

USE CASE

AI-Enhanced Operator SOP Analysis

How the NEON-2000-JNX helps manufacturers optimize operator processes, boost product quality, and attain new levels of production efficiency

Bolstering production line output and increasing the quality of products, even in small amounts, can reap significant benefits in hyper-competitive industries. Concerted efforts and development to increase speed and quality have led to the adoption of new technologies on the production line, including robots, cobots, AI, and other automation. The predictability and speed of these systems achieves the desired results but reveals a missing piece in the automation puzzle. Human operators, still critical for many processes, struggle to keep up with the increasingly high pace. To remedy this, manufacturers institute standard operating procedures to optimize operator output. A major challenge is ensuring operators consistently adhere to those procedures and achieved the desired level of productivity.



Challenges To Enforcing Standard Operating Procedures

Standardization, in both design and processes, is an overall net positive for manufacturing. Process standardization, usually embodied in the SOP, dictates procedural rules and parameters that aim to optimize processes by making them faster and safer. Production line personnel require training to learn the intricacies of these operating procedures. An evaluator, typically a n engineer or manager, must teach workers the operating procedure and make sure they are following instructions correctly. However, after instruction, the worker's interpretation of the SOP is often not as standard as expected, starts to deviate from the standard, or is sometimes simply ignored. In any of these cases, cycle times slow, production decreases, quality suffers, and the potential for injury goes up. Continuous monitoring is key to maintaining standards but raises a few critical issues.

Human evaluators have limited time available for training. After initial focused training, minor errors still need to be identified and corrected, but this continuous manual evaluation is time-intensive and takes evaluators' time away from their other critical activities. There are simply not enough resources to regularly perform evaluations or consistently identify many of the slips that could occur. If process optimization is an undeniable net positive, then how can it be done better?

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AI Vision - The Tireless Supervisor

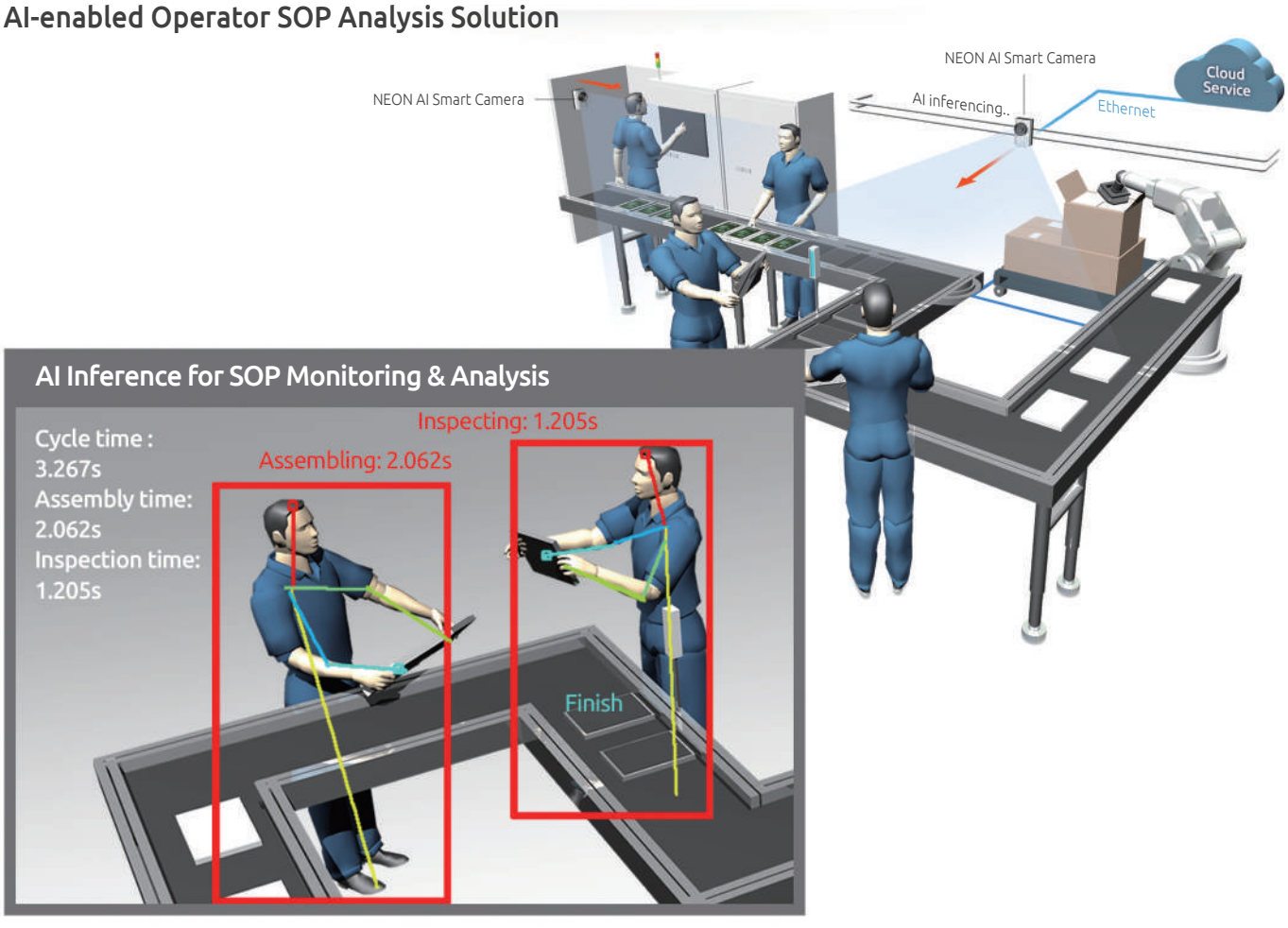
AI vision has stepped into the frame, providing an untiring extra set of eyes to monitor operators and free engineers and managers to focus on other tasks.

