

# Solution Brief

AI Computer Vision  
Brick-and-Mortar Retail



## Intel-Enabled AI from Sensormatic Solutions Closes the Gap between Brick and Mortar and E-Commerce

**Physical storefronts drive new efficiencies through the Sensormatic IQ platform optimized with the Intel® Distribution of OpenVINO™ toolkit and AI acceleration on Intel® processors**

**Sensormatic**  
by Johnson Controls

E-commerce has challenged brick-and-mortar retail over the last few decades, requiring physical storefronts to become more innovative and efficient to stay competitive. COVID-19 compounded these challenges further as more consumers embraced buy online, pick up in store (BOPIS) and curbside pickup.

To keep pace with market demands, retailers needed to dedicate staff and space to processing online orders, adding strain to an already overburdened environment. These trends aren't likely to change soon. McKinsey & Company expects that the rate of BOPIS and curbside pickup orders will continue to grow, making up 29 percent and 21 percent, respectively, of e-commerce orders in the post-COVID world.<sup>1</sup>

*"Most retailers have already invested in camera equipment. Sensormatic Solutions adds Intel-enabled computer vision to help retailers maximize the value of data they're already collecting for deeper visibility, control, and insights."*

—Chief Technology Officer Kunchithapatham Subramanian (KS), Sensormatic Solutions

### **Challenge: Complications across labor, safety, and data**

Brick-and-mortar retail faces three main challenges. The first is that workers are serving traditional walk-in customers in addition to a wave of new BOPIS and curbside pickup buyers. Customers on average also have more product knowledge from online research, and they have higher expectations for quick, convenient levels of service. The second is how to address the perceived uptick in shoplifting and incidents of violence and how to use data to inform smarter policy making around these issues. The third is how to extract value from data collected in store with the same depth of insight as e-commerce.

### **Solution: Sensormatic Solutions delivers insights with Intel-enabled AI computer vision**

Sensormatic IQ is a state-of-the-art platform that implements computer vision and AI analysis where data is generated in store. "Most retailers have already invested in camera equipment," says Chief Technology Officer Kunchithapatham Subramanian (KS), Sensormatic Solutions. "Sensormatic Solutions adds Intel-enabled computer vision at the edge, at the retailer, to help maximize the value of data they're already collecting for deeper visibility, control, and insights." Sensormatic Solutions deploys optimized video AI capabilities with the Intel® Distribution of OpenVINO™ toolkit and hardware-accelerated AI on Intel® Core™ and Intel® Xeon® processors.

**OpenVINO™**

With this solution stack, Sensormatic Solutions helps businesses tackle the challenges they're facing today. The platform can intelligently track inventory and send SMS notifications to staff to restock critical areas or help management know whether to open a new register in response to long queues. In terms of safety, the platform can identify aggressive or suspicious behaviors, product

concealment, or environmental hazards so staff can intervene as needed, and managers can use the data gathered to help inform policies. To help map customer journeys, the platform can anonymously follow customer pathing through a store, measure how long they engage with displays or digital signage, and support A/B testing for store configurations and product placement.

## How it works

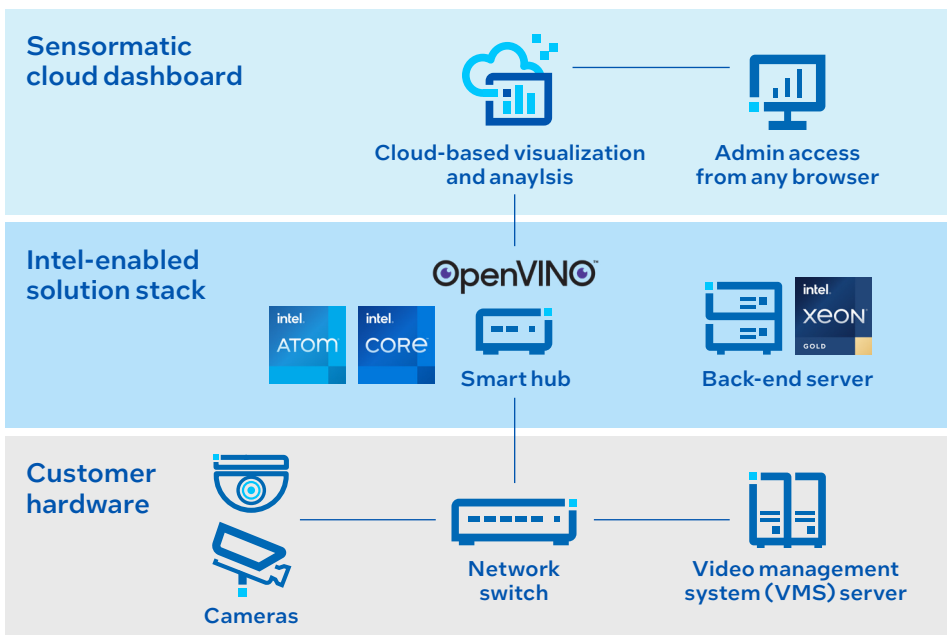
Sensormatic Solutions takes a consultative approach when working with customers to develop a right-sized, customized deployment that addresses all their needs. In a typical deployment, the solution stack will be added to a customer's existing cameras and video management system (VMS) server through the network switch. (Sensormatic Solutions also works with customers to deploy or upgrade camera infrastructure if needed.) The additional components include small form factor PCs—referred to as smart hub appliances—featuring scalable compute options from Intel Atom® or Intel Core processors, with AI optimized, using the Intel Distribution of OpenVINO toolkit.

