



Yifan Song

DOCTORAL STUDENT

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Summary

I am a 4th-year Doctoral student at NSRL@USTC on the distributed control system for large scientific facilities, especially the particle accelerator. My Ph.D research work covers a range of issues: Large distributed control system, Data acquisition, storage, retrieval, visualization and mining, Interlocking and alarm for the control system, System redundancy and availability, Industrial real-time Ethernet.

Education

University of Science and Technology of China

PH.D. IN NUCLEAR SCIENCE AND TECHNOLOGY

Sep. 2010 - Jun. 2019 [anticipated]

- GPA: top1 / total 60, supervisor: Prof. Gongfa Liu

University of South China

B.S. IN NUCLEAR SECURITY ENGINEERING

Sep. 2010 - Jun. 2014

- GPA: top1 / total 148

Skills

Programming	C, Python, Java, Matlab, Shell, LabWindows/CVI, JavaScript, Scala, PyQt
Web Development	Vue.js, Node.js, MongoDB, MySQL, SQLite, Express, jQuery
Big Data	Hadoop, Spark, Impala, Kafka
Control System	EPICS (V3 & V4 & 7), Control System Studio, Phoebus, Archiver Appliance, BEAST, S7plc, StreamDevice, pyEPICS
Physics	Background knowledge in partial accelerator physics (Synchrotron & Linac)
Misc.	Linux, Mac OS, Virtualization, Docker, openPOWERLINK, Git, \LaTeX .

Projects

Automatic data archiving and analysis system at Hefei Light Source (HLS-II)

CORE MEMBER

Nov. 2017 - PRESENT

- Local updated and deployed the Data archiving system based on the EPICS Archiver Appliance (AA) at HLS-II;
- Developed the Auto Configurator using C and Python to realize the automatic configuration of the archiving parameters;
- Developed the Single-Page-Application (SPA) based on Vue.js and Highcharts to realize the visualization of historical and real-time data;
- Constructed the Hadoop big-data platform using Cloudera CDH;
- Developed the ETL program from AA and RDB Channel Archiver using Sqoop and Spark.

Interlocking and alarm system at HLS-II

CORE MEMBER

May. 2015 - PRESENT

- Designed, developed and deployed the configurable software interlock system for HLS-II
- Local updated and deployed the alarm system based on BEAST at HLS-II;
- Developed the alarm message push program via email & SMS using Java;
- Upgraded the alarm system using Phoebus this year;
- Developing the new message push programs via WeChat using Python at present.

Control system design and construction for front-end devices of IRFEL

MEMBER

Sep. 2017 - PRESENT

- Developed the IOC Applications for front-end devices of Infrared Free Electron Laser Light (IRFEL);
- Completed the controls of vacuum gauge, power supply, motor, etc;
- Designed and developed the operation interface using Phoebus and Display Builder;
- Constructed the server system based on VMware vSphere.

High level control system for a coating equipment

CORE MEMBER

Jun. 2015 - May. 2016

- Developed the high level control system for a vacuum coating equipment using NI LabWindows/CVI;
- The control system includes the following functions: user rights division, rapid pumping and security protection for the vacuum system, flexible configuration for the complex process control, comprehensive process monitoring, comprehensive and detailed log system, and so on;
- Developed the driver program for PCI-6221 card to realize wide range scanning of ion beam.

Research about the Redundant EPICS IOC and industrial real-time Ethernet

CORE MEMBER

Feb. 2014 - Oct. 2016

- Designed and built a redundant platform in embedded Linux OS on both NI cRIO-9068 using the EPICS iocRedundancy toolkit;
- Designed and built a multilayer redundant control prototype system based on PROFINET;
- Built the prototype system of openPOWERLINK and tested its real-time performance;
- Developed the EPICS driver to integrate openPOWERLINK into EPICS environment.

Honors & Awards

- 2017 **Award**, Shunde scholarship
- 2013 **National first prize**, China Undergraduate Mathematical Contest in Modeling
- 2013 **Award**, National Scholarship
- 2011 **Award**, National Scholarship for Encouragement

Publications

JOURNAL ARTICLES

- **Yifan Song**, Gongfa Liu, et.al, Automatic data archiving and visualization at HLS-II, Nuclear Science and Techniques, 2018, 29(9): 129
- Peng-quan Wen, **Yifan Song**, Bing Li, et al. Beam cleaning status in HLS-II storage ring. Nuclear Techniques, 2015,10:10-14 (in Chinese)
- Hao Kang, **Yifan Song**, Ke Xuan, Gong-fa Liu, Development of Control System for Vacuum Coating Equipment Based on Lab Windows/CVI, Vacuum, 2016 (in Chinese)
- Zi-yu Huang, **Yifan Song**, Gongfa Liu, et. al, Design of Interlock System of FELiChEM, Atomic Energy Science and Technology, 2017, 51(09):1724-1728 (in Chinese)

CONFERENCE ARTICLES

- **Yifan Song**, Gongfa Liu, et.al, The Configurable Software Interlock System for HLS-II, Proceedings of IPAC2017, Copenhagen, Denmark
- Shuang Xu, **Yifan Song**, et.al, Control system design for front end devices of IRFEL, Proceedings of IPAC2018, Vancouver, British Columbia, Canada, 2018
- X.K. Sun, **Yifan Song**, G. Liu, Distributed I/O System Based on Ethernet POWERLINK Under the EPICS Architecture, Vancouver, British Columbia, Canada, 2018
- X.K. Sun, **Yifan Song**, Gongfa Liu, et. al, Design and Implementation of HLS-II Constant Temperature Cooling Water Control System, 2018(06):1139-1143 (in Chinese)
- Zi-yu Huang, **Yifan Song**, et. al, A Redundant EPICS Control System Based on PROFINET, Proceedings of ICALEPCS2015, Melbourne, Australia, 2015
- Zi-yu Huang, **Yifan Song**, et al. The Interlock System of FELiChEM, Proceedings of ICALEPCS2017, Barcelona, Spain, 2017
- Zi-yu Huang, **Yifan Song**, G. Liu, EPICS Driver for Siemens CP1616 Communication Module, Vancouver, British Columbia, Canada, 2018

PAPERS IN PREPARATION

- Yifan Song, Gongfa Liu, Design and construction of the data warehouse based on Hadoop ecosystem at HLS-II, Proceedings of PCaPAC 2018
- Yifan Song, Gongfa Liu, Data Archiving and visualization of IRFEL, Proceedings of PCaPAC 2018

Academic Activities

12th International Workshop on Personal Computers and Particle Accelerator Controls

THsinchu City, Taiwan, China

Oct. 16 - Oct. 20 in 2018

- Will make an oral report and a poster report at PCaPAC 2018

8th International Particle Accelerator Conference

Copenhagen, Denmark

May. 14 - May. 19 in 2017

- Successfully achieved the student grant and made a poster report at IPAC 2017

the 9th OCPA Accelerator School

Shanghai, China

Jul. 26 - Aug. 4 in 2016

- Finished the courses of the ninth OCPA (the International Organization of Chinese Physicists and Astronomers) Accelerator School

SAKURA Exchange Program in Science

Tsukuba, Ibaraki Prefecture, Japan

Jul. 5 - Jul. 14 in 2016

- Finished the courses of Japan-Asia Youth Exchange program in Science (SAKURA Exchange Program in Science) administered by KEK