VIDEO ANALYTICS AND SURVEILLANCE

Building a scalable end-to-end AI solution
## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>3</td>
</tr>
<tr>
<td>Video surveillance and analytics at a glance</td>
<td>3</td>
</tr>
<tr>
<td>Retail</td>
<td>4</td>
</tr>
<tr>
<td>Industrial products image-based quality control</td>
<td>4</td>
</tr>
<tr>
<td>Building a video analytics solution with HPE and partners</td>
<td>5</td>
</tr>
<tr>
<td>Infrastructure components in a video analytics solution</td>
<td>6</td>
</tr>
<tr>
<td>Services</td>
<td>10</td>
</tr>
<tr>
<td>Video analytics customer success stories</td>
<td>11</td>
</tr>
<tr>
<td>Manufacturing inspection (Customer: HPE factory/ISV: Relimetrics)</td>
<td>11</td>
</tr>
<tr>
<td>Wafer quality analysis with DL from edge to cloud (Industry: Disk manufacturer)</td>
<td>11</td>
</tr>
<tr>
<td>Reference designs by VENZO Secure and HPE</td>
<td>12</td>
</tr>
<tr>
<td>Summary</td>
<td>12</td>
</tr>
</tbody>
</table>
INTRODUCTION

Companies exploring video analytics and surveillance encounter big questions. Which applications provide the best fit for my organization? What hardware, apps, and software are best suited for my workloads and geographic location?

The resulting infrastructure must integrate and scale flexibly enough to address throughput, processing, and the storage needs of a content-rich video solution.

This white paper discusses video surveillance and analytics as a field—the infrastructure, solutions, and services offerings for successful video analytics implementations. Typical use cases are also discussed, as along with sample HPE reference architectures for customers to achieve their objectives.

VIDEO SURVEILLANCE AND ANALYTICS AT A GLANCE

Journey and transformation of surveillance systems

Sixty years ago, surveillance systems consisted of black and white cameras and hand-written logbooks. Today, they're Big Data undertakings involving numerous IP cameras that store images and videos in the cloud. It began as a series of discrete, passive observations in a demarcated topography whose results were used only for investigative purposes. Yet by coupling analytics and IoT capability with the surveillance system, the application areas have expanded beyond elementary security.

The proliferation of video and still image feeds today makes it difficult to monitor and analyze every source and data input manually. The additional tools and intelligent systems needed to help analyze these sources, as well as free the human operators to make informed decisions, are now critical. Broadly, video surveillance leverages computer algorithms to perceive data and machine intelligence to interpret, draw inferences, and make predictions.

With advances in body cameras, drones, and robots, video surveillance and analytics applications are only expanding today. Most customers today generate petabytes of raw video data, with a corresponding increase in their computing needs and network capacity. Newer video devices contain additional sensors to provide temperature, humidity, and other data feeds, which further add to a system's data processing and analytics needs.

Video analytics use cases

Video analytics and surveillance systems today make regular use of face recognition, event recognition, intelligent image processing, and computer vision technologies. Every implementation is unique. But common threads remain throughout a system's architecture. In nontechnical language, there are four primary tasks at hand: acquire, aggregate, analyze, and train (See Figure 1).

`FIGURE 1. Acquire, aggregate, analyze, and train—The typical high-level architecture of video analytics and surveillance solution`

Taken in order, the four tasks are:

- **Acquire**: Images pulled from multiple cameras are moved to a central point for aggregation and comparison.
- **Aggregate**: Images from many cameras are pooled together for analysis and storage. This may occur outside the data center—or near the cameras, where image analysis may also take place.
- **Analyze**: Image analytics are used on raw images to compare known images, people, and situations. The analytics models incorporate evolving circumstances, environments that are continually updated.
• **Train**: Create the decision-making model from images, events, and schedules and other factors, often done on high-performance computing (HPC) in the cloud or data center. The model can then be used to train analytics across the infrastructure. This allows analytics to be done at the network edge for timely decision-making and to minimize traffic traversing to the data center.

