Week 1

Project Identity:
Accessible Syringe Dosing Device
January 17, 2005 – January 21, 2005
Robert Mock

Work Completed:
During the break I decided to enlighten myself on the subject of Diabetes. I have found that the information on the Internet is vast, but sometimes can be misleading or even garbage. Therefore, I started with the Internet and reviewed about 15 websites, then went to Borders where fine books by well-respected authors can be read for free all day. Learning about the whole process of insulin testing and injecting along with the lifestyle changes needed to cope with Type 1 and Type 2 Diabetes will better prepare me to construct this project and give me a sense of meaning.

My best friend's father has Type 1 Diabetes and showed me the whole process of insulin testing. First, you prick the side of your finger, which is the least painful place to take a sample. Using a digital tester you observe and record the blood sugar level in your diary to keep track of your overall blood sugar level. He showed me that sometimes you have to push the air bubbles out of the insulin syringe after pulling in insulin in order to get an accurate dose. We may have to take this into account when programming the microprocessor.

Next, I located the proper syringes needed for the project. My first stop was Danbury Hospital, then Walgreens and CVS. All of the syringes met the specs of the project: 1cc, 1/4in. diameter, and 1/2in. needle size. I decided to choose the best out of the 3, (easiest to read, not generic brand) which turned out to be the BD Ultra-Fine Syringe. This syringe features a very fine needle for increased comfort and is a one-use disposable syringe made for insulin dosing.
BD insulin syringes are engineered to provide you with the quality, accuracy and ease you have come to expect from BD.

- Special Micro-Bond™ formula lubricants bonded to each needle for a more comfortable injection.
- Unique 100% needle point inspection to ensure consistent high quality.
- Flat-faced Thinline™ plunger tip and dark scale markings make it easier to draw up precise doses.
- All BD syringes have a money back guarantee for quality and comfort.

This week I was chosen to take care of our linear actuator problem. We found a company that produced linear actuators and drivers, but they did not seem to want to sell any of their products. Megan contacted the company for a price quote and they never got back to her. I decided to scour the Internet for about three hours and found a company that sold surplus electronics from well-known companies. This company, Herbach and Rademan, offered two linear actuators that meet our needs and where much cheaper than most of the other linear actuators which have very high forces worthless to our low force project. The company is in NJ, which means quick shipping by any form of shipping service, from my experience on selling on Ebay. Here are the actuators I found:

**12 VDC Miniature Stepping Linear Actuator**
The first one has a lower force and resolution, but has enough force and resolution to meet our needs. It is also smaller in size and weight. The latter linear actuator has a very high force and resolution, but uses a lot of current.

Our group also needs a Driver in order to run the stepper motor. I scoured the Internet again for about two hours and found the easiest-to-use, economical, stepper driver. I stumbled across one that can easily be connected to a microprocessor, runs on 12V and will meet our needs.
Its features are:

- low system cost
- reduced component count
- simplified circuitry
- direct interfacing to microprocessor
- no high frequency control lines
- no complex interfaces to program
- no phase sequence tables
- Low cost of $26

- +/- 750mA, 30V Output Rating
- Crossover-Current Circuit Protection
- Under-Voltage Lockout Protection
- Thermal Shutdown Protection
- Automatic Current-Decay Mode
- Built-in Step pulse generator
- Chip Enable Select Function
- Built-in Translator
- Sleep Mode
- Reduced audible motor noise
- Increased step accuracy
- Low Quiescent Current (10mA MAX)

Future Work:

This Friday Gabe and I plan on starting the code for the microprocessor and working on the circuit design for our project. This will include learning assembly code and the programs necessary for designing PC boards. We also hope to receive the linear actuators and driver by next week in order to start testing them.

Project Review:

Our project is slightly behind because of problems with the linear actuator order, but we have a very intelligent hard-working group of engineers. The programming and circuit design can be worked on, while we are waiting for these parts. The programming will probably be the most difficult part of this project so we plan to tackle this first. Megan and Karen are going to begin the process of creating our case. We plan on collaborating constantly to have a full perspective of project progress.
Hours Worked:

Diabetes Research: 6 hours
Syringe for project: 2 hours
Interview on Diabetes: ½ hour
Linear Actuator order: 4 hours
Driver order: 2 hours
Total: 14 ½ hours