APS Scientific Computation Seminar Series

Speaker:
Rob Knudson, DAQ Hardware Group Leader, Neutron Sciences Directorate, Oak Ridge National Lab

Title:
Modular Solutions for Obsolete Data Acquisition Hardware

Date:
July 15, 2024

Time:
1:00 p.m. (Central Time)

Location:
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Abstract:
Data Acquisition (DAQ) hardware for the neutron beamlines at the High Flux Isotope Reactor (HFIR) and the Spallation Neutron Source (SNS) at ORNL are rapidly approaching obsolescence. The DAQ and Detector groups have been working on this issue for the last several years. A new modular hardware platform has been developed based on the industry standard FPGA Mezzanine Card (FMC) specification. A common carrier has been designed with a Xilinx 7-series FPGA and four FPGA Mezzanine Card (FMC) connectors. The common carrier serves as the base platform for the modular hardware. A suite of FMC daughter boards has been designed including several communication cards and a Read-Out-Controller (ROC) card which serves as the A/D interface to the detectors. The combination of a carrier with custom or commercial FMCs enables the development of drop-in compatible replacements of legacy DAQ electronics while providing a bridge to the future with modern protocols and communication media. Additionally, an External Instrument Control (EIC) framework within the EPICS control system for ORNL neutron instruments facilitates AI/ML inference deployment at the edge where the edge can be as close to the detectors as the analog-to-digital interface utilizing modular hardware. This work was supported by the U.S. Department of Energy, Office of Science, Scientific User Facilities Division under Contract No. DE-AC05-00OR22725.