Techman Robot Selects NVIDIA Isaac Sim to Optimize Automated Optical Inspection

Taiwan cobot innovator accelerates robotics-based inspection by 20% to improve electronics manufacturing product quality with Omniverse.

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How do you help robots build better robots? By simulating even more robots.

NVIDIA founder and CEO Jensen Huang today showcased how leading electronics manufacturer Quanta is using AI-enabled robots to inspect the quality of its products.

In his keynote speech at this week's COMPUTEX trade show in Taipei, Huang presented on how electronics manufacturers are digitalizing their state-of-the art factories .

For example, robots from Quanta subsidiary Techman Robot tapped NVIDIA Isaac Sim — a robotics simulation application built on NVIDIA Omniverse — to develop a custom digital twin application to improve inspection on the Taiwan-based electronics provider's manufacturing line.

The below demo shows how Techman uses Isaac Sim to optimize the inspection of robots by robots on the manufacturing line. In effect, it's robots building robots.

Automated optical inspection, or AOI, helps manufacturers more quickly identify defects and deliver high-quality products to their customers around the globe. The NVIDIA Metropolis vision AI framework, now enabled for AOI, is also used to optimize inspection workflows for products ranging from automobiles to circuit boards.

Techman developed AOI with its factory-floor robots by using Isaac Sim to simulate, test and optimize its state-of-the-art collaborative robots, or cobots, while using NVIDIA AI and GPUs for training in the cloud and inference on the robots themselves.

Isaac Sim is built on NVIDIA Omniverse — an open development platform for building and operating industrial metaverse applications.

Unique features of Techman's robotic AOI solutions include their placement of the inspection camera directly on articulated robotic arms and GPUs integrated in the robot controller.

This allows the bots to inspect areas of products that fixed cameras simply can't access, as well as use AI at the edge to instantly detect defects.

"The distinctive features of Techman's robots — compared to other robot brands — lie in their built-in vision system and AI inference engine," said Scott Huang, chief operations officer at Techman. "NVIDIA RTX GPUs power up their AI performance."

But programming the movement of these robots can be time consuming.

A developer has to determine the precise arm positions, as well as the most efficient sequence, to capture potentially hundreds of images as quickly as possible.

This can involve several days of effort, exploring tens of thousands of possibilities to determine an optimal solution.

The solution: robot simulation.

Using Omniverse, Techman built a digital twin of the inspection robot — as well as the product to be inspected — in Isaac Sim.

Programming the robot in simulation reduced time spent on the task by over 70%, compared to programming manually on the real robot. Using an accurate 3D model of the product, the application can be developed in the digital twin even before the real product is manufactured, saving valuable time on the production line.

Then, with powerful optimization tools in Isaac Sim, Techman explored a massive number of program options in parallel on NVIDIA GPUs.

The end result was an efficient solution that reduced the cycle time of each inspection by 20%, according to Huang.

Every second saved in inspection time will drop down to the bottom line of Techman's manufacturing customers.

Gathering and labeling real-world images of defects is costly and time consuming, so Techman turned to synthetic data to improve the quality of inspections. It used the Omniverse Replicator framework to quickly generate high-quality synthetic datasets.

These perfectly labeled images are used to train the AI models in the cloud and dramatically enhance their performance.

And dozens of AI models can be run at the edge — efficiently and with low latency thanks to NVIDIA technology — while inspecting particularly complicated products, some of which take more than 40 models to scrutinize their different aspects.

Learn more about how Isaac Sim on Omniverse, Metropolis and AI are streamlining the optical inspection process across products and industries by joining NVIDIA at COMPUTEX , where the Techman cobots will be on display.

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