CASE STUDY

Deep Learning
Video Analytics

1.5x Performance Boost for Video Analytics

Gorilla Technology Optimizes the Efficiency of its IVAR™ Intelligent Video Analytics Recorder using Intel® Distribution of OpenVINO™ Toolkit and Intel® System Studio

"We can do a lot more today, with a lot less computing power. That's definitely because of the Intel® Distribution of OpenVINO™ toolkit."

—Dr. Spincer Koh, CEO
Gorilla Technology

Challenge

Deep learning is enabling a new generation of real-time video analytics technology that can identify and track people, vehicles, and more objects frame by frame in real time, providing state-of-the-art security for a wide range of businesses and government agencies. But along with the advances come challenges. Systems can be complex, and environmental inconsistencies make video analysis complicated. For Gorilla Technology's IVAR™ intelligent video analytics recorder platform, the key challenge was to maximize performance for its customers.

Solution

The key to edge analytics is computing power. Working with Intel, Gorilla Technology used the Intel® Distribution of OpenVINO™ toolkit to achieve a 50% increase in CPU performance—enabling low-end edge devices to analyze 1.5x more frames per second in real time.

Also, while CPU compute allows for one channel of analytics per core, adding the Intel® Movidius™ Vision Processing Units (VPUs) to Intel® Atom®, Celeron®, or Pentium® processor-based machines increases the number of channels from one to two. Gorilla can specifically see this jump in channel capability on the UP Squared™ machine from AAEON.

To offer even more scalability options, adding Intel® FPGAs to Core™ machines yields an increase from four to 12 channels of analytic capabilities. The jump from four- to 12-channel analytic processing is evident in the IEI TANK™.

Gorilla also uses Intel® System Studio, an all-in-one, cross-platform tool suite built to simplify system bring-up and improve system and IoT device application performance on Intel® platforms. Intel System Studio helps Gorilla speed up application development, boost performance and power efficiency with platform-tuned libraries and compilers, and strengthen system reliability with in-depth debugging, tracing, and analyzing capabilities that deliver deep platform insights.

In short, the Intel Distribution of OpenVINO toolkit, combined with other Intel solutions, translates to more video channels on the same hardware, flexibility to meet system requirements, and faster response time for Gorilla's customers.

Developing an Analytic Platform

Municipalities large and small use video for many applications, especially public safety. Video can lead to locating and prosecuting criminals to improve safety and better serve public needs.

Real-time video analytics have long been a challenge for computer vision applications, since video is an information-intensive media. Systems can be complex, and environmental inconsistencies make video analysis complicated and challenging.

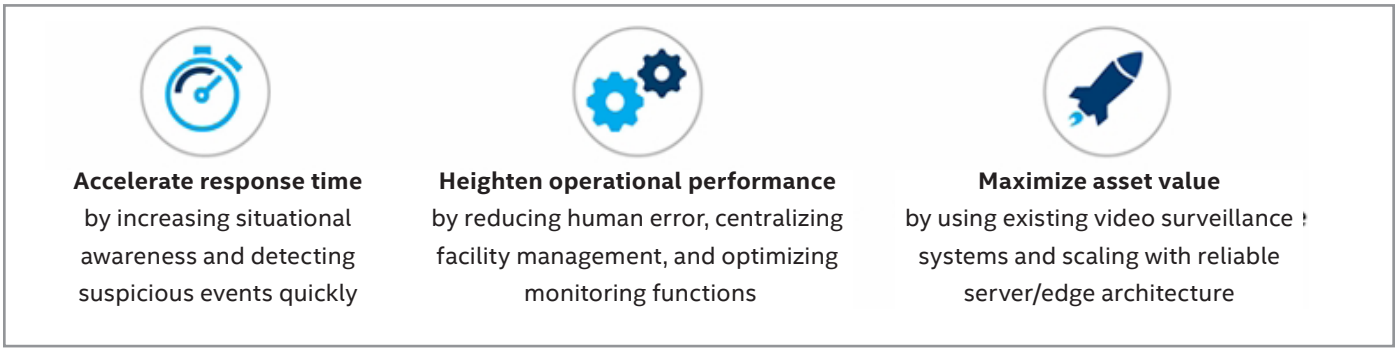

Figure 1. With the Intel® Distribution of OpenVINO™ toolkit, the IVAR™ solution offers strong business benefits.

With artificial intelligence, and now deep learning, the opportunities for computer vision applications continue to expand. Deep learning technology is enabling a new generation of video analytics where people, vehicles, and more objects can be identified frame by frame—and their movement tracked across frames and cameras.

Gorilla Technology's AI engineering team developed the IVAR™ platform including system design, engine development, and hardware dependency. The IVAR™ core algorithms are based on machine learning and deep learning technologies.

