

ABSTRACT

Tuning is the process of determining a standard frequencies and align it into the strings on the stringed musical instrument such as guitar. The tool used for tuning is called tuner. During the time, tuner is only produced by a manufacturer of musical instruments, but as the development of technology and science, the other parties can be participate to produce or at least make a guitar tuner on their own. This is not apart from the formation of much research in the field of IC design or embedded systems, especially FPGAs that coupled with the ease of acces to the device.

In this Final Project, a guitar tuner prototype was designed by using the zero-crossing detector algorithm on an FPGA board, using Spartan-3 XC3S1000, which aims to test a guitar tuner that uses zero-crossing algorithm can be designed on an FPGA with a cheap design cost and fairly good performance. This Final Project is using VHDL (Very High Speed Integrated Circuit Hardware Description Language) as the language that will encode each of the blocks of the guitar tuner.

The design process focuses on the organization of guitar tuner system blocks that is capable of calculating and comparing the number of a zero-crossing that occurs when an incoming analog signal, in this case is a signal from the strings of a guitar passes through, resulting in a performance similar with other tuners in general. Implementation in Spartan-3 XC3S1000 FPGA produces a simple guitar tuner system capable of running in real-time with average delay time range of 2,08 to 3,13 seconds for all inputs from six guitar strings also with 1.885% frequency's error in average.

Keywords: guitar tuner, zero-crossing, VHDL, FPGA