NumberOneRealTimeSpectralAnalyzerMAX
-or-
NORTSAM

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A real time audio spectral analyzer (sometimes called an RTA) is an invaluable tool for any audiophile. The ability to visualize the relative amplitude of discrete frequency ranges affords an objective measure by which to fine-tune a hi-fi audio system. Plus, it looks really really cool.

We propose to build an RTA using the Xilinx FPGA with the on-board audio and video-related peripherals. The on-board audio input will accept an analog stereo signal from some external device through the 1/8" mini jack. The signal will undergo Analog-to-Digital conversion with the assistance of the on-board THS1230. A Fast Fourier Transform must then be applied in order to appropriately isolate independent frequency ranges. The results of the FFT will be pipelined into graphics acceleration hardware and a frame buffer in order to produce a proper visualization. The end result will be a dynamic VGA oscilloscope-style display.

The FPGA itself must be used to implement a stereo FFT and graphics acceleration/frame buffer hardware. We will plan initially on displaying 31 discrete bands, each ranging 1/3 octave, with frequency centers in correlation to most commercial component equalizers.