SOLUTION BRIEF

Internet of Things (IoT)
AI-Based Intelligent Surveillance

iOmniscient Delivers AI-based, Multisensory, Smart Surveillance Analytics Powered by Intel® Architecture

Targeted analytics for a wide range of industries help increase security, operational efficiency, and insight

Executive summary

Artificial intelligence (AI) is enabling more accurate and timely surveillance with capabilities from facial recognition to object detection. However, taking advantage of these new capabilities can be challenging, especially for complex and often crowded multivenue environments, such as smart cities, airports, and oil and gas and manufacturing facilities. iOmniscient delivers an innovative AI-based analytics platform powered by Intel® architecture that utilizes a set of patented algorithms to provide multifaceted, multisensory analytics for a broad spectrum of industries worldwide.

Challenges

Surveillance solutions based on video from IP cameras, network video recorders (NVRs), and sensors have the potential to provide streaming, near-real-time, contextual insight to inform fast response. But ingesting, processing, and storing this data can be complex, costly, and difficult to manage. Sensory data such as sounds and smells can provide crucial information, but this requires a system that can integrate multiple types of streaming input.

Many surveillance systems are based on older technologies that were neither designed for AI nor capable of holistic, large-scale environmental analytics. Achieving comprehensive insight in a timely manner often relies on consolidating input from large numbers of individual sensors, costly in both CapEx equipment expenditures and high-bandwidth data transmission over networks.

Installing thousands of surveillance cameras is no guarantee that relevant events will be detected. Studies have shown that an operator watching just two cameras misses half the action after around 10 minutes and sees almost nothing after 20 minutes.[1] Likewise, setting up huge and expensive command and control centers cannot ensure that critical incidents are detected or that fast response times are enabled.

Solution

iOmniscient begins not with technology, but with a dedication to solve the unique challenges and opportunities of its customers. The flexible iOmniscient software module building blocks are then configured to serve the needs of an organization or of multiple groups within an organization, allowing various stakeholders to access the output relevant for them. Once a customer's goals are identified, iOmniscient offers targeted, innovative AI technologies to analyze data from crowded and complex environments and provide users with near-real-time responses.

iOmniscient
Hi-iQ Analytics

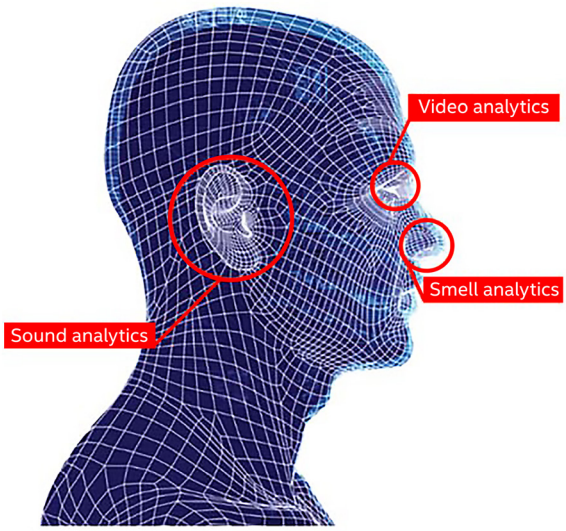
iOmniscient smart surveillance powered by Intel® architecture can identify individuals even in crowded urban environments

Deployed by 30 industries worldwide, ranging from oil & gas to smart cities, iOmniscient's systems utilize AI to achieve high levels of accuracy and low false alarm rates even in complex situations. And because the solution works with existing cameras, NVRs, and sensors—and achieves more functionality per device—even multilayered implementations such as smart cities can become more efficient at a low cost while helping to improve citizen safety.

iOmniscient's video analytics go beyond simple motion-based video analysis. Capabilities include behavioral analysis, counting in crowds, abandoned object detection and facial recognition in crowded scenes, and multilingual license plate recognition (LPR)—all done simultaneously on the same camera. In addition to analytics, the solution involves sophisticated automated response, allowing organizations to process large quantities of unstructured surveillance information; manage and respond to a wide range of events in a complex environment or venue very efficiently; and forecast future requirements for more effective planning.

iOmniscient's patented Artificial Intelligence Platform* consists of a set of modular, technology building blocks that can be combined in unlimited ways to provide unique multisensory solutions for operational automation and insight. The technology uses a unique hybrid of heuristic, neural network, and deep learning algorithms to achieve fast and accurate results with minimal computing infrastructure. With iOmniscient software running on high-performance Intel architecture, organizations can improve operational efficiency, enhance productivity, and increase ROI.