Video surveillance and analytics applications today range from theft deterrence to traffic management, floor operations management to weather monitoring, and more. These applications are today found in many industries and verticals including smart cities, manufacturing, oil and gas, retail, and transportation. Here are two use cases discussed briefly.

**Retail**

The 2019 National Retail Security Survey tells a story of a dramatically changing retail risk landscape, with new threats and challenges being met at each turn with new loss prevention tools. The average shrink rate (1.38%) has remained steady over the last few years. When extrapolated on an industry-wide basis, it would be an estimated $50.6 billion impact on the retail industry. About 42.9% of the respondents say fraud happens in-store.  

Combating shoplifting and other retail crimes has become a challenge for retailers. Some have found the mere presence of video surveillance acts as a deterrent for theft. Additionally, larger operational challenges proliferate today, including credit card data fraud, which places demands on video surveillance and monitoring systems. About 84.1% or the respondents use digital recorders while 61.9% use live customer visible CCTV as prevention technologies. Other applications of video analytics include guiding customers from offline to online experiences, gaze estimation, heat maps, and seamless payment solutions.

![FIGURE 2. Retail security use case](image)

**Industrial products image-based quality control**

There is an opportunity today to match the speed of automated manufacturing with automation in quality control. To do so would improve accuracy, early detection of faulty products, and speed of quality control.

Quality control using digital image processing is one way to identify faulty products: images are captured at the production line and analyzed at the core. Image processing compares user requirements with the manufactured product image and flags any deviations (faults). With this methodology, the entire task of quality inspection can be automated and fault detection can be accomplished in milliseconds.

---

1 nrf.com/sites/default/files/2019-06/NRSS%202019.pdf
2 nrf.com/sites/default/files/2019-06/NRSS%202019.pdf
3 National Retail Security Survey 2017, National Retail Federation, June 2017
Recently, Seagate’s engineers implemented an artificial intelligence (AI) platform that eliminates inefficiencies and prevents anomalies from sneaking their way into products before they are made—on factory floors. The smart manufacturing application boosts quality control of wafer images produced in the process of disk drive production. As this technology becomes incorporated, Seagate expects to see improved efficiency and quality. In one project, at a factory in Thailand, engineers estimate a 20% reduction in cleanroom investments, a 10% reduction in manufacturing throughput time, and up to a 300% return on investment.  

BUILDING A VIDEO ANALYTICS SOLUTION WITH HPE AND PARTNERS

Video analytics requires an edge-to-core approach. When building such a solution, you should consider cameras, sensors, controllers, and management systems, along with edge systems, data center assets, and enterprise storage. Appropriate network infrastructure is required as well. (However, discussion of network infrastructure falls outside the subject area of the present white paper. For video analytics networking, consult our Aruba representative.)

From HPE Edgeline systems to purpose-built HPE Apollo and HPE ProLiant systems at the core, the broad HPE portfolio of solutions delivers integrated, AI-powered video analytics. Our curated APIs and ISV applications ensure performance, efficiency, and flexibility. Edge-to-core solutions are tested in global IoT and AI labs to ensure compatibility and functionality. HPE Pointnext Services offers various support packages as well as detection-as-a-service solutions to help with the deployment of video analytics solutions.

Figure 3 depicts the different stages the data passes through in the process—be it recognizing a face, detecting an object, or spotting something abnormal. Nearly every step requires an architectural decision that could affect the chain and workflow. So building a correctly sized system becomes critical.

Creating a video analytics solution begins by accessing the right data, properly curating it, and transforming and annotating it. It is important, then, to choose the appropriate deep learning (DL) model that delivers both relevant and accurate predictions—leading to appropriate and timely actions in response.

In some cases, such models require tuning based on customers’ specific use cases and data. For this reason, Figure 3 contains two datapaths with different requirements: one for training the model, the other for inferences and predictions. In addition, model deployment and management, as well as post production, must be considered.

---

4 blog.seagate.com/enterprises/ai-for-the-factory-floor/
• **Ingestion—Training (Steps 1–3 in Figure 3):** Cameras provide data that is fed via an edge device into the data center. This does not have to be a live process. In fact, for training purposes, other sources such as public image databases or existing customer datasets are sometimes used. Important questions to be asked at this stage include:
  - Which ISV, if any, will be needed to build this portion of the present solution?
  - Does the solution need to be designed from scratch? If so:
    - Which infrastructure should be in place and what should it contain?
    - How should the data generated by the system be obtained, transformed, and curated?

