CMPE 490 Capstone Design Project
MIDI Synthesizer

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April 2012

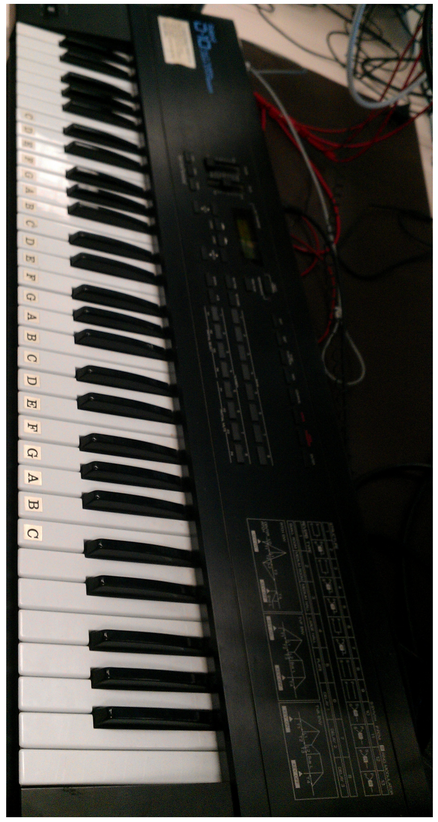
Overview

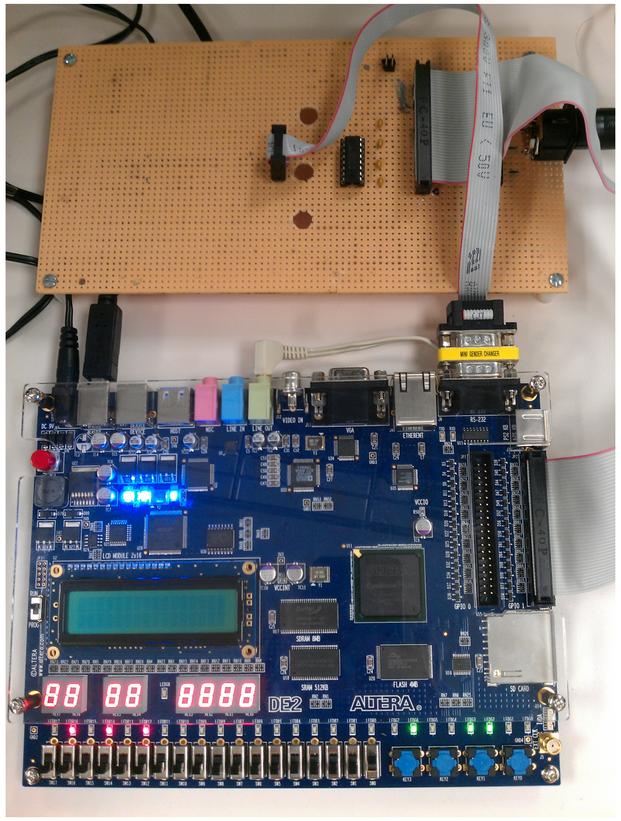
The goal of this project was to develop a digital audio synthesizer using the MIDI communication protocol. The product functions similarly to a commercially available synthesizer product, albiet with a slightly reduced feature set.

Features

- Input over MIDI protocol
- Wavetable Lookup Synthesis
- 6 Simultaneous Voices
- ADSR Envelope Generator
- Audio Effects

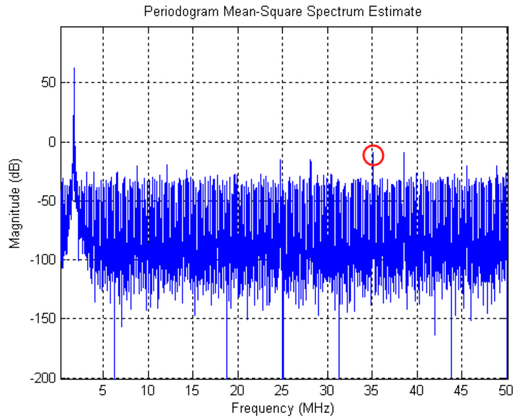
System





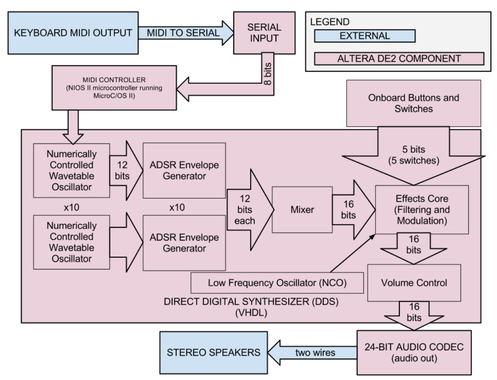
Digital Synthesis

Sound synthesis in this project is accomplished through Wavetable Lookup Synthesis. This process involves storing a sample waveform in a lookup table, then playing those samples at a varying rate dependant upon what frequency you desire to output.

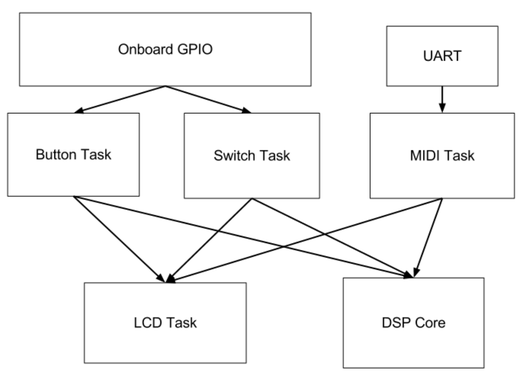


Hardware

- MIDI to RS-232 Circuit
- Numerically Controller Oscillators
- Time-Domain Envelope Generators
- Onboard Audio Codec Chip
- Onboard Buttons/Switches/LCD



Software



- uC/OS-II Operating System
- Function-Dedicated Tasks
- Memory Mapped Interfaces to Hardware
- Message Queue Based IPC