AI ADVANCES NEXT-GENERATION INDUSTRIAL ROBOTICS

AI Amplifies Opportunities for Efficient, Safe, and Secure Innovation in Industrial Environments

THE CHALLENGE

Emerging instances of AI-enabled cobots, autonomous vehicles, and non-piloted drone operations are part of an expanding array of innovative use cases in industrial robotics. Industrial robotics integrated with AI are predicted to spur market growth by a projected CAGR of more than 15% in coming years, reaching USD 66.48 billion by 2027, according to Fortune Business Insights. As barriers between human activities and robotic capabilities diminish — moving beyond the fenced activities of last-generation industrial robots — new collaboration and workflow models are bringing humans and robots together in industry.

Despite advances, however, expanding the range of use cases for robotics in Industrial IoT (IIoT) environments requires negotiating long-standing technical roadblocks. This includes the challenge of integrating diverse components across heterogeneous networks, employing machine learning to build and operate intelligent systems that adapt to workflows, and implementing responsive, low-latency communication services to interact with robotics systems in real time.

THE APPROACH

Artificial intelligence is critical to new robotics approaches. And rather than augmenting existing machine operations by bolting on AI-driven components, AI-first puts the intelligence at the forefront of the design process to perform at the core of a task. The focus is on building solutions that meld hardware and software to effectively use machine learning and AI-guided functions, performing operations with greater speed, reliability, security, and safety.

As with digital transformation, the AI-first approach requires a rethinking of traditional design — transforming architectures to satisfy the solution requirements over the full lifecycle, rather than just reorganizing and tinkering with existing solutions. The Wind River portfolio, with its multiple solutions and purpose-built embedded components, provides a flexible and agile foundation for meeting this need. Wind River solutions are elements of an extensive roadmap leading to the benefits and enhanced business value promised by today's industrial robotics.

INDUSTRIAL ROBOTICS SECTOR CHALLENGES

- Despite surging interest in industrial robotics, fundamental challenges still exist when trying to perform business operations and automate workflows across hybrid network environments and disparate systems.
- Recent advances in artificial intelligence (AI) combined with new communication technologies, including 5G, help integrate robotics into software-defined infrastructures as part of the full-scale digital transformation of organizations. This confluence of technologies creates abundant opportunities for factory automation, transportation breakthroughs, and unprecedented efficiency.

WIND RIVER SOLUTIONS

- **Wind River Studio operator capabilities:** Integrates cloud platform, orchestration, and analytics capabilities so operators can deploy and manage their intelligent 5G edge networks globally
- **VxWorks:** The world's leading RTOS, enabling deterministic applications scaling from very small compute packages
- **Wind River Simics:** Allows developers to simulate anything, chip to system, and get the access, automation, and collaboration tools required for agile development practices
- **Wind River Helix Virtualization Platform:** A real-time, embedded, Type 1 hypervisor that can manage unmodified guest operating systems running in virtual machines, consolidating workloads for factory control automation

Wind River Studio

Wind River Studio integrates cloud platform, orchestration, and analytics capabilities, allowing industrial equipment companies to develop and encompass 5G communications and intelligent edge infrastructures in their products. Studio will expand the scope of IIoT solutions as well as the functions, operations, and services of industrial robotics.

VxWorks

Particularly when safety and security are essential, the VxWorks® real-time operating system (RTOS) is found at the heart of many industrial robotics deployments across a wide range of critical infrastructure environments — including the Mars rover. VxWorks excels at high-performance industrial applications, including robotics, control automation, and intelligent vehicle applications.

And for meeting the most rigorous industry requirements, VxWorks Cert Edition has been specifically designed for safety-critical applications. VxWorks Cert Edition is supported by certification evidence spanning industrial, avionics, and automotive applications, meeting the highest achievable standards set by certification authorities.

Wind River Simics

The most challenging aspect of launching a project involving industrial robotics is often made up of the design, development, deployment, and testing issues that need to be resolved before final hardware and components are available to the developers. This is the core capability offered by Wind River Simics®. Enabling engineers to work independently of physical hardware, Simics provides a comprehensive simulation platform, employing virtual hardware components to accelerate solution design, integration, and testing. With strengthened cybersecurity features and close alignment with DevOps practices, Simics is the unifying tool for a robotics development team, guiding development, communicating issues, validating solution security and integrity, and rapidly eliminating bugs.

THE RESULT

Nimble, streamlined development processes and an architecture constructed of proven, interoperable components provide the infrastructure for reliable, high-performing industrial robotics solutions. Wind River supplies the embedded software expertise; an unrivaled real-time operating system; flexible, standard-based virtualization tools; and deep experience in crafting intelligent edge solutions. The result is an exceptionally adaptable, future-proof infrastructure architected to the latest open standards and designed to equip developers and engineers with everything they need to take advantage of robotics advancements and reduce downtime in industrial environments.

As AI becomes increasingly sophisticated and the intelligent edge is fortified with new technologies, including key building blocks from Wind River, the opportunities for using industrial robots in the manufacturing, transportation, and aerospace sectors will continue to climb.

To learn more about Studio, VxWorks, or Simics, visit *www.windriver.com* or contact *salesinquiry@windriver.com*.