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GNU Radio 4.0 for real-time signal-processing and feedback applications at FAIR

Thursday, 11 May 2023 16:30 (2 hours)

At FAIR, GNU Radio* is being used as part of the generic monitoring and first-line diagnostics for accelera-torrelated devices, and to further support equipment experts, operation, and FAIR users in developing basic to advanced top-level measurement and control loops.

GNU Radio is a free and open-source software development toolkit supporting hundreds of low-cost to high-performance industrial digitizers with sampling frequencies ranging from a few MS/s to GS/s~\cite{gnuradio, gnuradio_github, gnuradio4_github, FAIR_Digitizer, FAIR_Digitizer2}. At its core are directed signal flow graphs expressing arbitrary post-processing and feedback control loop logic that are both numerically highly efficient as well as providing an intuitive yet detailed nuts-and-bolts representation. This facilitates to inspect and/or to reconfigure existing systems by accelerator-, control- or other system domain-experts alike with little to no prior required programming experience.

This contribution describes the community-driven improvement and modernisation process leading to GNU Radio 4.0 supporting improved type-safety, improved performance, and new features such as event-driven data processing, nanosecond-level synchronisation using White-Rabbit, and slow feedback loops.

Funding Agency

Footnotes

*https://www.gnuradio.org/

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Yes

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