EEL 4914 Electrical Engineering Design

(Senior Design)

Project Abstract with Diagram(s)

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Project Title: 2.4Ghz Wireless Headphones

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Project Abstract:

The project will serve as a wireless audio communication device that can be used with any standard stereo 1/8" audio player such as a computer or iPod, as well as any TV/VCR/DVD player. The analog signals from a TV/VCR/DVD audio out or headphone jack will be filter the signal using an analog filter, and then sample the signal with an A/D. The A/D will send the signal to an Atmega2560, which will communicate to a wireless transmitter, which will send the data out via 2.4Ghz. The receiver will receive the 2.4Ghz signal, send the digital signal to another atmega2560 on the receiving side. The data will be then sent out a D/A, it will be amplified and connected to a headphone jack. The TV audio signal should be audible in real time from anywhere in the room.

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Project Features/Objectives

The project will serve as a wireless audio communication device that can be used with any standard stereo 1/8" audio player such as a computer or iPod, as well as any TV/VCR/DVD player. The analog signals from a TV/VCR/DVD audio out or headphone jack will be filter the signal using an analog filter, and then sample the signal with an A/D. The A/D will send the signal to an Atmega2560, which will communicate to a wireless transmitter, which will send the data out via 2.4Ghz. The receiver will receive the 2.4Ghz signal, send the digital signal to another atmega2560 on the receiving side. The data will be then sent out a D/A, it will be amplified and connected to a headphone jack. The TV audio signal should be audible in real time from anywhere in the room. The wireless headphones should be able to produce high quality sound from a distance of up to 20m. The audio sampling will be done using 16 bit A/D, and each channel will be broadcast at a rate of 1Mbps. This will allow for a sampling rate up to 62.5kbps under ideal conditions.

Concept/Technology

The only technology choices in the project are the wireless transmitter and microprocessor. The ATmega2560 was chosen as the microprocessor for several reasons. First, we are familiar with the AVR architecture and thus it will be easy to program. Second, the ATmega2560 model is twice the size of the ATmega128, allowing us the possibility of dedicating 32 general I/O ports to reading in both 16 bit A/D in parallel. The nRF24L01 was chosen because of its high data rate and relative ease of use. It takes care of all 2.4Ghz transmission/receiving and exposes a simple SPI interface.

