Plant Services

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A LOOK AT SMART DEVICE ECOSYSTEMS

What can we measure using IIoT technologies that we couldn't before?

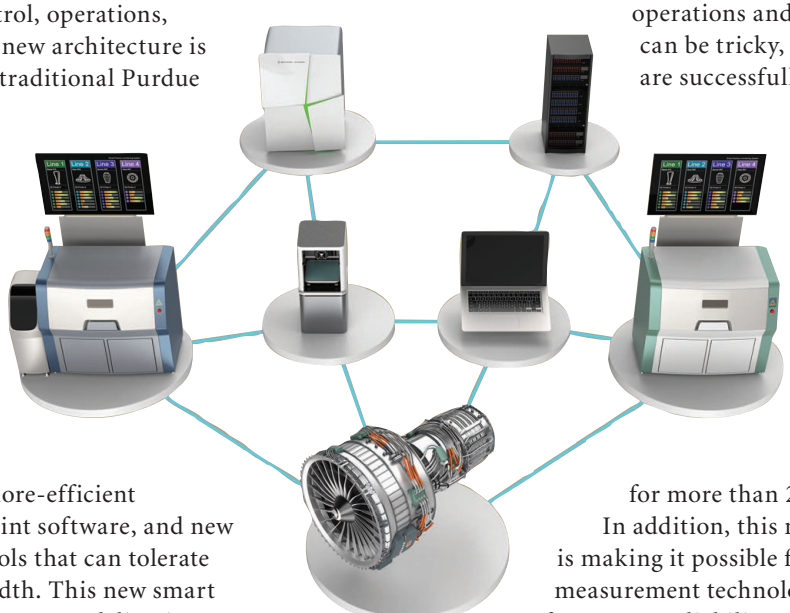
A lot of conversation is happening today about the Industrial Internet of Things (IIoT), which we define loosely as a new ecosystem of smart industrial equipment that is connected to software based on Internet technologies.

The IIoT promises to make it possible for new applications to deliver significant value to industrial operations. There is also the potential to quickly access experts wherever they are located, helping companies that are struggling to deal with the retirement of baby boomers and the associated skills gap that follows. Still, many people with experience in process automation are wondering what is new about this – it seems that we've been doing this for a while now.

Since the 1990s, the Purdue model has been used as a reference architecture for securely integrating applications among control, operations, and business systems. A new architecture is emerging outside of the traditional Purdue model for monitoring applications that don't involve control of the process. This architecture resembles SCADA systems, but when you remove supervisory control, they become simply data acquisition systems. New IIoT gateways are based on more-efficient processors, small-footprint software, and new message queuing protocols that can tolerate limited network bandwidth. This new smart connected ecosystem focuses on delivering actionable information to engineers and managers when and where they need it.

Applications related to energy, reliability, personal safety, and environmental monitoring are challenged when implemented in traditional process automation architectures based on the Purdue model. Getting data from the control network to the right user can be costly; it involves long integration project schedules; and it's burdened by new security standards that are making this more difficult as time progresses. Securely routing the data from control networks to the operations and business networks can be tricky, but many companies are successfully doing this through the use of enterprise data historians or by hosting applications on the operations network with secure access through a DMZ. This kind of smart, connected device ecosystem is something that has been developing for more than 20 years.

THIS NEW IIoT ECOSYSTEM IS MAKING IT POSSIBLE FOR INNOVATIVE MEASUREMENT TECHNOLOGIES TO BE INTRODUCED FOR ENERGY, RELIABILITY, PERSONAL SAFETY, AND ENVIRONMENTAL MONITORING APPLICATIONS.



In addition, this new IIoT ecosystem is making it possible for innovative measurement technologies to be introduced for energy, reliability, personal safety, and

environmental monitoring applications. Examples include new wireless power monitoring; condition monitoring on pumps, fans, and heat exchangers; toxic gas monitoring; and safety relief-valve monitoring applications. These applications can be purchased, installed, and owned by operating companies or provided as a service by third-party organizations that have domain expertise. Add in new cloud computing technologies that combine distributed data processing with advanced analytics, and the potential value of this new application ecosystem is getting everyone excited.

The concept of smart devices isn't new for process automation. Most transmitters used today are considered to be "smart." Some smart instruments are multifunctional, with a rich set of onboard diagnostics and processing capability. There are also many new innovative sensing technologies being brought to market, enabling applications that previously weren't economically justifiable. Wireless sensor networks based on WirelessHART and ISA100 are being deployed in monitoring systems that are outside of the traditional process control and safety domain.

Wired and wireless gateways can be installed with direct connections to software running in the business and operations networks, and in some cases they are being integrated with cloud computing through the Internet. The cybersecurity model is simplified here, because the threat to control and safety systems is reduced given that there is no direct connection to the control and safety system networks.

The cost and complexity of implementing these new monitoring networks is significantly reduced. Wireless sensor networks eliminate a lot of design and installation costs, thanks to the elimination of wiring, cable trays, cable terminations, and junction boxes. Wired and wireless gateways can be connected to the same networks as the information users, reducing the complexity of IT security systems deployed. Gateways can host some user-based applications for focused point solutions, or they can host algorithms that filter and process information before passing it along to higher level systems on the company networks or in the cloud. In some cases, cellular modems or other wireless backhaul networks are being used to connect the gateways directly to cloud computing.

There is significant value to be delivered to industry as a result of the new smart connected device ecosystem that is developing. The new monitoring networks will co-exist with the traditional networks that are based on the Purdue model. There will be some applications where data is combined from the two architectures as well as other external sources such as lab data, weather data, and maintenance records.

The smart connected device ecosystem is making it possible to address energy, reliability, personal safety, and environmental problems that have yet to be solved by traditional approaches. It is becoming possible to securely get the right information into the hands of expert problem-solvers wherever they are located, whether in a control room on-site or in a factory somewhere on the other side of the world.

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