Bringing together a number of different video, sound, and smell analytics technologies, iOmniscient systems can automatically find the nearest responder, providing him with information on where to go and what to do. This can help reduce response times significantly for mission-critical applications.



iOmniscient integrates multisensory data to increase insight and operational efficiency

Intel® Distribution of OpenVINO™ toolkit

iOmniscient uses Intel Distribution of OpenVINO toolkit to further accelerate AI model training and deep learning inference. This is a free, downloadable toolkit that helps developers and data scientists fast-track the development of high-performance computer vision and deep learning into vision applications. It enables deep learning on hardware accelerators and streamlined heterogeneous execution across multiple types of Intel® platforms. It includes the Intel® Deep Learning Deployment Toolkit with a model optimizer and inference engine, along with optimized computer vision libraries and functions for OpenCV* and OpenVX*. This comprehensive toolkit supports the full range of vision solutions, speeding computer vision workloads, streamlining deep learning deployments, and enabling easy, heterogeneous execution across Intel platforms from device to cloud.

MULTISENSORY ANALYTICS INCREASE ACCURACY AND DEPTH OF INSIGHT	
VIDEO ANALYTICS	
Facial recognition: iOmniscient Face Recognition System*	• Anonymous facial analytics to protect privacy • Recognize people who are noncooperative, match them against data bases, and locate persons of interest • Operate in an uncontrolled environment at far distances in crowds on low resolution cameras • Identify individuals despite variations in pose, expression, head gear, eyeglasses, or facial hair • Match faces against multiple large databases • Track person of interest on nonoverlapping cameras (if person A has been seen on a particular camera and tagged, the system can determine which other cameras A has appeared on and when)
Behavior analytics	• Identify specific behaviors in crowded environments • Identify suspicious behavior, such as loitering, sudden crowd gathering, man down • Combine behavior analysis with facial recognition • Understand how long people spend in a particular zone • Intelligent traffic management
License plate recognition (LPR)	• Multilingual license plate recognition • Help track any vehicle that is stolen or used for any criminal activity • Identify blacklisted suspect cars in any country
AUDIO ANALYTICS	
iQ-Sound*	• Analyze and differentiate sounds (e.g., glass breaking and gunshots) • Discern if people are conversing normally or if some have raised their voices and are engaged in an argument • Authenticate individual speakers based on their voice
ANALYSIS OF SMELLS	
iQ-Smell*	• Smell and detect a variety of gases at a distance of several hundred meters (if a new chemical needs to be detected the system can be trained to smell it) • Detect gas leaks or the unusual accumulation of certain gases in a particular location • Detect the spraying of graffiti at a distance of 50 meters (150 feet) or more

Airport productivity and security

Airports are among the busiest, most densely populated places in the world and security and safety are the highest priority. As such, airports offer an excellent example of the range and depth of the iOmniscient solution based on Intel architecture. The complexities of obscuration and ambiguities in crowded scenes, as well as the complex behaviors and scene semantics, make video analysis and detection of threats, events, and people in airports particularly challenging.

iOmniscient's patented technologies enable automated face recognition and complex behavior analytics even in extremely crowded conditions. This advanced software can detect abandoned luggage, even when it would be impossible to do so with the naked eye. This feature is coupled with a "jump to event" capability that shows who was involved. Additionally, behavior recognition, and slip and fall detection tools help airports become more secure for children and the elderly. For instance, airports' integrated, automated systems can stop the luggage conveyance belt from moving if a child jumps onto it, thus minimizing the chance of injury.

