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Applications of Triggered Scaler Module for Accelerator Timing

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During the operation of J-PARC timing system since 2006, there were a few unexpected trigger-failure events occurred. It was difficult to find the faulty module among many suspicious modules. In order to find such a module easily, a Yokogawa PLC- type triggered scaler module was developed. It can accept the start of J-PARC Main Ring (MR) slow cycle (2.48s/5.2s) signal and the start of rapid cycle (25Hz) signal, which are generated by J-PARC timing system. A scaler in the module counts number of trigger pulses during the J-PARC slow cycle and stores counts in an array. In 2018, the module was tested successfully and the results showed the expected performance.

Two applications were developed based on the triggered scaler module. The first one, a Machine Protection System (MPS) detection system, succeeded to visualize which phase of a slow cycle an MPS event occurred. The second one, an unexpected-trigger detection system, was developed to detect failure events and to identify the type of failure. Both applications were tested successfully during J-PARC beam operation in June, 2020, and showed that the triggered scaler module can be applied for various timing-related applications in the future.

The details of the module and two associated applications will be described in the paper.

Minioral

Yes

IEEE Member

No

Are you a student?

Yes

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