

A Networked Control/Data Acquisition System Based On The ColdFire Microprocessor. ILYA SUKHANOV (Stony Brook University, NY 11704) ANDREY SUKHANOV (Brookhaven National Laboratory, NY 11973).

Nose Cone Colorimeter Control (N3C) is a highly dynamic system used for slow data acquisition (DAQ), remote system control, and environmental monitoring. The N3C project utilizes an embedded ColdFire processor with the Quadros real time operating system (RTOS) which acts as a bridge between an array of hardware devices and remote-controlling machines over the TCP/IP network protocol. The requirements of this project were to build a network capable device to program field-programmable gate array (FPGA) devices such as Xilinx and Altera. While such network-FPGA-programmers are available on the market they all only do one task, our specification called for a way to interface with other buses of the system and DAQ. N3C utilizes the feature rich ColdFire microprocessor which allows for easy access to a number of buses such as I²C, QSPI, UART, JTAG and GPIO. With the help of the N3C client one can quickly develop custom tools to remotely interface with devices via these buses. In the case of the Nose Cone Colorimeter, N3C is used to interface with most of the buses supported by ColdFire, JTAG is utilized for FPGA configuration and the systems slow control, I²C as a bridge to a Dallas 1-Wire bus which in turn is used for environmental monitoring and control, QSPI for slow DAQ read out. The N3C system is controlled via a simple control protocol over TCP and DAQ is transferred over UDP to reduce the network overhead at the cost of reliability. During the course of this project we've optimized Quadros RTOS supplied TCP/IP

stack (a modified OpenTCP implementation) for our applications resulting in a ten-times performance increase. This optimization makes it feasible to use N3C as a slow (2MBytes/s) DAQ system. Built with flexibility in mind, N3C was developed to work on two versions of the ColdFire processor, the MCF5282 and MCF523x. Such flexibility allows for easy integration of new features and utilization of this system in projects other than the Nose Cone Colorimeter Upgrade.

Category: Engineering

Things to add:

- * Hashemian based Huffman coding for DAQ