### BESIII 慢控制系统高压和VME监控 系统的设计和实现

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#### Design and implementation of HV system

- System overview
- Requirement analysis
- Logic design of the whole system
- Features
- Implementation
- Brief introduction to VME system
  - System overview
  - Requirement analysis
  - Logic design of the whole system
  - Features
  - Implementation of a demo
- Tasks on the road...



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### **Requirement analysis**

- MDC 60 channels
- TOF 450 channels
- MC 144 channels
- Each channel with 7 parameters: PwStatus, Vwork, Vpre, Imon, Trip, Rup, RDwn
- 59 temperature points
- Totally 4637 datapoints need to read or control



### Hardware Connection



### Usecase Diagram--function view



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#### State machine



### **DataFlow Diagram**





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# Main Display Panel—MDC HV



#### Realtime chart and History Graph

- With realtime chart, it is easy for you to see the trend of the data or the difference between channels.
- With history graph, you can browse all the data stored in the disk in graph or save the data into Excel in format easy to analyze.

#### **Realtime chart**





### History graph



### Expert window

 With expert window which designed for detector experts, you can set several parameters in detail.

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### System config

#### Parameters inject

 Detector experts can save several config files for different mode, so different config parameters can be easily injected.

#### System parameter

• This is mainly for Slow control administrator to manage the system.

# System Config

MDCHVSaveConfigInfo.vi	HV MDCHVSaveConfigInfo.vi
MDC HV Configure Panel	MDC HV Configure Panel
Image: Production of the production	VmonDBConfig   DSN_Name   HV   MDCHV_Wmon   Database Backup Path   UserID   PastMITHERRIE ZMITHERRIEZ ZMI (mysql_data_back(MDCHV   ImonDBConfig   DSN_Name   table   HV   MDCHV_Imon   Backup every 1   day(s) at 20:18:00
	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

# Running log

 With Running log, alarms and events happened in any time can be easily retrieved.



# Security Strategy

#### User Account manage

 Several features (especially for control or config) are only accessed for granted users. And any actions associated with the logged user will be record.

HV NI Security Log	in					
🚳 La	<b>bVIEW</b> <sup>™</sup>					
		ni.com/labview				
User name:	Administrator					
Password:						
NI domain:	MyDomain(DCS_VME)	<b>~</b>				
	ОК	Cancel Help				



#### An example of user doesn't not login

MDCHVMainTest.vi					
2	O TOF H	IV System	Start Time 19:54:23.665 2006-4-12	Last Update Run Count 22:39:30.415 2006-4-13 96117	@powered by BESIII Slow Control Group phone:88236173 mail:chenxh@mail.ihep.ac.cn
0 Board7	1 Board8	2 Board9	3 Board10	4 Board11	AlarmWindow
ch0 1998.25 0	Ch0 1997.75 0	Ch0 1997 0	Ch0 2000.5 0	Ch0 1998 0	
Ch1 🛑 0.25 0	Ch1 1998 0	Ch1 💭 1998 0	Ch1 1999.5 0	Ch1 1998 0	
Ch2 💙 1998 0	Ch2 1998.25 0	Ch2 1997.25 0	Ch2 1999.5 0	Ch2 1998 0	
Ch3 1997.75 0	Ch3 1998.25 0	Ch3 1997.5 0	Ch3 1999 0	Ch3 1999 0	
Ch4 1998.25 0	Ch4 💭 1998 0	Ch4 💙 1998 0	Ch4 2000.5 0	Ch4 💙 1998.5 0	
Ch5 1998 0	Ch5 1998 0	Ch5 1996.5 0	Ch5 2000 0	Ch5 1999 0	
Ch6 💙 1998 0	Ch6 1998.75 0	Ch6 1995.75 0	Ch6 2000.5 0	Ch6 1998.5 0	
Ch7 1998 0	Ch7 1998.25 0	Ch7 1997.5 0.2	Ch7 1999 0	Ch7 1997.5 0	SOUND
Ch8 1997.75 0	Ch8 1998.25 0	Ch8 1996 0	Ch8 2000 0	Ch8 1999 0	
Ch9 1997.75 0	Ch9 1997.75 0	Ch9 1997.25 0	Ch9 2000.5 0.2	Ch9 2000 0	
Ch10 1998 0	Ch10 1998 0	Ch10 1997.25 0	Ch10 2000.5 0	Ch10 1999 0	
ch11 💙 1997.75 0	Ch11 0 1998.25 0	Ch11 💭 1997.5 0	Ch11 2000.5 0	Ch11 2 1999 0	
					-
Login Tenn D	erature Curve chart etail Realtime splay Bar chart	History Graph Trip&Error History			Meaning of bulb Color Trip Vwork Vpre Pw off

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### **Other features**

- Daily Report
  - A html report with graph and data will be generated every day which is useful for system analysis.
- SMS Alarm
  - When alarm happened, a SMS message will be sent to related staff automatically.
- Remote monitor in IHEP LAN by browser
  - All realtime and history data is stored in a web database, so any granted user in LAN will be able to access the data in browser.