Each smart hub can support up to 32 video channels, but the solution is flexible enough to scale up based on location needs with the addition of an Intel® Xeon® Gold processor-powered server. The addition of a back-end server can support up to 132 video channels per rack. In most cases, the solution stack integrates seamlessly with the customer's existing hardware, making for an easy deployment. AI analysis of video data takes place at the customer's edge within the solution stack, and results are upstreamed to the client's cloud and made accessible via the Sensormatic dashboard. Administrators can access data visualizations, analyses, and exportable reports from any web browser on any device.

## The OpenVINO toolkit simplifies deployments

Sensormatic Solutions was an early adopter of the OpenVINO toolkit and continues to use it to accelerate AI model training and inference. The OpenVINO toolkit optimizes AI workloads for high performance on Intel® architecture, with the flexibility of developing once and deploying across a variety of hardware targets. Sensormatic Solutions also uses the Intel® Deep Learning Streamer (Intel® DL Streamer) framework, which is part of the OpenVINO toolkit, to drive maximum performance from AI models and save on engineering time.

Not only do these optimizations help shorten time to deployment for Sensormatic Solutions, but they also reduce the hardware requirements to run complex AI at the edge. As a result, smart hubs with Intel Atom and Intel Core processors can achieve fast results when analyzing video streams across multiple video channels, all packaged within a small footprint that fits anywhere in a store environment.



**Figure 1:** This edge-to-cloud solution stack featuring Intel® processors and the Intel® Distribution of OpenVINO™ toolkit integrates seamlessly with existing customer hardware and upstreams data to the cloud for easy visualization and reporting.

## Intel® Deep Learning Boost (Intel® DL Boost) accelerates AI

Both the Intel Xeon Gold processors and Intel Core processors used by Sensormatic Solutions support Intel DL Boost, a set of instructions that enhance Intel® Advanced Vector Extensions 512 (Intel® AVX-512). Intel DL Boost is effective at accelerating the types of workloads that Sensormatic Solutions targets in retail environments, including image classification and object detection. Hardware-based acceleration makes it possible to run inference on the CPU alone or in tandem with an accelerator while reducing dependence on expensive discrete GPU cards in the configuration.

### The importance of CPU-based computer vision

When you consider the retailer landscape, there are many franchise and small-box stores that deal with the same challenges as big-box retailers. Smaller stores don't have the same budget capacity. "Working with Intel allows us to scale appropriately," KS says. "OpenVINO lets us build and deploy models on a CPU-based hardware set, rather than having to push a USD 10K or 15K server with an expensive GPU card." A smart hub supports up to 32 video channels for one location and can connect to existing cameras over an Ethernet switch. This makes for a much more cost-effective and turnkey solution for smaller stores and provides access to advanced capabilities typically reserved for big-budget deployments, like AI customer journey mapping or automated SMS alerts.

## Advanced capabilities at any-size retailer

As workers strain to process online orders, restock shelves, manage queues, and engage customers on the sales floor, Sensormatic Solutions can bring intelligence to a chaotic environment and help direct workers' efforts where they're needed most. Example use cases include the ability to automatically track inventory in near-real time and send SMS alerts to staff to restock key areas at pivotal moments, such as a deli counter just before lunchtime.

