USI: Universal Standard for Instrumentation

NEUTRONS FOR SCIENCE

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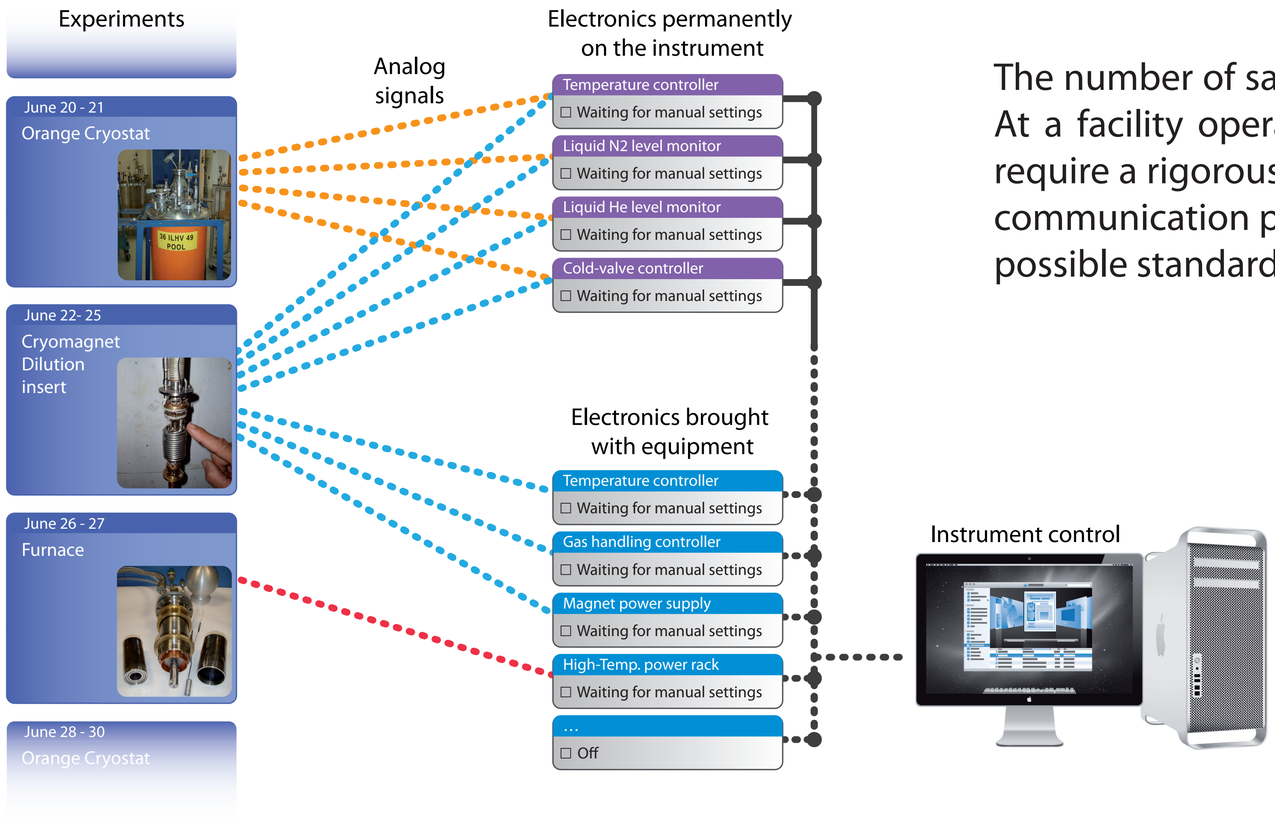


Actual organisation

Introduction

The number of sample environment equipment grows and gets more and more complex. At a facility operating more than 40 instruments, their installations on the instruments require a rigorous organisation with well-known calibration curves, PID parameters, limits, communication protocols, etc. Indeed, in order to reduce the costs, we employ as much as possible standard electronics and share as many devices as possible.

Aims and Difficulties

- Reduce the beam-time losses:
  - time required to plug and set the equipment,
  - time to fix the parameters, limits and procedures,
  - time to deploy new electronics.

