

Development of EPICS-Based Control and Diagnostic Interface for X-ray detection system

Abstract

The XRCS Survey Diagnostic System requires a robust and scalable software framework for monitoring, control, and data acquisition from various diagnostic instruments, including Silicon Drift Detectors (SDDs), X-ray detectors, and associated measurement devices.

This project focuses on the development of a top-level control and monitoring interface using the Experimental Physics and Industrial Control System (EPICS), an open-source distributed control framework widely adopted in large-scale scientific facilities and industrial automation systems worldwide. EPICS serves as the backbone of control systems in major research infrastructures such as particle accelerators, synchrotron radiation facilities, fusion experiments, and advanced diagnostic laboratories. Its modular architecture, network transparency, and real-time data-sharing capabilities make it the preferred choice for integrating heterogeneous hardware and software components. The student will be responsible for interfacing existing detector systems with EPICS, developing Input/Output Controllers (IOCs), creating process variables (PVs), implementing data acquisition and monitoring functionalities, and designing user-friendly operator interfaces for real-time visualization and control.

The project will also involve communication with detector hardware, data archiving, alarm management, and system testing in an experimental environment.

Through this project, the student will gain hands-on experience in established control system framework, detector integration, and scientific instrumentation, providing valuable skills relevant to research laboratories, accelerator facilities, fusion research centers, and high-technology industries. Skills in linux OS will be helpful but not mandatory

Academic Project Requirements:

1) Required No. of student(s) for academic project: 1

2) Name of course with branch/discipline: M.E./M.Tech Electronics and Instrumentation Engineering

3) Academic Project duration:

(a) Total academic project duration: 40 Weeks

(b) Student's presence at IPR for academic project work: 4 Full working Days per week

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