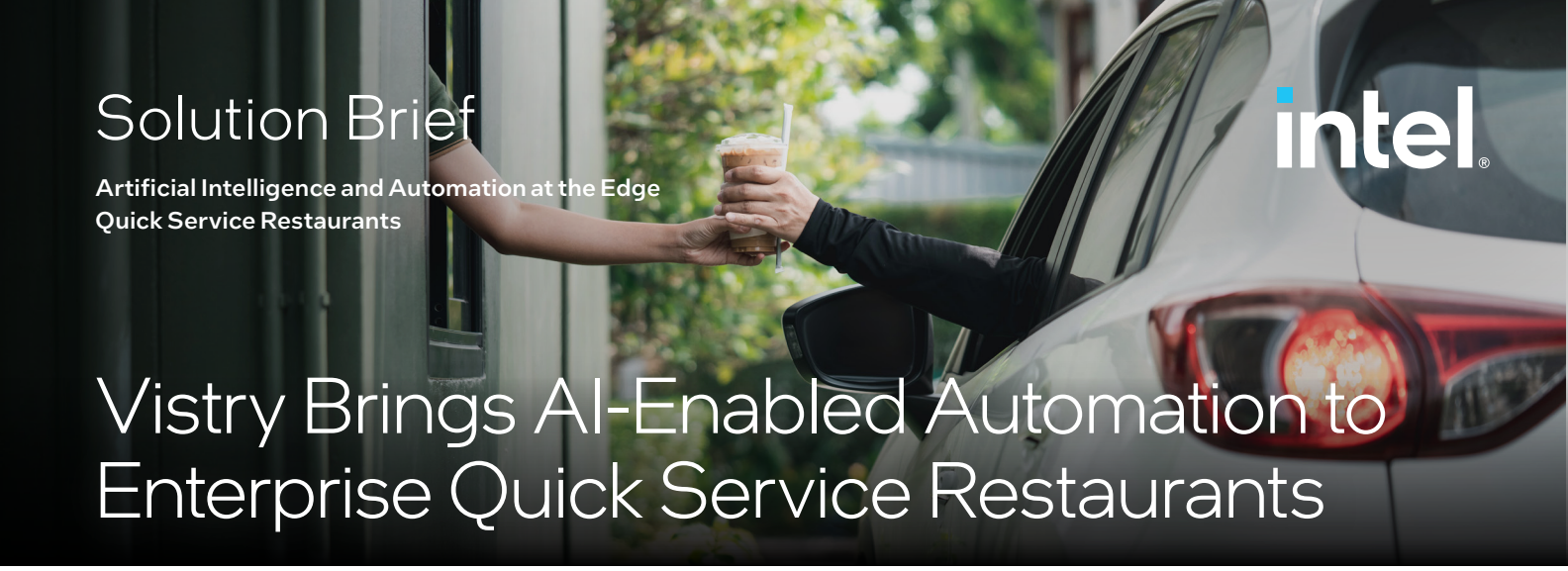


Solution Brief

Artificial Intelligence and Automation at the Edge
Quick Service Restaurants

Vistry Brings AI-Enabled Automation to Enterprise Quick Service Restaurants

Vistry's Discrn restaurant automation platform captures and analyzes data from the kitchen and parking lot in near-real time to drive automation, improve restaurant efficiency, and enhance the customer experience. The platform is performance optimized for a wide range of hardware using the Intel® Distribution of OpenVINO™ toolkit and Intel® Edge Insights for Industrial (Intel® EII) software.

VISTRY

"OpenVINO™ has been a critical component to the agility, flexibility, and responsiveness of the Discrn platform. It allowed us to experiment with new AI-based models, computer vision networks, and techniques while still staying highly efficient."