- Reduce the investment and operation costs:
  - share equipment and electronics,
  - prevent damages of the equipment.

- Help non-expert users to operate complex equipment.

Hardware Solution: USI - Universal Standard for Instrumentation

To enhance the autonomy and minimize the role of the software, we embed as much intelligence as possible directly in the equipment:

- Commands for setting the PID parameters, limits, etc.,
- Procedures for operating the device without a computer,
- Safety loop to protect the user and the equipment.

The commands are pushed automatically when plugging USI compliant systems. For non-USI compliant controllers, an auto-identification system dispatch the commands.

The procedures are hard-coded in automats not relying on operating systems and the safety loops are cabled.

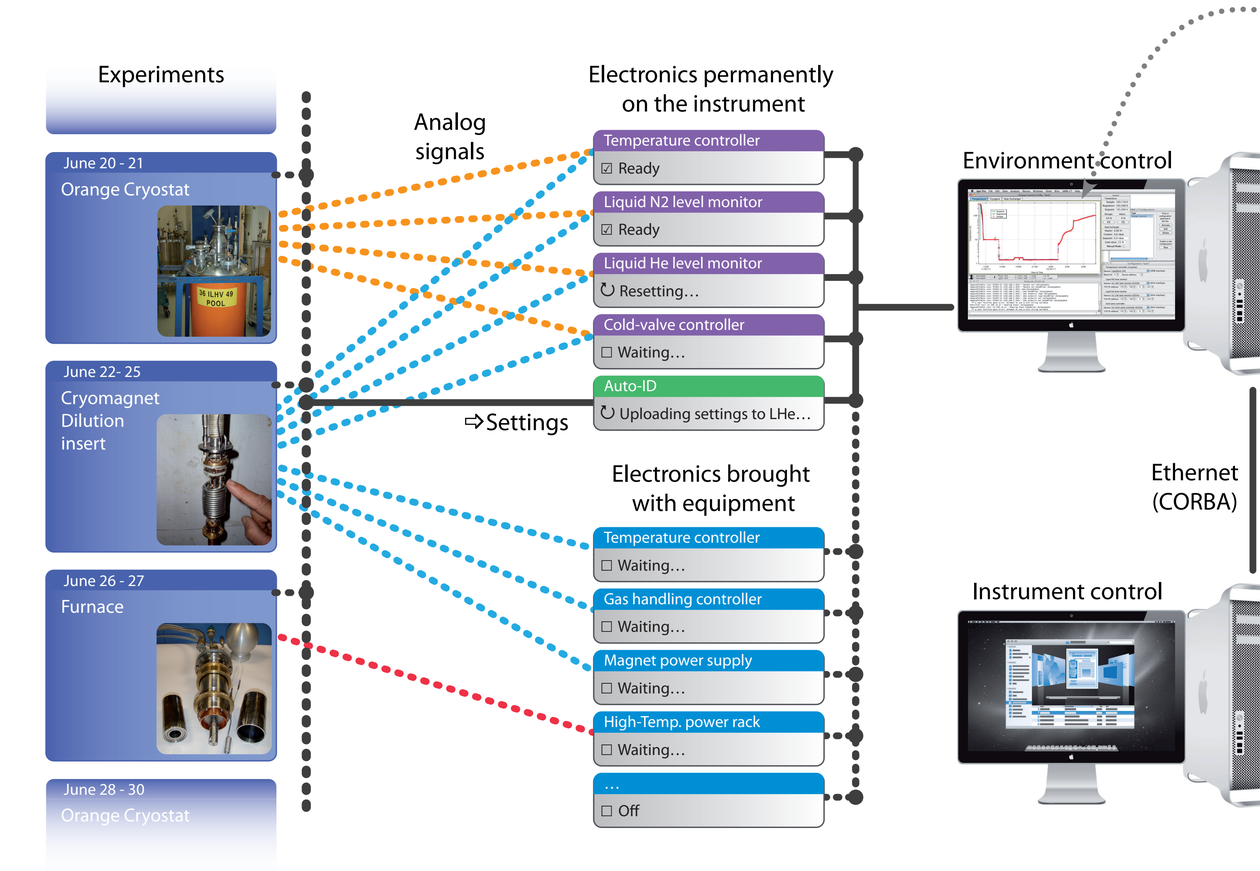
ILL implementation of a USI auto-identification system (prototype)