• **Management—Model deployment (Steps 4–5 in Figure 3):** Some DL models are static and do not need to be updated. Some are dynamic, with new versions of the model generated when new products or employees to be recognized are added. All deployed edge devices must then be updated with these new versions of the model when this happens. Questions to be asked at this stage include:
  - How are the different models compared?
  - How are the new models deployed to all the edge devices?
  - How are the deployments checked to ensure consistency across devices?

• **Inference/Production (Steps 6–7 in Figure 3):** Depending on the number of cameras present, video management systems (VMS) can become useful or even necessary, gathering all video streams and running all predictions on one system. Relevant questions at this stage include:
  - Is a VMS solution required?
  - How many edge devices are needed for an array of cameras?
  - Which accelerators are required in the edge devices and how many?
  - Does the camera resolution impact the workflow design?

• **Post-production (Steps 8–9 in Figure 3):** Prediction completed, data storage is now important, as is the question of how much should be rerouted into training the model. At this stage, questions to be asked include:
  - How long does the data need to be kept? Are there any policies/laws/regulations that need to be considered?
  - How big should the storage be if there are X cameras with Y resolution?
  - Which type of storage is required and what should be its performance and features?

In addition to these steps, a video analytics solution can include a system reacting to alerts and generating actions for IoT or edge devices. This is illustrated in Figure 3.

### Infrastructure components in a video analytics solution

As illustrated in Figure 3, the infrastructure needed for video analytics span from the edge (where video cameras capture and send their feeds) to the data center or core (where, if needed, the highest-performance compute resides, where files are stored and where model updates and training are performed).

#### Edge

Data is collected at the edge to extract insights and perform actions. Improving system reaction time is critical for video footage, especially in safety, security, or incident prevention scenarios. However, if a video feed has to be sent back to the core (data center) or cloud for processing, the system response time may be impacted. Additionally, sending video data back to the core requires significant bandwidth and it can also open up the data to the security risks of a public network. These speed and security problems can be avoided, though, if video processing is done at the edge, where the video data originated.

The choices of the edge devices depend on how many cameras are present, their resolutions, and configuration. Another important factor is how the inference/prediction is going to be run—is it supported on CPU or does it run on GPUs? Table 1 lays out different use cases along with their camera and infrastructure requirements.
### TABLE 1. Use cases and number of cameras streams supported using an edge server

<table>
<thead>
<tr>
<th>Feature layer/Type 2</th>
<th>Integrated software</th>
<th>Camera streams per component unit/Server cartridge</th>
<th>Server component building block</th>
<th>Hardware acceleration</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMS</td>
<td>Milestone, XProtect Corporate</td>
<td>300 (1080p @ 30 FPS)</td>
<td>HPE ProLiant m710x</td>
<td>NVIDIA® Tesla P4 or T4</td>
</tr>
<tr>
<td>AI/Machine learning (ML) anomaly detection</td>
<td>iCetana</td>
<td>62 (720p @ 12 FPS)</td>
<td>HPE ProLiant m710x</td>
<td>NVIDIA Tesla P4 or T4</td>
</tr>
<tr>
<td>Facial recognition</td>
<td>FaceFirst</td>
<td>10 (1080p @ 30 FPS)</td>
<td>HPE ProLiant m510 8-core</td>
<td>NVIDIA Tesla P4 or T4</td>
</tr>
<tr>
<td>Facial recognition, body recognition, object detection</td>
<td>AnyVision</td>
<td>5 (1080p @ 30 FPS)</td>
<td>HPE ProLiant m710x</td>
<td>NVIDIA Tesla P4 or T4</td>
</tr>
</tbody>
</table>

In the HPE Edgeline products series (Figure 4), Hewlett Packard Enterprise has created rugged, edge-optimized compute platforms. These systems are enterprise-class servers in a compact and energy-efficient form factor specifically designed for edge environments. HPE Edgeline solutions provide a broad range of network connectivity, data acquisition, and control options to accommodate a customer’s video management and analytics use cases.

