Project Identity

Monitor Lift & Paint Cap Remover Project

Progress Report #2- Katie Zilm

Week 2: September 13-September 20

Work Completed

Monitor Lift Project

Last week our group decided upon a new mechanism for the Monitor Lift- linear actuators. We ordered a linear actuator from Furgelli Auto that is capable of lifting a 400 lb load and has an 18 inch stroke length. Below is a drawing of the actuator we ordered and just received today, September 20.

![Figure 1. Dimension Drawing of Linear Actuator](image)

The linear actuator has a built-in limit switch. However, the limit switch is set so that the actuator stops after 18 inches. We will have to look into incorporating a manual limit switch or a microprocessor so that the lift can be stopped at either 12 inches or at any interval height.

Now that the mechanism for the lift had been revised, the base/platform needed to be revised also. I designed a base/platform comprised of two main parts
last week. This week we drew them and added tried to figure the best dimensions. Below is a general drawing of the setup by Dan. The actuator at its lowest height is 24.88 inches. The monitor itself has a height of 19.25 inches, width of 19.5” and a depth of 10 inches. The guide rails we ordered are about 20 inches in length so the wall will be about 20” high and around 1/8” thick (maybe less to lighten the weight of the setup). The base of this piece must accommodate the footprint of the monitor along with the width of the wall, which will be very small and also have enough space to attach the linear actuator behind the wall. Therefore the base will be around 23-25” wide and about 15-18” deep. The open face-top box piece that will house the monitor will be 23-25” wide, around 12-15” deep, and about 25-26” high (see next page for a general drawing of this piece by Dan). This piece must have a height of at least 25” so that when the actuator is in its closed state, it will not be taller than the ‘box’. We have ordered a bracket that should allow us to secure the actuator to this piece on its backside above where the guide rails would end. We have also tossed around the idea of reducing the area of the sides, perhaps to half. Besides being less bulky, this is also a way that we can reduce the weight of the setup.
Thuy and I went to the machine shop to get ideas of which type of material we should use to make the lift. We considered using aluminum since it is strong yet relatively light. However, we were advised that aluminum would not be a good choice if we were going to bend it to the shape we want because there is a good chance that it will crack. Steel was recommended. We will not use stainless steel since it would be unnecessarily expensive and we want the box to be a color that will not be distracting. This piece of the setup up will be made from steel. Steel will be strong enough to accommodate the monitor. Steel is heavier than aluminum and we calculated that this base/platform setup will probably weigh around 70 lbs when made out of 1/8” steel.

The linear actuator was just received at the end of this week so we will work on assembling the base of the lift unit and troubleshooting the actuator. This will include researching microprocessors and manual limit switch systems as well.

**Paint Cap Remover**

The focus of the work done on the paint cap project this last week has still been on the cap head. Numerous pieces of the HDPE rod were drilled out and epoxy was used to try and make more cap head insets for the top of the motor. This procedure seems to be working successfully. However, the cap of the paint tube has been damage from all of the strength tests that we have performed on it and many of the teeth have sheared making it difficult for us to get a good casting of it. I went to Michael’s Arts and Crafts store in Manchester, CT and purchased some clay and two more tubes of Grumbacher 1.25 oz tubes of paint.
I used the clay as a mold. I imprinted the paint cap of each tube into a piece of clay and filled the ‘molds’ with epoxy. I let the epoxy set and harden and we now have replicas of the paint caps which we can use as stencils or models.

Unfortunately, it seems that Grumbacher no longer makes the same style paint cap for their 1.25 oz tubes of paint. The paint cap that we have been customizing this project for has many teeth, which are small yet still large enough to grip and supply some torque. However, all of the tubes at the store, except for the very old looking ones, had a paint cap with no teeth. Rather than teeth, the paint caps now have only small ribs all the way around. This new paint cap will not work with our current cap head design because there is nowhere for a tough mold to grip. The new paint cap design is great for people who manually remove the tops because the cap with teeth could be painful. However, the new cap is not very good for our project because the teeth of the cap were a main component to the mechanism we were going to use to remove it (mold fit-torque). The ribs on the new style to provide to grip but we may have to redesign our cap head in light of this new information. We will brainstorm in this coming week about how to redesign the cap head so that it will fit any paint cap of a circular shape regardless of detail and be more universal.

In addition to work on the cap head, we have started constructing the circuit for the paint cap remover. We have made a very general one thus far to which we need to add a fuse and a few other components. I looked through catalogues this past week and tried to find a switch that would be more suitable for our project since the one that we have is somewhat difficult to flip. I was looking at large round buttons, but at the moment we have found a keyboard key that we are using.

**Future Work**

In the following week we will work on trouble shooting the linear actuator (i.e. researching manual limit switches and hopefully the bracket will arrive so we can work on mounting it). We will also get material from the machine shop and start to build the base/platform setup for the monitor lift.

For the paint cap remover project we will continue working on the circuit and we will work on possibly redesigning the cap head so that it will be able to accommodate a more general shape (so that if Grumbacher changes the type of cap they use again our project will still be useful).

**Project Review**

Our projects are progressing well. We have run into many setbacks and have had to redesign multiple components in the past weeks. Now with the new paint caps, it seems that we will have to continue to redesign some more. However, we have dealt
with these obstacles very well in the weeks that have passed so far and have come up with new designs very quickly.

Hours Worked  13