Team 2: The ATPC X42 All-Terrain Power Chair

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Overview

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Annalee Hughes

- Age: 10
- Height: 56”
- Weight: 62lbs
- Bright and Adventurous
- Has Cerebral Palsy
- Has very poor trunk strength and leans forward while sitting
Cerebral Palsy

- Neuromuscular disorder often caused at birth
- No known cure
- Characterized by involuntary muscle movements
- Motor control drastically reduced
- Causes muscle deficiencies such as in the trunk
- Mental disabilities may be apparent
Design an all-terrain power chair with a low center of gravity that will allow Annalee to travel on her hilly property.

- Annalee has tipped her current power chair over in her yard before and does not have the strength to right herself.
Other Products

- X4 Extreme by Vestil - $16995
- Tracabout IRV 2000 - $18498
- X8 Extreme by Magic Mobility – 14995

- All have joystick control, seat positioning, and many other options that increase the price
Key Aspects

- Joy stick control
- Specialized chair and harness to keep Annalee upright
- Low center of gravity
- Transportable
Mechanical Components

- Independently powered rear wheels
- Modular seat mount so the vehicle may be used as Annalee continues to grow
- Rear wheel suspension
- Customized chassis
- Actuated seat
Electrical Components

- Single hand joystick control programmed into software
- Electric motor governed by software and joystick
- On/Off killswitch
• Two car batteries - provide a full day’s operation

• Charge Inverter - recharges batteries, plugs directly into wall socket

• Tilt sensor – sounds alarm when grade becomes too steep, automatically adjusts seat level through actuator
Software

- Microcontroller used to control joystick and tilt sensor
- Motor stopped when joystick in neutral, force sensitive to control speed
<table>
<thead>
<tr>
<th>Part</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chassis/Harness</td>
<td>300</td>
</tr>
<tr>
<td>Seat</td>
<td>2000</td>
</tr>
<tr>
<td>Joystick</td>
<td>50</td>
</tr>
<tr>
<td>Motors (2)</td>
<td>500</td>
</tr>
<tr>
<td>Batteries (2)</td>
<td>250</td>
</tr>
<tr>
<td>Charge Inverter</td>
<td>500</td>
</tr>
<tr>
<td>Tires/Wheels</td>
<td>600</td>
</tr>
<tr>
<td>Shocks</td>
<td>100</td>
</tr>
<tr>
<td>Circuitry</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$4400</strong></td>
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Conclusion

- ATPC X42 will allow Annalee to experience nature in a safe and carefree way
- The power chair will be as similar in operation to the client’s current system as possible
- Design will be cost effective and much less expensive than current options
- Will be hand made to customize requirements and desires of the client