—Atif Kureishy, founder and CEO of Vistry

The food service market—which includes all activities, services, and businesses involved in preparing and serving food—is expected to grow at a compound annual growth rate (CAGR) of 9.9 percent and reach a value of more than USD 4.4 billion by 2028.[1]

One market segment already experiencing the impact of this demand is quick service restaurants (QSRs). QSRs that successfully weathered the COVID-19 pandemic are now trying to drive new profits while facing a barrage of challenges: rising food costs, supply chain disruptions, labor shortages, and an unexpected shift in consumer behavior toward omnichannel ordering. To stay profitable, QSRs need to drastically optimize their performance by improving the speed and accuracy of service and the quality of food.

Innovative restaurants are turning to AI-enabled automation to address these challenges. By combining techniques and strategies from the manufacturing industry with machine vision, Vistry is helping QSRs measure and improve the quality and speed of service and food, reduce costs and waste, streamline processes, boost customer satisfaction, and enhance the customer experience inside the restaurant, in the drive-thru, and at the curbside for pickup.

The use of AI-enabled machine vision and deep learning algorithms creates new and exciting capabilities for QSRs. With this technology, operators can get detailed insight into what is happening in their restaurants at any given time, helping to identify problems in near-real time so issues can be addressed quickly.

However, some QSRs aren't aware that integrating this type of technology is possible for their restaurant or aren't familiar with the benefits of deploying it. Other QSRs may be aware of this technology but don't believe they have a cost-effective way to adopt it.

Challenge: Disparate systems, legacy hardware, and point solutions make optimization of restaurant performance costly and complex

Finding opportunities to optimize restaurant performance is key to driving profitability and success for QSRs in today's hypercompetitive, evolving market. However, many restaurants operate on a conglomeration of systems, IoT technologies, legacy kitchen machinery, and hardware solutions that aren't connected to each other. This creates complexity and fragmentation—ultimately making everyone's jobs harder without improving the customer experience or boosting profits.

OpenVINO™

For companies that don't possess significant in-house expertise in AI, software, and hardware integration, trying to bring game-changing technologies like machine learning to their complicated environments can seem impossible. Plus, most QSRs need a way to deploy these AI capabilities without a large footprint or outsized hardware investment. If the right team of experts isn't in place, these projects can quickly escalate to be expensive, time consuming, and support intensive.

Solution: Vistry Discrn AI-enabled automation platform optimized with Intel® Distribution of OpenVINO™ toolkit and Intel® Edge Insights for Industrial

With the Vistry Discrn platform, QSR operators get a unified and detailed view into what is happening in their restaurant at any point of any process—from the kitchen production system to the drive-thru flow—enabling them to gain intelligence, streamline and improve processes, increase profits, and create a sustainable operating model that elevates the customer experience. The Discrn platform uses AI and deep learning–based predictive analytics to help optimize food purchasing and production, predict labor needs to improve employee scheduling, conduct predictive maintenance on kitchen equipment, and offer better service to customers.

Vistry Discrn is a unified Software as a Service (SaaS) automation platform designed to be a cost-effective, low-footprint solution. It can run on a wide range of existing hardware solutions, is compatible with multiple generations of Intel® processors, and can deploy AI without additional capital investments in GPUs or other technologies.

Discrn acts as a single source of truth to help QSRs better understand what's happening in their restaurant—from how a sandwich is being assembled in the kitchen to what's happening in the drive-thru and parking lot—at any time. The platform helps eliminate complexity and fragmentation by compiling data collected from sensors, cameras, robotics, and other machinery in one easy-to-understand dashboard. With Discrn, operators get insights at 15-minute intervals about kitchen production, customer behavior, employee performance, drive-thru flow and throughput, and other critical operations. Discrn relies on restaurant-specific AI-based automation applications and machine learning to perform a wide range of measurements such as detecting missing items from delivery orders, tracking food waste, calculating customer wait times, and performing dozens of other KPIs to inform improvement plans and drive-thru automation.

Uses for the Vistry Discrn platform

Front of house

Improve food preparation and quality

Deploy depth sensors to determine remaining servings in food pans and inform the kitchen staff when to prepare another batch.

