Work Completed

Last week was spent both creating ways to mount the electronics battery and charging unit along with ordering appropriate circuit breakers for the voltage and current used to charge the go-kart. I also spent time asking Dave Price, Dave Kaputa, and reading online about how to wire the charging unit into the electronic circuit.

The battery I ordered for the electronics is a 12 volt battery that is rated at 12Ah, which means it can supply 12 amps for 1 hour or 1 amp for 12 hours. I chose this battery because we needed one that was 12 volts and also had sufficient current output to power both the linear actuators for steering and braking that each measured high amperage and when full load was applied. The battery was about half the size of the 36 volt battery that came on the back of the go-kart to power the electric engine. Since there isn’t a lot of spare room on the back of the go-kart, I had to be strategic with my mounting of the battery. After talking to Dave Price, I figured that it would be alright to mount the smaller battery on top of the 36 volt battery since heat would not be an issue.

I went into the machine shop and took some measurements of the existing go-kart and using a similar design to the way it was mounted, I came up with a relatively simple design. The 36 volt battery is held down to the go-kart by a bar that travels across the top of it and bolts hold the bar to side tall side supports welded to the go-kart. I used a piece of ¼ inch aluminum, because of its light weight and high strength to make a base plate for the 12 volt battery to rest on. This plate was cut a little larger than the 12 volt battery so other pieces could be added around the battery and attached to the plate to hold the battery in place from sliding in any direction. I measured the distance between the mounting bolts on the sides of the 36 volt battery and drilled corresponding holes in one side of the plate so I could use these same bolts to hold the plate in place. Next I used L-Coping shaped Aluminum that was 1 inch deep by 1 inch tall and cut two pieces each 1.5 inches long. I placed the battery onto the plate, traced its outline onto the plate, and drilled holes in both the L-Coping and the plate to mount a piece of the L-Coping on either side of the battery to hold it in place in that direction. Next I needed to find a way to both resist the battery from sliding in the direction I didn’t mount the L-Coping and also hold the battery down to the plate. Following a similar design to how the 36 volt battery was mounted, I measure the height of the battery to be 4 inches and purchase two 4.5 inch long 3/8 inch diameter bolts to place on either side of the battery. Next I drilled holes in the base plate and tapped the holes so the bolts could screw into them.

At first, I figured I would hold the battery down to the go-kart with a thin strip of metal that had holes drilled through it to allow the 4.5 inch bolts to go through, but instead I designed a way to mount both the charging unit and hold the battery down at the same time. After first trying to use ¼ inch plexiglass and cracking it several times, along with Surge, trying to drill holes through it, I found a piece of scrap ½ inch Lexan, which
is a highly durable polycarbonate resin thermoplastic. Surge agreed that this material would not crack during drilling holes, but it wasn’t the ideal $\frac{1}{4}$ inch thickness I desired. I cut it to fit over the 12 volt battery and also stick off one end 4 inches to provide an area to mount the charging unit and later the circuit breaker. I also drilled two holes in it that lined up directly with the bolts on either side of the battery to serve as a piece that would hold the battery down onto the go-kart.

After installing this piece, I needed to mount the charging unit on the go-kart that a wall charger could easily be plugged into for recharging of the electrical battery. The charging unit is a small circular insert that accepts a plug attached to the end of the wiring from a wall charger. The charging unit was set up to be attached to any item that was less than $\frac{1}{4}$ inch thick and this is where my problem came in with using the thicker Lexan material. I decided I would need to first drill a hole large enough to allow the threaded portion of the charging unit to fit through. Then I would need to recess the charging unit a little more than $\frac{1}{4}$ inch down into the lexan so it could be installed and held in place. I used a $\frac{3}{4}$ inch drill bit to drill a second hole over the first one, and after several attempts followed by checks to see if the charging unit fit accordingly, I had drilled the secondary hole to a correct depth. I installed the charging unit, then cut out another piece of the Lexan to use as a cover to protect the charging unit and circuit breaker from accidental bumps and weather. I still need to purchase a hinge to use for the cover, but the rest is finished.

Having very little knowledge about charging units, batteries, and how a charger should be hooked up to an electronic circuit to charge it, I consulted Dave Price, Dave Kaputa, and the internet for help on the issue. None of these sources could answer my question, because it was something new they had never dealt with and the search on the internet continuously pointed me in the wrong direction. I decided that either I would need to install a manual switch between charging and running mode, install the charging unit in series with the electronic circuit and expect it won’t have an affect on the electronics or actuators, or install a relay that would automatically switch the circuit to charging mode once the charger was plugged into the charging unit and switch back to run mode once it was charged and unattached. I came up with the relay idea after reading about switching mechanisms on the internet, but after a long search, I was unable to find a relay that would switch with the very little current that our wall charge supplied to the battery. This left me figuring that I will have to try installing the charging unit directly in series with the electronics to charge the battery and if there is a problem, I will add a simple switch onto the same plate that hosts the charging unit to switch between charging and run modes.

**Future Work**

In the next week, I plan to receive the circuit breaker. This will mimic the circuit breaker connected to the charging unit for the 36 volt battery. It will be connected between the 12 volt battery and the charging unit to prevent potential problems in the circuitry if large current is drawn through the charger by either the circuit or the battery. I will also connect all the wiring associated with the circuit break, charging unit, and battery. I will also go to Mansfield Supply and purchase some pins that will hold the
steering console down to the go-kart. The pins will be replacing nuts and bolts and make it easier for the client’s mother to move items out of the way while helping her son get into the go-kart seat and buckling him in. I will also help to connect the wiring among all the various parts of the go-kart with weather protected rubber tubes around them. Finally I will help to clean up all the parts of the go-kart and put all the items together that we previously have taken apart during the semester.

**Project Review**

The project is nearing its end with only 2.5 weeks left before the due date. Everyone in my group and the other groups are starting to get stressed out, which is helping to get everyone to put in more time doing work to get their projects finished on time. I feel good about our project and expect that it will work according to our plans, but there will definitely be a lot of problem solving once everything is together. We plan to have the go-kart installations finished by the end of this week so we can spend 2 weeks working on figuring out the numerous problems we expect to encounter.

**Hours Worked**

Hours spent working on the project, Week 9 (3/26/08- 4/2/08): 18