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An overview of the FGC4 –CERN's new power converter controller

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The CERN's Electrical Power Converters group manages over 5000 power converters, 4000 of which are controlled, monitored, and diagnosed by a few generations of the Function Generator/Controller (FGC) devices. However, the current generation (FGC3) is now facing performance limitations and component obsolescence. To address this and accommodate future installations at CERN and other laboratories, a fourth generation of FGC is under development. Built with cutting-edge technology and modern standards, FGC4 features a Linux-based System-on-Chip (SoC), delivering an order-of-magnitude improvement in regulation rate, extensive configuration options, and significantly enhanced diagnostics. While designed to fit CERN's accelerator control system, reusability beyond CERN has been a core design principle from the outset, enabling compatibility with EPICS and TANGO frameworks. This paper provides an overview of the FGC4 project, with a primary focus on its software architecture and highly modular design, which facilitates extensibility and ensures a future-proof solution. Additionally, it discusses the hardware architecture, including a CERN-developed System-on-Module hosting a Xilinx SoC.

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Footnotes

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