DEVELOPMENT OF A SPACEWIRE/RMAP-BASED DATA ACQUISITION FRAMEWORK FOR SCIENTIFIC DETECTOR APPLICATIONS

Session: SpaceWire Missions and Applications

Short Paper

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ABSTRACT

We have been developing a multipurpose data acquisition framework for scientific detector applications, using the SpaceWire technology. It consists of a small size computer "SpaceCube", a circuit board, and software libraries. The SpaceCube works as a data/command handler and recorder, operated by The Real Time OS Kernel (TRON). The circuit board is equipped with a SpaceWire protocol stack FPGA, a user-alterable FPGA, and chips for AD conversion or digital input/output. The data and commands are transferred via the Remote Memory Access Protocol (RMAP) and the software on the SpaceCube can read the data just invoking *read* method of the library. The template functional blocks for the user-alterable FPGA, on-chip bus interface or data buffering module for example, are prepared and users can construct their own data acquisition system by connecting those modules. It is only needed to code an interface module, which communicates with their detectors. From the detector developers' viewpoint, this framework appears to be a simple *pipeline* that connects their detector hardware and the data collecting software. The implementation of the subsequent components after the detector interface module are encapsulated, and the

whole framework structure is considerably modularized in respects of both software and hardware, so that a user-module (IP core) can be directly ported from the laboratory test environment to the satellite data acquisition system.

This talk is dedicated to an introduction to the structure of our data acquisition framework, including an example of the implementation in our gamma-ray imager system with a 256ch multi anode photomultiplier tube. Another talk presented by Odaka et al. (this conference) gives further application oriented talk on the framework, representing their balloon-borne Compton camera experiment.