Accelerate and enhance customer checkout experience

Automatically create orders using vision technology to track which food items are being served from the steam table, allowing orders to be injected into a point-of-sale (POS) system before the customer arrives at the cashier to pay.

Back of house

Improve food quality

Collect data produced by Henny Penny or other fryers to better understand how fried products are cooked and dumped, and find opportunities to optimize these processes to improve product quality, minimize waste, and lower food costs.

Increase order accuracy

Adopt vision technology to detect missing items during order fulfillment by comparing food items placed in to-go containers to an internal checklist of all required items.

Drive-thru and parking lot

Minimize food waste

Identify the number and different types of vehicles in a drive-thru lane and use estimations of vehicle passenger capacities to improve forecasting and prediction of batch sizes in near-real time.

Enhance guest experience and improve parking lot throughput

Detect when a vehicle enters the parking lot to better determine actual wait time—rather than tracking wait time only after a customer has ordered in the drive-thru lane.

Vistry Discrn platform key features and benefits

- Modern, secure microservices cloud architecture for agile edge deployments
- Robust machine learning operations (MLOps) and data lake infrastructure for collection and visualization of key insights across thousands of locations
- Data connectors for integrating point-of-service (POS) systems, video/audio streams, IoT devices, and smart equipment
- AI-based automation applications that integrate data streams aligned to operational capabilities

How it works

Vistry created the Discrn platform to treat QSRs as mini manufacturing plants by considering all components of a restaurant as part of an assembly line that uses raw materials to create a final product. Restaurant components can include curbside pickup, delivery, drive-thru, front-of-house processes, and kitchen production.

"We see manufacturers face these same types of problems that restaurants are experiencing now. So we began applying many of the same technologies that manufacturers use to identify issues in near-real time to QSR environments, and almost immediately we began finding opportunities for efficiency and improvement," says Atif Kureishy, founder and CEO of Vistry. "We also recognized that restaurants and plants both use older equipment and machinery that doesn't have a way to provide important data to the Discrn platform. That's where we provide a lot of additional value to restaurants. We can retrofit much—if not all—of a restaurant's equipment with sensors, cameras, and edge compute technology to make them smart and connected at a super affordable price. Once the newly intelligent machinery begins providing data for analysis, operators have more insight into how to quickly fix whatever issues pop up."

The Discrn platform offers one source of truth for QSR operators

The Discrn platform processes live data that is collected in near-real time from equipment, video, and voice technologies throughout a restaurant. It uses AI and machine learning to automatically identify features, contours, depth, and background information from the collected data. It also detects moving or stationary objects, distinguishes them from known background images, and classifies the objects based on predefined scenarios.

Once data is collected from disparate data sources, it is stored, analyzed, and presented in the Discrn platform's easy-to-understand dashboard using compute, connectivity, memory, and storage technologies at the edge.

The platform also aggregates information from various restaurant systems and software already in place, including programs for POS, fleet management, third-party delivery, scheduling, accounting, self-ordering kiosks, inventory management, sales reporting, and customer loyalty and engagement. This gives operators an even better, more holistic overview of the inner workings of their restaurant.

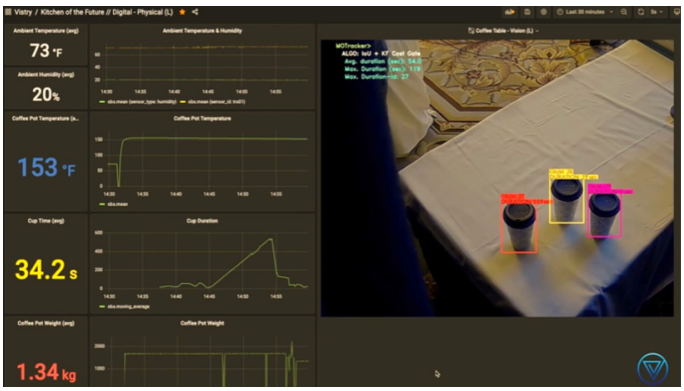


Figure 1. Images from the Discrn platform illustrate how data is captured in restaurants or parking lots, analyzed, and presented in one unified view.