![HPE Edgeline EL300](image1)

![HPE Edgeline EL1000](image2)

![HPE Edgeline EL4000](image3)

![HPE Edgeline EL8000](image4)

**FIGURE 4.** HPE Edgeline portfolio of servers and converged edge systems

The HPE Edgeline systems can be tailored for the precise number and quality of video feeds, as well as the intensity of processing and analytics needed—including chassis type, number of servers, number of CPU cores, memory, and storage hardware.

**Core (data center)**

The data center hosts the core functions of video analytics and surveillance solution, as well as compute resources needed for DL development and model training. Core requirements for typical video analytics and surveillance applications include:

**Training accelerators used in a video analytics solution**

GPU-based platforms can support light or heavy DL model training. If the DL model is designed in-house, one should expect their data center to perform the training and updating of the new models. If a readymade solution is used, then it is most likely that the training will be performed by the ISV designing the solution.

The core analytics engines from HPE, featuring multiple powerful CPU and GPU combinations—with servers supporting from two to eight GPUs—are designed for the kinds of DL capabilities that visual analytics and surveillance applications demand.

The size of the system that is required depends on the number of GPUs that are needed to perform the training. This depends on several factors:

- The size of the images.
- The size of the model being deployed.
- The framework and the ability of the framework to scale.
An example is shown here.

**TABLE 2.** An example of compute power of different neural networks considering the fastest GPUs today.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Amount MB/s analyzed on the accelerator</th>
</tr>
</thead>
<tbody>
<tr>
<td>ResNet50</td>
<td>CNN</td>
<td>293 MB/s</td>
</tr>
<tr>
<td>Inception</td>
<td>CNN</td>
<td>187 MB/s</td>
</tr>
</tbody>
</table>

Assume that the training model would be for 100 Epochs (an Epoch is finished when the model has seen all the data once). This means that the number of Epochs represents how many times the model will go through the data. The remaining question is how many GPUs are needed.

$$\text{Time to train on 1 GPU} = \frac{\text{Number of Epochs of data Model}}{\text{bandwidth}}$$

This would mean that for two networks one obtains:

$$\text{Time (ResNet50)} = \frac{100 \text{ Epochs } 25 \text{ TB}}{293 \text{ MB/s}} = 4266211 \text{ seconds} = 14.10 \text{ weeks}$$

$$\text{Time (Inception v3)} = \frac{100 \text{ Epochs } 25 \text{ TB}}{187 \text{ MB/s}} = 6684482 \text{ seconds} = 22.10 \text{ weeks}$$

This is not practical wait time. To decrease to under a week, additional GPUs are needed. In this case, we would need 14 GPUs for the ResNet50 network and 22 GPUs for the Inception v3.

For additional efficiency, additional GPUs would result in linear scaling. An appropriate configuration would be 2X HPE Apollo 6500 for the ResNet50 training and 3X HPE Apollo 6500 for the Inception v3 network as each HPE Apollo 6500 can hold up to 8 GPUs.

**Storage**

Table 3 presents the results of benchmarking the Milestone application and gives the number of cameras supported by the HPE ProLiant m710x Server—used in the HPE Edgeline EL1000 and HPE EL4000 Converged Edge Systems—and the storage capacity needed according to the number of retention days and percentage of failover recording servers.

**TABLE 3.** Benchmark results for the Milestone application with potential camera resolutions and configurations (Benchmarks were done by HPE in collaboration with VENZO Secure)