The airport solution provides more than just security. Using a patented dwell time feature, airports can streamline operations at check-in counters, baggage areas, airport gates, and in other essential zones. Further, intelligent video analysis can also be used to monitor customer behavior, allowing airports and airlines to improve service. If the video analysis shows that most customers move toward a certain security checkpoint or frequent a particular area of the airport for preflight snacks, management can create marketing campaigns targeted at those areas or change processes to make the experience more pleasant for travelers.

IOMNISCIENT AIRPORT ANALYTICS CAPABILITIES	
Security	• Detection of abandoned/suspected luggage left in a crowd • Detection of objects being left where they should not be • Facial recognition in a crowd • Detection of fights
Operations	• Queue management • Automate check-in and boarding gates with facial recognition • Automated quarantine control • Airplane metering at airbridge • Parking management • Facial recognition, people counting, movement monitoring • Access control and staff identification • Detection of asset destruction or manipulation
Safety	• Detection of someone slipping and falling to mitigate liability • Find lost children even without having an image of them • Help prevent runway hazards by detecting objects left on runways
Efficiency	• AI-based Nuisance Alarm Minimization System* (NAMS*) helps eliminate false alarms while still maintaining detection accuracy • Smart compression allows high bandwidth video to be sent over low bandwidth networks

Making global cities safer

iOmniscient has implemented automated response smart city solutions in over 50 countries. Drawing on video, sound, and smell data, the system analyzes the moment when an incident occurs, identifies the individuals involved, and finds the nearest responder. For example, object detection can quickly detect an abandoned package, facial recognition tracks the movements of the person who left it there, and the nearest law enforcement official is located and informed. As a result, response times for street incidents in some cities have been reduced from 25 minutes to under five minutes.

More use cases

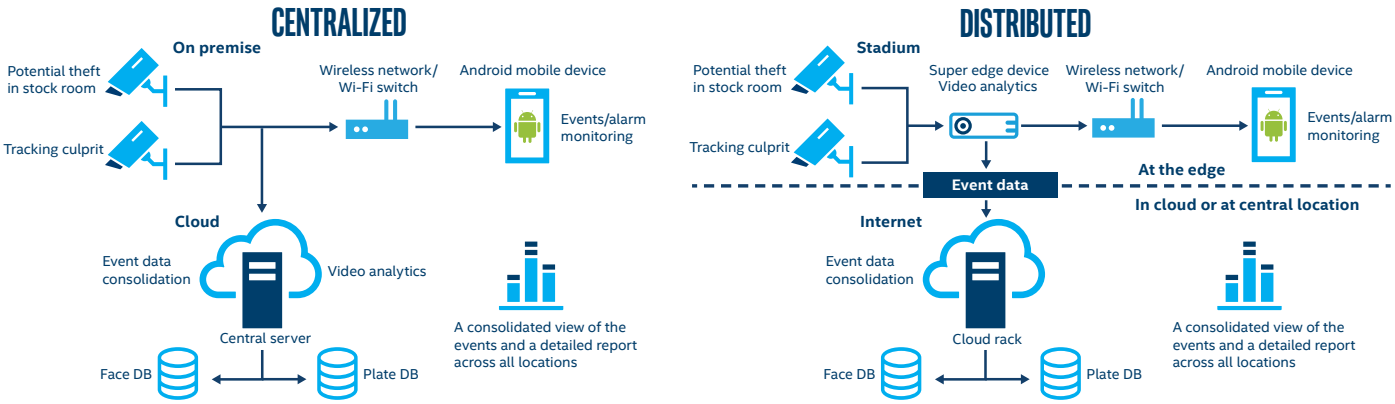
With more than 50 patents to date, iOmniscient solutions streamline analytics for a wide range of vertical sectors. The Nuisance Alarm Minimization System* (NAMS*) module, connected to all iOmniscient products, provides an accurate and reliable alarm system for industries.

