Beach Wheelchair & Walker

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Overview

- The Client
- Purpose of Project
- Part Breakdown
- Existing Products
- Existing Patents
- Budget
- Conclusion
- Questions
Cerebral Palsy

- Refers to a number of non-curable neurological disorders that appear in infancy or early childhood and permanently affect body movement and muscle coordination but don’t worsen over time.
- Caused by abnormalities in parts of the brain that control muscle movements.
- Effects the body’s movement, balance, and posture.
- Many different treatments: Physical therapy, Botox to relax contracting muscles, drugs to control seizures, and orthotic devices.
Spastic Cerebral Palsy

- Most common type of Cerebral Palsy
- Neuromuscular mobility impairment
  - Stemming from an upper motor neuron lesion in the brain
- Have one or more tight muscle groups which limit movement
- Patients have a hard time holding and letting go of objects
- Difficulty moving from one position to another (stiff, jerky movements)
The Client

- Jack Davies
- 12 years old
- 72 pounds
- 4’ 4” tall
- Diagnosed with cerebral palsy, also suffers from scoliosis
Design a wheelchair capable of safely transporting Jack across sandy terrain

- Important that there be enough restraints for Jack to be safe but also be comfortable
- Device must be compatible with tumbleforms chair that parents have
- Chair must also be able to support feeding tube and accompanying backpack apparatus
- For maximum comfort, chair should recline at multiple angles
Seat (Tumbleforms Chair)

- Parents are providing a seat that is tailored to Jack’s size and support needs
- Seat is best suited to provide support for Jack’s scoliosis
- Removable to allow wheelchair to fold smaller
- Allows family to replace cushions to adjust to figure as he grows
Frame

- Platform and back frame
- Seat will be anchored to back frame by very strong velcro adhesive
- Will have ability to recline at various angles
- Frame will be hinged on either side to allow for folding of chair for easy transport
- Early design based on building frame from stainless steel; possibility of modifying an existing wheelchair body
Chassis

* Lower section of the chair that sits under the seat platform
* Includes axels and is weight bearing portion of chair
* Most likely will be designed and built from stainless steel but also a chance of modifying an existing wheelchair frame if it seems compatible with our design
* Must be built to withstand Jack’s weight as he grows
* Built to absorb some of the shock of rough terrain
Suspension

- Very important to safety
- Important to keep chair upright, suspension will serve to prevent chair from tipping too far in any direction
- Help keep center of gravity of chair low to further prevent tipping
- Absorb forces from rough, uneven terrain
- Will most likely be spring based
Existing Products

Joy on the Beach Wheelchair by NEATECH

- Lightweight-aluminum alloy
- Lacking in safety constraints
- ~$1600
Existing Products

Landeez Beach Wheelchair by Natural Access

- Lightweight stainless steel, very durable
- Lacking in safety constraints
- ~3600
Existing Patents

- William Penn Charter School in Pennsylvania
- Patent was in 2005 for a dignified broad footprint beach wheelchair
- Folds, removable seat
- Two front skid wheels with springs, rear wheels are to disperse weight of chair and rider
The budget is based on a custom design, the overall cost could be significantly reduced if an existing frame is modified.

<table>
<thead>
<tr>
<th>Budget</th>
<th>Estimated Cost</th>
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<tbody>
<tr>
<td>Parts</td>
<td></td>
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<tr>
<td>Frame (axle, lower frame, seat platform, back support)</td>
<td>$1,200</td>
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<tr>
<td>Tires</td>
<td>$200</td>
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<tr>
<td>Suspension</td>
<td>$500</td>
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<tr>
<td>Velcro</td>
<td>$100</td>
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<tr>
<td><strong>Total Cost</strong></td>
<td><strong>$2,000</strong></td>
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Matthew Davies
- 12 years old
- Cerebral Palsy
- 98 lbs.
- 4’ 11” tall
- Can walk, is receptive
- Uses a walker or quad-canes to move around
Objective

- Matthew must be able to use the walker on the beach
  - Ease of Use
  - Portability
  - Ability to use in water (doesn’t float)
  - All-terrain wheels
Previous Designs

- Stainless Steel All Terrain Beach Walker
- 30 cm Wheeleez wheels
- Front casters rotate 360°
- Rear wheels are fixed
Previous Designs

- Aluminum All Terrain Beach Walker
  - Lightweight frame
  - Folds for storage
  - Adjustable height
  - Front casters rotate 360°
  - Rear wheels are fixed with push to lock brakes
**Previous Designs**

- NIMBO Walker
  - Specially designed for children with CP
    - Height Adjustable
    - Posterior Support
    - Fold Easily
    - No suitable brakes or seat
    - Tires?
Features & Designs

- Accommodating client’s growth
  - Adjustable height
- Portability
  - Lightweight
  - Collapsible
Features & Designs

* PVC Medical Wheeleez Wheels
  * 49 cm polyurethane balloon wheel
  * Non-corrosive and will not puncture
  * Can roll over Sand, Dirt, Snow, Rocks, etc.
Features & Designs

※ Seat
   ※ Allow for Matthew to sit and rest anywhere

※ Brakes
   ※ Disc brakes with handle

※ Umbrella and cup holder
## Budget

<table>
<thead>
<tr>
<th>Parts</th>
<th>Cost</th>
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<tr>
<td>Frame</td>
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<tr>
<td>Wheels</td>
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<td>Seat</td>
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<tr>
<td>Harness</td>
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<td>Accessories (cup holder, umbrella)</td>
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<tr>
<td>Miscellaneous</td>
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<tr>
<td>Shipping</td>
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<tr>
<td><strong>Total</strong></td>
<td>~1100</td>
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</tbody>
</table>
Priority is Jack’s and Matthew’s safety
Provide client with beach travel that can adjust to his size as he grows
Design a product that is both easy to transport and easy for parents to push and use
Design product to exactly meet the needs of the clients and their family
QUESTIONS?