



Contribution ID: 69

Type: **Poster presentation**

Prototype Design for Upgrading Central Safety and Interlock System on EAST

Tuesday 13 October 2020 16:34 (1 minute)

The national project of experimental advanced superconducting tokamak (EAST) is an important part of the fusion development stratagem of China. The safety and interlock system (SIS) is in charge of implementing the investment protection of human and tokamak from potential accidents. The SIS is constituted by two horizontal layers, one for the central safety and interlock system (CSIS), and another for the different plant SIS, they are connected through different networks. With the development of physical experiment, the CSIS had come close to reaching its limits for expandability. For instance, the former central safety and interlock system based on PLC just offers digital I/O channels with 1ms scan time, and the response time of event is around 4ms. What more, the primitive GREEN and RED circles dashboard, and intermittent event record display problem make the central control team determines to update the CSIS. The new CSIS is divided in two architectures according to timing requirements. The slow architecture has been established based on PLC, the fast one executes functions within 100 us by using COTS based on FPGA. The new CSIS preserves the previous PLC systems as slow controller, and introduces NI compactRIO into fast architecture. The fast controller processes not only digital signals but also analogue variables, which require certain calculation. The supervisory HMI of CSIS is redesigned, and variables from slow controller and fast architecture are collected through OPC UA. In this paper, we'll present EAST machine and human protection mechanism and the architecture of the upgrading CSIS.

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No

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Author: Mr ZHANG, Zuchao (ASIPP)

Co-authors: XIAO, Bingjia (Institute of Plasma Physics, Chinese Academy of Sciences); Mr JI, Zhenshan (ASIPP); WANG, Yong; Ms WANG, Ping (Institute of Plasma Physics, Chinese Academy of Sciences, Hefei Anhui, P.R China)

Presenter: Mr ZHANG, Zuchao (ASIPP)

Session Classification: Poster session B-01

Track Classification: Real Time Safety and Security