The L.A.D.
Electric Wheelchair to Riding Lawnmower Assist Device

TEAM 16
Michael Chen            Fall Semester Final Report
Matthew Desch         12/01/2010
Joshua Aferzon
Overview

• Introduction
• Objective
• Specifications
• Division of Labor
• Design
• Work Done
• Budget
• Conclusion
• Acknowledgements
Introduction

- Client: Ronald Hiller
  - Ashford, CT
  - Age: 56
  - Height: 5’10”
  - Kind and charitable
  - Suffers from Multiple Sclerosis
  - Ron maintains complete upper body function and limited lower body function
• An inflammatory disease where the myelin sheaths are damaged
• Affects communication between brain and spinal cord
• Disease onset occurs usually in young adults
• Effects between 2 and 150 per 100,000 individuals
• Can be caused by genetics, environmental factors and infections
• Design an assistive lift that will allow Ron to easily mount and dismount his lawn mower

• The greatest challenges that the lawnmower presents to our design are the height of the seat and placement of the control arms

**Objective**
The L.A.D. must have/be:

- Lightweight
- Sturdy
- Winter resistant (when stored indoors)
- A reliable breaking mechanism to wheels
- A modified control arm
- Seat belt
- A reliable and adjustable bridging system
• Michael Chen
  • Part fabrication
    • Seat, bridge, safety bars, safety belt(s)
  • Part integration with pump
  • Website maintenance
• Matthew Desch
  • Budget Manager and responsible for ordering all parts
  • Microsoft Project Manager
  • Part fabrication
    • Lawnmower attachment, breaking system, pumping mechanism
• Joshua Aferzon
  • CAD designer
  • Part fabrication
    • Base/wheels, casing, general aesthetics
Design
• Computer-Aided Design (CAD) prototype has been designed in SolidWorks to model our preliminary ideas.
• An updated design will be created after components and dimensions are finalized.
The finalized design will have several components, categorized as follows:

- **Base**
  - Multi-axial medical grade wheels
  - Stainless steel star base
  - Stainless steel brake clamping system

- **Hydraulic Pump**
  - Inner and Outer high-grade PVC casings
  - Hydraulic pump
  - Custom stainless steel lever with grip
  - Brake handle
Components (cont’d.)

- Seat
  - Durable leather cushion
  - Carbon-steel plate framing
- Bridge
  - Bridge alignment device
  - Bridge-seatbelt attachment
- Carbon-steel safety rails
- Seatbelt
- Foot-rest
<table>
<thead>
<tr>
<th>This Semester</th>
<th>Next Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Part orders ready</td>
<td>• Parts fabrication</td>
</tr>
<tr>
<td>• Build plan created</td>
<td>• Parts integration</td>
</tr>
<tr>
<td>• CAD prototype created</td>
<td>• Testing</td>
</tr>
<tr>
<td></td>
<td>• Finalization</td>
</tr>
<tr>
<td></td>
<td>• Aesthetics</td>
</tr>
<tr>
<td></td>
<td>• Comfort</td>
</tr>
<tr>
<td></td>
<td>• Additional safety measures</td>
</tr>
</tbody>
</table>

**Work Done**
### Budget

<table>
<thead>
<tr>
<th>PART</th>
<th>TOTAL PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL PARTS FROM METALSDEPOT.COM</td>
<td>$176.11</td>
</tr>
<tr>
<td>G2 hydraulic pump</td>
<td>$101</td>
</tr>
<tr>
<td>Piston Interior Casing</td>
<td>$59.24</td>
</tr>
<tr>
<td>Piston Exterior Casing</td>
<td>$165.00</td>
</tr>
<tr>
<td>Desk Chair Base</td>
<td>$63.32</td>
</tr>
<tr>
<td>Wheels w/Brakes</td>
<td>$106.70</td>
</tr>
<tr>
<td>Misc (cushion, small parts, nuts/bolts/screws)</td>
<td>$100.00</td>
</tr>
<tr>
<td><strong>GRAND TOTAL</strong></td>
<td><strong>$771.81</strong></td>
</tr>
</tbody>
</table>

(totals include shipping)
• The device design and a thorough build plan have been completed; parts are ready to be ordered.
• Overall goal of project: provide our client (Ron) with a safer and easier way to mount/dismount his lawnmower.
• After next semester, the L.A.D. will be able to:
  • Undergo extensive testing.
  • Function for many years to come.
  • Be stored easily in a shed.

Conclusion
• Dr. Enderle
• Marek & Emily
• Mr. Ronald Hiller and his family
• Kerrie Wenzler in the BME office
• Pete Glaude and Serge Doyon from SOE Machine Shop
Questions?