Contribution ID: **554** Contribution code: **THPM098** Type: **Poster Presentation**

VSlib: a C++ library for next-generation voltage source control at CERN

Thursday 5 June 2025 15:30 (2 hours)

The ongoing upgrades to CERN power converters pose new challenges to the converter control hardware that require a next-generation embedded control computer: the Function Generator/Controller 4 (FGC4), currently in development. The hardware is based on an AMD Zynq UltraScale+ MPSoC System-on-Chip (SoC), featuring a quad-core A53 ARM-architecture CPU, with one bare-metal core dedicated to the voltage source control. To fulfil the goal of high-reliability control in this integrated environment, a C++20 library to run on bare-metal, called VSlib (Voltage Source library) has been developed. The library is a toolkit providing all the necessary building blocks for regulation algorithms, as well as communication with other bare-metal and Linux-running cores of the SoC. A dedicated GUI was created to facilitate configuration of library parameters. The main focus was placed on high performance, determinism, and reliability. The library was developed according to best industrial practices, including version control, static analysis, and automated unit testing, with tests against expert models using Hardware-in-a-Loop simulator of a power converter, and continuous deployment.

Footnotes

Paper preparation format

LaTeX

Region represented

Europe

Funding Agency

Author: AROMINSKI, Dominik (European Organization for Nuclear Research)

Co-authors: MISRI, Antriksh (European Organization for Nuclear Research); ZIELINSKI, Dariusz (European Organization for Nuclear Research); GARCIA, Raul (European Organization for Nuclear Research)

Presenter: AROMINSKI, Dominik (European Organization for Nuclear Research)

Session Classification: Thursday Poster Session

Track Classification: MC6: Beam Instrumentation and Controls,Feedback and Operational Aspects: MC6.T04 Accelerator/Storage Ring Control Systems