The L.A.D.

Electric Wheelchair to Riding-Lawnmower Assist Device

TEAM 16

Michael Chen
Matthew Desch
Joshua Aferzon
• Mr. Ronald Hiller
• Suffers from multiple sclerosis
  • Inflammatory disease that effects the communication between the brain and spine
  • Developed MS at age 19
• Limited lower body control
• Strong, kind-hearted individual
  • Volunteers in Ashford at the local Hole in the Wall Gang Camp for children with cancer and other serious blood diseases
  • Dresses up as Santa Claus during Christmas time
The Problem

• Mr. Hiller would like to do his fair share of work around the house
• Mounting and dismounting his riding lawnmower is a problem
Bruno Turnout/Carony Transportation System

Hydraulic pump

Previous Patents

http://www.avnmobility.com/Turney%20w%20Carony%20Back.jpg

http://www.okokchina.com/Files/uppic16/Hydraulic%20pump%20with%20round%20base495.jpg
The "Competition"

- Personal power chair lifts
  - Hard to move/not mobile
  - Heavy
  - Doesn’t handle transfer of person to lawnmower chair
  - Safety concerns
  - Not weather resistant
  - $2400

http://s.sears.com/is/image/Sears/00870848000?hei=248&wid=248&op_sharpen=1&resMode=sharp&op_usm=0.9,0.5,0,0
• The L.A.D. allows users to transfer themselves using only their upper body from their wheelchair into the device and subsequently onto the lawnmower.
• The purpose of the device is to positively and negatively displace the users to facilitate access to a riding lawnmower which is at a substantially higher elevation than their wheelchairs.
• The basis of the device will be the installation of a hydraulic pump in the apparatus similar to those used in salon chairs to allow pressurized lifting and lowering.
Several factors were considered when designing the device:

- The elevation of the lawnmower relative to the wheelchair
- Environmental damage to the hydraulic pump
- Ease of entry and exit from the device
- Attachment of the device to the lawnmower
- Weight and price of the device features
- Overall safety of the user
Design

- **Hydraulic pump**
  - Allows pressurized lifting and lowering of the apparatus
- **Hydraulic pump exterior casing**
  - Adds medial support to the entire device
  - Protects the pump/piston from environmental and other foreign damage
- **Seat**
  - Allows full 360° rotation to simplify entry and exit from device
  - Comfortable padding for user to sit on during motion

Preliminary CAD Representation of the L.A.D.
Design

- Safety Rails
  - Hollow to minimize weight/expense
  - Stainless steel to maximize durability
  - User can grasp during motion to secure position
- Pull-out Board
  - Attached within the seat frame
  - Extendable from the seat to allow access to the lawnmower
- Base
  - Provides foundation to apparatus
## Budget

<table>
<thead>
<tr>
<th>Part</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hydraulic pump</strong></td>
<td>$170</td>
</tr>
<tr>
<td><strong>Seat</strong></td>
<td></td>
</tr>
<tr>
<td>Steel safety bars</td>
<td>$95</td>
</tr>
<tr>
<td>Wooden seat base</td>
<td>$50</td>
</tr>
<tr>
<td>Connector for chair base to pump</td>
<td>$50</td>
</tr>
<tr>
<td><strong>Electric pumping mechanism</strong></td>
<td>$300</td>
</tr>
<tr>
<td><strong>Seat belt</strong></td>
<td>$130</td>
</tr>
<tr>
<td><strong>Wheels</strong></td>
<td>$60</td>
</tr>
<tr>
<td><strong>Misc</strong></td>
<td>$100</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$955</strong></td>
</tr>
</tbody>
</table>
• Ultimate goal: to make Mr. Hiller’s life easier
• The L.A.D. will allow Ron to mow his lawn and help maintain the upkeep of his home by providing risk-free transportation from his wheelchair to lawnmower
• Unique design is specialized for Ron’s needs
• Improved safety of lawnmower
  • Seatbelt modification

Conclusion
Questions?