PROJECTS FOR NATHAN LAMB

Improvements to SmartKart
Mobile Stander
Porch Swing
iHome Remote

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Client Background

- Nathan was born with spina-bifida; a birth defect that prevents the backbone and spinal canal from closing before birth. This causes him to have a weak torso.
- Nathan has no control over his legs, and has sole use of his left arm
- He presents with hydrocephally, and has a cerebral shunt to drain excess fluid
- Nathan is also cognitively impaired and has slight autism
Purpose for Projects

- Nathan’s parents want him to enjoy the sensation of movement, as well as have some independence in his choices of auto-locomotion, music, and lights in his room.

- These projects are aimed at allowing Nathan to enjoy the pleasures often experienced by boys his age.
Client Requests

- SmartKart was unsafe
  - Turn radius too large
  - Awkward controls
  - Shifting Mechanism ungainly and ineffective
  - Harness difficult to operate
  - Smart braking system does not work
Client Requests

- iHome Remote
  - Must be user-friendly
  - Must be resistant to impact damage
  - Must control iHome and lights
  - Parents suggested iPad app, as he plays with the iPad already
Client Requests

- **Porch Swing**
  - Must be stable enough to resist capsize
  - Must be portable, indoor/outdoor
  - At our suggestion, “ glider bench”

- **Mobile Stander**
  - Only able to use left arm, one-arm drive required
  - His school will provide an old stander he outgrew
Design

- SmartKart
  - Correcting turn radius by displacing rack-and-pinion setup
  - Tuning controls to be more responsive to variable inputs
  - Replacing Xbox Controller with wheel and pedals
  - Adjusting Smart-braking to not pick up the ground
  - Replacing latch-link harness with cam-lock harness
  - Packaging circuitry more effectively to prevent wear
  - Replacing shifting mechanism
Design

- iHome remote
  - Using Xcode, create an iPad app to interface with playlists
  - Set up Apple Airport and wireless light switch to respond to output from iPad app
Design

- **Mobile Stander**
  - Create new frame to accommodate Nathan’s growth
  - Attach a one-arm drive to left side of stander
  - Retrofit parts from the outgrown stander

- **Porch Swing**
  - Glider will be outfitted with casters, padding, a harness, and additional supports to prevent capsize
Budget

- Allotted Budget: $2000
- Current planned expenditures:
  - Apple Airport Express: 74.99
  - Levitron Wireless Switch: 64.99
- Remaining Funds: 1860.02
  - Must accommodate purchase of glider, harness, and other simple mechanical solutions
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