Experience with a Slow Control system based on industrial process control hardware and software for the Xenon1T Dark Matter Search

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on behalf of the XENON1T Collaboration

The XENON1T Experiment

- Dark Matter direct search experiment based on dual phase TPC with 3.5 ton of ultra-pure LXe and fiducial volume of 1 ton (currently commissioning at LNGS).
- Build all the Slow Control System (SCS) on a very tight schedule (2y planning + 2y construction)

Motivation

The Challenge...

- Extreme care with load (LXe) and associated instrumentation that regulates and control all the mechanisms of the experiment (Storage, Purification, Cryogenics, Distillation, Calibration,...).
- Segmented development by sub-system workgroups
- Allow local and remote selective access to data and control according to the nature of the action and the role of the operator.

The Solution
A distributed fail-over SCADA system, based on industrial process control software and hardware from GE: Cimplicity software and the RX3i family of Programmable Automation Controllers (PACs) and IO modules.

- System with more than 10000 variables (process variables + 2500 variables in Historian)
- Totally virtualized supervisory components (VSphere)
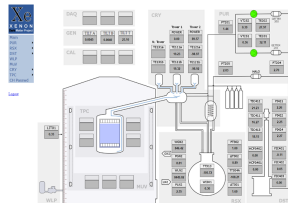
Snapshots of Xe1T...

Example of PAC for Cryogenics sub-system with different IO modules
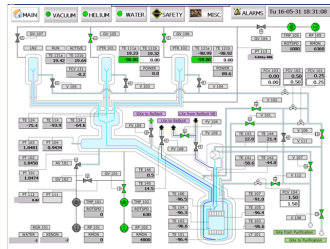
Example of touch panel screen for the Cryogenics sub-system.
SCADA and Xe1tViewer have similar screens

Operator at local touch-panel (Beijer Exter T150) setting alarm
thresholds

Main screen of universal monitoring tool for fixed or mobile platforms