Modern AI vision systems include built-in capabilities for human body movement detection, relative to each other body parts, and relative to other objects in the environment. Teaching the AI vision system the intended SOP is as simple as feeding samples of the correct procedure and having the AI infer the acceptable movement patterns from that input. Acceptable boundaries for operation are set, then the AI vision system takes over monitoring and guides them to follow the SOP both through real-time on-site reminders and later data analysis. With a new dataset and retraining, AI vision systems are also tolerant of varied camera angles, different lighting, multiple workers, changed work items, and even new SOP that can be updated through new example images.

The results speak for themselves, and AI vision setups have helped various industries attain measurable results: better quality control for more reliable throughput, set quality targets, set reasonable performance, improve management, set expectations, and through this increased revenue. So, what is the downside?

Until now, the biggest downside of AI vision systems has been the complexity of setup. A typical system that includes a high-resolution camera, AI box, and cables, must still tackle hardware compatibility, software dependencies, and the wide footprint of peripheral cables.
The ADLINK NEON-2000-JNX solves these problems.

AI-enabled Operator SOP Analysis Solution



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NEON Standalone All-In-One AI Vision Camera

The NEON-2000-JNX is an all-in-one AI vision system with built-in GUI software for easy programming and setup, providing a simple yet powerful standalone system for monitoring SOP, providing real-time alerts, and retaining data for future analysis.

