

Fast and Furious: High Speeds at High Hopes Preschool Progress Presentation



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Problem Statement

There currently are no standard power toy cars that are able to be modified for children who have mobility impairments. The current product comes with a non-adjustable seat, only one option for activation mechanism, and one option for steering mechanism. Children who lack the freedom of independent mobility experience the resulting negative cognitive effects such as poor depth perception and cause and effect reasoning. These same children also unfortunately tend to be ostracized by their peers, preventing the development of valuable social skills.

Primary Objective

Mainly, we seek to help the children gain individual control of their mobility. Simply granting them the ability to move about on their own will help them with:

- Conceptualization of cause and effect
- Depth perception
- Cognitive development
- Social development

Needs Assessment

Patient :

- Needs to accommodate children of different sizes
- Must not startle the child during acceleration
- Needs to accommodate children that need different acceleration options

Provider:

- Must be able to easily adjust seat for child
- Must be able to easily access battery for charging
- Easy access for adjusting motor controller
- Must be able to adapt car for distinct needs of child
- Must have easily removable acceleration mechanisms

System:

- Can't compromise original outer structure
- Additional parts for the car must not cost over \$200
- Time to fully charge battery should be 8-12 hours
- Total run time will be 1-2 hours

Solution Description

A power wheels car (6-V battery powered ride-on) with modular components and attachments which will support a variety of conditions. Our car is suited for children younger than 5 years and will have:

1. Safety Features
 - a. Torso harness, foam padding, postural supports, possibly a parent handle and brake
2. Plug and Play Inputs
 - a. Button to accelerate, steering wheel, handle bars, pressure controls
3. Motivational Appeals
 - a. Colored inputs, music, lighting

Measurements/Observations to Consider

Measurement	Modification Effect
Child has a weak trunk and cannot sit up straight	Chair that allows the child to lean back depending on his size and weakness of trunk
Button supplied is too large	Create our own buttons with 3D printing and vacuum forming
Can't have all of the button modifications on the car at one time	Add in a jack to plug buttons into
Some children are startled by the jolt of a car and become upset	Add in motor controller

Noteworthy Progress

- Uploaded all pictures to website
- Divided into teams (next slide)
- Received materials (charger, harness, plastic tray)
- Bought more parts for seat
- Will and Taylor updated circuit diagram with battery and charger
- Taylor created a mock-up of an acceleration button
- Amanda and Nick learned Tinker CAD and created seat track design models
- Amanda and Nick made saddle attachment shape in CAD, printed in makerspace (5 kinds)
- Amanda and Nick used epoxy from machine shop to secure nut to clamp
- Received IRB from Nancy Darr for High Hopes GoBabyGo 16 week study
- Scheduled High Hopes visit to meet with relevant OT/PT/children and established consistent contact pipeline

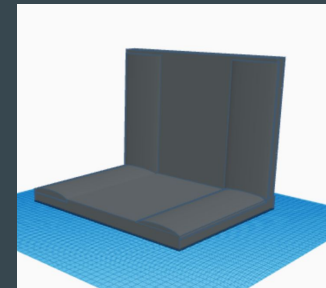
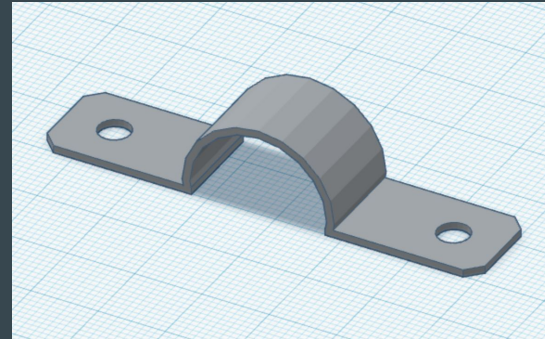
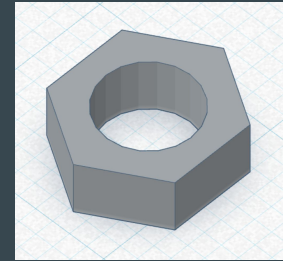
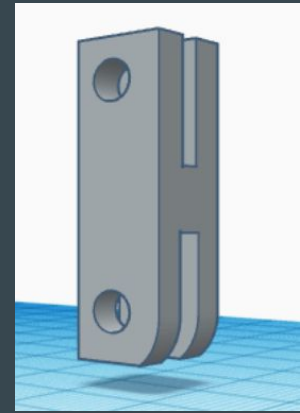
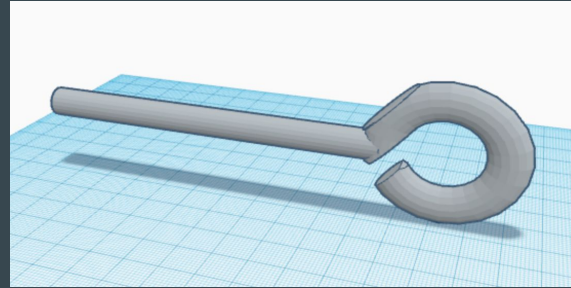
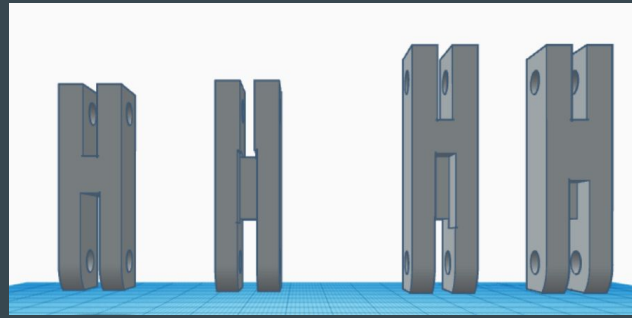
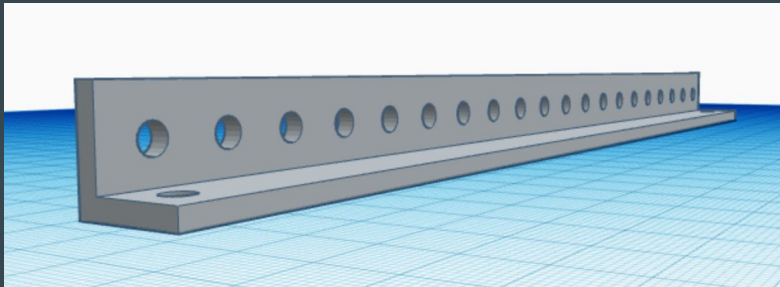
Current Goals

