

Electronics: A Voyage of Discovery

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By John Teresko
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Smart Machines

Industrial interest in evolving machine intelligence could be another opportunity for the future application of nanoelectronics, suggests Jay Lee, director of the Center for Intelligent Maintenance Systems at the University of Wisconsin, Milwaukee. Lee's Center is an industry research consortium that is developing new approaches to the maintenance monitoring of production equipment. The University of Michigan, Ann Arbor, is a partner.

The goal is to equip production equipment with sensing systems that can anticipate the earliest beginnings of anything that could lead to machine downtime. The concept is intended to predict and prevent equipment failure.

Lee says the developing field of nanoelectronics could offer cost-effective improvements in configuring the embedded intelligence systems required. Industry membership in the research cooperative includes about 40 manufacturers such as Rockwell Automation, General Motors Corp., Intel Corp., Harley-Davidson Inc. and Hitachi.

Lee predicts that the eventual convergence of nanoelectronics' with intelligent maintenance systems will be typical of a future for both industrial components and consumer products. "For example, industrial pumps will routinely contain embedded computational intelligence. The lower cost of such embedded systems will gradually win out over today's add-on approach."

Nanoelectronic based sensors will be a critical benefit for machine tools as builders continue to add diagnostic capabilities, adds Paul Warndorf, vice president technology, the Association for Manufacturing Technology, McLean, Va.

"Eventually nanoelectronics will add a kind of cognition -- giving machine tools the ability to sense and adapt to changes that could impact tolerances and quality. Customers are beginning to ask for machines that, in effect, understand their tasks, enabling them to compensate when necessary." He also sees the nano-based approach leading to multifunctional sensors that will change the economics of utilization via greater capability at less cost. "Intelligence will increase at the sensor level."