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Design and Testing of a Prototype High Speed Data Acquisition System for Nasa

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Abstract

Modern radar and signal processing applications require data acquisition systems capable of high-speed analog data reception and processing. These systems need to support sophisticated signal processing algorithms and reliable high-speed interfaces. The objective of this project is to develop a prototype of a state of the art data acquisition system to aid NASA's Surface Water and Ocean Topography (SWOT) mission. The SWOT mission aims at monitoring water levels of various water bodies to predict and avoid any catastrophic events. The principal instrument is a Ka-band Radar Interferometer (KaRIN) that is used for the measurement of water levels. The collected data need to be digitized and processed using an FPGA based-data acquisition system housed in a satellite. The scope of this project involves the design, implementation and test of a high-speed printed circuit board (PCB) that serves as the prototype data acquisition system. A lot of emphasis is placed on layout design, as the PCB needs to support data rates up to three Giga samples per second. The goal of this research is to provide Jet Propulsion Laboratory (JPL), NASA with a prototype version of the high- speed acquisition system that can be integrated with the KaRIN system in future.

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