- Finish installing motor controller
- Purchase more nuts
- Complete construction of seat modification and put together CAD pieces
- Create foam molds for hip alignment and leg flair restriction

Milestone	Deadline	Status
Track construction- amanda and nick	Tues Feb 07	Completed
Total seat modification- amanda and nick	Tues Feb 07 Tues Feb 21 Wed Feb 22	In progress
Leg/hip padding- amanda and taylor	Tues Feb 14 Fri Feb 24	Not started
Steering wheel modification- taylor and nick	Fri Feb 17 Fri Mar 3	Not started
Motor operation/wiring- will and taylor	Tues Feb 21	In progress
Kill switch- will	Fri Feb 24	Not started
Headrest construction- amanda and taylor	Fri Feb 24	Not started
Armrest construction- amanda and taylor	Tues Feb 28	Not started
Harness attachment- will	Tues Feb 28	Not started
Acceleration options (buttons, head, handlebars)- taylor	Fri Mar 17	In progress
Car test-ready	Fri Mar 24	Not started

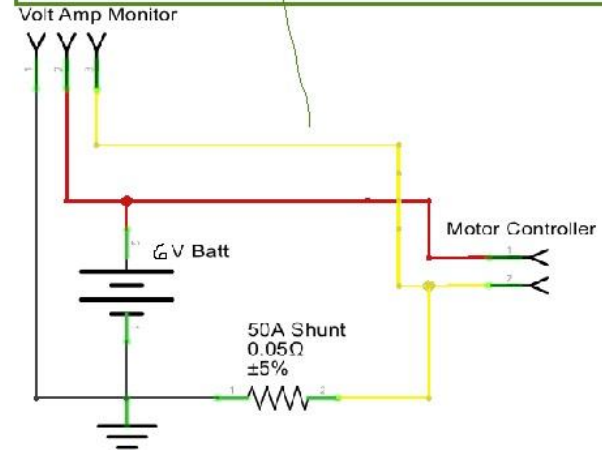
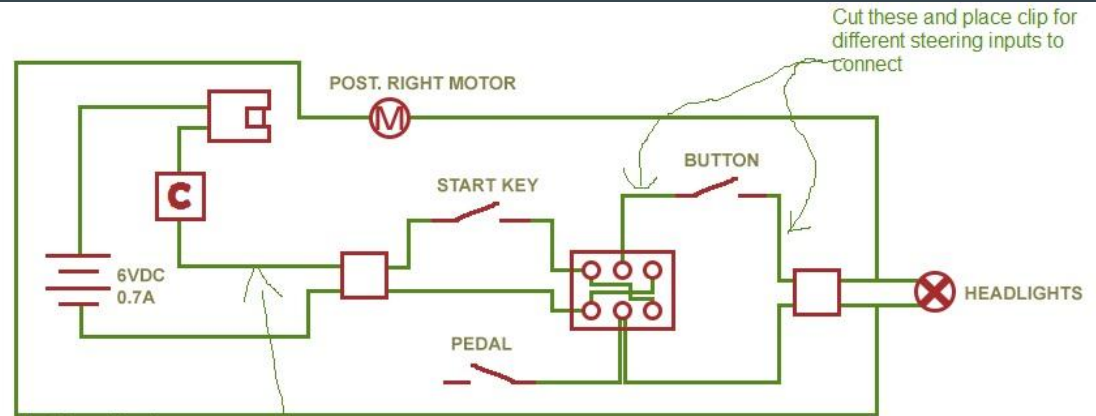
Design Updates- Seat

