The Device:

The automated syringe loading device is an aid for diabetes patients who live with common conditions typical of the disease. These conditions include, but are not limited to, arthritis, hemiplegia, Parkinson’s disease, tremors, neuropathy, and vision and hearing impairment. The device will assist these patients by filling syringes with their required dose of insulin. To operate the device, the user will input the amount of insulin required, and the device will then fill the syringe to that amount within a tolerance of 1/1000th mL. To make the device more user friendly, it will hold any size insulin bottle, store up to 10 syringes for loading, and alert the user when the current bottle of insulin is near empty. For the doctor’s records, the device will also maintain a time stamped account of the volume of each syringe filled.

Work Completed:

For some of this past week, and over spring break, more parts were assembled in Autodesk Inventor. These parts included the new gears we received, along with the case. The case’s computer graphic is not yet completed, but will be shortly. It is important to create a working model in simulation before construction, because any accidents or miscalculations could lead to a ruined case. If this were to occur, the case would need to be replaced, taking up a lot of precious time.

Through these efforts, a motor assembly design has been formed, and the dimensions it holds will fit in the case. A picture of the assembly can be seen in figure 1. Using these drawings, the necessary supports that will hold the components of the device in place have been investigated. The dimensions we now have from Inventor can be used to design the structure of the machine, and will make purchasing and building simpler.

Figure 1: The motor assembly of the device.
During the past week, the new cartridge was machined. This cartridge can be seen in figure two. This was machined with the help of Rich in the machine shop. Since the welding of sheets of aluminum proved almost impossible for me, the resulting cartridge we have been building looks terrible, and a few dimensions are off. The new cartridge looks great, and the characteristics are spot on.

Figure 2: The newly milled syringe cartridge is shown with a syringe for scale.

Future Work:

Next week, I look forward to building the motor assembly using some of the drawings I will be finishing up. I also plan on programming the Bluetooth module, and designing the circuit that accompanies it. The module was ordered recently, and it should be arriving in the mail shortly. The guide rod is under construction, and should be finished next week as well.

Project Review:

Right now the final parts are coming in, and construction for the device is nearing completion. Once some more measurements are taken with the new parts, the drawings will prove useful in laying out the structure. All that remains is the programming and some future trouble-shooting. So far, the team has had some struggles with this, but we are making progress.
Hours:

Autodesk Inventor: 11

Machine Shop: 7

Calculations and other work: 2

Total Hours: 20