gPod Accessible Blood Glucose Meter

Week 3
February 5, 2006
David Price

Work Completed

At the beginning of the week we received the new speech chip and DIP adapter. I took the chip and board to my place of work in Massachusetts to do the surface mount soldering. Due to the small spacing of the pins on the chip, the facilities at my work were better suited for surface mount soldering. The chip and adapter can be seen in Figure 1.

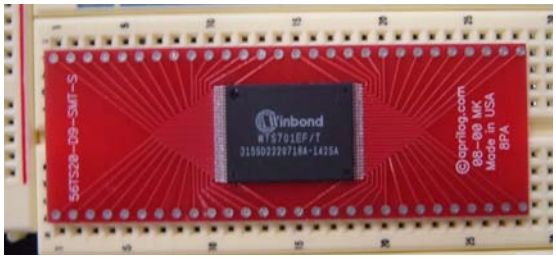

Figure 1, Speech Chip and DIP adapter.

During the remainder of the week I worked with the microprocessor. The first stage of this process involved learning MPLab and the procedures necessary to program the microprocessor. Secondly, I spent time looking for example code for analog-to-digital conversion. I found a program for the PIC16F874 microprocessor in a lab from BME 252 and edited the assembly code to suit the PIC16F874A. Some of the changes involved renaming the ports and registers and changing some of the configuration settings.

The microprocessor was programmed successfully with the A/D example code and demonstrated on the QIK Start Education Board using the LED's and a potentiometer. As the voltage level was increased the LED's could be seen incrementing. Table 1 shows the digital counts representing a variety of analog voltages.

Analog Voltage	Binary Representation	Decimal Count
0.00	00000000	0
1.06	00110110	54
3.06	10011101	157
5.00	11111111	255

Table 1, Analog, Binary, Decimal Count values.

The LCD demo board and new LCD screen were received on Friday. A longer power cable was first needed to accommodate the test setup on the workbench. The board and LCD screen were connected to the computer via the parallel port. Using the CFAX WinTest software available from the Crystalfontz website, initial tests showed the LCD

screen to be working correctly. Figure 2 shows the LCD screen attached to the demonstration board.

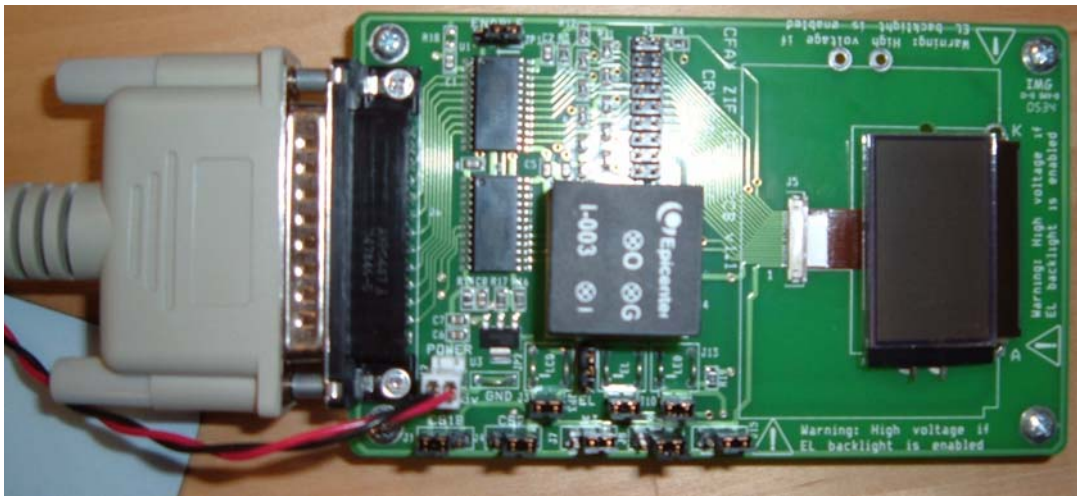

Figure 2, CFAX ZIF Demo Board and CFAX12864A screen.

Future Work

This week I plan to focus on learning how to write the microprocessor code using the PICC compiler. The current A/D code is configured to use the +5V supply as the reference voltage. The glucose meter will only require a voltage range from 0-2V. The code will be modified to use a different reference voltage to increase the accuracy of the A/D converter. The code will also be changed to use all 10 bits of the A/D converter. The final change to the A/D code will be to use the input voltage from the glucose circuit. I will also work to display the decimal equivalent of the LED output on the LCD display on the programming board. This will help me work on the binary to floating point conversions as well as start to understand the basics of LCD communication.

In addition to the work on the A/D code, I will also begin learning how to work with the LCD screen. By the end of the week I plan to be able to write values to the LCD screen using the PC.

Mike will continue to work with the glucose circuit and generate accurate glucose-voltage curves. This work depends on the delivery date of the higher concentration glucose solutions.

Matt will work with the speech chip once the required crystal oscillators arrive. He will continue setting up the circuit and working on the voltage supply circuit. By the end of the week we plan on having the speech circuit working and successfully converting text to speech.

Project Review

Good progress was made with the microprocessor and the A/D converters, as well as getting the speech chip circuit prototyped on the protoboard. Work with the glucose circuit was slow and more results will need to be seen next week. Goals for this week are to get the A/D code configured for our project, get accurate glucose measurements, and successful text-to-speech conversion. Total costs to date are $470.07.

Hours Worked

Hours spent on the project for Week 3: **23 Hours**