- 10-inch L-track with holes every $\frac{1}{2}$ inch
- 3D printed saddle to connect the chair (permanent) into track (removable)
- Eye bolt to loosen and move chair along track
- PVC to keep chair up

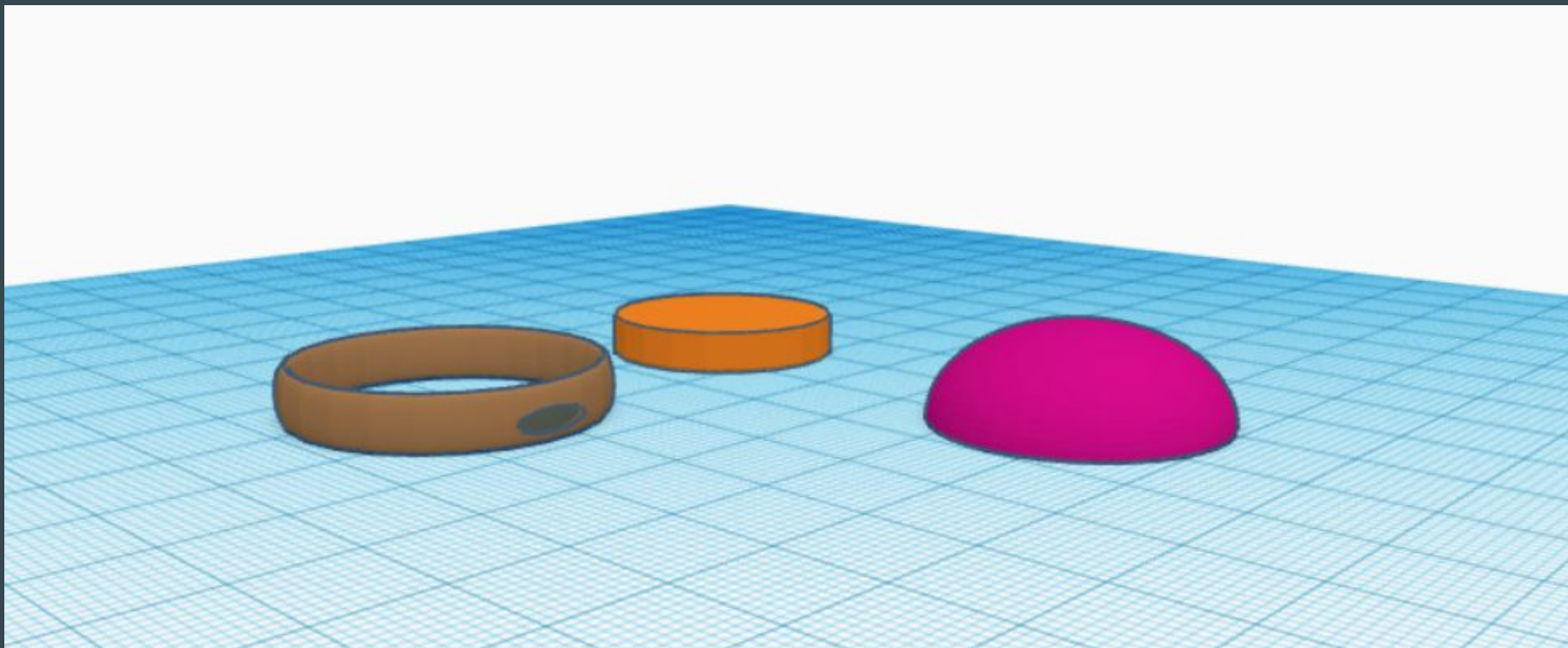


Design Updates- Circuit

Insert picture of motor controller in the car



Design Updates - Button



Future Goals

- Installation of motor controller
- Update of pending circuit diagram to account for new wiring
- Shaping and attachment of foam correction blocks for legs and hips
- Acquisition of materials necessary for steering wheel adjustment
- Installation and customisation of safety harness, headrest, and armrest
- Installation of kill switch and multiple activation methods

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Comments

- Next week we're meeting at noon. No progress report.
- Check notes from each slide and apply