Since the platform combines video management system (VMS) functions and video analytic capability, optimizing IVAR™ to run these traditionally resource-heavy applications on Intel® architecture was the logical solution. Gorilla collaborated with Intel to make sure IVAR™ gets the best possible performance from the hardware on which it runs, ensuring it can meet different customer requirements and is easy to deploy.

The most difficult part of IVAR™ development was finding the right balance of hardware cost, size, inference engine accuracy, and performance.

Gorilla worked closely with Intel support teams from Taipei, Israel, and the U.S., using the Intel Distribution of OpenVINO toolkit to quickly adjust Gorilla's deep learning engine neural networks for video analytics to maximize performance. The free, downloadable toolkit fast-tracks the development of high-performance computer vision and deep learning inference into vision applications, optimizing inference on multiple Intel architectures including CPUs, CPUs with integrated graphics, Intel FPGAs, and Intel Movidius VPUs. The Intel Distribution of the OpenVINO toolkit enables accelerated computer vision performance, shortened vision solution development, and streamlined deep learning inference and deployment.

With the Intel Distribution of OpenVINO toolkit, IVAR™ video analytics performance achieved a 50% increase in CPU performance, enabling low-end edge devices to analyze 1.5x more frames per second in real time. The immediate beneficial result is more accurate analytic processing. This leads to superior response times, increased operational performance, and maximized asset value, as shown in **Figure 1**.

Safer Transportation and Better Service

The Gorilla IVAR™ solution is also well suited for public transportation. One organization using it this way is the rail network, operating 300 train stations nationwide. The rail authority's goal was to provide better commuter services while improving station security.

It deployed the first Intel Distribution of OpenVINO toolkit-based IVAR™ system at a busy transit station with more than 17,000 daily travelers and a limited security staff. It can now recognize people on watch lists, monitor footfall traffic, analyze abnormal behavior, detect unlawful intrusions, and more. With IoT sensors built into the IVAR™ edge systems, authorities can detect fires and intrusions on the tracks or other restricted areas.

Alongside expanding station safety, Gorilla provides better customer experiences. The ticket office can allocate staff as needed—such as in areas where there are long wait times to purchase tickets. Stations can apply platform entry policies if too many people are crowding a platform space, and provide more accurate schedule information.

The administration also benefits from significantly lower deployment costs and the public benefits from better customer services, for a win-win all the way around.

Since Gorilla IVAR™ provides real-time alerts and smarter services, the railway administration has experienced a 90% decrease in response time. Plus, incidents and complaint rates have dropped by 70%. "Overall, crime rates have dropped up to 80%, while clearance rates have increased by 50%," explained Dr. Spincer Koh, CEO of Gorilla Technology.

An Open System

Gorilla is making video surveillance a more cost-effective security tool through an open platform. It runs on standard Intel® processor-based computers, which gives customers a broad range of hardware options. The system supports open-standard codecs and protocols to work with any kind of IP camera as long as they are ONVIF Profile S and RTPS streaming.

Many surveillance systems are cumbersome—with multi-vendor and multi-generation video systems. This makes video and data monitoring a big challenge. IVAR™ can be easily integrated into existing surveillance systems, enabling numerous cameras in different locations or sites to connect to a central management hub, as shown in **Figure 2**.

Gorilla's IVAR™ solution is a software-based, comprehensive video surveillance system designed for CPU efficiency. It enables efficient monitoring across areas and activities to immediately detect emergencies and threats. With the creation of watch lists, for example, detection of unusual

