



Web-based Parameter Control and Real-time Waveform Display for the GRIFFIN Experiment

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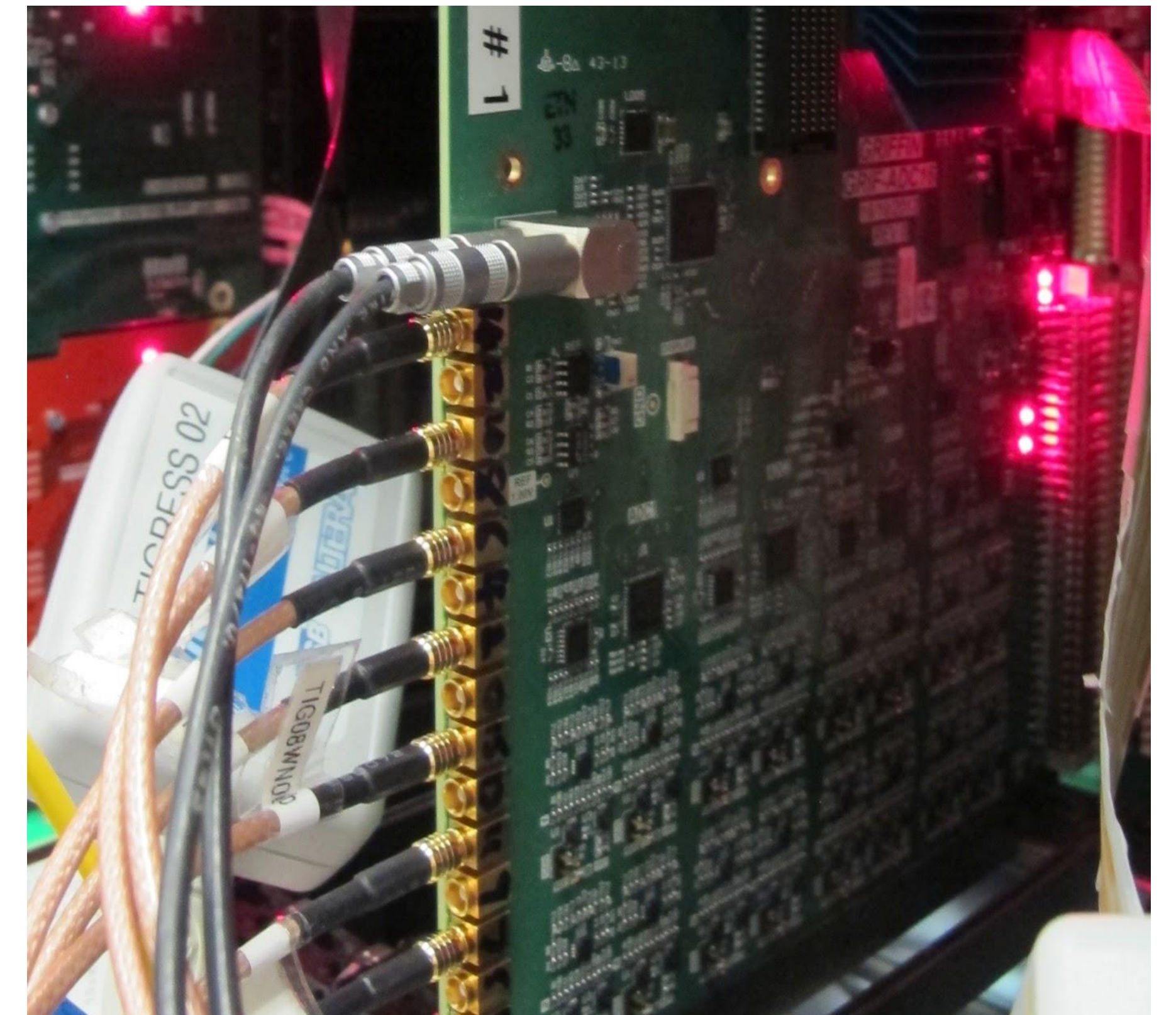
Abstract

New data acquisition electronics is being developed at TRIUMF for the Gamma-Ray Infrastructure For Fundamental Investigations of Nuclei (GRIFFIN) spectrometer. Current FPGA capabilities have allowed opportunities for providing a more user friendly, web-based, hardware control interface that can be used without requiring additional custom software. Several software and firmware components are being developed, including a real-time waveform viewer, parameter control and readback, diagnostic counters, and a template-based configuration system utilizing MIDAS, and Javascript. This paper discusses the various protocols that were investigated, the benefits and challenges of the choices made, and the details of the interface implementations.