<table>
<thead>
<tr>
<th>Camera bitrate</th>
<th>720p</th>
<th>1080p</th>
<th>4K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camera bitrate</td>
<td>2 Mbit/s</td>
<td>4 Mbit/s</td>
<td>16 Mbit/s</td>
</tr>
<tr>
<td>Number of cameras per m710x</td>
<td>300</td>
<td>200</td>
<td>50</td>
</tr>
<tr>
<td>Retention days and percentage of failover recording servers</td>
<td>90 Days 100%</td>
<td>583 TB</td>
<td>778 TB</td>
</tr>
<tr>
<td>90 Days 50%</td>
<td>292 TB</td>
<td>389 TB</td>
<td>1555 TB</td>
</tr>
<tr>
<td>90 Days 30%</td>
<td>175 TB</td>
<td>234 TB</td>
<td>934 TB</td>
</tr>
<tr>
<td>90 Days 10%</td>
<td>59 TB</td>
<td>78 TB</td>
<td>312 TB</td>
</tr>
<tr>
<td>30 Days 100%</td>
<td>195 TB</td>
<td>260 TB</td>
<td>1036 TB</td>
</tr>
<tr>
<td>30 Days 50%</td>
<td>98 TB</td>
<td>130 TB</td>
<td>520 TB</td>
</tr>
<tr>
<td>30 Days 30%</td>
<td>59 TB</td>
<td>78 TB</td>
<td>311 TB</td>
</tr>
<tr>
<td>30 Days 10%</td>
<td>20 TB</td>
<td>26 TB</td>
<td>104 TB</td>
</tr>
<tr>
<td>7 Days 100%</td>
<td>45 TB</td>
<td>61 TB</td>
<td>242 TB</td>
</tr>
<tr>
<td>7 Days 50%</td>
<td>23 TB</td>
<td>31 TB</td>
<td>121 TB</td>
</tr>
<tr>
<td>7 Days 30%</td>
<td>14 TB</td>
<td>19 TB</td>
<td>73 TB</td>
</tr>
<tr>
<td>7 Days 10%</td>
<td>5 TB</td>
<td>7 TB</td>
<td>25 TB</td>
</tr>
</tbody>
</table>
Direct-attach storage is appropriate for smaller configurations, while SAN-based storage and Ethernet/iSCSI-based storage work best with larger configurations. Other large-configuration options include multi-tier storage (flash disks for live databases, spinning disks for archive database) as well as predictive flash technology (HPE Nimble Storage), flash-optimized systems offering rapid and automated provisioning (HPE 3PAR), and hybrid cloud file storage (Qumulo and Scality).

**Software**

Some video analytics systems provide an embedded VMS and others can be integrated into existing ones. The choice is dependent on the use case and the number of video streams to be analyzed and stored.

**Video management system**

- A VMS is required for managing the various video streams. HPE has developed solutions using Milestone as the foundation VMS. It is also possible to adapt the HPE solutions to other VMS platform providers such as Genetec, Bosch, and others—including other storage and indexing system options. Here is an example of a Milestone VMS system design. The number of cameras, recording servers, and connected clients can be customized to address the requirements.
• The management server stores the configuration of the surveillance system in a relational database, either on the management server itself or on a separate SQL Server on the network. It also handles user authentication, user rights, the rule system, and more.

• The recording server is responsible for communicating with the network cameras and video encoders, recording the retrieved audio and video, as well as providing client access to both live, recorded audio and video.

• The mobile server is responsible for giving Milestone mobile client and XProtect web client users access to the system.

• The event server handles various tasks related to events, alarms, maps, and third-party integrations via the MIP Software Development Kit (SDK).

Use cases enabled by video analytics software vendors

The partner ecosystem from HPE provides comprehensive video analytics architecture that’s been tuned and validated with targeted use cases. Here are examples of offerings from ISVs whose innovative solutions have been tested with the full range of HPE edge-to-core systems.

