

Development of Web-based OPI of superconducting LLRF System and Current Status of the PLS-II Control System

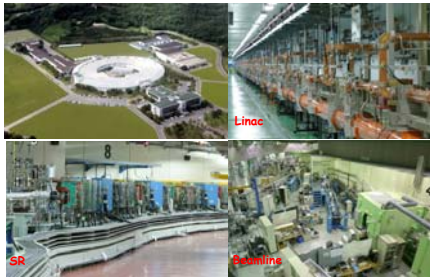
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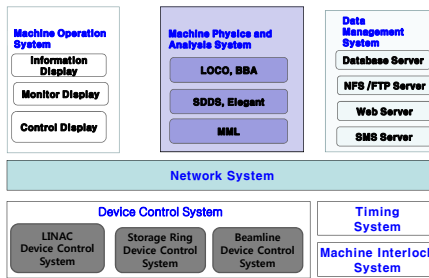
Abstract

Most of the world's Accelerator Laboratory provides stable beam services through numerous control devices. In addition, EPICS (Experimental Physics and Industrial Control System) software is used to acquire the normal status and data of the device through a LAN (Local Area Network). The software that plays a central role in EPICS is an Input / Output Controller (IOC) and communicates directly with the device. EPICS provides a number of tools for controlling or monitoring control devices using the Operator Interface (OPI). However, most OPIs only provide an environment that works on a PC. Therefore, when a problem occurs due to failure of a main device during operation of the beam, the person in charge of the device cannot quickly check the status of the device with the smartphone. To improve this inconvenience, we will apply the user-oriented OPI according to the redevelopment of the superconducting LLRF System at KAERI. In this paper, we propose a method to remotely control and monitor real-time device information from a smartphone as well as a PC. By observing the Web standards, we confirmed that remote devices can be controlled and monitored in various web browsers. We introduce web-based OPI using HTML5, Web Socket, and communication between IOC and web server.

Aerial View of PLS-II System



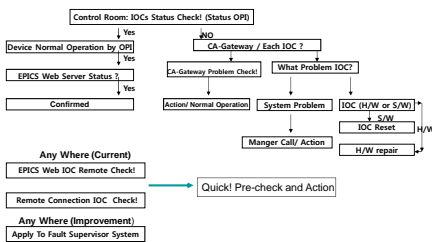
Design Concept: Configuration (PLS-II)



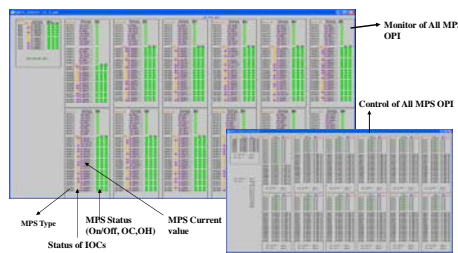
SR Components and IOCs

SR	Machine Components	IOC Hardware	IOC OS	IOC Number	PV Number	Remarks
	BPM	Embedded	Linux	96 ea	8,000	Upgrade
	PBPM	Embedded PC	Linux	12 ea	500	
	RF System	cPCI	Linux	3 ea	2,400	
	MPS System	VME/Embedded	VxWorks/RTMS	12 ea / 348 ea	3,500	
	Vacuum System	Embedded	RTMS	30 ea	2,000	
	FOFB System	VME	VxWorks	12 ea	1,200	
	Utility/Girder	PC/Embedded	Linux/RTMS	1 ea / 12 ea	600	
Total				407 ea	21,000	

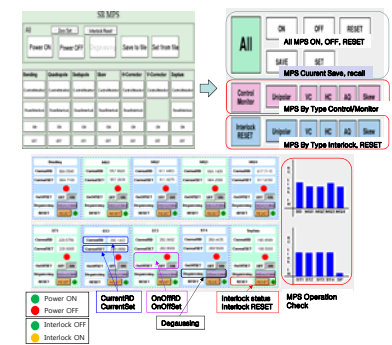
Operation Daily Check flow



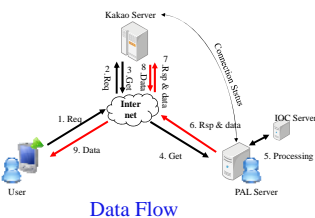
System Check OPI : SR MPS Status



Improvement of SR MPS OPI: Main

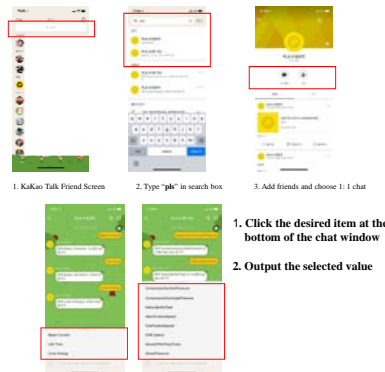


Introduce of Mobile Messenger



- Data Flow Using KakaoTalk, a domestic mobile messenger
- KakaoTalk Plus Friends use to get information

Search & How to use



Operation Status monitored by Mobile Phone



Protocol

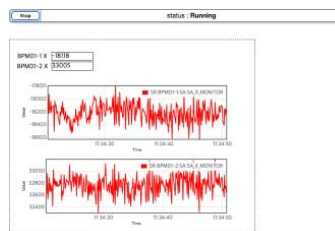
- EPICS IOC requests PV.
- The PV list requested by the user is specified to the server and the corresponding data is acquired.
- The web server scans the corresponding PV to prepare for data transmission.



- Save GUI screen data
- Save DOM Element as a component of JavaScript
- Contains the properties of the components that make up the screen



Run OPI Screen (web-base service)



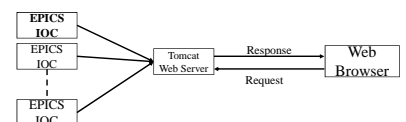
Communication command

- Define the necessary commands as a simple structure to reduce data usage.
- After configuring the GUI screen for each individual, perform save and recall function.

COMMAND	EXECUTION
REGISTER	Create user's private storage space
LOGIN	Log in with generated user information
RUN	Run the created OPI screen
STOP	Stop running OPI screen
SAVE	Save the created OPI screen to the server
LOAD	The saved OPI screen is loaded.
DELETE	Delete the saved OPI screen.

Web-based server and IOC communication Structure

- It is based on Tomcat which provides Web service and collects PV data provided by many IOCs and communicates with Web browser.
- Web Socket is used for TCP / IP communication.



Conclusion

- Using the HTML5 standard, the screen can be configured or used directly on the smartphone even outside the PC environment.
- Data can be successfully viewed on a web browser.
- In order to configure OPI screen on smartphone, UI environment suitable for touch environment is needed.
- A stronger security scheme is needed than using a user ID and password.
- In the future, more components will need to be supported of PLS-II Control System
- To improve this inconvenience, we will apply the user oriented OPI according to the redevelopment of the superconducting LLRF System at KAERI