This week, the adjustable back angle controller has begun to take shape. The focus of this week's senior design lab was putting together the bed, and demonstrating the lifting capabilities of the circuit up to this point. I also developed a new handle design which would allow for much more angular displacement, with little complication.

On Thursday, Ray and I spent hours testing and modifying the circuit in an attempt to lift a load of 165 lbs, which I provided myself. The circuit was easily able to lift the bed back by itself, as well as a 50 pound weight. The circuit was also able to lift at varying speeds, and change direction. However, there were complications, especially at higher loads, in which the current draw from the motor was too high, causing the MOSFETs to overheat and burn. To correct this, Ray put two MOSFETs in series on each of the legs of the H-Bridge. This would split the current between the two MOSFETs, while still providing the entire voltage through to the motor. This allowed for a much higher current load to pass through the H-Bridge, however the ability to lift the full load was still an issue.

During senior design on Friday, we worked as a group to put the bed together, and get it ready for an initial demonstration. To improve the comfort for any operator on the bed, as well as improve the aesthetics, we stuffed and upholstered the head and foot sections of the bed using egg crates, pillows, and fleece blankets, as shown in fig 1. In addition, we planned on adding a skirt to the side of the bed, which would hide the lifting mechanism, so that the bed will look more like a normal bed. During construction and demonstration of the bed, we discovered that there were issues with the track and caster wheel system, which have been corrected by Alaena during the beginning of this week.
I focused on a final design for the handle, which is the last piece of our project which requires construction. This modified handle will incorporate torsion springs in the place of the afore mentioned compression springs, in order to provide the force feed-back characteristics of the controller. This design incorporated two torsion springs, which will sit around the support axel for the handle. One arm of each spring will press against a bar protruding from the side of the handle, while the other arm is supported by a bar which sits behind the handle. Each spring will resist opposite motions, for example the spring shown below in fig. 2, would resist a downward push on the handle, while the spring on the other side, which is not shown, would resist an upward pull on the handle. This axel which supports the handle, will be allowed to turn with the handle, and will be attached at one end to the potentiometer. This, in turn, will rotate the potentiometer resulting in a change in motor speed and direction.
Future Work

In the following week, we plan on constructing the handle which is shown above, so that by this Friday we will be able to test the entire system, as well as attach the handle to the bed, leaving the final component to be the PCB to be ordered and finished, so that the prototype is ready for display. We also plan on putting a skirt around the bed, which we can either use Velcro tape, tape, or glue to attach around the perimeter of the bed. This skirt will be used to hide the moving lift system of the bed, so that the bed has a more pleasant look. We also plan to test the entire system with weight, as well as for ease of use by a variety of potential users.

Project Review

Currently, the bed looks like a very comfortable bed, which is capable of supporting patients of any weight. It has some lifting ability, which can be best illustrated without a load besides the bed back, on the lift jack, however, Ray is in the process of trouble shooting this set back, so that we will be able to use the bed as was anticipated. Having used $____, we will have $_____ left of our $2000 budget. We do not anticipate any more purchases, therefore this seems to be our final budget for the project.

Hours Worked

13 hours