gPod Accessible Blood Glucose Meter

Week 4
February 20, 2006
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Work Completed

This week I worked with both the Winbond speech chip and the SP03 speech module. This was the final week for trying to try and get the Winbond speech chip circuit to work on its own, so that we do not have to use the SP03 module as was intended by our optimal design. I mapped all the pins on the SP03 speech module for the Windbond speech chip to see what the voltage levels on each pin were set to. This was to help me figure out which pins had to be set to 3.3 volts and which pins had to be set to +5 volts. The voltage levels were split about evenly so not sure why some needed one voltage versus another exactly. I tried a new crystal oscillator to see if the circuit did actually need one and not just a resonator since the SP03 speech module had one but this did not make a difference. Also, a slight variation to the 5MHz resonator circuit was attempted and still nothing happened. Both ways the resonators and the crystal oscillators did not generate a signal as they were suppose to. Due to this, I could not figure out how to get the Winbond speech chip to work and therefore had to give up on its construction for time reasons.

With that I moved to working solely with the SP03 speech module. The first thing that I did was to map out what exactly was on the SP03 speech module so that I could better understand the circuit. Figure 1 below shows the mapped out circuit.

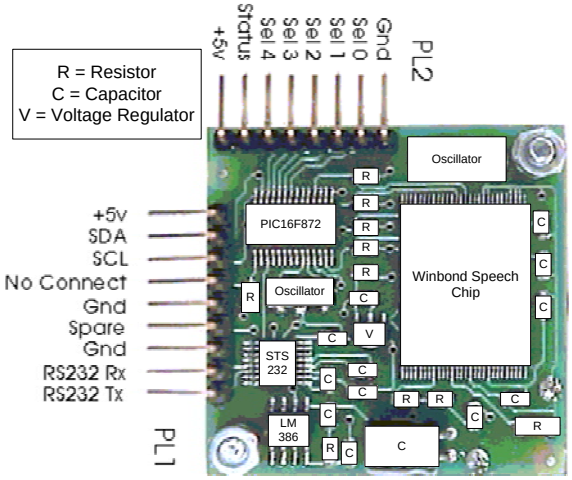

Figure 1: SP03 mapped components

The Sp03 speech module circuit consists of:

- A Winbond speech chip which generates the text-to-speech capabilities.
- PIC16F872 microprocessor
- STS232 for serial connection
- LM386 which is an audio amplifier
- 2 oscillators
- A voltage regulator
- A variety of resistors and capacitors
- A speaker

This means that I should not need to develop an audio amplifier circuit as was first though but possibly just double to output of the built in one if needed for the sound volume which can be a bit low.

While working with the SP03 speech module it was noticed that it seemed to be running very hot to the touch. This was investigated and determined that the built-in microprocessor was drawing about 150 micro amps while in stand by and drawing up to about 250 micro amps while speaking. This was very perplexing since the specifications for the microprocessor said that at most it would draw up to 100 micro amps. The solution to this problem was that we happened to find another SP03 speech module that we can use and it draws the correct amount of current. So we will be using this new SP03 speech module since it seems to be working better.

Next up will be to start talking to the SP03 speech module. Most of the speech needed for the SP03 so speak will be preprogrammed phrases that can be programmed to the speech module through the SP03.exe program that allows for testing and programming up to 30 phrases. The one problem we will have is with the results of the glucose meter tests where a value will be determined and then have to be sent to the meter for the text-to-speech capabilities. I mapped out some of the base phrases that will be needed to be programmed for the meter testing to flow. Examples below:

- Insert Test Strip
- Test Strip Inserted Correctly
- Add Blood Sample
- Testing 5 4 3 2 1
- Blood Glucose Level High/Low
- Low Battery
- Volume Up/Down
- Errors

Dave and I began to work on how to talk to the SP03 speech module. We need to be able to talk from the computer to the SP03 speech module and have the command sent be spoken by the module. The initial attempts were not looking so a piece of software that allows the SP03.exe file code to be observed was used. This allowed for the exact code that was being sent between the SP03 speech module and the computer to be observed and replicated. Unfortunately there currently still are communication issues.

Future Work

This week I will continue to work with the speech module if the communication issues can be resolved. I will also pick up where Dave left off on the LCD screen due to the microprocessor is far more complicated than first estimated. I will familiarize myself with the screen and begin to try and figure out how to show text on the screen.

Dave will continue to work on A/D converter and connecting integrating it with the speech circuit and glucose circuit. He will work on some code to use the SPI or USART port for use with the speech module. He will continue to work with the A/D converter on increasing the acquisition sampling speed to try and resolve the glucose circuit input problems. Then he should be able to work on the algorithms to convert the voltage level to a glucose concentration.

Mike will continue to work on the glucose circuit. He will start the circuit on the sample detection for the glucose circuit. This will allow for the meter to determine when blood has been added to the test strip. If the high blood glucose control solution arrives mike will work on the glucose curve.

Project Review

For speech capability the SP03 has replaced the Winbond speech chip circuit. This has allowed moved the speech module to the coding part. The microprocessor work this week is slow since complications were run into trying to communicate with the SP03 speech module. Also, the glucose circuit filtering problem so far has been proved to much more difficult than was expected. Mike will continue to work on the signal noise problem and development of the glucose curve. I will continue to work on the speech module and start to work with the LCD screen. Dave will try to get the A/D code working for the glucose circuit, communicate with the speech module, and reduce the noise on the glucose circuit. Total costs to date are $681.01

Hours Worked

Hours worked on the project: 18 Hours