Project(s) for Carolyn Martin
Team 10

Nishant Patel & Eric Puffer
Project 14 – Sponsor Dr. Enderle

Carolyn Martin, 1 Wheatfield Circle Shelton, CT 06484
Phone: 203-225-0123
Email: Carolyn8289@sbcglobal.net
Our Client: Carolyn Martin

- 42 year old woman with Multiple Sclerosis
- Minimal leg function from the hips down
- Has been in a wheelchair for the last 10 years
- Atrophy
- Full upper body and brain function
- Able to walk minimally with assistance
- Has a desire to rehabilitate herself back to health
- Wants to be able to exercise and cook in her kitchen
Multiple Sclerosis (MS)

- Inflammatory disease in which the fatty myelin sheaths around the axons of the brain and spinal cord are damaged.
- Affects the ability of nerve cells in the brain and spinal cord to communicate with each other effectively.
- Theories say it can be genetic or infectious.
- Leads to physical and/or cognitive disability.
Project 1
2-in-1 Exercise Machine

- Custom built exercise machine
- Made of aluminum
- Two distinct exercises (stretching + peddling)
- Can be used while client is still in her wheelchair
- Stepper Motor, Controller, Push-button
- Has three layers in the mechanical design
Part 1: Base

- Made up of 14 aluminum pipes
- Welded together
- Rubber grips
Part 2: Rotating Disk(s)

1. Outside Disk
   - Holds the inner disk (mold)
   - Mount to base
   - Must allow inner disk to rotate
   - Engine box

2. Inner Disk
   - Rotates
   - Fours holes that enclose upper struc.
   - Rotate 180 degrees
Part 3: Upper Level

- Extending aluminum rods
- Layers for mounting (welding)
- Mount on opposite sides
Exercise Attachments

• Stamina 15-0120 InStride Cycle XL
  - Will be mounted to create the peddling system
  - Peddles need to be modified

• Stretching Mechanism
  - Foot Plates
  - Galvanized Vinyl Covered Steel Rope
  - Stretches Calves and hamstrings
Stepper Motor and Controller

- Stepper motor and controller will be used in order to control the degree of rotation of the rotating plate.
- The client will use a push button to rotate the exercise machine 180 degrees.
- More precise than using a potentiometer to measure degree of rotation.
Project 2: Automated Mobile Stander

- Custom alteration of a stander frame
- Automated lifting mechanism
- Full mobility via joystick control
- Add Caster wheels
Part 1: Frame

- Frame made of steel
- A immobile frame purchased at the NEAT Market.
- Needs to be sanded and repainted for final product
Part 2: Lifting Mechanism

- Consists of a harness and lifting bar
- Bar height is controlled by a switch which controls an actuator
- Objective is to lift client from wheelchair into a secured standing position
Part Gathering

- Power source (battery), motor, wheels, and joystick are going to be scrapped from a cheap power wheelchair found at the NEAT marketplace.
Current Work - Future Work

• Solidworks models of both projects
• Purchased stander frame and wheelchair from NEAT marketplace
• Ordered individual parts for exercise machine
• Stripped wheelchair for parts
• Tested motors and actuators

• Order additional parts for both projects
• Build attachments for Stander
• Construction of exercise machine
• Test rotation of exercise machine
• Test motion of stander
<table>
<thead>
<tr>
<th>Product</th>
<th>Cost ($)</th>
<th>Shipping($)</th>
<th>Total Cost($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stamina 15-0120 Instridy Cycle XL Pedal Exerciser</td>
<td>$40.00</td>
<td>Free</td>
<td>$40.00</td>
</tr>
<tr>
<td>10 ft Aluminum Square Tube 1.5 in</td>
<td>$35.70</td>
<td>$103.64</td>
<td>$243.78</td>
</tr>
<tr>
<td>10 ft Aluminum Square Tube 1 in</td>
<td>$21.90</td>
<td></td>
<td>$243.78</td>
</tr>
<tr>
<td>.25 inch Thick Aluminum Plate (1x1)</td>
<td>$22.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.5 inch Thick Aluminum plate (1x1)</td>
<td>$60.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stander frame</td>
<td>$275.00</td>
<td>Free</td>
<td>$275.00</td>
</tr>
<tr>
<td>Old Motorized Wheelchair</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
</tr>
<tr>
<td>23MD - Stepper Motor with Integrated Drivers</td>
<td>$150.00</td>
<td>$14.95</td>
<td>$164.95</td>
</tr>
<tr>
<td>PA-02-10-200 Linear Actuator</td>
<td>$129</td>
<td>$9.99</td>
<td>$139.99</td>
</tr>
<tr>
<td>Miscellaneous (ie. Anti-scratch pads, handles, microcontroller ect.)</td>
<td>$100</td>
<td>TBD</td>
<td>$100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$834.55</strong></td>
<td><strong>$128.58</strong></td>
<td><strong>$963.13</strong></td>
</tr>
</tbody>
</table>
Acknowledgements

• Our Professor/Advisor Dr Enderle

• Our TA/Advisor Marek Wartenberg

• Don Hoerman from the Neat Market Place

• Our client Carolyn Martin