

Solution Brief

AI and Computer Vision
Retail Inventory Tracking



Vispera Shelvesight™ Automates Shelf Inspection for Optimal Inventory Management

Smart inventory tracking optimized by the Intel® Distribution of OpenVINO™ toolkit



"The results from our exercise in Intel® DevCloud for the Edge show that neural network computing performance on a CPU now matches a GPU. These performance benchmarks are constantly improving, thanks to new, innovative tools. Now, advanced edge inference solutions like ours are feasible with CPUs, allowing us to run our solution as a real-time IoT application operating on Intel® Xeon® processors at multiple stores."

— Erdem Yoruk, Chief Scientist,
Vispera Information Technologies

Up to
20% ↑
improvement in planogram compliance²

Real-time shelf monitoring makes inventory management faster and more accurate

For retailers, customer experience often hinges on maintaining optimum inventory levels. Historically, managing stock has been a time-consuming task relying on floor personnel manually inspecting each shelf, with stockouts costing retailers an estimated \$1 trillion per year.¹ Now, Vispera Information Technologies brings the power of deep learning and computer vision to store shelves, increasing product availability while improving planogram compliance by up to 20 percent.²

Vispera's new Shelvesight™ solution automates the shelf inspection process, maintaining a constant digital record of shelf content throughout the store. Using Intel® Xeon® Scalable processors optimized with the Intel® Distribution of OpenVINO™ toolkit and Intel® DevCloud for the Edge, Shelvesight™ drives smart optimization of shelf execution, detecting out-of-stock (OOS), misplaced, and excess items as well as other noncompliance issues. With a better grasp of shelf stock, retailers can make data-driven decisions about inventory purchases and allocation of store personnel.

Challenges: Fast-moving inventory and multivendor optimization

Shoppers have high expectations for finding the products they want, when they want them. Although out-of-stock items contribute to poor customer experience and lost sales, understanding shelf inventory well enough to correctly identify specific OOS items requires more than generic object recognition. Visual inspection of shelf stock requires recognition of many fine-grained products. Modifications to product appearance, introduction of new products, and delisted products create a constantly evolving inventory landscape that must regularly be updated.

Retailers need a turnkey, fixed-camera, shelf-monitoring solution to meet their challenges, using an orchestrated multivendor approach, including hardware suppliers for cameras and on-premises servers and system integrators. Real-time execution of deep neural networks requires optimized models that maximize CPU resource efficiency.



Solution: Real-time on-demand shelf inspection at the SKU level

Shelvesight™ automates the shelf inspection process, using shelf-facing fixed cameras in real time, continuously, and with near-perfect accuracy.² Using state-of-the-art deep learning algorithms developed by Vispera and optimized with Intel Distribution of OpenVINO toolkit and Intel DevCloud for the Edge, Shelvesight™ detects and recognizes individual products with stock keeping unit (SKU)–level granularity, rather than generic product types. The solution also detects price tags, reads them, and matches them with the nearest product. Shelvesight™ maintains a complete digital model of shelf content, generating guided notifications with replenishment tasks for store personnel. Noncompliance can be rapidly addressed with fast action to eliminate OOS items and planogram errors, maximizing sales by ensuring that customers can find the products they're looking for.

Shelvesight™ can provide measurements in two modes: scheduled or on demand. Scheduled mode takes measurements at a preset frequency—10 minutes for stores currently using the system. With each measurement, Shelvesight™ detects out-of-stock events and noncompliance issues, then issues push alerts to store personnel using in-store screens. For a typical supermarket with 100 m of shelves, Shelvesight™ can scan an entire store every 30 minutes using a single Intel Xeon Scalable processor.²

Measurement requests may also be made on demand, detecting noncompliance issues—including excess inventory, misplaced or missing facings, shelf gaps, and inadequate shelf space allocated to brands—and reporting them with a visual task list. Using the realogram view, discrepancies between the ideal store shelf and a digitized

version of the actual store space can be visually highlighted for fast replenishment. Automated plans can guide stockers to creating compliant shelves storewide.

