EPICS IOC Module Development and Implementation for the ISTTOK Machine Operation and Control

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This article presents a developed, tested and implemented EPICS IOC (I/O controller) module solution for the ISTTOK tokamak machine operation and control for the vacuum and gas injection systems.

The work is divided in two software layers which communicate through a developed and implemented serial RS-232 communication protocol.

The first software layer is an EPICS IOC module running as a computer server application capable of receiving requests from remote or local clients providing driver interface to the system by forwarding requested commands and receiving system and control operation status.

The second software layer is the firmware running in the Microchip dsPIC microcontroller modules which performs the interface from RS-232 optical fibre serial protocol to the EPICS IOC. The dsPIC module communicates to the ISTTOK tokamak sensors and actuators via RS-485 and is programmed with a new protocol developed for this purpose that allows EPICS IOC module command sending/receiving, machine operation control and monitoring and system status information.

In addition, the EPICS IOC module provides user client applications access in order to allow operators to perform remote or local monitoring, operation and control. Communication between the EPICS IOC module and the clients is achieved via a TCP/IP and UDP protocol referred as Channel Access.

The complete solution, has been developed, tested and implemented successfully in the ISTTOK tokamak machine.