

Signal processing architecture of the next generation LLRF systems at PSI

Wednesday, October 25, 2023 5:40 PM (5 minutes)

LLRF systems play a crucial role in the efficient operation and control of particle accelerators. At the Paul Scherrer Institute (PSI), advanced LLRF systems are being developed to meet the demands of upcoming facility upgrades, including Swiss Light Source (SLS) and High Intensity Proton Accelerator (HIPA). In this contribution, we present the signal processing architecture designed for these next-generation LLRF systems.

Always and independent of the machine or operation type, digital LLRF systems share the same key functions: Data acquisition (DAQ), RF actuation and feedback control. In addition, some management and automation features including exception handling and state control are required. Finally, LLRF systems typically interoperate with others systems, such as timing and machine protection.

As an example architecture implementation, we present the design of the SLS-2 500 MHz LLRF, which is intended for CW and pulsed RF operation. The LLRF features are divided into different architecture layers, including programmable logic, embedded software, and the high level control system. Where applicable, reusable and universal library elements are used.

Keyword

FPGA DSP DAQ

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Session Classification: Posters

Track Classification: Software