IRIO. Intelligent instrumentation for adaptative integration

IRIO consists on a methodology and a set of software tools that drastically simplify your intelligent data-acquisition system development cycle. With IRIO, FPGA implementations are automatically integrated into EPICS.

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Technological Offers type

Technological solutions

Research and innovation areas

- Digital Technologies, Artificial Intelligence, Cybersecurity, 5G, Robotics
- Social Innovation, Open Science, Governance, and Education Science

ODS

Available from: 2020

Where?

Research into Instrumentation and Applied Acoustics (I2A2)

Keywords: | big science | EPICS | FPGA

Brief description of the technology solution and the added value it provides

Big Science facilities use complex control systems like EPICS to control their plant systems. The integration of reconfigurable hardware (FPGA) is particularly complicated. To aid on this integration IRIO creates a solution that intelligently detects hardware and substantially reduces integration time on the control systems.

IRIO can help on the several stages that are required for the development of these systems, reducing initial expertise on the control systems by more than 160 hours of work and reducing implementation time by 70%. It is also a convenient tool that eases maintenance work.

IRIO is currently part of ITER instrumentation and control. To evaluate ITER control systems. KSTAR tokamak (an ITER-like facility) uses IRIO on already working systems.

Description of the technological base

Los proyectos de experimentación en el ámbito de Big Science usan mecanismos de control complejos para controlar sus sistemas de planta de una manera distribuida y robusta. Una gran parte del sector usa una colección de software, EPICS, para hacerlo. La integración de los diferentes instrumentos es una tarea muy lenta. En particular, los sistemas basados en FPGA, que son sistemas multifuncionales reconfigurables, requieren un esfuerzo adicional de desarrollo en la integración. La característica interesante de los sistemas FPGA, su capacidad de reconfiguración, tiene por contra su impedimiento, ya que EPICS no puede detectar los cambios de recursos hardware por sí mismo.

IRIO automatiza la integración de estos sistemas de adquisición de datos mediante la detección inteligente de los recursos utilizados en el hardware, reduciendo el tiempo de implementación y el coste de mantenimiento.

"IRIO simplifica la integración del diseño de hardware en los sistemas de planta, reduciendo el tiempo de desarrollo y facilitando las pruebas en el proceso"

Market demands

- Big science experiments move slow and require of lots of resources. For this reason, Big science facilities use open-software based solutions and FPGA-based hardware. They look for long collaborations with the businesses they trust to integrate the systems and do not want to be constrained by closed solutions.
- An example of such efforts is reflected in recent interests of big companies like Altera and Xilinx which lead the market on FPGA sales and patent production, to also push on the open-software initiative named OpenCL for developing with FPGAs. These companies are exploring mechanisms that aid on integration of diverse control and processing systems.
- The potential of OpenCL also attracted companies like: Apple, IBM, Texas Instruments, NVIDIA, Intel and many more.
  Oher areas of application requiring the integration of diverse electronic devices with high performance are the automotive sector, with Tesla leading on innovation for autonomous driving; Industrial processes that highly value reduced maintenance time and cost; Medical applications using accelerators for proton therapy are the primary markets.
- To relieve the pain of integrating systems, some companies are offering solutions, for instance, the companies focused in the Big Science market, such as Observatory Sciences or Cosylab. Although, these companies still relay on conventional custom solutions.

Competitive advantages

- Less implementation hours: working with IRIO is easier than straight implementation with EPICS. When working with our tools, development time is reduced around 70%.
- More design adaptability: hardware changes don't require a software change. Unlocking FPGA potential.
- Lower initial expertise: reduced EPICS knowledge needs. Learning EPICS-basics for a senior engineer may take 160 hours,

mastering will take years.
- Lower commissioning & maintenance costs: simple changes require no additional work with IRIO. Major changes benefit as much as normal implementations.

"Simplify the Integration of your intelligent Instrumentation system in EPICS with IRIO reducing the cost and development time to the minimun"

Development stage

- Concept
- Research
- Lab prototype
- **Industrial prototype**
- Production

Contact

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w:http://www.i2a2.upm.es/idi/instrumentacion-aplicada/sistemas-de-adquisicion-de-datos-avanzados-2/

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