Automated Quality Tests of the VMM-Hybrid

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The SRS-VMM Project



- VMM developed since 2012 for ATLAS NSW Upgrade
- VMM-Hybrid integrated into SRS
- multiple Prototypes
 - VMM2 (5 Hybrids)
 - VMM3 (7 Hybrids)
 - VMM3a (52 Hybrids)
- 2020: Production of ~1000 Hybrids planned
- First O(100) expected next months
- At the moment: Manual testing $(\sim 1 \text{ h/Hybrid})$
- New batch needs automated testing



My Project



- Developement and Setup of a "Testing Station" for the VMM-Hybrids
 - Measure properties of Hybrids (Computer controlled)
 - Noise, pedestal, etc...
 - Evaluate measurements and classify Hybrids
 - Upload Hybrid quality results to database



VMM Hybrid

















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The Scalable Readout System (SRS)



The Scalable Readout System (SRS)



- Readout System for gaseous detectors
 - Compatible with multiple frontends (APV25, TimePix, VMM [1])
- Handles data from VMM
- Transmits data via Ethernet to computer
- Forwards control sequences to Hybrid

VMM Slow Control





VMM Slow Control

- Controls Hybrids and SRS
- Is used for:
 - Configuring Hybrids
 - Read monitoring ADCs of both VMM
 - Read data output of VMM to SRS
 - Calibrating Hybrids
- Different functions (Calibration or Hybrid Control) in separate "modules"
- Additional testing module
 - GUI for results and start of tests



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Power Supply VMM Hybrid JTAG Programmer SRS Crate Multiplexer PCB . . . Power Supply Computer Signal Generator VMM Slow Control

Power Supply



- USB or RS232 to PC
- PyVISA
- SCPI Commands
- Task
 - Measure 3V and 2V currents
 - Monitoring during tests possible
- Status
 - Preliminary tests with DMM in supply circuit
 - No communication with power supply yet
 - Remote controllable power supply needed
 - GPD-3303 from GW-Instek

 \rightarrow Quality criterion: proper power consumption





Firmware Programmer





Firmware Programmer

- Flash Firmware onto Spartan-FPGA on Hybrid if not programmed yet
- Needs JTAG programmer and Dongle Adapter
- Use terminal (2 possibilities)
 - 1 using Xilinx Impact
 - use impact script for programming (impact -batch scriptname.cmd)
 - Flash memory programming easy once setup works
 - 2 using xc3sprog (command line utility)
 - Difficult or not possible to program Hybrid flash memory
 - FPGA temporary programmable → useful for VTC project?







External Connection VMM Hybrid JTAG Programmer SRS Crate 1.678A Multiplexer PCB . . . Power Supply Computer Signal Generator

VMM Slow Control

External Connection



- "Simulates" a connected Detector
 - External test pulses from signal generator for individual channels
 Multialayer DCP
 - Multiplexer PCB
 - 1 16-Channel MUX + 16
 8-Channel MUX controlled by
 7-bit counter
 - Distributes pulses onto single channels
 - "Clock" from signal generator advances Channel
 - Check if pulses were received with Slow Control
- Signal Generator controlled via USB with SCPI & PyVISA



External Connection II



Status

- PCB ordered
- Remote controllable Signal Generator on hand
- Signal Generator programmed



Project Status



- Most testing elements Work in Progress
- Two tests working





- I Implementation of more tests & Definition of quality criteria
- 2 Automatic upload to database
 - if possible also upload plots/measured data
- 3 Tests with real detectors
- 4 Coordination with VTC-project (open for discussion)

References





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Questions...?