Software Solution: Unified and Dynamic

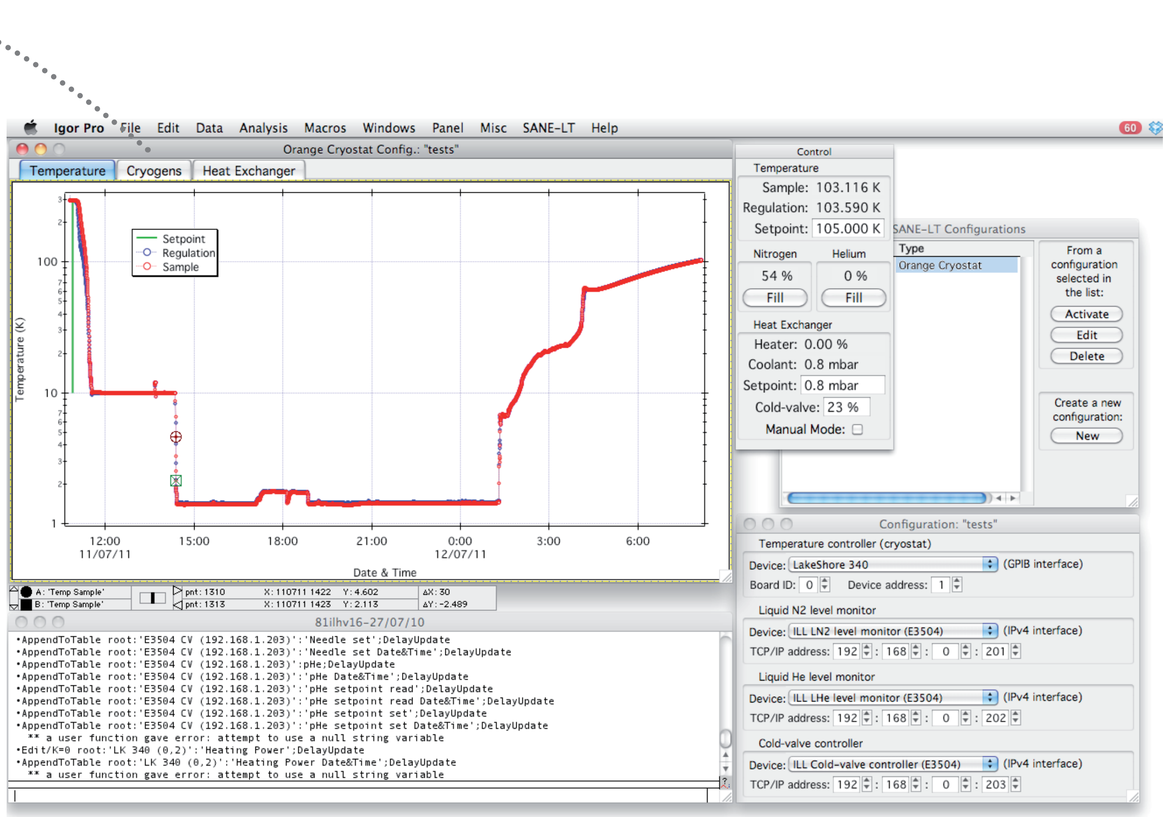
To ease the control of complex equipment (e.g. dilution fridge in cryomagnet, high-pressure cell inside a cryostat, etc.), we propose a unified and dynamic software:

- dynamic management of the electronics,
- dynamic management of the instrument configurations,
- single user-friendly graphical interface for all equipment,
- USI compliant, i.e. updated by the equipment,
- simple and reliable protocol of communication shared with the instrument control software,
- automatic logging of the events,
- automatic alerts management by email and SMS,
- full and safe remote control for out-of-hours support.

Based on the IGOR scientific graphing and data analysis program in active development since 1988, it does not require a big programming effort while ensuring a very efficient and reliable result (http://www.wavemetrics.com).



Future organisation



Standard graphical user interface

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