Current Hardware Setup

A custom VME64x acquisition module:

- 16 Channel 100MSp/s ADC
- ArriaV FPGA /w NIOSII soft-core processor
- 256MB DDR3 @ 500MHz
- 1 Gbit SFP Ethernet Link
- Real-time Web Control System Utilizing:
 - HTTP Server
 - HTTP Client
 - MSCB Submaster /w Nodes
 - HTML+JS downloadable content

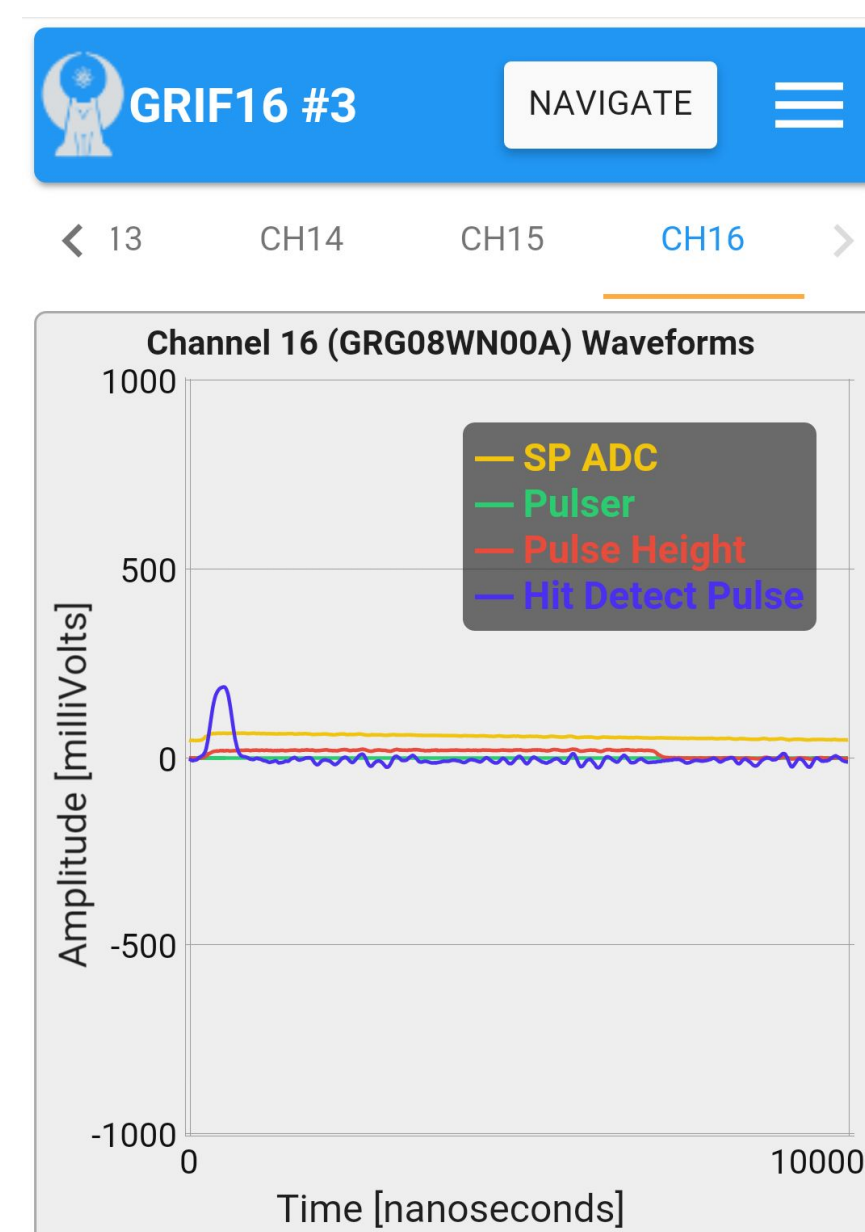


Current Features

- MIDAS ODB template and synchronization
- Real-time display of waveforms and rates
- Desktop and mobile friendly web interface

