EVOLUTION OF THE CERN LINAC 4 INTENSITY INTERLOCK SYSTEM USING A GENERIC, REAL-TIME COMPARATOR IN C++



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transmission

Arithmetic Comparison Model

Introduction

This poster presents the software of the Beam Current Transformer Watchdog of the new Linac 4 at CERN. In addition, it demonstrates a GUI that facilitates the monitoring of the system's instances. Arithmetic Comparisons

Calculation of the transmission / losses and comparison with threshold.



L4L.BCT.1137 L4L.BCT.4013

L4P.BCT.0117 L4T.MBH.0250 L4Z.BCT.0273



Linac 4 Watchdog Installation Layout

The Watchdog cut the beam if losses, calculated by combining the intensity measurements at various locations, exceed predefined thresholds. A Generic
Comparator in C++pre-pulsepost-pulseSombine the two
permits calculated
in the previous
pulse.Read the intensity
information.

Apply the single

beam permit.

Module to combine multiple measurements arithmetically (sum / product).

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Logical Comparisons

Logical combination (AND / OR) of the results of other comparisons.

Fully parameterised combination (which comparisons / logical operand).

Numerous combinations enable the implementation of complex protection schemes.

acceptable.

Decide if the

beam pulse was

Modularised Readout

Visual Monitoring

Local module: use of predefined Inter-Process Communication structures that require the sharing of the CPU between the intensity measurement system and the watchdog.

<u>Remote module:</u> use of the <u>Remote</u> Device Access service that is <u>configurable</u> as to which information should be transmitted and <u>decouples</u> the watchdog from the measuring devices

<u>Additional custom module:</u> possibility to add more custom modules according to requirements.



Conclusion

The new, configurable, remote readout module of the Watchdog together with the possibility to add additional custom ones, decouples the system from the BCTs making it application agnostic.

The extended parameterisation of the Watchdog devices that can perform a combination of any kind of comparison, enables the implementation of complex protection schemes.



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