Projects for Elysa Carlson

BME4910 Final Presentation
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Overview of Presentation

- Background on Elysa
- Purpose of Projects
- Individual Designs
- Budget
- Acknowledgements
- Questions
Our Client: Elysa Carlson

- Elysa was born prematurely, and consequently her motor function has been impaired.
- She has weakened muscles as a result of the lack of use.
- She has trouble coordinating movements so simple tasks like walking are very difficult for her.
Purpose of Projects

By creating several assistive devices we hope to help teach Elysa the motor coordination necessary to complete independent motions, as well as increase her strength.

- Zip-Line Walker - Assistive Walking Device
- Recumbent Bike – Coordination & Strength
- Water Bike - Hydro-Physical Therapy
- Adaptive Ski Device – Outdoor activity
- Saddle Eating Chair – Core Strengthening & Freedom of Motion
Zip Line Walking Device
Zip Line Walking Device

- Designed to help Elysa get around more freely
- Way to safely strengthen her muscles
- Parents wanted design to be lightweight with minimal support
- Ability to rotate and turn around is important
Zip Line & Turnbuckle

- Rope with cable center
  - Connected to trolley eyebolt via carabiner
  - Tied off with cable clamps
    - Knots are not ideal
- Turnbuckle used to adjust tension of zip line
Track System

- Slotted Aluminum Strut Channel (8ft. long)
  - Mounted on two of the entryways, one on each side of the room.

- Trolley with Eyebolt
  - Rolls inside channel to prevent wheels from falling off.
  - Zip line connects to eyebolt via carabiners, one on each end.
  - Added plastic shims to reduce friction
Harness and Structure

- Provide minimal support to give Elysa maximum freedom to move around
- Not pictured are the straps connected to the harness and carabiners

[Image of a harness and structure]
Harness and Structure (cont.)

- Pulley
- Zip Line
- Swivel
- Carabiner
- Lanyard
- Eye Bolts
- Aluminum block for harness & straps
- Harness straps
- Loop for harness straps
- Harness
Harness and Structure (cont.)

- Changed the distribution of the holes for the eye bolts
  - Weight is distributed more evenly
  - Helps balance out the structure so that it is less likely to tip over toward one side
Harness and Structure (cont.)

- Visio drawing of the old hole distribution for the eyebolts
Harness and Structure (cont.)

• Visio drawing of the new hole distribution for the eyebolts
Water Bike
Water Bike

- Family takes regular trip to the local pool
  - Elysa enjoys floating in the water with aid of her Personal Floatation Device
- Parents expressed interest in a device to make the time in the pool productive with a form of Hydro-Physical Therapy
- Similar design to recumbent bike used to stimulate same pedaling motion while Elysa is partially submerged underwater
Chair

- Bought from NEAT Marketplace
- Originally part of a refurbished bathing chair
Pedals

- Made with plastic and Velcro straps
- Cut slit in plastic to slide Velcro through
- Sewed Velcro to make it more secure
Flotation Tubes

- Made with PVC tubes wrapped with foam
  - Same material as in pool noodles
- Originally wanted to fill tubes with expanding foam
  - Found it not as buoyant when we went full scale
- Foam kept in place via zip ties
Adaptive Ski Device
Adaptive Ski Device

- Allows Elysa to enjoy skiing in their backyard with minimal support
- Structure made of aluminum tubes
  - Provides strength and has good corrosion resistance
- Parts were painted at Central CT Coatings
Skis

- Used plastic skis provided by client
  - Smaller size than original skis
  - Reinforced with aluminum bar to make skis more rigid
Skis (cont.)
Back Support

- Made of outdoor canvas
- Straps with Velcro makes it removable
- Adjustable height
Arm Support

- Bought from NEAT Marketplace
- Modified to be adjustable for different heights
Corner Braces

- Used to create more support for the arm rests and back support
Outriggers

- 2 for back support and 2 for arm rests
- Use tube adapter and perforated base stud for connection
Outriggers (cont.)

- Made of plexiglass
- Bent to slide better; doesn’t caught on snow
Stationary Bike
Stationary Bike

- Ended up staying with the Schwinn A20 model
- Found better model, Proform 110 R
  - Only vendor was Sears, so could not buy it
- Original bike was best choice after looking at alternatives
Harness

- EZ-On Adjustable Vest
- Both this and Saddle Eating Chair use the harness
LED Light

- RGB light is music sensitive
- Changes colors with the music
Saddle Eating Chair
Saddle Eating Chair

- Height adjustable
  - Tables 28”-36”
- Seat can lean backwards or forwards
- Parts were professionally painted at Central CT Coatings
Base

- Made with 2”x2” aluminum
- Seat post is adjustable with telescoping tube
  - 2”x2” outer tube
  - 1½”x1½” inner tube
- Machined holes to insert pins to adjust height
- Locking caster wheels
Seat and Harness

- Seat is cruiser bicycle seat.
- Has additional back and head support.
- Uses same harness as Stationary Bike.
Budget

- Spent: $1622.46
- Remaining: $377.54
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Questions?