Flow Charts and Diagrams

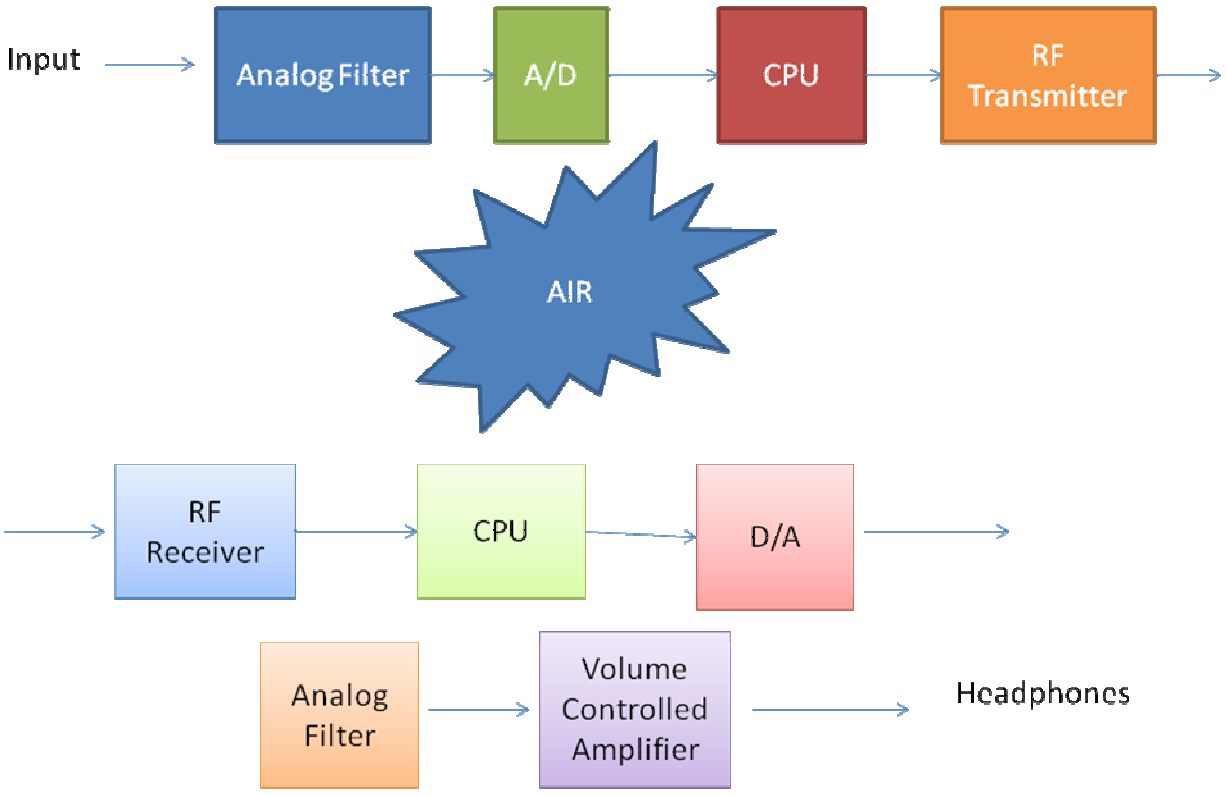
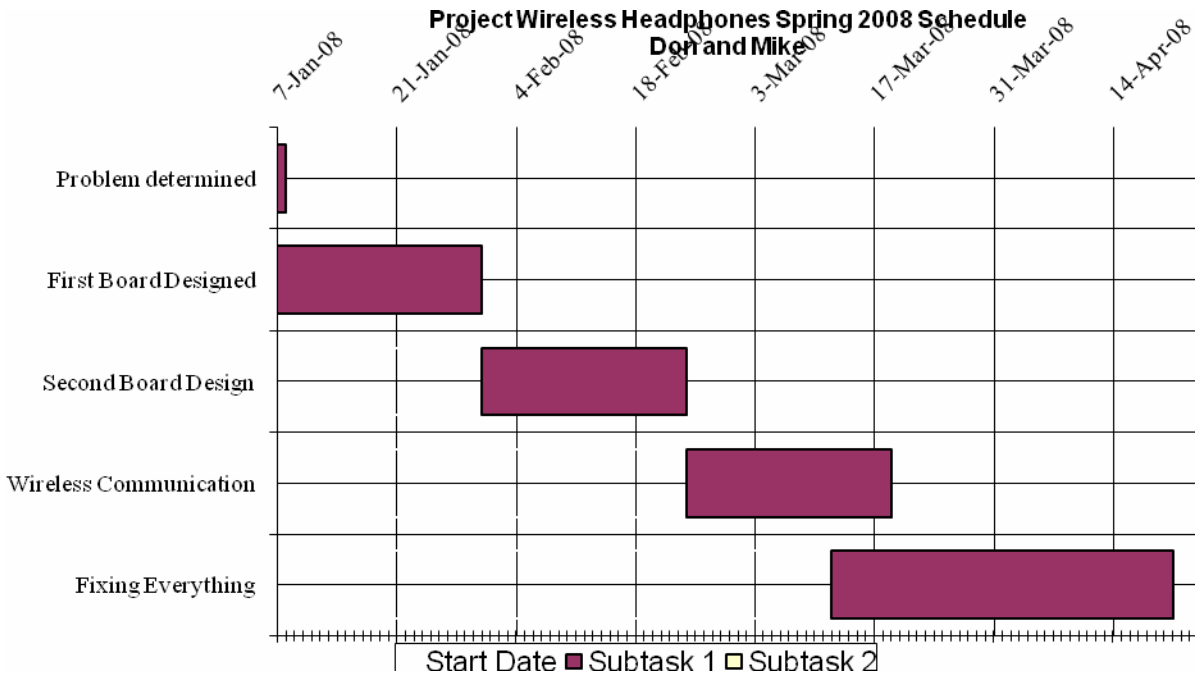


Figure 1 – Block diagram of System

Separation of Work

Don will be responsible for the board design and programming of the CPU while Mike will be responsible for the analog filter design, along with the analog filter debugging and tweaking.

Gantt Chart:


Project Wireless Headphones Spring 2008 Schedule
Don and Mike
7-Jan-08
21-Jan-08
4-Feb-08
18-Feb-08
3-Mar-08
17-Mar-08
31-Mar-08
14-Apr-08
Problem determined
First Board Designed
Second Board Design
Wireless Communication
Fixing Everything
Start Date
Subtask 1
Subtask 2