Anastasia Karatrantou
Expert in Residence

Whole Lotta Fusion

The fusion of physical and digital intelligence — powered by digital twins, robotics, and advanced connectivity — optimizes processes, enhances resilience, and drives scalable innovation

When the physical world fuses with digital intelligence, it's a highway to overdrive. Digital twins, high-fidelity replicas of physical processes, let organizations simulate, monitor, and optimize without breaking a sweat. Robotics adds another layer, automating tasks and collaborating with humans to enhance precision and efficiency. This fusion bridges virtual and real-world scenarios, enabling risk-free experimentation and electrifying operational visibility. The result? A whole lotta impact, delivered through sleek, digitally enhanced processes that truly rock.

What

- Digital twin is leveraged to design products and test their behavior and performance. They also design and stress test operations to evaluate their efficiency and ultimately design the E2E supply chain and optimize its resilience and ability to cope with environmental demands.
- Mixed reality applications can support the workforce in a variety of tasks and roles; onboarding engineers with AR-based training; enabling remote collaboration and connection with rare and remote expertise.
- Robotics, such as autonomous intelligent vehicles and autonomous mobile robots, are adopted to automate the distribution of goods. Simultaneously, cobots (collaborative robots) are being deployed to collaborate with humans when increased precision and repetition are required.
- IT best practices like software-defined and cloud-native architectures allow for hardware to become a commodity. The software on top of it provides a scalable and flexible value platform. This is mimicked in the operational technology space, as part of the accelerated convergence between the two domains.
- Hyperconnectivity and embedded sensors everywhere, allow for a fully connected, flexible and reconfigurable enterprise environment that can adopt advanced digital use-cases at scale.

Use

- **Foxconn** is leveraging NVIDIA Omniverse and Siemens Xcelerator portfolio, including Teamcenter, to create digital twins of its factories. This initiative aims to drive automation, enhance industrial efficiency, and reduce time, costs, and energy consumption. It also utilizes these virtual environments to simulate, test, and validate autonomous mobile robots (AMRs) and robot arms.
- **Benesch**, a US-based civil infrastructure firm, is using Bentley's iTwin Capture and iTwin Experience to create digital twins of project sites and develop AI/ML-powered workflows for automating and streamlining the process of detecting pavement cracks. The automated solution reduced the manual fieldwork by an estimated 75% over the course of three projects.
- **Volvo Group** and **Daimler Truck** formed a joint venture to develop a software-defined vehicle platform and a dedicated truck operating system. The platform will allow the decoupling of software and hardware development, enabling standalone digital vehicle functions. It will also allow wireless over-the-air updates to customers for enhanced experience and efficiency.
- **Jeh Aerospace**, an Indian startup specializing in precision aerospace manufacturing, is integrating GridRaster's spatial AI and AR/VR technologies to enhance training, inspection, and productivity in aerospace manufacturing.
- **Midea**, **Huawei**, **AIS**, and **China Unicom** jointly opened Southeast Asia's first fully 5G-connected factory. The factory, which primarily manufactures air conditioners, features a range of innovations, including AI inspection systems and real-time monitoring, automated guided vehicles (AGVs) with real-time 5G communication, and remote-controlled robotic arms, to boost efficiency, cut production errors, and enhance safety.

Impact

- Data-driven decisions with detailed performance insights create robust and resilient industrial processes. There's also smoother adaptation in case of unexpected change (e.g., supply chain disruption) and anticipation of planned change is optimized.
- Optimizing workforce allocation and leveraging rare expertise reduce onboarding time for complex industrial processes. This also accelerates the resolution of operational disruptions and increases workforce productivity, safety, and well-being.
- An AI-ready infrastructure that is future-proof and easily reconfigurable enables a fully connected enterprise, supporting advanced digital use cases that rely on premium quality of service without coverage gaps.
- A faster innovation cycle enables quicker introduction of services and products to the market with consistent and optimized quality.

Tech

- **Digital twin/Simulation:** Dassault Systemes, Siemens, Aveva, Ansys, Bentley, NVIDIA
- **Mixed Reality:** Apple, Microsoft, RealWear, XReal, Unity, Lenovo, GridRaster
- **Robotics:** ABB, Omron, Universal Robots, MiR
- **Edge Computing:** Siemens, IBM, AWS, Dell, Cisco, Project Margo
- **Industrial Automation:** Siemens, Rockwell, Schneider Electric, ABB, Beckhoff
- **IIoT:** Schneider Electric, Siemens, Emerson, Ubisense, Cisco
- **5G Networks:** Nokia, Ericsson, Siemens, Celona, HfR, Druid