6 - 40 Technological Remolding of HIRFL-CSRm Power Supply Monitoring System

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It is significant to collect output information of power supply for beam commissioning. The technological remolding of power supply monitoring system is a necessary part in the process of EPICS remolding of HIRFL-CSRm. On the basis of original monitoring system, a new processing flow is proposed. However, the proposed method is not necessary for hardware update. The new software system has been operating steadily in the past five months at HIRFL-CSRm site and satisfies the design requirement.

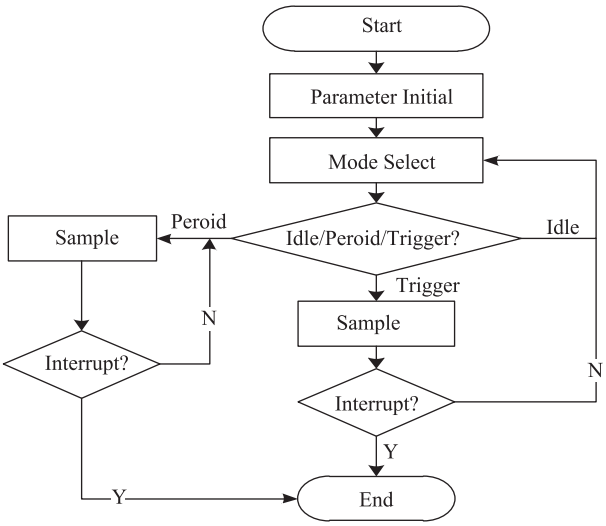

Fig. 1 The flow chart of power supply monitoring system.

The processing flow includes three working modes, such as Idle Period and Trigger. Idle means no sampling and waits to be changed mode Period means sampling periodically, Trigger means sampling until trigger condition happening. The program flow chart shows as Fig. 1.

Since complex noises data filtering algorithm is necessary for the sampling data. Considering the instantaneity of data processing, the filtering algorithm must be high-efficiency and less resource consumed. In order to handle different problems the processing flow adopts different filtering algorithm based on power supply characteristics. Compared with original software system, the new one adds some features, such as trigger delay, threshold and pre-sampling. Experiment results are shown in Fig. 2 and Table 1. The power supply output is 10.3 A with a small noise. Fig. 3 shows the real-time running information.

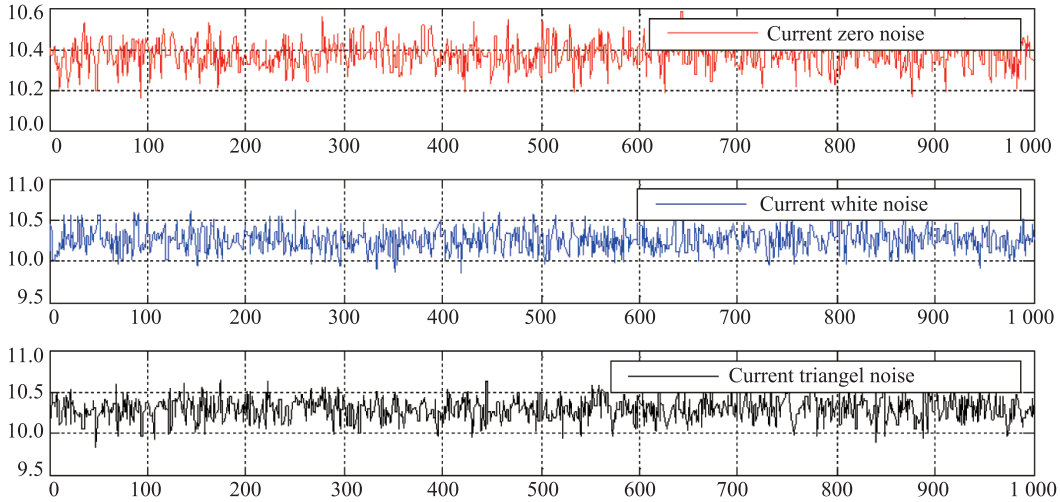

Fig. 2 (color online) The experiment results of remolding system.

Table 1 The comparison results for different noise.

	Noise-free	With white noise	With triangular noise
Maximum amplitude	10.583 4	10.627 1	10.712 8
Minimum amplitude	10.166 2	9.860 0	9.846 1
Mean	10.373 5	10.262 4	10.296 2
Variance	0.004 6	0.018 1	0.019 0

Fig. 3 The real-time running information.

Based on experiment results, filtering effect is satisfactory and filtering algorithm can be applied to different kinds of noise. Under the condition of higher signal-to-noise ratio, statistical property of sampling data remains largely unchanged. So, the new software system can meet need for design and usage.

6 - 41 Design and Implementation of Power Supply Control Program

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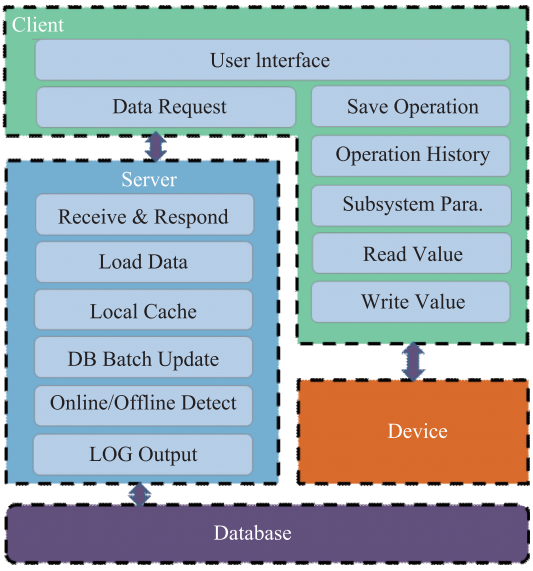

Fig. 1 (color online) Overall architecture of power supply control program.

Power Supply Control Program provides an integrated interface for operators in central control room. The program implemented major functions like reading power supply device's value and status parameters, writing and adjusting device value, saving both the read/write data and operation history to corresponding relational database, detecting and display device online/offline state, generating log files on server side to track the running condition of the Control Program[1].

The overall architecture of the Power Supply Control Program is shown in Fig. 1. The system is developed based on B/S structure, which saves the trouble of configuring all kinds of running environment on client PC, meanwhile the user interface can be opened in any PC in the control room with control network access. This design also separates front-end UI from back-end server, thus the client end program mainly focus on display and device control, leave the data processing and storage work to server end program.

Server side program continuously listens for client requests on a specific port. According to a pre-defined request and response format, the server determines to load requested data from oracle database and send it back to client or save the newly received value to database. To reduce frequent database connections, server maintains a local cache to update the newly received value, periodically update the cached data to database in a batch operation[2]. The server program also provide device online/offline detection function, so every power supply device's connection to control network can be noticed on the user interface, this function will also avoid time consuming for reconnection and wait timeout when an offline device is operate on, thus improves user experience on the user interface. A log file will be generated daily on the server side to track the running condition of the server program as an evidence to recovery from any unpredictable crashes.

The database is redesigned to adapt to new functions, each element strictly obey the HIRFL database naming conventions. Table view, index and triggers are also updated to improve performance.

The client program provides graphic user interface and power supply device control function. User interface of power supply control program is shown in Fig. 2. Each device belongs to a subsystem list, and all devices in the