

The increasing accuracy of computer vision technology that is based on deep learning coupled with the declining cost of in-store technology is improving the cost-effectiveness of intelligent retail loss prevention.

## Retail Loss Prevention

Empowering retailers to cost-effectively reduce inventory loss at store checkout lanes with AI driven software and hardware technology

Retail organizations have long recognized the financial impact of inventory that is deemed missing or lost. The National Retail Federation reported, "Theft, fraud and [other] losses... totaled \$61.7 billion in 2019, up from \$50.6 billion the year before."<sup>1</sup> Industry experts recognize five major categories of retail inventory loss: internal theft (employees), external theft (shoplifting), paperwork and operational errors, system issues and supplier fraud.

Most of the financial impact of inventory loss in the retail sector occurs in stores at the point of sale (POS). The combined loss from the warehouse, from the store and from supplier fraud, is less than the loss from the actions of both employees and customers at the POS.

Preventing scan fraud activities such as scanning errors and UPC barcode switching at the POS is critical to reducing the major source of inventory loss. Dell Technologies in partnership with Malong Technologies and NVIDIA offer a solution that uses artificial intelligence (AI) to reduce inventory loss that is caused by either accidental or intentional behavior during checkout.

Powered by an in-store Dell EMC PowerEdge server that runs state-of-the-art product recognition technology from Malong RetailAI<sup>®</sup> Protect, the solution can be used in most retail stores to reduce inventory loss during POS use at both self-checkout (SCO) and employee-staffed checkout lanes. Cameras that are positioned around an SCO kiosk capture real-time video of product items as they are scanned. The products are cross-checked with purchases that are recorded by the POS system.

Dell EMC PowerEdge servers have a well-integrated management suite that makes them ideal as edge nodes in distributed retail environments. NVIDIA<sup>®</sup> T4 GPUs perform video decoding and product recognition. The GPUs provide the throughput and fast response times that a retail checkout system requires. The Malong software is designed for distributed deployment, monitoring, and management through Microsoft Azure<sup>®</sup> IoT Hub and the NVIDIA EGX stack.

<sup>1</sup> National Retail Federation, [Retail shrink totaled \\$61.7 billion in 2019 amid rising employee theft and shoplifting](#), July 2020.

## Resources

- See the [Validated Design](#)
- Get validated designs and performance testing information at the [AI InfoHub](#)
- Explore the [Dell Technologies HPC & AI Innovation Lab](#)

## Validated Design

The goal of the Retail Loss Prevention architecture is to prevent fraud as it occurs without affecting the customer experience. It is a self-learning computer vision solution that can protect a wide range of stock keeping units (SKUs) by detecting mis-scans and ticket switching in near real time. The main design criterion for choosing solution components is determining if they can co-exist with and augment existing POS scanners.

Two scenarios in which the Malong RetailAI Protect solution can prevent retail loss are ticket switching and mis-scans. An overhead fixed-dome camera captures video of an item that is either not scanned or has a suspect UPC barcode. The video is decoded in the GPU and the decoded video is used as input to the Malong RetailAI model. The model then predicts the item's UPC barcode. If Malong RetailAI Protect determines that:

- The item was never scanned, after a set interval of time, Malong RetailAI Protect notifies the SCO system to raise an alert
- The scanned UPC barcode does not match the correct UPC barcode, Malong Retail AI Protect immediately notifies the SCO system to raise an alert

The retail associate overseeing the SCO lanes can then take the necessary action. This solution is easy to put into use at scale for thousands of retail stores. The technology for this solution can be used at both SCO and staffed lanes.

Components				
Servers	Storage	Networking	Graphics	Software
Dell EMC PowerEdge R740, R7515 or R7525	2TB SAS SSDs in RAID 6	Broadcom® 57416 Dual Port 10 GbE BaseT Network LOM Mezz Card	NVIDIA T4 GPU and associated software (CUDA, DeepStream SDK, etc.)	RetailAI Protect by Malong Technologies  Docker® container runtime

## Learn more

- [delltechnologies.com/ai](https://delltechnologies.com/ai)
- [Malong RetailAI Protect](#)

## Malong and Dell Technologies

Most inventory loss in the retail sector occurs in traditional stores at the POS. The increased use of security personnel in stores involves a large cost with limited value. New AI-based automated systems using Dell Technologies hardware and special purpose deep learning models from Malong provide cost-effective tools to reduce inventory loss.

The combination of Dell Technologies hardware with NVIDIA GPUs and Malong software provide a complete solution that is easy to deploy and maintain. The solution can satisfy the demanding needs of retail loss prevention by improving margins while remaining largely transparent to the customer's shopping experience.

