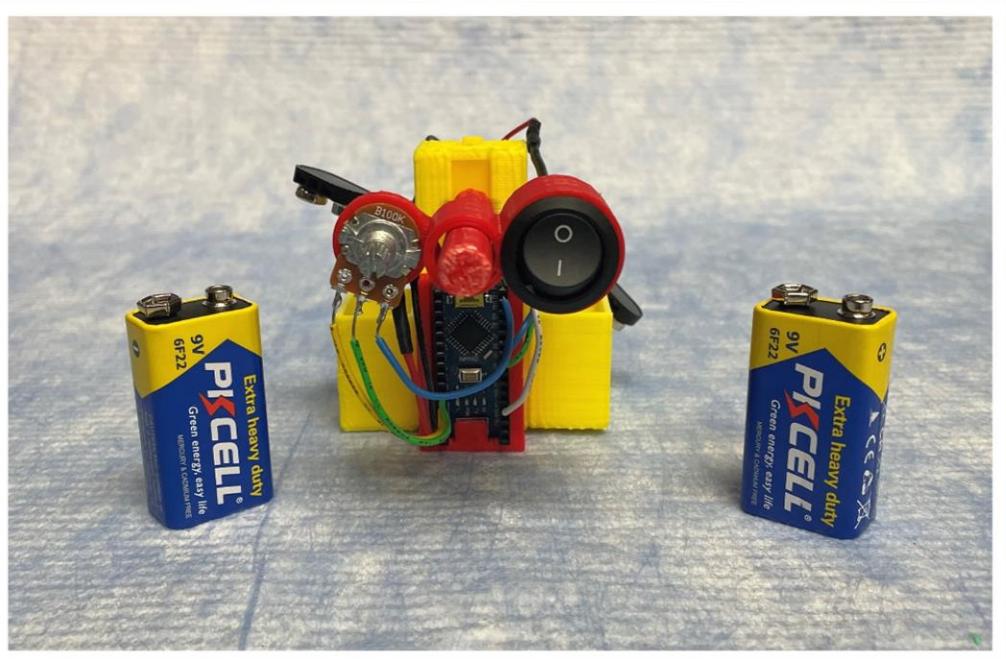
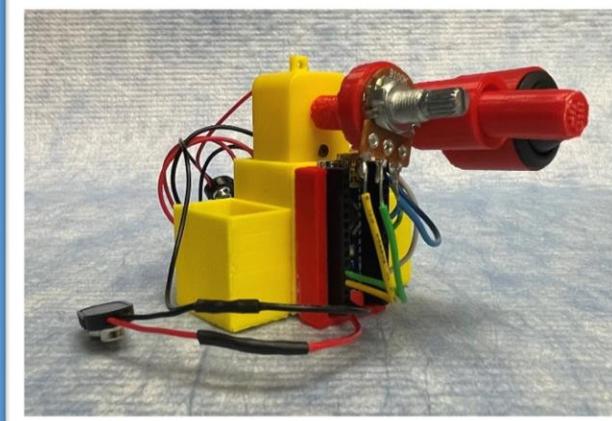


Parts Needed:



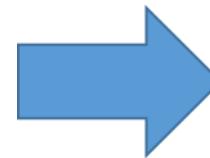
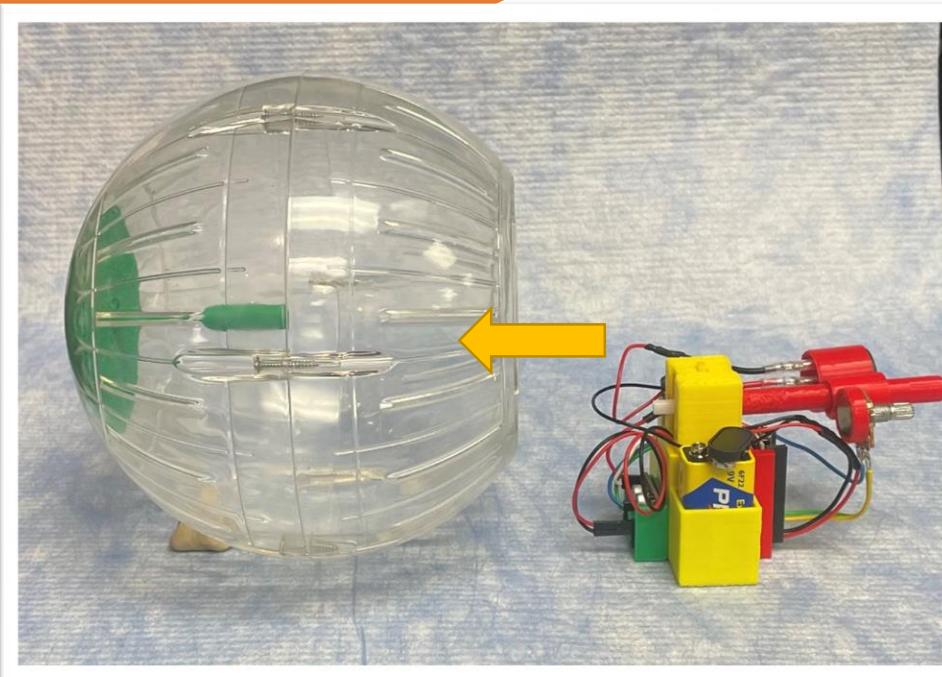
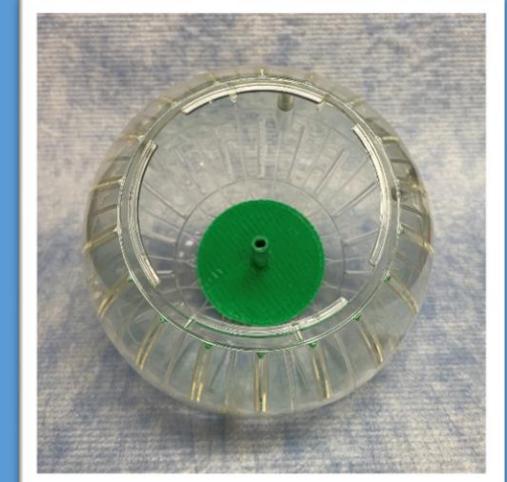
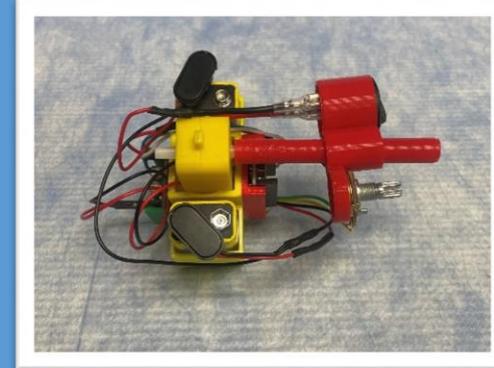
Step 18: Insert Batteries and Attach Clips

