Painting Solutions for Limited Mobility
Weekly Report #1
Monday Jan 16th – Friday Jan 22nd

Daniel Phillips
Team #1
BME 291
25 January 2006

Work Completed:

Week one of Senior Design consisted of a final parts order due to a delay imposed by design changes which occurred during the last phase of our design process, the final report. From the last report it was deduced that a linear actuator could be replaced by a small stepper gear motor. The largest reason for this last minute decision is largely economic. The gear motor system is much cheaper to produce and the motor is far more inexpensive than the actuator. By replacing the actuator, more time and money can be devoted to designing a more aesthetic and ergonomic product, which will also be more reliable due to a stable gear system.

Overall, by changing this design now, the project is less complicated and can be completed on a shorter timeline. In addition this will increase the likelihood for success. This motor does not require full construction of a stepper circuit since the driver is included and ready to be immediately programmed.

The actual project progress carried out this week consisted of preparing additional part order forms to add supplemental parts to enhance the overall design. Several tubes of acrylic paint of different shapes, sizes, and materials were purchased in order to ensure that this design can function despite any external variables which perhaps could have been previously unconsidered during analysis and design process. For example, the flow rate paint from a tube of metal can only be estimated to a certain extent because the exact value is distorted by the strength of the thin metal container. By purchasing a variety of acrylic tubes, the actual properties of the tube can be identified and we can ensure that the design functions seamlessly.

Another important step taken during this first week was the addition of a valuable contact to our contact list. Previously all of our communication was carried out through the Brooke Hallowell and the National Science Foundation. Although this initial contact was helpful, additional information about our client and his needs was found by our client’s caretaker, Patty Mitchell. This contact was able to provide a newer, more descriptive picture of our client, as well as brief our group on an update as to his last surgery and his current condition and mobility limitations. This invaluable information does not necessarily pose any immediate changes to the design, but allows our team to continue to craft our design with a better understanding of the challenges at hand as we begin the construction process. By referring directly to the Passion Works company for information about our client, we are now able to gain more accurate information at a significantly faster rate.

Future Work:

The following week will include receiving several materials including the brush set and some of the acrylic tubes. The last of the supplementary parts will be ordered on Friday. This included the webbing and all hooks and locks for the auxiliary shoulder support system which is to be constructed as a corollary to the brush.

The machine shop will be used to design a roller which will be used to physically extrude the paint from the acrylic tubes. This will only need to be a small 3/8” hollow cylinder of steel which will provide a physical force as it impacts the tube. This can be cut and drilled using the machine shop.

Work for the Next Few Weeks:

- Obtain template wheel chair for prototype design
- Interfacing of hinges for support system with a wheel chair
- Construction of metal roller in machine shop
- Obtain casing
- Construct brush enclosure

Project Review:

This initial week was used to reevaluate some of the difficulties of the design and overcome them at an early stage of the design process. Although this delays the project timeline, it shortens the latter stages of the design by removing two unnecessary components from the original plan. This simplification leads to a timeline which is updated in the following manner.

Updates to Timeline:

- Obtain a template wheel chair
- Initial machining of parts

Hours Worked:

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wednesday</td>
<td>1:00Pm-3:00Pm</td>
</tr>
<tr>
<td>Friday</td>
<td>11:30Am-5:00Pm</td>
</tr>
</tbody>
</table>

Hours total = 7.5