E-Racer
Week 3 (2/2/08 – 2/13/08)
February 13, 2008
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Work Completed

The biggest problem that the group faced after last week’s meeting was finding a linear actuator to use for the steering. After finding out that our initial linear actuator we had planned to use for it was too weak, we were forced to find one that was much stronger, faster, and also had a slightly longer stroke length. The problem with finding an appropriate linear actuator for our application was that all companies basically made similar sized, speed, length, and powerful actuators and none of them fit perfectly into our application. We came to the decision that we would need to find a company that would custom make a linear actuator to our specifications, but also do it at a reasonable price.

I spent all of Friday while in the senior design lab searching the internet through search engines such as “Global Spec”, for companies in the United States that custom makes linear actuators. After several calls and quote requests to companies, I came upon a company from New Jersey called Motion Systems. I called them and spoke to their Application Engineer in charge of processing orders for custom linear actuators. They make electromechanical linear actuators, small enough, strong enough, fast enough, and with any size stroke length between 2 and 12 inches. Below in Fig. 1 is an image of the linear actuator that they will be building for us. He also said that they would send us one for free as long as we gave them a copy of our final report, indicating what we used their product for and how it was beneficial ($235 value). After several calls, emails, and faxes back and forth, I forwarded them a letter indicating all the specifications for the production of the linear actuator and explained other details pertaining to its production.
Last Wednesday, Kevin found a Bi-Directional DC Motor Controller from Carl’s Electronics online. This controller is perfect for our application, but requires that it be connected to a 12 volt motor to operate correctly. This meant we needed to verify the linear actuator motor accepted 12 volts. So, before I could order the speed controller, I needed to find a linear actuator and verify it accepted 12 volts input. Once I found the linear actuator and ordered it, we ordered the DC motor controller. Below in Fig. 2 is an image of the motor controller.
Using Fig. 2 as a reference, I drew some new diagrams indicating how the steering rod column will be hooked up to this motor controller. On the left side of Fig. 2 is a potentiometer that will need to be attached to the steering column. There will also be a metal box enclosing the circuit board, electronics, and keeping the components dry. A plastic ring will be made with the same diameter at the steering column to allow the steering column through it, while keeping the internal components dry.

I also came up with an idea for providing resistance to the steering wheel so that it isn’t free to rotate continuously. I will attach a small pin to the top of the steering column, and then attach springs to the pin. There will be two springs, one will pull the rod to the right by attaching to the interior wall of the box, and the other will do the same on the opposite side of the rod. The combination of these two springs will produce enough force to keep the steering wheel in the center position while not being operated, and also return the steering wheel to its center position after it has been moved.

The battery on the existing go-kart is not working well, so I found an OEM battery identical to the original sold online from ZEUS.com. First I communicated with the company to make sure the batteries they sold were relatively new, since the company who produces the go-kart went out of business. Once we received confirmation from the company that the batteries were fine, we ordered it.

**Future Work**

In the next week I plan on designing the final plans to install the DC motor controller. Hopefully it will arrive so I can design an appropriate way for the potentiometer to connect to the steering column rod. I also would like to find the necessary components to install the motor controller in a metal box and connect it to the go-kart frame. I will also work with the battery if it comes in and testing it to see if it is holding a charge and operating correctly.

**Project Review**

The project is progressing really well and the group is continuing great communication via phone calls and emails. Each group member is stepping up and helping out others depending if they have free time and how much help each of us needs. The go-kart is getting very close to having several components installed on it including the steering assembly, braking operation, seat belt, and seat supports. The group had another conference call with the clients last Thursday and all the questions remaining regarding the project were answered. Next week we will all continue working diligently to stay on track with our project timeline we have laid out.

**Hours Worked**

Hours spent working on the project, Week 2 (2/6/08- 2/13/08): 13