Work Completed

The microcontroller code has been completed. As previously stated, I used Port D for all of the I/O except for the PWM signal to control the motor’s speed. For this function, I decided to use hardware PWM because it allowed for easier manipulation of the duty cycle. The duty cycle of the PWM is basically the ratio of the CCPRxL register to the PR2 register. Keeping this in mind, I set the PR2 register to 128 in the initialization of the program. This allows for a full duty cycle even when using only half of an 8-bit analog to digital conversion of a potentiometer reading.

After converting the analog 0-5V input to a number between 0 and 255, the data needed to be converted so that the middle of the potentiometer was 0 and the 2 extremes were 128. First the binary number was checked to see if the most significant digit was a 0 or a 1 to decide which direction subroutine to use. For example, if the most significant digit was a 1, then the potentiometer was turned more than halfway to the left, and the program would proceed to the Up subroutine. Next the program changed the number into one that was from 0 to 128 by using a combination of the comf and sublw commands. This number was transferred to the CCPRxL register for the specified direction, and the PWM was activated simultaneously with the corresponding high side flat 5V output.

The program includes a series of bit tests to ascertain if the safety button on the handle has been pressed. If it has not, the program does not activate the outputs. There are also 2 tests to see if the motor limits have been reached. If the motor has reached the bottom of its range, it will press a button that prevents the program from lowering the motor any further. The same holds true for the ‘up’ extreme.

The new P channel MOSFETs came in, and when they were integrated into the circuit, and manually tested, they worked. When the PIC was programmed and placed in the circuit, it worked perfectly, as evidenced by oscilloscope readings at of the PWM signals. When the motor was hooked up, it also worked, varying in speed from stop to full in either direction as the potentiometer was moved away from the center. However, when the motor was loaded by attaching it to the weighted scissor jack, it no longer worked in
the up direction. I believed that it was due to the MOSFETs restricting the current to the motor, so I tried to use 2 MOSFETs in parallel for every corner of the H-Bridge. While it did not solve the problem completely, the new setup greatly reduced the heat generated by the MOSFETs, and none of them have blown since.

**Future Work**

We have just days to show a working model, and there is still much to be done. The continuing problems with the current need to be solved, and the handle needs to be constructed. The microcontroller program can then be calibrated for the range that the potentiometer will be turning within the working model. The PCB must also be designed and ordered.

**Project Review**

The deadline for the project is growing near, and much work still needs to be done. Unfortunately, there is little room for error if the project is to be completed on time.

**Hours Worked**

Total hours worked this week: 28