In addition to live measurement notifications to store personnel, Shelvesight™ analyzes shelf data in the cloud to enable more in-depth data analytics and trend visualization. Vispera's web-based reporting applications are accessible via any internet-connected device with a web browser, and Shelvesight's reporting API can directly integrate data to existing enterprise systems.

Benefits of Vispera Shelvesight's shelf inventory monitoring include:

- **Real-time OOS detection:** SKU-level detection of OOS items, triggering instant correction of shelf inventory problems that could otherwise lead to lost sales.
- **Improved planogram compliance:** Based on six months of solution data from chain supermarket retailers, product availability and planogram compliance have increased up to 20 percent in multiple product categories.
- **Historical trend analysis:** Cloud aggregation of historical data enables supply chain optimization and deeper understanding of consumer shopping habits.
- **Shelf share monitoring:** Shelvesight™ can monitor a brand's shelf share by taking a facing count of all displayed products or by detecting the percentage of shelf space occupied by each brand.

How it works in brief

Vispera Shelvesight™ is a hybrid solution, with on-premises and cloud components. Precalibrated shelf-facing cameras transfer visual shelf data to image acquisition units, which is then routed to the on-premises back end using an edge application. Edge inferencing is handled by an Intel Xeon Scalable processor, while a lightweight PC typically serves as a gateway. Applications for real-time shelf monitoring, including OOS and noncompliance replenishment alerts, are maintained locally, while detailed shelf data is transferred to the cloud for aggregation, visualization, and analytics.

The Shelvesight™ system uses a REST API–based microservice architecture to allow third-party applications to ingest and interpret data. These applications can include automated ordering, fusion of camera data with other in-store sensors like RFID or digital signage, and analysis of shopping habits and patterns.

High-performance on-premises computing is required for inferencing at the edge for real-time retail scene understanding down to the SKU level. Vispera used Intel Xeon Scalable processors to provide the necessary power in a scalable, cost-effective way, compared to GPU processing.

While GPU processing has historically offered faster performance on inferencing at the edge, Vispera optimizes its deep learning neural network models with the Intel Distribution of OpenVINO toolkit. Using the toolkit, Shelvesight's image recognition engines have been benchmarked to perform on par with GPUs, with lower total cost of ownership. Intel DevCloud for the Edge enabled Vispera to determine optimal edge hardware configurations, algorithmic choices, engine parameters, production-level load estimations, and scalability assessments under different production scenarios.

Conclusion: A smarter shopping experience powered by Intel® technology

Today's consumer expects to find products where they want them, when they want them. For retailers, minimizing OOS products and keeping shelves compliant with planograms can have a significant impact on revenue. Vispera created Shelvesight™, a shelf-monitoring solution, using deep neural networks to perform SKU-level product detection from image data supplied by fixed cameras.

Powered by Intel Xeon Scalable processors, the Intel Distribution of OpenVINO toolkit, and Intel DevCloud for the Edge, Shelvesight™ offers highly customizable measurement, reporting, and analytics capabilities to retailers. With on-demand and near-real-time detection and notification options, Shelvesight™ gives retailers the power to monitor shelves with an improved level of granularity, speed, and accuracy vs. manual stock inspection.

Learn more

To discover how the Vispera Shelvesight™ solution can enhance customer experience, improve inventory management, and optimize personnel efficiency, download our [white paper](#).

About Vispera

Vispera Information Technologies specializes in image recognition-based data analytics services and platforms for retailers and suppliers. Founded in 2014, Vispera works to help clients execute perfect stores using advanced image recognition technologies.

vispera.co



1. Source: <https://www.retaildive.com/news/out-of-stocks-could-be-costing-retailers-1t/526327/>.

2. Based on Vispera's internal study. CPU: Intel® Xeon® Platinum 8160 CPU @ 2.10 GHz; 24 physical cores; memory: 2x32 GB DDR4-2666; disk drive: 240 GB, 2.5 in SATA 6 Gb/s (Intel® SSD DC S3320 Series or similar).

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