

CSEE 4840 Final Project Proposal

Hot Spring and Steam Simulator with Musical Stimulus

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1 - Motivation

Inspired by the patterns shown on the old generation MP3 screen that corresponds to the pitch and volume of the music being played, we came by with the idea to visualize the music in a way that not only looks nice but is also computationally expensive. Therefore, using the FPGA programmable fabric can accelerate the computation of audio information and achieve real-time processing as long as the video output generation.

2 - Objective

In this project, we plan to realize music visualization. A hot spring and steam simulator that reacts to a real-time sound input from music stimulus is implemented and displayed on the monitor. In addition, we plan to implement a piano keyboard in order to increase interaction between users and the device.

3- Proposed method

The project will be accomplished by a combination of SystemVerilog and C code running on the Altera- De1 SoC board. The music input comes from a microphone port and will be handled by the C code running on the hard processor system (HPS). Some mathematical methods will be implemented to process the audio information and will be accelerated by the FPGA. And finally, the video output of the hot spring and steam will be displayed on a 640 * 480 monitor via a VGA output.

4 - Expected Result

As we feed different music file to the microphone input, the hot spring and steam on the screen (as shown below) will react to the pitch and frequency of the music. For example, the volume

will affect the degree of vibration in the water and the amount of steam on top of the hot spring.
And the rhythm will affect the changing rate of the displayed image.

