WHEELCHAIR FOR ABBY MILLER

Benjamin Marcus, Katharine Guineau, Julia Olczyk
Overview

- Client Information
- Client Needs, Purpose, and Goals
- Design and Design Components
- Detailed Description of Parts
- Budget
- Conclusion
Client Information
Client

- The Miller Family
- Clinton, Illinois
- Abby Miller

- Age: 17
- Height: 5’2”
- Weight: 72 lbs
Cerebral Palsy

- Characterized by disorders involving the nervous system and can affect functions such as movement and posture.

- Symptoms: tight muscles, muscle weakness and an abnormal gait.

- Caused by abnormal development or damage to the part of the brain responsible for control of muscle tone and motor activities.
Abby

- Weakness of left and right sides of body
- Leans to left side so her back is left unsupported

- Exaggerated tone throughout body- frequently tries to stand up
  - Abby tends to push through the materials on her current chair

- Weakness in both arms, head and neck
Abby is in need of a new wheelchair that will provide better support for her body but will also provide maximum comfort.
Previous Work and Goals
Currently on the Market

- Karman Healthcare
  - Folding tilt in space wheelchair
  - Price: $1,699.00.
  - Drawbacks:
    - Wheels are only 14 inches which is pretty small
    - The seat cushions and headrest needs to be customized for anyone who wants to use it.

- Quickie
  - Price: $2,825.00
  - Drawbacks:
    - Needs a lot of customizing to make it comfortable for any user.
    - Has anti-tip bars on the back which prevents the wheelchair from tipping backwards when going up ramps and other obstacles.
Patents

- **Tilt in Space**
  - Patented by Theodore C. O’Neill Sr. in 2001
  - The patent is unique to the tilt in space function which keeps all of the angles of the seat as the whole seat can be tilted back and forth.
  - Patent Number: 6257609.
Goals

- Better neck support
- Contoured seat
- Uniform foot rest
- Tilt in space feature
- More safety belts
Important Design Features
Seat

- The seat will be composed of a double layer of foam - a dense layer covered with a softer layer
  - Soft layer - for comfort
  - Dense layer - for support
- More conforming material than her current seat which is composed of gel
Seat Continued

- The seat will have a wedged bottom to encourage Abby to sit back in her chair.
- It will also prevent her from pushing on her footrest because it will raise her feet.
Seat Continued

- Abby has weakness in her back and often leans to her left side. This leaves a space between the back of her chair and the right side of her back.

- Extra padding will be placed on the right side of her chair for better support.

- The back of the chair will use the same foam as the seat.
Tilt in Space

- Is a feature on her current chair that the family enjoys because it allows them to help Abby in and out of her chair easily.
  - This is often a desirable feature for people with weakness in their neck and back.
Wheels

- There will be several sets of wheels for Abby’s chair
- Indoor and Outdoor terrain
Harnesses

- H-Strap for chest
  - Possibly similar to straps on a backpack

- More padding

- Incorporate hip straps to keep Abby in a sitting position and to prevent sliding

- Ideally have one buckle for entire apparatus to allow for easy entrance and exit

- Millers would also like to have a form of shoulder strap for extra safety and restraint
Budget and Conclusions
### Budget

<table>
<thead>
<tr>
<th>Parts List</th>
<th>Estimated Cost</th>
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<tbody>
<tr>
<td>Tilt in Space Wheelchair</td>
<td>$600.00</td>
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<tr>
<td>Head and Neck Support</td>
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<td>All Terrain Wheels</td>
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<td>Normal Wheels</td>
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<tr>
<td>Motor</td>
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<td>Circuits</td>
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<tr>
<td>Batteries</td>
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<td>Power Inverter</td>
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<td>Harnesses</td>
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<td>Foot Rests</td>
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<td>Miscellaneous</td>
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<tr>
<td><strong>Total Expenses</strong></td>
<td><strong>$2,600.00</strong></td>
</tr>
</tbody>
</table>
Conclusion

- Customize a Tilt-in-Space wheelchair to Abby’s specific weaknesses due to cerebral palsy

- Maximize comfort and safety while maintaining freedom and functionality for both Abby and her parents
Questions?