Open Architecture Controls: The Key to Interoperability

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Background

At the 1999 Robotics Industry Forum several speakers spoke on the problems of integrating robots into production systems. Open architecture controls were proposed as one possible means for reducing the time and cost of system integration. More specifically, Clif Triplett of General Motors proposed a "first wave" of desired standards relating to factory data network interfaces.

However, it was clear from the presentations and the subsequent off-line discussion that there was no consensus on what open architecture controls were, whether there would be commonality between vendors, or whether the industry would even support such an approach. Certainly in the past there has been active resistance on the part of vendors to the concept of open architectures. Large users, on the other hand, have shown increased interest in recent years in achieving interoperability across heterogeneous components of manufacturing systems, driven by the imperative of survival in the competitive global marketplace.

To provide an open forum for further discussion of these issues, the National Institute of Standards and Technology (NIST) and the Robotics Industries Association (RIA) agreed to organize a workshop including vendors, users, and system integrators. That effort has continued and we just completed the third workshop this week.

Open Architectures

The term "open architectures" covers a spectrum of ideas, from well-defined and documented external interfaces, to component based software architectures, to any software running on a personal computer.

An agreement has emerged from the first two workshops that we are talking generally about what is called a "PC Augmented Architecture" where a standard personal computer is interfaced to a proprietary closed control. Vendors argue that maintaining integrity of the motion control functions is essential from the standpoints of reliability and liability.

Vendors further agree that there are three external interfaces where standardization could reasonably occur: factory data network interfaces, peripheral interfaces, and human-machine interfaces. Those are the areas where we are focusing attention.

First Target: Factory Data Network Interface

Clif Triplett of GM has proposed a "first wave" of existing network standards that could be immediately adopted by the industry and that would make factory integration much easier. Those standards include Ethernet, TCP/IP internet communication protocols, Network Time Protocol (NTP), Simple Network Management Protocol (SNMP) and Extended Markup Language (XML… so data can be viewed with a browser).

While these are bread-and-butter concepts to network engineers and network systems administrators, they are not so well known to factory automation and robotics engineers. Further, there have been many more formal and de facto standards proposed for consideration, and sorting through these has taken some time.

The agenda for this week's meeting was to reach agreement on the specific standards to be adopted, and to reach agreement on an implementation plan.

Open Architecture Web Site

NIST has established a web site to post meeting notices, proceedings of past meetings, mailing lists and links to additional information on the standards under consideration. The url is www.isd.mel.nist.gov/projects/openarch. If you would like to see additional material there or need more information, please contact Fred Proctor (proctor@ nist.gov) who is heading this effort.