Building Safe Experiments: A Tool for Configuring Interlocks Without Writing Code

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Abstract

We will demonstrate a new tool developed at the Advanced Light Source (ALS) in collaboration with the European Synchrotron Radiation Facility (ESRF), supported through ALS funding, designed to help scientists and operators safely control lab equipment without needing to program PLCs. The Wago Interlock System combines easy-to-use software with flexible WAGO hardware to let users set up interlocks—the safety rules that prevent hardware from operating in unsafe conditions. Using a graphical interface, users can create and edit configurations, connect inputs and outputs (sensors, thermocouples, valves, relays), and test them, all without writing code. The system supports WAGO 750-series PLCs and a variety of modules, making it adaptable to different experimental setups. Built-in tools help track changes, manage user access, and ensure consistent operation across different lab areas. The hardware and a CLI software are already in use at all beamlines at ESRF (France) with the BLISS control system; with the new interface and EPICS driver, the system is now ready to expand to other lab environments at Berkeley Lab. Whether you are an operator, technician, or scientist, this tool makes interlock setup safer, faster, and more consistent—with minimal training and no need for PLC coding.