

Design Team 1: Progress Report 1

Introduction

The project has been going smoothly thus far. There have been a few unexpected problems with microcontroller programming, as well as a change in direction regarding the text input and synchronization. The software development for the user interface has been progressing smoothly as well. These two problems have put our team roughly one week behind. However, due to a slight change in direction in the text recording part of the project, we are still expecting to finish on time.

Meeting with Sponsor

During our meeting with Stephen, we have shown our progress of audio amplifier, MSP430 programmer and power design and our idea about using key-logger. He liked the design thus far and agreed with our idea to use the keylogger to obtain the time-stamp for the synchronization. He also suggested looking for different file types and software to make the search function, such as the .LRC file and the ASM online reading program. Furthermore, he suggested using a DC-to-DC converter to build the power supply and to add filters to stabilize the output voltage. We also spoke about CAD programs for PCB design. He suggested a free software program found online, specifically PCBArtist.

Hardware

The hardware development portion of the project is progressing smoothly so far. The microcontroller is able to be programmed to drive an LED both attached to the programmer and in a stand-alone fashion when detached. However, there have been some problems programming our breadboard MSP430 microcontroller with the debugger. After having one successful attempt programming the MSP430 on the breadboard, the results have not been reproduced. One possibility is that the breadboard cannot transmit the data well enough due to the way it is constructed. The breadboard may not be able to correctly transmit the clock and programming data. In order to test this theory, our group will try connecting the programming wires through means other than the breadboard. As of right now, this part of the project has been put on hold in order to continue moving forward with recording audio.

The microphone preamp has been developed and tested. It will be able to provide the correct input voltages to the microcontroller in order to take full advantage of the 3.3V span that the MSP430's ADC uses. The output filter on the preamp still needs to be adjusted in order to filter out the unwanted high frequencies. The final design of the preamp will be completed once audio recording is achieved. It will be necessary to adjust the gain and possibly the filtering to provide an optimal signal to the ADC.

Schematics for the SD card connection to the microcontroller have been developed. We are going to produce a PCB for testing to ensure proper connections since the SD card connector only comes in a surface mount package. It is expected this will be completed by the end of next week, allowing for an audio stream to be captured in the next two weeks. This should give our group enough lead time to then process the audio and finish development of the user interface.

After completing more research and speaking with our sponsor, Stephen Blosser, we came to the conclusion that it would be in our best interest to purchase a hardware dependent keylogger to record and synchronize the keystrokes. A keylogger is a device that a keyboard plugs into. When the user begins typing, it produces a time stamp, and then records all the keyboard input until there is a pause of about five seconds. When typing resumes, another timestamp is inserted and the next string of characters is recorded. Since this technology already exists and fits the needs of our project, we decided it would be best to use the existing solution. This will accelerate development and increase our groups' chances to accomplish all of our goals..

Since the Audio Circuit requires a 3.3VDC supply, we have to build a power circuit to output 3.3V from either 5-10VDC or 9-12VDC wall power supply. The LM317 voltage regulator is currently being used to step-down a 5-10VDC input voltage and output 3.3VDC. The circuit is complete for this case, and has been successfully tested. Presently, the current drawn by the audio recording circuit is unknown so the battery cannot be selected. Also, our sponsor has suggested using a DC to DC converter instead of voltage regulator because it is more stable and more power efficient. This will be investigated and new schematics will be developed.

Software

Microcontroller programming as posed to be the most challenging aspect of the project, specifically making an A/D conversion. The MSP430 utilizes a sigma delta ADC which is different than other ADCs our group is familiar with. There are also many more initialization steps needed to prepare

the ADC for use. However, once this hurdle is overcome, the rest of the development should run smoothly since we have found all of the SD communication protocols for TI. There are also similar projects to ours that have recorded audio to an SD card and the source codes are available which should be very helpful.

The graphical user interface has been progressing better than we had expected. There were some difficulties with setting up the audio engine to compile correctly on the Windows environment. Once this was accomplished, there haven't been any major issues. The GUI is now capable of playing and pausing mp3 audio files. In addition, a position and volume slider have been implemented and have passed initial testing. Text can be loaded and displayed to the output window, but the hardware keylogger will need to be tested in order to complete the text parsing algorithm within the GUI.

Budget

As of right now, the budget is in very good shape. We have over \$350 left to spend with very few necessary purchases left to make. Next, we will be purchasing the keylogger, which is around \$100. It should be our last major purchase. A list of purchases thus far is below.

Component	Quantity	Price (per each)
Microprocessor development tool kit	3	\$20.4
Microprocessor chip	4	\$3.00
4 Channel Op-Amp	4	\$2.56
2G SD card	2	\$9.75
SD card connector	5	\$3.02
Keyboard	1	\$6.99
Microphone	3	\$1.45
beeper	1	\$1.45
Tool kit connector	1	\$13.77

Total budget used: \$144.60

Conclusion

Our design team's ability to deal with unexpected problems has kept us from deviating too far from our schedule. We have learned a lot from our mistakes and feel a lot more confident about the remainder of our project.