People-counting AI models can measure queue length and instruct managers on whether to open a new register or wait for a spike in customers to pass. Sensormatic Solutions also acts as an extra layer of awareness for the entire store, with the potential to spot spills and other hazards or identify suspicious behavior and create a safer environment for shoppers and workers. With clear data points about when and where hazards or suspicious behavior occur, store management can better inform their policy making around prevention and intervention.

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—Chief Technology Officer Kunchithapatham Subramanian (KS), Sensormatic Solutions

### Sensormatic Solutions computer vision analytics overview

Retail Challenge	Solution Capability	Business Benefit
The need for retail workers to do more with less	<ul style="list-style-type: none"> <li>Intelligent inventory tracking</li> <li>Precision queue management</li> <li>Automated SMS alerts to staff</li> </ul>	Businesses can coordinate and direct labor where it's needed most, delivering better customer experiences and saving more time to process online orders.
Perceived increase in shoplifting and incidents of violence	<ul style="list-style-type: none"> <li>Aggressive behavior recognition</li> <li>Product concealment or suspicious movement identification</li> <li>Debris detection for hazards and OSHA violations</li> </ul>	Businesses can identify and prevent incidents before they happen, creating a safer environment for customers and generating data to inform policy making.
Lack of capability to map customer journey in physical locations	<ul style="list-style-type: none"> <li>Anonymous customer path tracing</li> <li>Displays and digital signage engagement measuring</li> <li>A/B testing of on-site customer experiences</li> </ul>	Businesses get deeper insights into customer experiences and can leverage data-driven refinements to increase basket size and improve store layout.

### Intel-enabled solution stack



Powerful AI optimized with the Intel® Distribution of OpenVINO™ toolkit for multiple hardware targets without the need to redo code



Intel Atom® and Intel® Core™ processor-enabled PCs that interface with store cameras over the network switch and support up to 32 video channels



Back-end servers enabled by Intel® Xeon® Gold processors that support up to 128 video channels

## Driving value by making data actionable

Sensormatic Solutions helps bridge a critical gap by endowing physical storefronts with a set of e-commerce-like capabilities to understand the customer journey, all in a privacy-respecting manner that doesn't rely on facial recognition. The platform can anonymously trace customer paths through a store and help retailers understand where customers are spending the most time and which displays and endcaps are drawing the most attention. This generates new possibilities for A/B testing layouts and configurations that encourage bigger baskets and smoother experiences.

### Customized cloud-based dashboards

All the data gathered by Sensormatic Solutions flows upstream to the business's cloud, where managers and decision-makers can access insights through the Sensormatic dashboard from any web browser. "Each store has their own aggregated view, selectable by store, region, or corporate level, all refreshed in near-real time," KS says. Businesses choose which dashboard views and visualizations they want, allowing for deep customization in the level of insights available.

## Conclusion: Customized and right-sized solutions

Collaboration with Intel has been an asset for both Sensormatic Solutions and its customers, who benefit from Intel's industry leadership in AI and edge solutions. "We work with Intel to consult with our common retail customers to assess their challenges and desired outcomes," KS says. With Intel and Sensormatic Solutions, businesses get a comprehensive and right-sized solution that acts on the data they're already collecting, ultimately helping them create safer and more-efficient shopping experiences.

### Learn more

Explore Sensormatic Solutions at [sensormatic.com/computer-vision](https://sensormatic.com/computer-vision).

Discover the value of the OpenVINO toolkit at [intel.com/opencvino](https://intel.com/opencvino).

Learn more about Intel® processors for IoT at [intel.com/iot](https://intel.com/iot).

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### About Sensormatic Solutions

Sensormatic Solutions is the leading global retail solutions portfolio of Johnson Controls, powering operational excellence at scale and enabling smart and connected shopper engagement. Our intelligent digital operating platform—Sensormatic IQ—combines the full Sensormatic Solutions portfolio, including third-party data, to deliver unmatched insights into shopper experience, inventory intelligence, loss prevention, and operational effectiveness with advanced technologies like AI and machine learning. This enables retailers to act on prescriptive and predictive data-driven outcomes to confidently move into the future. Follow us on [LinkedIn](#), [Twitter](#), and our [YouTube channel](#).

[sensormatic.com](https://sensormatic.com)



#### Notices and disclaimers

1. John Barbee et al., "Retail's need for speed: Unlocking value in omnichannel delivery," McKinsey & Company, September 2021, [mckinsey.com/industries/retail/our-insights/retails-need-for-speed-unlocking-value-in-omnichannel-delivery](https://mckinsey.com/industries/retail/our-insights/retails-need-for-speed-unlocking-value-in-omnichannel-delivery).

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