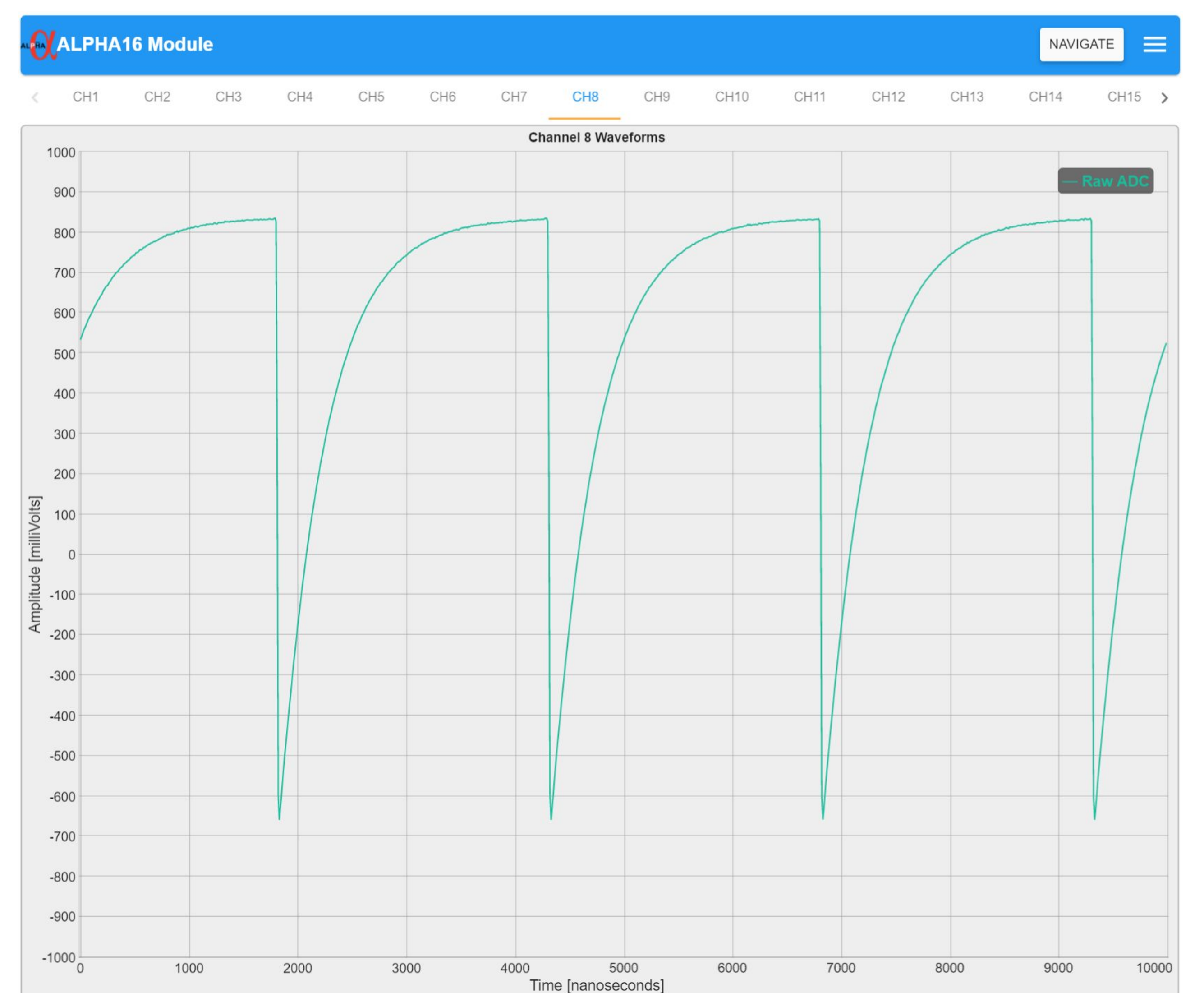
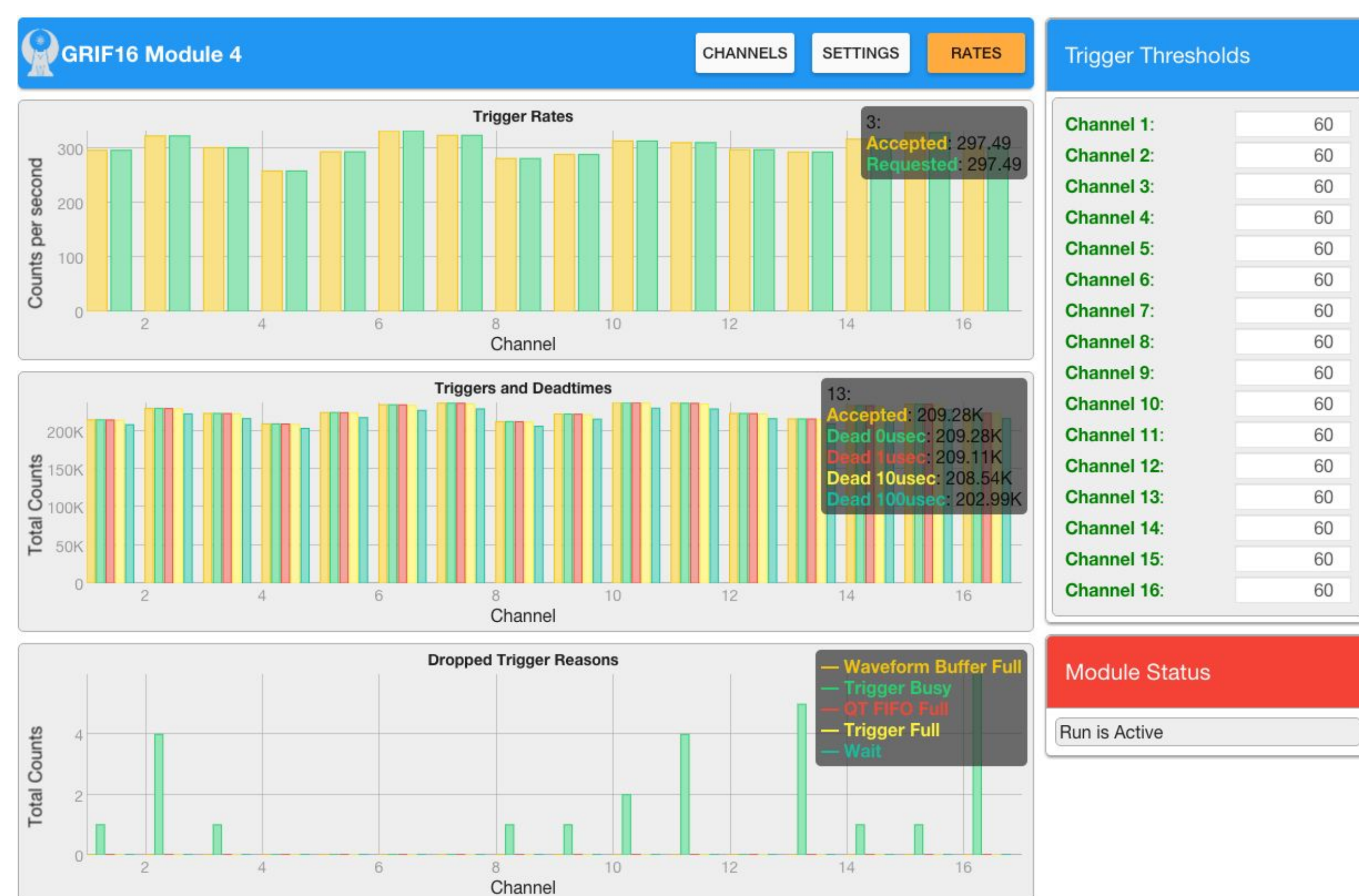
Advantages

- Easy visualization of data and variables
- Self-documenting parameters
- Client-side input validation
- Stand-alone operation, only web browser needed to run
- Custom and Template configuration stored in MIDAS ODB



Planned Features

- WebGL-based Waveform Oscilloscope
- Additional metadata and parameter self-documentation
- Flexible Transport-Agnostic Routing
- Remote Upgrade for FPGA Firmware
- WebSocket Support



Protocols Researched

- ZeroMQ
- Advanced Message Queuing Protocol (AMQP)
- MQTT
- Constrained Application Protocol (CoAP)

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