

TerrorMouse - A MIDI Synthesizer

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1 Introduction

We propose to build a MIDI synthesizer using the XESS XSB-300E. We will require an external MIDI controller¹. We plan to convert MIDI signals to RS-232 via a customized MIDI to serial cable, which we will build ourselves. We plan on synthesizing the actual sounds in hardware, which will then be outputted through the DAC to analog stereo output. We are currently exploring several ideas for sound synthesis. The two main options are 1) Simple FM synthesis, and 2) Physical modeling of a musical instrument using digital waveguides. The former would require research into FM synthesis techniques. The latter has already been implemented in software.² While physical modeling would be more interesting than FM synthesis, we suspect it will be more complex, especially if we plan on implementing it in hardware.

2 Implementation Challenges

- Building a MIDI to RS-232 adapter – We have studied several schematics available online. We expect this to be relatively simple.
- Implementing the MIDI protocol
- Implementing sound synthesis algorithms. Ideally we would like to build a rudimentary DSP supporting addition, multiplication, and delays of fixed point numbers using VHDL. However, if this proves to be too difficult we will utilize the Microblaze processor and implement it in software instead.

¹The StudioLogic (by Fatar) CMK-137 is an affordable controller and is available at www.samash.com

²Weiss, Ron and Steven Sanders “Synthesizing a Guitar Using Physical Modeling Techniques” <http://www1.cs.columbia.edu/~ronw/dsp/>