<table>
<thead>
<tr>
<th>ISV name</th>
<th>Title</th>
<th>Use case</th>
</tr>
</thead>
<tbody>
<tr>
<td>BriefCam</td>
<td>Transforming video into actionable intelligence</td>
<td>Object detection and classification, object tracking and pathing, video synopsis</td>
</tr>
<tr>
<td>Micro Focus IDOL</td>
<td>Unified text analytics, speech analytics, and video analytics</td>
<td>Color recognition, facial recognition, Automatic License Plate Recognition (ALPR), object detection, object tracking and pathing, and unstructured data analysis</td>
</tr>
<tr>
<td>AnyVision</td>
<td>Making AI accessible to the world</td>
<td>Facial recognition, body recognition, object detection</td>
</tr>
<tr>
<td>VisionLabs</td>
<td>Computer vision and ML experts</td>
<td>Facial recognition, face attributes estimation (gender, age, and such.), face expression analysis</td>
</tr>
<tr>
<td>iCetana</td>
<td>Real-time critical event detection for video</td>
<td>AI/ML anomaly detection</td>
</tr>
<tr>
<td>Relimetrics</td>
<td>Going beyond visual inspections</td>
<td>Smart quality audit for industry 4.0</td>
</tr>
<tr>
<td>RealNetworks SAFR</td>
<td>AI-powered facial recognition for security professionals</td>
<td>Facial recognition, face attributes estimation (gender, age, and such.), face expression analysis</td>
</tr>
<tr>
<td>Assaia</td>
<td>The Apron AI</td>
<td>Predictive analytics and turn management, object detection</td>
</tr>
</tbody>
</table>

Services

HPE offers a wide range of services for video analytics and surveillance solutions including but not limited to:

<table>
<thead>
<tr>
<th>Advisory and Professional Services</th>
<th>Service description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPE AI Digital Transformation Workshop for key data, business, and IT stakeholders</td>
<td>Achieving the optimal video analytics solution often begins with an HPE Artificial Intelligence Transformation Workshop.</td>
</tr>
<tr>
<td>• Explore use case objectives and priorities for business, data, and IT stakeholders.</td>
<td></td>
</tr>
<tr>
<td>• Identify AI and analytics functionalities to reach your objectives.</td>
<td></td>
</tr>
<tr>
<td>• Reveal dependencies and data sources to develop an intelligent data strategy.</td>
<td></td>
</tr>
<tr>
<td>HPE AI Agile Design and Planning Service</td>
<td>HPE Pointnext Services has created the HPE AI Agile Design and Planning Service, enabling the design and planning of digital and AI transformation.</td>
</tr>
<tr>
<td>• Design implementation within approved budget allocations, while verifying compliance of the solution to the customer’s/end-user’s needs.</td>
<td></td>
</tr>
</tbody>
</table>

Operational Services

Our Operational Services team understands that success means being accountable across old and new infrastructure and apps—across the whole ecosystem.

Consumption-based IT services

<table>
<thead>
<tr>
<th>Video analytics as-a-service (detection-as-a-service)</th>
<th>HPE Pointnext Services has developed a consumption-based model for IT operations. For video analytics, HPE Pointnext Services offers detection-as-a-service (DaaS). Like other as-a-service models, DaaS enables organizations to bundle all costs relating to this solution (hardware, software, and support) into a single subscription. The DaaS solutions provide the organization’s markets a true business-oriented offering that minimizes administration organization and local IT/finance teams.</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPE Adaptive Management Services</td>
<td>HPE Adaptive Management Services is an integrated component of HPE GreenLake solutions, delivering IT outcomes in a pay-per-use model.</td>
</tr>
</tbody>
</table>
VIDEO ANALYTICS CUSTOMER SUCCESS STORIES

Manufacturing inspection (Customer: HPE factory/ISV: Relimetrics)

HPE offers a complex and customized portfolio of servers. Quality assurance of server assembly today is performed manually by human operators. HPE and Relimetrics have developed an automated final quality audit system for the HPE assembly line. It uses advanced algorithms and machine learning techniques to run reliable, automated inspections.

FIGURE 7. AI-enabled video analytics solution example for automated quality audit during server manufacturing

The solution uses an edge-to-core architecture. Inferencing is done on an HPE Edgeline EL4000 System and when a new model is needed, the training is done in the core/data center and then deployed on the edge. The edge also hosts the operator human-machine interface (HMI). Other consolidation functions reside at the core: consolidation dashboards, correlation with order management, and specific images are stored for post-analysis if needed.

