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## **Control and operation of detector systems and their readout electronics in a complex experiment control system**

An extensive RnD program together with an optimized detector design and high performing readout electronics is essential for the success of an experiment. However the required amount of work and complexity to integrate a complete subdetector system into an experiment control system at the level of an expert system is often underestimated. We report here on the layered software structures and protocols used by the LHCb experiment to control their detectors and readout boards. The Experiment Control System of LHCb is based on the commercial SCADA system PVSS II. Readout boards which are outside the radiation area are accessed via an embedded microcontroller which is connected to a large Local Area Network. Finite state machines are introduced to facilitate the control of a large number of electronics boards. The SPECS protocol which can transfer data rates of up to 10 Mbit/s is used for control of the front end electronics. Radiation tolerance of the SPECS slave is implemented by using Actel ProASIC FPGAs and triple voting on all necessary registers.

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