

Project Identity

Accessible Blood Glucose Monitor Interface

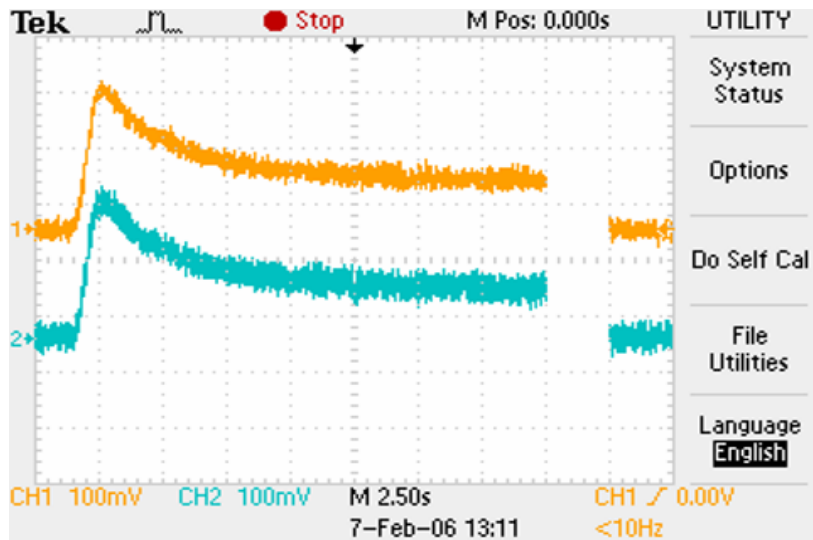
Week # 4 (February 6 – February 12, 2006)

Mike Rivera

Work Completed

Week 4 was primarily spent on filtering the circuit output signal. I began applying filters to the circuit that were designed using the Filter Pro software. In this software, the user can choose various types of filters as well as the amount of poles, the cut-off frequency, and other component values. The first filter that was designed was a 4 pole low-pass Butterworth filter. After successfully building and implementing the filter into the glucose circuit, I performed some testing trials. The filtered signal actually came out to be noisier than the unfiltered. After this outcome, I did some isolated testing on the filter alone, and it seemed to be built correctly. Figure 1 is the voltage signals for the filtered and unfiltered outputs. The orange signal (on top) is the unfiltered signal, and the blue signal (bottom) is the filtered. It is clear that the top signal has less noise.

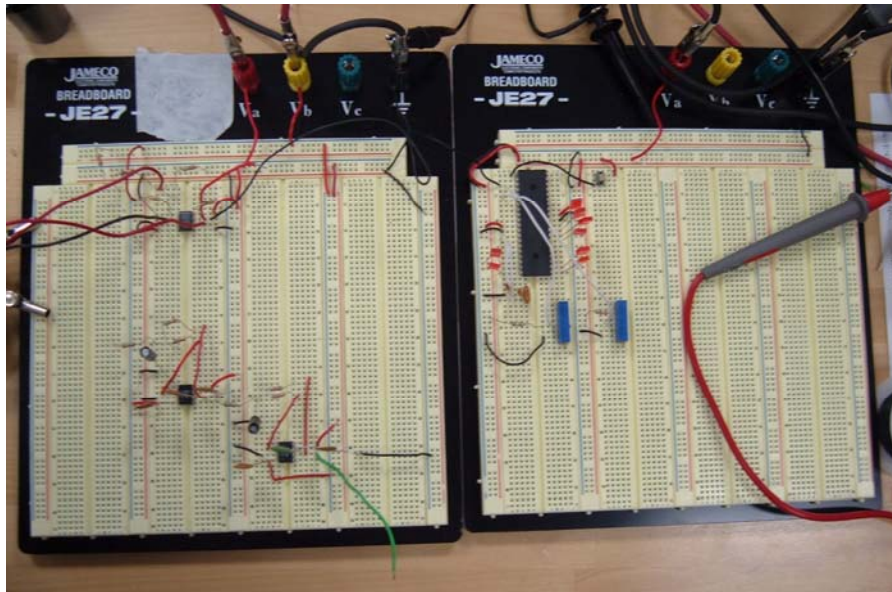
Figure 1: Filtered and Unfiltered Outputs



To get some help with this issue, I consulted Dr. Northrop. He was able to provide useful insight and made some helpful recommendations for me to try. Some of his ideas were simply standard practices that are done when using op-amps and other components on a proto-board. I was also informed that the op-amps that I was using in the filter were very out-dated in design, and were probably the reason why my filter was actually noisier than the unfiltered signal. After the short meeting, I was able to go back to the board and fix some of the areas that may have been causing problems. However, some of his recommendations required components that were not available in the lab. I called around to some local Radio Shack's and no store had what was needed. I was hoping to avoid the delay of ordering the parts, but was left with no other option.

Throughout the week, Dave was able to set-up a circuit for the microprocessor (MP). On the proto board, he set up a series of lights that would illuminate as instructed to by the MP. Essentially, they were digital, binary counters that would output the input voltage. Dave was able to demonstrate by varying a potentiometer and watching the lights change. The next step was to connect the processor board to the glucose board and try to capture the lights change in response to the glucose output. After a few trials, there was a response from the lights when sample was applied to the glucose circuit. However, it did not seem to be the correct response. Only a few trials were attempted though, so more testing is in order. Figure 2 is a picture of this setup.

Figure 2: Glucose Circuit in Connection with the Microprocessor Circuit



Future Work

In the upcoming week, more testing needs to be done with the glucose circuit. This same experiment needs to be ran for concentrations above 114 mg/dL. This will be done using a 'high' control solution that we ordered. This solution has a glucose concentration of about 300 mg/dL which would allow for the whole glucose spectrum to be tested. Once the entire range has been tested, the final curve can be examined, and our glucose-voltage relationship can be set. Also, more work can be done on the filtering aspect.

Project Review

So far, so good. Things are running smoothly and we seem to be making good progress. Each of our parts of the project are gradually beginning to come together which is great. The next big challenges will be the coding of everything and really getting everything to run smoothly.

Hours Worked: 12