Work Completed

I spent last week completely building, putting several parts together, and finalizing the steering control box. It took some time to position the black box I had ordered correctly and mounting it with black clamps that were .5 inch diameter, to correctly fit around the round frame. I had to use the drill press to drill several holes with .25 inch diameter, the size of the bolts I used to mount the box, and also spent a while holding the box in the exact location it would be mounted and measuring out the locations of the holes to drill. Once the holes were made, I mounted the box, lined up the steering rod and drilled a .75 inch hole to fit the rod through. Then I took the steering wheel off the rod attaching it to the car and measured the correct length to cut this rod so that it ran into the steering control box 1 inch. I cut the rod using the band saw in the machine shop and installed it appropriately to make sure it fit properly. Then I mounted the rotary potentiometer inside the box and measured the distance from the potentiometer to the rod. I needed to make a connector piece that would connect the small .25 inch diameter of the potentiometer to the .75 inch diameter of the steering rod. There was a smaller pipe piece that was identical shape to the steering rod, but its diameter was smaller so that it perfectly fit into the steering rod. This piece would work perfectly for attaching to the steering rod and also be very tight and strong.

To make the connector, I found a piece of scrap metal in the shape of a cylinder, 1 inch in diameter and 3 inches long. I decided I would drill a .25 inch hole in the center of this cylinder, use the lathe to square off and smooth either side, and also use the lathe to shrink the length of the cylinder down to .5 inches. After all the lathe work, I had a piece that fit perfectly onto the shaft of the potentiometer. I drilled out a perpendicular hole to the center potentiometer shaft hole, screwed in some threads, and screwed in a grub screw to assist in holding the cylinder onto the potentiometer shaft in one location and firmly. With the assistance of Surge, we welded the steel smaller pipe onto the center of the cylinder, over the center hole on one side. After waiting a while for this piece to cool, I used the band saw once again to cut the pipe down to 1.5 inches sticking off of the cylinder. This was sufficient pipe to connect at least 1 inch into the steering rod and mechanically transfer the motion from the steering rod to the rotary potentiometer.

Once the connector piece was made, I added long red, black, and orange wiring to the potentiometer and threaded them through a small hole I made in the box for the wiring. Using a power source and a DMM, I made sure the potentiometer was positioned exactly in its center location, and then mounted the pipe onto it. This way, when everything was put together, the steering wheel positioned in the center would output half the voltage inputted into the potentiometer. I placed everything where it was positioned in the box, and screwed the top of the box on to finish the installation. Finally I checked the
output voltage from the potentiometer to make sure as I turned the steering wheel, the outputted voltage changed in a linear fashion.

To prevent the steering wheel from being turned too far by the driver, I placed some stop pins into the steering rod. I figured out where I would want the pins to be located along the steering rod, and figured the best option would be to have them bump into the frame to resist any steering further. First I measured the angle that the steering wheel was allowed to turn when we first purchased the go-kart. This was 35º from the center position in either direction. I found the center location of the steering rod and measured 35º in either direction and made a mark to know where to drill. Then I made centering holes and finally drilled holes through the steering rod to house a 3/16 inch diameter pin I had found. The hole I drilled was one size smaller than 3/16 inch, so that I could use a hammer to press fit the pin into the hole. After talking to Surge, the press fit would work best and be strong enough for this application, versus using solder or any type of glue. I used a hack saw to cut 1.5 inch pieces of the pins and then hammered them into the steering rod, after it was positioned on the go-kart, and as I turned the rod from side to side, the steering was restricted after moving a short distance.

Finally I measured the varying voltage that came out of the potentiometer in the new restricted range. All the way to the left, the potentiometer outputted 2.96V, and all the way to the right the potentiometer outputted 1.75V.

**Future Work**

In the next week, I plan to install the new 12 volt battery onto the back of the go-kart. I will need to wait for Allison to finish mounting the braking linear actuator, and then I will find sufficient room to manufacture brackets and a way to mount the battery. I will also need to produce a bracket that I can install the charging base to. We already purchased the charging unit, but there needs to be an easy to use, obvious location to plug the charger into. I must also figure out the electronics behind charging the battery and how to hook the wiring from the charging base to the battery and also rest of the electronics. I will probably ask Dave Kaputa for help with this. I will then also look into helping Mike finish installing the linear actuator and also installing the linear potentiometer he found. Finally I will measure the range of voltage from the linear potentiometer and tell Kevin so he can work on programming the PIC.

**Project Review**

The group got a lot of progress done this week towards installing items on the go-kart. The seat, braking linear actuator, steering linear actuator, and steering control box all have been finished. Kevin is continuing to work on the programming for the microprocessor and we also have a couple items coming in the mail for next week already. Our project seems to be coming along after realizing last week that we had a lot more work to do. We will hopefully have another really productive week next week and we will be almost done with the project. We’ve decided that there should be at least 1 week spent troubleshooting all the electronics.
Hours Worked

Hours spent working on the project, Week 8 (3/19/08- 3/26/08): 17