1) Backpack Lever Arm System

Work Completed

This week, I continued to work with the microcontroller, in terms of developing the C code and connecting it to the computer for 'in-circuit debugging'. A significant change from last week is that we decided to change the PIC that we were using, from the PIC16F84A to the PIC16F877. After learning more about the different microcontrollers, I realized that the previous PIC being used did not have CCP modules. The ‘Capture, Compare, PWM’ module is necessary for our project, as it will be used in pulse width modulation, and therefore, the sequential control of the servo motors.

Using the PIC 16F877, an oscillator, a 47k ohm resistor, a voltage regulator, an LED, and an ICD cable, we were able to successfully connect the PIC16F877 to the microchip box; it was also detected by the MPLAB IDE software, meaning our setup was correct. This circuit will give us the ability to debug, in case of errors that we are unable to detect on our own. (The schematic for this circuit was provided by Dr. Martin Fox.)

In terms of code development, I am looking into the use of a nested ‘for’ loop for sequential movement of our servo motors. This will involve sequential movement of both servo motors and use time delays to start/stop them at desired angles. By changing the number of seconds that the servo motor should be ‘On’, using a time delay, we can change the positions of the Backpack Lever Arm system. A primary concern in the code is still being able to initialize all the data ports correctly on the PIC, and setting up the PIC correctly for PWM mode, using PR2, T2CON, CCP1, and CCP2. Along with theoretical writing of the code, perfecting the program will involve some experimentation once the motors arrive.

This week, I went to Home Depot and bought 270 degree overlay hinges. To use the hinges on our limbs, we have to design a T-shaped component (cardboard prototype shown below) to be attached to the limb at one end, and the hinge at another. The following pictures will provide a better explanation of the design idea:
Future Work
Future work will involve operation of the PIC16F877, and further development of the C code. The group is still waiting on delivery of the servo motors, to experiment with the PIC interface and possible locations for mounting. On the basis of this experimentation, the team will decide whether these 270 degree hinges are practical, or if an alternative such as mounting one limb on top of another will be necessary for motion.

If these methods do not prove to be viable ones, it might become imperative to make 270 degree hinges at the machine shop on our own, or further manipulate the 180 degree Pivot, available through 80/20. Design issues still include where to put the power supply, and how to properly insulate the wires/circuitry running within the hollow limbs.

Project Review
The team is proceeding according the schedule. However, if the servo motors do not arrive by next week, schedules may be disrupted. We have contacted ServoCity to try and have the order expedited.

Hours Worked: 10
2) Shampoo-Conditioner Identification Device

Work Completed

This week, my teammate and I looked into different power sources that could be used to supply the microcontroller as well as the 1 W, 8 Ohm speaker. After purchasing 4 AA batteries, and connecting them to circuit, we concluded that they were sufficient in terms of being able to supply the correct amount of current to the speaker. (When using the watch batteries, the speaker did not function to its maximum capacity, as the current provided was less than the amount it required.) Although 4 AA batteries proved to be sufficient, the team does not feel that it is ideal, due to weight and thickness. We will also face design issues, as to where they should be placed and how to adequately insulate them. Therefore, we are looking at the possibility of smaller AAA batteries to power the circuit. We have ordered a AAA battery holder, and are waiting to receive that for our project.

Since bestbuyforbusiness.com did not have the Griffin IPod holder that we had done a purchase order for last week, we had to process a new one through another company.

The team is also in the process of developing a layout of the board schematic using ExpressPCB, as it will be useful in building the final ‘compact’ model of the circuit.
Future Work

Once the belt arrives, we will incorporate the insulation to prevent water contact and damage to electrical components. In addition, we will mount buttons onto the circuit to allow easy input from the client.

After we finish making the ExpressPCB layout diagram, we will begin building the circuit in a compact manner, so that it fits into the iPod holder, and is in accordance with our weight and volume expectations.

Project Review:

This project is on track, as the voice amplifier has already been constructed, the belt/casing has been ordered, along with the buttons. Once these components are put together, the team will focus on safety issues that are relevant and necessary for a long-lasting product.

Hours Worked: 4