Intel Distribution of OpenVINO toolkit sparks experimentation and creativity

A key differentiator for Vistry comes from the Intel Distribution of OpenVINO toolkit, which helps their developers build, optimize, and deploy models faster as well as run their edge inference pipeline within the Discrn platform on Intel® architectures.

"OpenVINO has been a critical component to the agility, flexibility, and responsiveness of the Discrn platform. It allowed us to experiment with new AI-based models, computer vision networks, and techniques while still staying highly efficient," says Kureishy. "We have been able to not only respond to our customers' needs quickly, but OpenVINO also helped spark our customers' creativity. Once they see and understand all the capabilities of our platform (many of which are enabled through OpenVINO), they begin brainstorming new and unique KPIs they can measure and applications they can leverage on Discrn. It's a fun process to watch our customers come to the realization of everything that's possible with our platform."

Another way the Intel Distribution of OpenVINO toolkit benefits Vistry and their customers is how efficiently the toolkit allows Discrn AI apps to run on edge servers.

"Most restaurants don't have big, beefy GPUs servers sitting on-premises. OpenVINO allows us to use our AI models in low-powered environments and still run them in a near-real-time fashion, which is critical for certain restaurant applications," adds Gabriel Ibagon, head of engineering and cofounder of Vistry. "I don't know of any other toolkit that has the complete set of tools in terms of optimization, benchmarking, and interference execution and is as easy to use as OpenVINO."

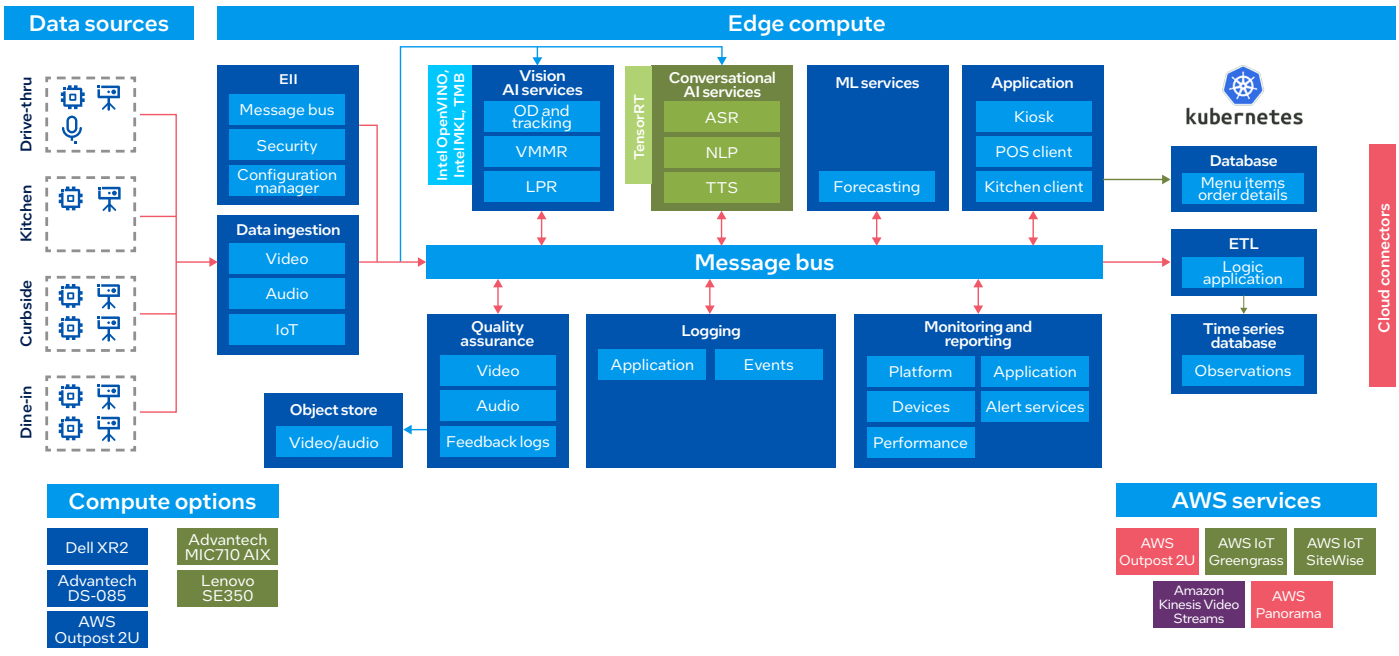
The toolkit has also saved Vistry hiring and labor costs. For example, converting a TensorFlow model to a model that's optimized to run inference on a CPU device would typically involve several steps and layers of complexity and introduce many opportunities for something to go wrong. Completing this task could require hiring an optimization engineer or even a team of engineers for the larger or more complex architectures.

