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Multiplexer used for measuring temperatures in a TOF detector

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Temperature measurements are an essential part of the Slow Control System. Using temperature sensors, one can monitor the operation of electronics within the system and monitor possible faults. In order to work properly, those sensors need to be scattered around the whole system, and data acquisition system must be able to handle all of them.

The simplest solution is to assign every single sensor to its own analog-to-digital converter and have them connected to data acquisition at the same time. Unfortunately, this can become quite expensive when a lot of sensors are connected. A different approach is to assign only one ADC to all of them and use a switching device to measure temperature with only one sensor at a time. The challenge is to demonstrate which solution is more applicable to Slow Control System.

This work presents the development of a multiplexer device for switching the sensors. The device consists of an 8-bit shift register driven by an AVR microcontroller. A 2-bit prototype was constructed and tested with a Slow Control dedicated temperature sensor and acquisition system, and a circuit board was designed as well. The test uncovered several advantages and disadvantages of the multiplexer and contributed to the discussion comparing parallel, multi-ADC approach with single ADC, switching device solution.

Primary author: KUBIELA, Adam (University of Warsaw)

Co-author: ROSLON, Krystian (Warsaw University of Technology (PL))

Presenter: KUBIELA, Adam (University of Warsaw)

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