Work Completed:

The main work completed this week consisted of some touch-ups and a whole bunch of planning for the path of the project over the upcoming months. Much time was put into planning how the workload will be split up amongst the team members in order to assign a specific design task to each member. We decided that Frank will continue to do the majority of the welding, since he possesses the skills to do it correctly and efficiently. Jon is in charge mainly of the electronics and will take it all the way from the design aspect to the wiring and touch-ups at the end. Jackie is designing a container for accessories and a box to house all the easel’s electrical components as well as is in charge of doing the finishing touches to the easel such as painting and other accessories. Lastly, Adam will be designing the remaining portions of the easel, from the horizontal motion to the easel face where the canvas will attach. Aside from that, some of the aluminum pieces used to fabricate the easel were cleaned up with a grinder. Frank went down to the shop and did some more fabrication on the easel.

The issue of limited horizontal movement was tackled more over the past week, as last week’s designs were reviewed and analyzed. Unfortunately, the problem maintains a lack of horizontal range for the canvas. Our actuators account for only six inches of travel, which was thought to be justified, using a lever system Adam and I developed last week. However, this required swing arms and more cluttering of parts from the front of the easel. It would also add weight hanging off the front of the tilting arms that may build up a rather large moment about the pivoting points. The ideas from last week were scrapped due to these measures.
In response to this problem Jon called a company located in Waterbury, CT called Haydon Switch & Instrument, Inc. Since they specialize in linear actuators, stepper motors, and sealed switches, he asked to speak to an engineer to discuss the cost and details of a non-captive linear actuator. This type of actuator drives itself along a threaded rod of any length, and does not require the rod to turn. With this method we could design the system with a rod length appropriate for the easel, and the actuator would carry the easel horizontally along the rod.

Jackie researched power supplies for the easel. The power supply wasn’t ordered earlier in the semester because you have to be sure that the right one for the project is purchased. She has done a lot of work so far trying different web sites as well the Jameco and the Big Book to find appropriate power supplies for consideration. Pictures of some of the initial options can be found in our lab notebooks. It will take quite a lot of work until she finds a suitable power supply. She has to be sure to keep in mind that we want one that will keep 12 volts while maintaining 6 amps.

Fortunately for us, while Frank worked on grinding down parts for fabrication in the stock room, our team came across a screw drive set up, with a horizontal span of 24 inches which would perfectly fit the width of the easel. Using the gear motor in our inventory, the drive was tested and works beautifully. Its speed is still slow enough to control and really matches the design of the project. I began taking dimensions of the preset bracket holes on the back of the drive, and worked on plans to attach it to the vertical channel pieces originally planned for the design. Figure 1 is a picture of the screw drive that we found in the lab.
Future Work:

As far as the future work is concerned we are still awaiting the arrival of the 80/20 track that will tie the base components and carriage together, the rest of the preliminary fabrication steps was completed.

Frank will be welding up the majority of the structure this weekend and Adam will be devising a way to reduce the weight of the horizontal motion system, along with how to affix it to the carriage and how/where to attach the gear motor. We are now at a juncture where the only major purchase remaining will be for a power supply for the easel; however it is expected that selecting an appropriate one will take quite a bit of time for Jackie. She will be working on turning down some rods on the lathe to around 0.25 inches to provide support for our vertical motion.

This Saturday Frank will be heading once again to the welding shop where most of the carriage will be welded and assembled. The 80/20 track, if it arrives, will be in and cut to lengths as well.

Further testing of the gear motor and screw drive will also proceed next week so we can incorporate it into our easel design. Jon will need to design a system to limit the range of motion of the easel in the horizontal directions in order to keep the motor from attempting to move the easel beyond its maximum range of motion. Because the motor uses reverse polarity to reverse its direction, the limit switches will need to be equipped with a diode to allow the motor to turn in the opposite direction one the limit switch has been tripped.

Project Review:

In our opinion, the progress this week on the project seemed to be rather slow but very productive. This is mainly attributed to the need to sit down and figure out how to proceed for the remainder of the semester and allow for everyone to have a major
component of the easel to work on. The addition of the screw drive was a huge lifesaver for our project. The problem of limited horizontal range has been eliminated. The only foreseeable problems include a more complicated circuit design, and a heavier contraption hanging off the front of the easel. We will need to test the strength of the 80/20 clamps so slipping of the bearings will not occur. Continuation of the fabrication will be a good step for us to move forward with.