Parts Needed:

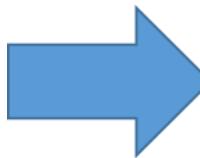
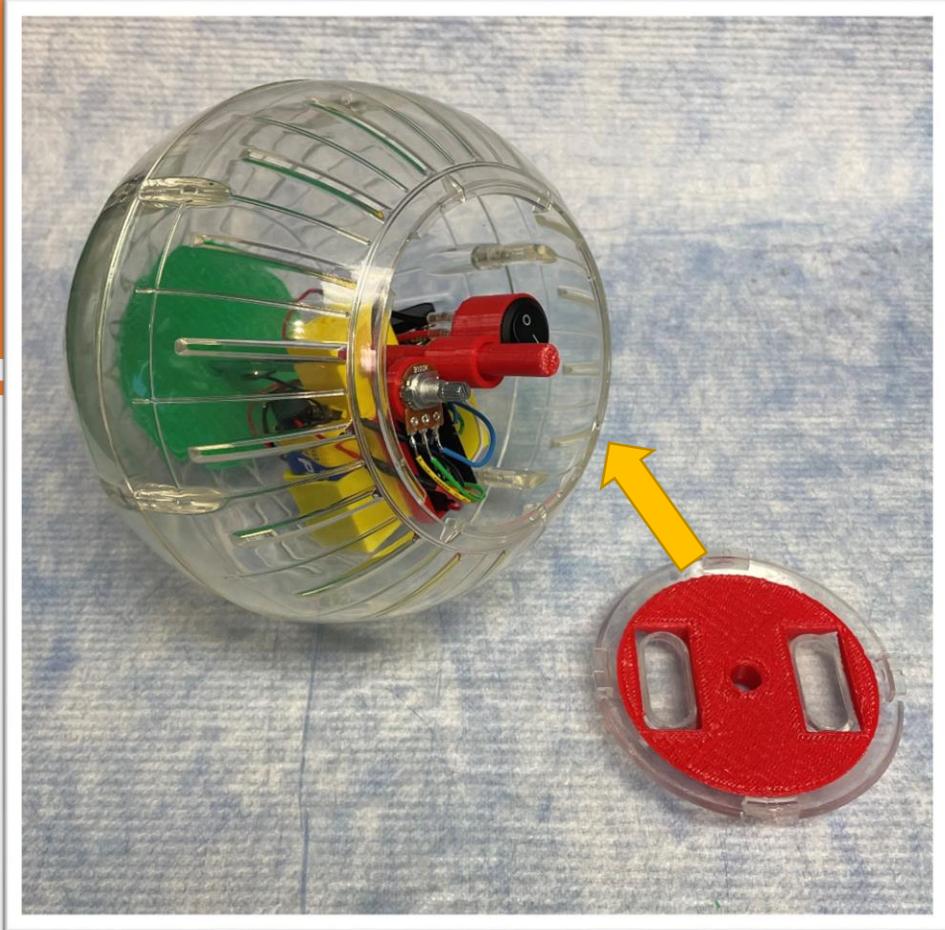


Step 19: Insert Motor Inside Ball

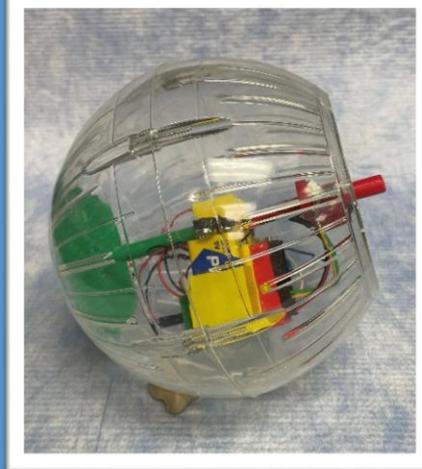
Parts Needed:



Step 20: Add Ball Cap



Parts Needed:



How to operate your Cheetah Ball



When you attach the batteries, you will see..

One Red Power Light

One Blinking Red Light

- On for 5 seconds, off for 5 seconds
- When the light is on, the ball should move



Play with potentiometer to get the right spin.

The potentiometer controls the motor power.

Turn to the left to increase power, right to decrease power



For files and codes go to:

[Github.com/disney](https://github.com/disney)



Contact Info

Jose Dominguez
jose.dominguez@disney.com

Andy Milluzzi
andy.j.milluzzi@disney.com