Wafer quality analysis with DL from edge to cloud (Industry: Disk manufacturer)

Scanning electron microscopes (SEM) for silicon wafer inspection

HPE Edgeline EL4000 Converged Edge System

HPE Apollo 6500

Images

Outliers and labels

Trained models

DL inference on real time SEM images to identify defects

DL training to build and continually improve defect identification model

Quality assurance in silicon factories demands cutting-edge AI and video analytics to reduce errors, recoup investments, and maximize product output. HPE Pointnext Services deploys its world-class analytics, AI, and data experts to develop an edge-to-core reference storage architecture. The system includes an HPE Edgeline EL4000, which performs real-time inferencing at the edge. In the data center, an HPE Apollo 6500 trains its AI/visual analytics models to improve the HPE Edgeline’s pass/fail inferencing.

The manufacturer then replicates HPE Pointnext Services architecture to deploy their quality assurance inference engine across multiple factories in different geographies. All factories adapted the latest updated AI model for detecting pass/fail SEM images. In all deployments, the core HPE Apollo 6500 acts as a centralized resource to train/retrain multiple AI models for this task.
REFERENCE DESIGNS BY VENZO SECURE AND HPE

HPE and VENZO Secure propose a highly advanced analytics platform based on world-leading computer-vision technology, enabling a purpose-built hardware platform for video analytics, eliminating IT complexity with pre-configured software, and delivering endless scalability with worldwide support.

For more information on the HPE and VENZO Secure partnership, check the following link: h20195.www2.hpe.com/v2/Getdocument.aspx?docname=a00061666enw&skiphtml=1

SUMMARY

With a broad range of core computing solutions and HPC leadership, HPE is uniquely positioned to deliver edge-to-core video analytics systems for a wide variety of workload and operating conditions. HPE Edgeline enterprise-grade systems are built for rugged environments and designed for power-efficient operations. The tested technology from HPE ensures security, remote access, high-availability performance management tools and platforms with HPE iLO, TPM, RAID, and so on.

HPE video analytics solutions produce video streams that can be analyzed at the network edge without bandwidth limitations—eliminating any need for degradation of video image quality. Data costs are also optimized, as only relevant video segments will be processed—others are discarded at the source. HPE GreenLake also provides consumption-based alternatives, Daas, for flexible deployment and operations. The partner ecosystem from HPE builds out the edge-to-core AI architecture that is tuned, validated, and performance-optimized with targeted use cases and ISV partners.

HPE’s scalable building blocks integrate multiple supported features within the HPE Edgeline Converged Edge System. Together, they comprise industry-leading solutions for video management, AI, and hardware-accelerated video analytics. The video surveillance and analytics solutions from HPE also store high volumes of IP video surveillance data efficiently, ensuring the overall performance and reliability of the surveillance solution.

Unlike any other video analytics provider today, HPE provides a full portfolio of video analytics and surveillance solutions and support. A comprehensive video analytics solution comprising compute, storage, networking, and services are all available from one of the industry’s recognized leaders in HPC with a global presence.

The HPE edge-to-core offerings include HPE Edgeline Converged Edge Systems, HPE ProLiant Servers, and HPE Apollo Servers—providing high-performance CPU and accelerator options at a wide range of price points and form factors. A broad range of configurations and partner solutions enable video surveillance and analytics capabilities. The HPE storage portfolio comprises scalable storage options ranging from JBODs, HPE 3PAR all-flash arrays, HPE Nimble Storage, and HPE Apollo 4500 and Qumulo-based block and object stores for petabyte scale-out. HPE Pointnext Services together with domain-specific system integrators such as VENZO Secure enable scaling out of edge-to-core solutions and delivering video analytics-based outcomes as-a-service, globally.

The emergence of new technologies such as deep neural networks (DNNs) and hardware-accelerated video analytics increases computer vision’s capabilities of accuracy and time to results. Combining DNNs and third-party ISVs’ accelerated video analytics with edge-to-core computing enables a new class of outcomes for our customers.

Contact your HPE representative for more information, reference configurations, use cases, service, and support offerings and the latest HPE and partner technology for world-class video analytics today.

Follow us on

Facebook: facebook.com/HPEAI/
Twitter: HPE AI - @HPE_Ai
LinkedIn: linkedin.com/showcase/hpe-ai/
LEARN MORE AT
hpe.com/ai
HPE OEM Surveillance and Security Solution