"With OpenVINO, we're able to avoid all of that. With just a few lines of code, I can easily import models, do the execution, and pass the data that's extracted into other parts of our application," says Ibagon. "Working with Intel and leveraging the OpenVINO toolkit has been revolutionary for our platform and capabilities."

Vistry leverages Intel® Edge Insights for Industrial (Intel® EII) and modifies it for restaurant needs

To provide their advanced edge AI and computer vision capabilities to customers, Vistry relies heavily on Intel EII software. Intel EII is an open and modular product-validated software solution that helps enable data ingestion, storage, and analytics processing at the edge of image and video data. When used with the Intel Distribution of OpenVINO toolkit, Intel EII accelerates development and enables quick integration of pretrained models (e.g., TensorFlow) for object recognition and classification—both key components of the Discrn platform.

"We are very fond of EII and build a lot of our edge stack on it. In fact, we renamed it internally and call it EIR—edge insights for restaurants—since we've recalibrated a lot of its microservices architectures for restaurant environments," says Kureishy. "EII gives us a distinct advantage over competitors in price per performance because it allows us to run our machine and deep learning and inference workloads at the edge on existing or next-gen Intel architectures very efficiently and at lower cost."



Conclusion: Vistry Discrn platform is the recipe for QSR efficiency and success

The Vistry Discrn platform helps restaurants become future-focused, data-driven operations. It uses machine vision, AI, and IoT data analytics to help control costs for restaurants by optimizing food production, minimizing waste, and deploying team members based on available labor. It uses the Intel Distribution of OpenVINO toolkit to provide restaurateurs the insights and automation services needed to meet evolving food service challenges and come out ahead.

About Vistry

Vistry is a software development company focused on helping quick service restaurants improve their speed and quality of service through AI-based restaurant automation. Vistry's Discrn unified automation platform empowers restaurant operators to make more-informed decisions by providing a holistic view of data and analytics from across the whole business. As a participant in the Intel® Disruptor Initiative, Vistry is recognized as one of the top companies driving innovative AI and data-centric use cases in their industry.

vistry.ai

Learn more

Explore Vistry's platform at vistry.ai

Download the Intel Distribution of OpenVINO toolkit for free

Begin building your applications with Intel Edge Insights for Industrial–our prevalidated, ready-to-deploy package

Learn more about the Intel® Disruptor Initiative

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1. "Global Food Service Market Size to Grow by USD 4431.5 Billion | Revenue Forecast, Company Ranking, Competitive Landscape, Growth Factors, And Trends," Vantage Market Research, May 24, 2022, https://www.globenewswire.com/en/news-release/2022/05/24/2449485/0/en/Global-Food-Service-Market-Size-to-Grow-by-USD-4431-5-Billion-Revenue-Forecast-Company-Ranking-Competitive-Landscape-Growth-Factors-And-Trends-Vantage-Market-Research.html.

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