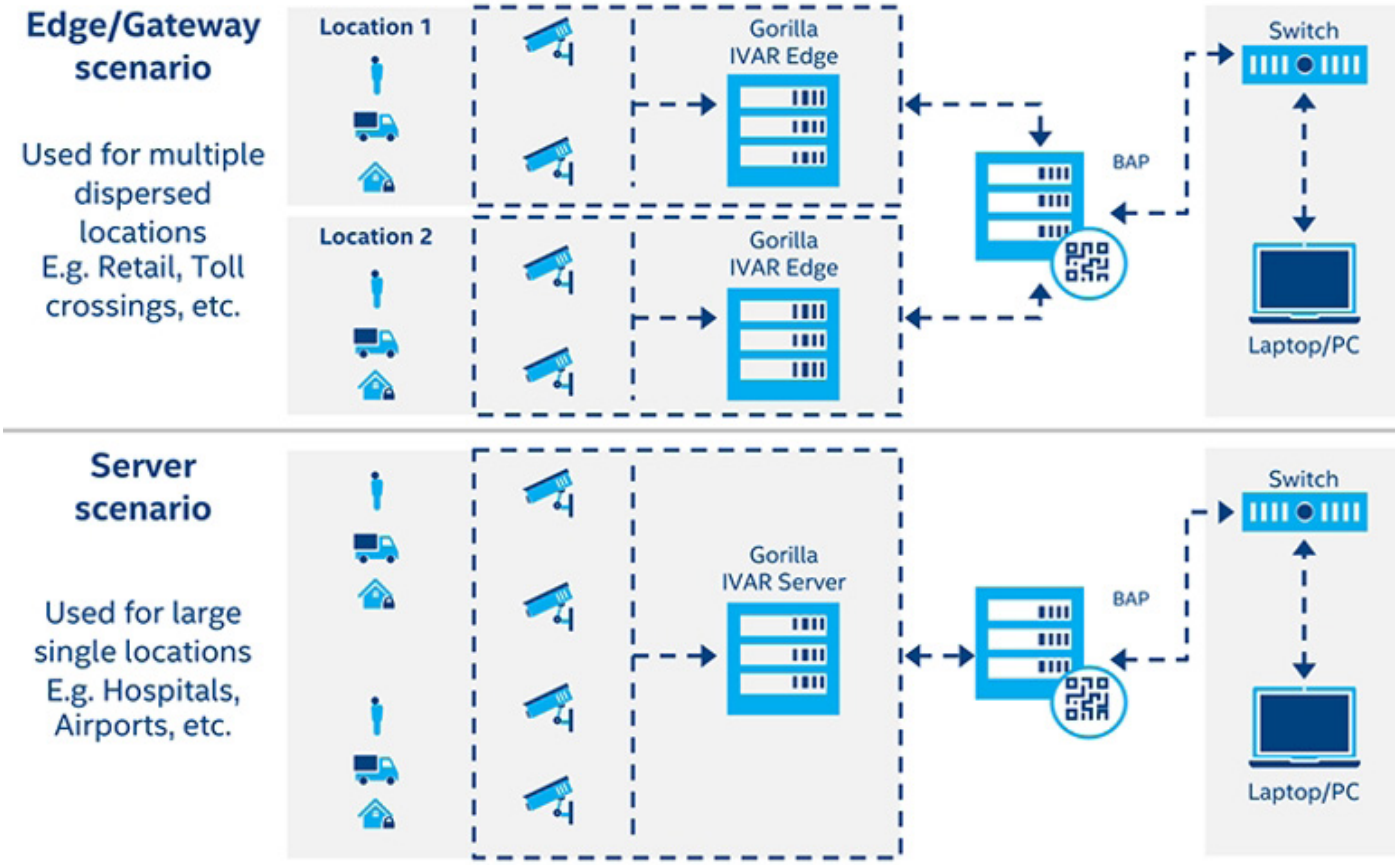

Figure 2. IVAR™ extracts and processes video from multi-vendor video systems at the edge.

activities and repeat offenders reduces manual effort and human error. Another feature—intrusion detection—quickly identifies suspects and uses push notifications to alert personnel if an event occurs.

Remote administration allows operators to keep track of cameras and manage multiple feeds simultaneously. Security personnel can efficiently search, view, and monitor premises to increase situational awareness and reduce time to action. By integrating existing surveillance systems, all essential timeline and event data is displayed. And a single dashboard—providing centralized monitoring—brings it all together.

The IVAR™ solution is versatile VMS functionality in that it can work as a complete and standalone system or be integrated into others via API or RTSP. This takes a big step beyond traditional network video recorder (NVR) systems, which typically only provide storage, streaming, and playback on a proprietary platform. This limited flexibility makes it a huge challenge for these systems to keep up with rapidly evolving, high-performance technology.

"We can do a lot more today, with a lot less computing power. That's definitely because of the Intel Distribution of OpenVINO toolkit," said Dr. Koh.

Learn More

- **Intel® Distribution of OpenVINO™ toolkit**
- **Intel® System Studio**
- **Gorilla Technology IVAR™ Intelligent Video Recorder**

intel® Software

Benchmark results were obtained prior to implementation of recent software patches and firmware updates intended to address exploits referred to as "Spectre" and "Meltdown". Implementation of these updates may make these results inapplicable to your device or system.

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more complete information visit http://www.intel.com/performance.

Intel's compilers may or may not optimize to the same degree for non-Intel microprocessors for optimizations that are not unique to Intel microprocessors. These optimizations include SSE2, SSE3, and SSSE3 instruction sets and other optimizations. Intel does not guarantee the availability, functionality, or effectiveness of any optimization on microprocessors not manufactured by Intel. Microprocessor-dependent optimizations in this product are intended for use with Intel microprocessors. Certain optimizations not specific to Intel microarchitecture are reserved for Intel microprocessors. Please refer to the applicable product User and Reference Guides for more information regarding the specific instruction sets covered by this notice.

For more information regarding performance and optimization choices in Intel® Software Development Products, see our Optimization Notice: https://software.intel.com/articles/optimization-notice#opt

Intel and the Intel logo are trademarks of Intel Corporation in the U.S. and/or other countries.

*Other names and brands may be claimed as the property of others.

Copyright © 2019 Intel Corporation

Printed in USA 319/SS Please Recycle