### Current status of HV System

- Already finished the first version: SCHV1.0.2.2 and applied in TOF HV board test.
  - Features already implemented:
    - Data display and HV control
    - Trip and error alarm
    - System config
    - History graph and Realtime chart
    - Expert window
    - Database backup
    - Running log
    - Security manage
  - Features need to be implementd in next version:
    - Daily report
    - SMS Alarm
    - Integrate to SI system
    - Detailed help file
    - webpage

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### Implementation

- The system is constructed mainly in Labview+DSC module, with mysql as database.
  - Xcontrol is widely used, it makes the GUI more modularity. All the display function of a HV Board is capsulated in Xcontrol. We only need to configure the index and name for the board, and call the "read" method, data for the board will be displayed.

 Apache+php+mysql will be used for webpage design

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### Statistic of the VMECrates

system	9U Crate	6U Crate	Backup	Total
MDC	16	1		17
EMC	16		9U crate: 2	18
TOF	2			2
MUC	2			2
TRG	5	1	6U Crate: 1	7
Total	41	2	3	46
Total in use			43	

### Parameters need to monitor

- 9U crate:
  - On/Off
  - Voltage and Current: +3.3V、+5V、+12V、-12V、-5.2V
  - 8 channels of temperature
  - Fanspeed
- 6U Crate
  - On/Off
  - Voltage and Current: +3.3V、+5V、+12V、-12V
  - 4 channels of temperature
  - Fanspeed

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### System Structure and Dataflow Diagram



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### A demo of display



### **Parameter Config**

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() o	CrateName MDC_VMECrate						CrateName MDC_VMECrate2						Path to new Library File		
				CANNo 1 🚔 CrateNo 2 🚖					<u>.</u>	A D:\VME\SCVME1.0.0 For LV8.0\VMECrate.lvlib					
		Isramator Namo 🔹 Ölarm Hi					December Name		Alarm H				Lib.Database Path		
	Parameter Name		Aldriit.hi		Hidriffice	0	Parameter Name		Alarin.n		Alarin.L	U	B D:\VME\SCVME1.0.0 for LV8.0\data\LocalDB		
	Voltage.+5V	*	5.25		4.75		Voltage.+5V	~	5.25	<b>~</b>	4.75		Lib.Database Name		
	Current.+5V	¥	10	✓	-1		Current.+5V	*	10	<b>~</b>	-1		VMECrate_LocalDB		
	Voltage5.2V	*	5.45		4.95		Voltage5.2V	*	5.45	<b>~</b>	4.95		error out		
	Current5.2V	¥	5	<b>~</b>	-1		Current5.2V	¥	5	<b>V</b>	-1		status code		
	Voltage.+12V	¥	12.5	<b>~</b>	11.5		Voltage.+12V	~	12.5	<b>V</b>	11.5		source		
	Current.+12V	¥	5	<b>~</b>	-1		Current.+12V	~	5	<b>V</b>	-1				
	Voltage12V	<b>v</b>	12.5	<b>~</b>	11.5		Voltage12V	~	12.5	<b>V</b>	11.5				
	Current12V	~	5	<b>~</b>	-1		Current12V	~	5	<b>V</b>	-1				
	Voltage.+3.3V	~	3.55	<b>~</b>	3.15		Voltage.+3.3V	~	3.55	<b>V</b>	3.15				
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	Т3	•	129		0		T3	~	129	<b>V</b>	0				
	T4	<b>~</b>	129	<b>~</b>	0		T4	~	129	<b>V</b>	0				
	T5	<b>~</b>	129	<b>~</b>	0		T5	~	129	<b>V</b>	0				
	T6	~	129		0		T6	~	129	<ul><li>✓</li></ul>	0				
	Fanspeed1	~	3800		1200		Fanspeed1	~	3800		1200				
	PowerStatus	~	0		0		PowerStatus	~	0		0				

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### Tasks on the road...

#### HV system

nearly finished, aging test is on the going.

#### VME System

- Under building...
- T&H System update...SI System...
- Webpage...



