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Title

Design of an Open-Source Sata Core for Virtex-4 FPGAs

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Document Type

Open Access

Degree Program

Electrical & Computer Engineering

Degree Type

Master of Science in Electrical and Computer Engineering (M.S.E.C.E.)

Year Degree Awarded

2013

Month Degree Awarded

September

Keywords

SATA, FPGA, Virtex-4, Hardware, Storage, High Speed Serial I/O

Abstract

Many hard drives manufactured today use the Serial ATA (SATA) protocol to communicate with the host machine, typically a PC. SATA is a much faster and much more robust protocol than its predecessor, ATA (also referred to as Parallel ATA or IDE). Many hardware designs, including those using Field-Programmable Gate Arrays (FPGAs), have a need for a long-term storage solution, and a hard drive would be ideal. One such design is the high-speed Data Acquisition System (DAS) created for the NASA Surface Water and Ocean Topography mission. This system utilizes a Xilinx Virtex-4 FPGA. Although the DAS includes a SATA connector for interfacing with a disk, a SATA core is needed to implement the protocol for disk operations.

In this work, an open-source SATA core for Virtex-4 FPGAs has been created. SATA cores for Virtex-5 and Virtex-6 devices were already available, but they are not compatible with the different serial transceivers in the Virtex-4. The core can interface with disks at SATA I or SATA II speeds, and has been shown working at rates up to 180MB/s. It has been successfully integrated into the hardware design of the DAS board so that radar samples can be stored on the disk.

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