MEDSense: Accessible Pill Dispensing Device- Week 8 Report

Work Completed

We as a group have all been very successful over both spring break and this week. Personally I have accomplished a lot in the areas of motor control and interaction with the Bluetooth module.

The most fundamental part of our project is the ability for the device to cut a pill in half. This and the offsite alert distinguish our device from other devices currently on the market. I worked extensively on this over the past two weeks and finally was able to control the motors the way I would like. The servo motor we have has a range of 0 to 90 degrees. Each degree corresponds to a pulse width. In the beginning of the week I was able to program the motor to move forwards but did not get it to return to its original place. It would begin trying to move but then ultimately stop. There was a sort of twitching associated with the movement of the motor. I knew that the code was close to being correct but not exactly correct.

Just as I was making progress on the motors the ICD began to malfunction. It kept failing to recognize the microcontroller which made it impossible to program the microcontroller effectively. We changed the microcontroller twice and finally were able to reprogram the device. This allowed me to make changes to the code and see immediate results. I changed many of the variables associated with the program to get the timing correct. Using delays of 1 ms and 2 ms for 0 degrees and 90 degrees respectively I was able to move the motor to 0 degrees and then finally to 90 degrees. The code still was not perfect since the loops within the code were not running successfully.

After many changes to the code I was able to accomplish the task. For the purposes of testing my control I set out to have the motor move to 0 degrees, hold for one second, move to 90 degrees, and hold for one second and repeat. The motors performed exactly how I had imagined which means my code was correct. Once we implement the device I will be able to change the code to reflect a longer hold period for the blade which is important in the functioning of our device.

The advantageous part about using servo motors is that all servo motors are programmed in the same manner. By finishing the programming of the cutting motor and understanding the theory behind it I was able to write the code associated with the motor that will rotate the disc. All that is left to do with the motors is tweak the angles once the device is constructed.
Since the motor control was frustrating at times I took breaks by looking into the PIC interaction with the Bluetooth module. I learned a lot about UART commands over break and was ready to apply this knowledge when I returned to campus. There was some sample code from HI-Tech Software that allowed me to get acquainted with UART programming. The code did not need to be modified and was ready to be put on the PIC. The code called for typing a character on HyperTerminal with a return of the character and a statement from the PIC saying it understood the character. I now just have to write code so that there is no echo between HyperTerminal and the PIC but a statement sent from the PIC to HyperTerminal. I also have found that I will most likely have to use the `printf` function for text. This will take up a lot of space on the microcontroller which could necessitate efficiency in writing code.
Future Work

This week I will focus all of my attention on the Bluetooth module. We have established UART communication between the Bluetooth module and the PIC microcontroller. This was evidenced by typing characters in HyperTerminal and having the microcontroller echo it back. Since we have the connection set up correctly we now just have to find how to send data from within the PIC to the Bluetooth dongle. I have heard from people that have done this previously that it will not be difficult. The UART programming does not seem difficult and I should be able to finish the Bluetooth technology this week. Once the Bluetooth aspect of the project is completed I will turn my attention to the text-to-speech module. Our microcontroller has addressable UART within it which allows us to program this device with UART. Since I will have had previous experience with UART in Bluetooth I do not expect this to be much of a problem. There will be 28 days left tomorrow before the project must be working. I will finish programming the text-to-speech module and the Bluetooth module this week which will leave me three weeks to design an alarm system and organize the code. The alarm system should take another week which will leave two full weeks to create a user interface with Chris and optimize all of the controls.

Project Overview

The group as a whole has accomplished a lot this week. Controlling the motors is probably the most important aspect of the project and that was finished this week. We have a great handle on the Bluetooth technology which is the second most important aspect of the project. It is not out of the question to believe that the Bluetooth interaction will be completed tomorrow in the laboratory session. I think we are currently on schedule now and if all goes well with UART programming we will be ahead of schedule by next Friday. Ashley’s work with the arrangement of the various elements within the device was much needed and will make assembly much easier. Tim has nearly finished the mechanical aspect of the project which combined with the motors will form the cutting mechanism. Chris has made a lot of progress on the photodetector element and the I2C programming. We are functioning well as a group and there is no doubt in my mind that our project as a whole will be a success.

Hours Worked

18