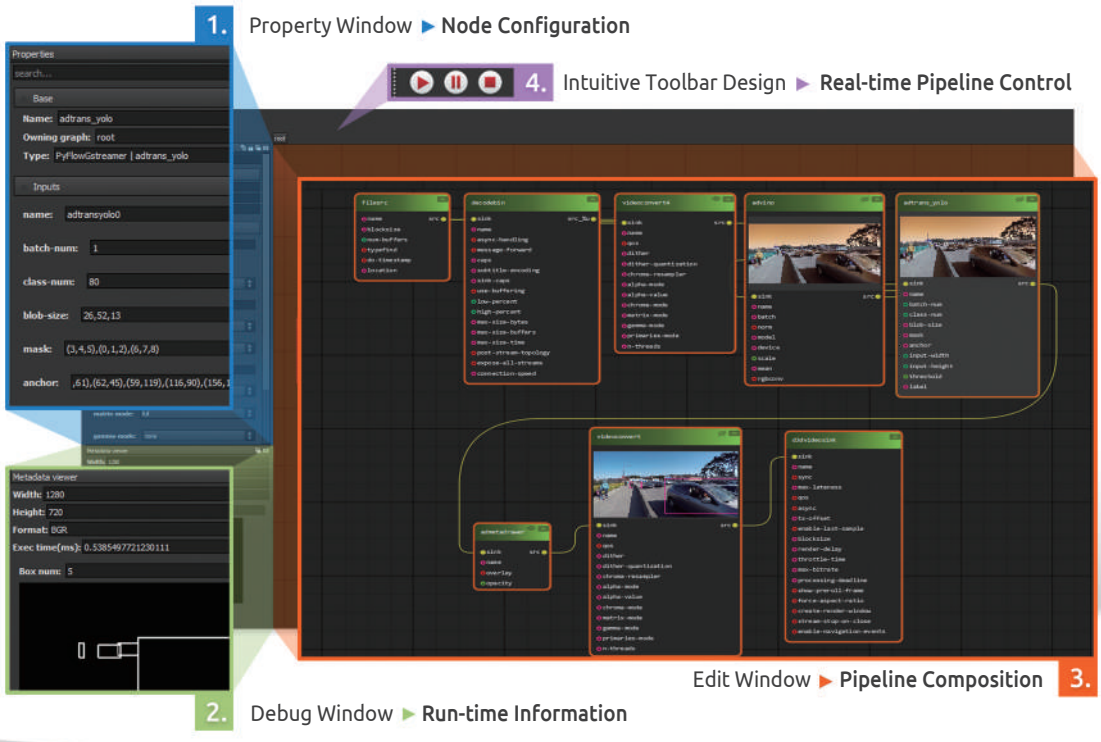


- ***All-in-one standalone AI vision system*** - Traditional AI vision systems include cameras, an AI box, multiple cables, and a backend network. Multiple pieces of hardware to maintain, cables to install, and hardware and software compatibility to tackle. With an integrated NVIDIA® Jetson Xavier NX processor and an optimized software environment, the NEON rolls all hardware and software into a single affordable package that provides a fully standalone system for superior AI monitoring. Even if the network goes down, the NEON continues to monitor personnel performance.

- ***Industrial-grade DIO for lighting or alert alarm*** - AI systems based on regular hardware cannot handle the demands of industrial applications. They often require add-ons to provide commonly used features like digital input/output. For AI to be helpful in the field, visual and audio notifications must alert people. The NEON includes DIO to make hardware integration frictionless, enabling the addition of visual and audio warning devices.

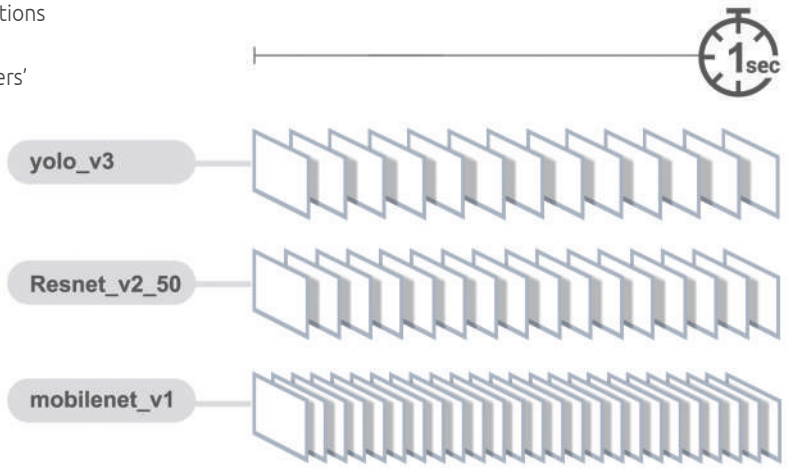
- ***More responsive and efficient AI design*** - Other AI systems use compressed video from traditional IP surveillance cameras, wasting valuable GPU resources to decompress the incoming video stream. The loss of power diverts resources away from inference systems, resulting in substandard performance. The NEON uses high-definition raw image data with its MIPI or USB3 image sensor, eliminating encoding/decoding, retaining critical resources for inference, and achieving higher frames-per-second with lower latency.

- ***Edge AI vision SDK*** - The NEON includes preinstalled software for AI body movement and motion recognition. The EVA SDK provides a visual interface for creating an AI pipeline and includes a suite of plugins that drastically cut development time. The GUI offers additional features including, a preview of each plugin, bottleneck identification with plugin performance monitoring, drag-and-play pipeline setup, and runtime image and results for visual verification of inference results. Setting standard parameters, acceptable deviance, and alerts has never been easier.



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- ***Performance consultancy service for optimization*** - ADLINK has verified the performance of all possible combinations of neural networks and AI accelerators. The performance benchmarks are available upon requests to optimize customers' applications.



> Display assembly requires high standardization to ensure the product quality. We need a solution to keep an eye on every movement on the assembly line all the time. ADLINK utilizes AI smart cameras and behavior analysis deep learning algorithms to take care of these requirements.
>
> said by the assembly supervisor of a worldwide leading display manufacturer.

Conclusion

AI-based human body movement detection provides new possibilities for monitoring employee actions and adherence with acceptable SOP. Engineers and managers can free up their time to focus on their other responsibilities, by teaching the AI system to watch over the worker and alert them to inconsistencies or deviations from the acceptable standards. Through consistent monitoring, workers are motivated to improve their speed and accuracy, improving cycle times and increasing production while ensuring their safety. With the NEON-2000-JNX, manufacturers can implement these powerful AI-based systems with the minimum of fuss and immediately start to see the benefits.



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