Smart cities: Helping to increase safety, security, and efficiency for law enforcement, traffic management, utilities, transportation, first responders, hospitals, and schools.

Oil & gas: Comprehensive video analysis for perimeter protection, gas leak detection, and smoke and fire detection.

Finance: Helping to monitor and prevent fraud and identify theft, improve customer service, and increase cybersecurity. Analyze customer behavior, determine if a bank queue has exceeded acceptable limits, study customer dwell time, and recognize VIP customers.

Healthcare: Offers tracking of dementia patients, detection of patients falling down in bathrooms without infringing on their privacy, access control, detection of theft from drug stock rooms, parking management, queue management, and crowd control.



iOmniscient solutions powered by Intel® architecture support both centralized and distributed infrastructure

How it works in brief

iOmniscient has evolved the traditional analytics platform from video management to an automated surveillance and response system integrating multisensory data.

In part because the modular building blocks of the iOmniscient platform can be combined in multiple ways, the resulting systems are able to do more with less. With iOmniscient, an intelligent system can typically be implemented at a lower cost than a "non-smart" video recording system. The iOmniscient solution can simultaneously perform behavior analysis and facial and license plate recognition in crowded and complex environments. The recognition system can recognize faces at very low resolution and license plates for 130 countries. And, because these capabilities are modular, they can be combined to solve complex problems.

The behavior analytics system is designed to operate with very low resolution (QCIF) and low frame rates (2 to 6 FPS). This also helps to reduce computational requirements. The Face Recognition system is designed to give accurate results with an image resolution that provides only 22 pixels between the eyes. For covering large areas this means one low resolution camera can do the job of five to 10 cameras required by many other systems. iOmniscient's Smart Compression can reduce storage and bandwidth requirements by more than 90 percent on top of that achieved by H.264 or H.265.[2]

Edge computing is critical for IoT analytics due to the diverse array of connected devices and equipment, necessary for near-real-time responsiveness; and the high cost of transmitting huge amounts of rich metadata to the cloud. The iOmniscient and Intel solution provides the intelligence, reliability, performance, and enhanced security to meet these edge computing requirements. For example, multiple cameras can feed into the iOmniscient-enabled Intel architecture-based device, perform analytics, and compress and send data directly to a smart phone or to a central location in the cloud or data center for deeper analysis.

The platform integrates and analyzes multimedia metadata, including video, sound, and smell for insight before, during, and after an event or incident. All big data analysis is based on text data. iOmniscient systems convert everything that is seen, heard, or smelled by the system into meaningful, multimedia metadata (MMM), which is essentially text. This allows very fast analysis of data for forensic investigations.

Designed for legacy and modern systems, the solution will work with any cameras, whether high or low resolution, network video recordes, and sensors. It is effective even in crowded and complex scenes, such as airports, stadiums, and cities, for example, recognizing a person from 60 feet away in a crowded stadium on relatively low resolution cameras.

iOmniscient's patented smart video compression compresses video to 10 percent of its size without losing important details via a small Intel architecture-based edge device placed near the camera. As the system is able to eliminate noise which is usually 90 percent of the data, it helps to speed up searching and analysis even further.

With iOmniscient, organizations can save on data transmission and storage costs, get more value from fewer recording devices, and implement an analytics-based recording system at a lower cost than a basic recording solution.

For additional security, organizations own their own database and all systems have reversible redaction to help ensure only authorized people can see faces.

iOmniscient iQ-Implant*

The Intel® architecture-based iQ-Implant is designed to make any IP camera intelligent and consists of a Super Edge Device, specially designed to process multiple, advanced video analytics on the edge. These devices are optimized to handle very advanced analytics for crowded scenes that cannot perform on any traditional digital signal processing (DSP)-based edge camera or device. A variety of software analytics can be implanted on the hardware suited to the specific requirements of the environment.

The foundation for IoT

iOmniscient solutions provide an example of how Intel works closely with the IoT ecosystem to help enable smart solutions based on standardized, scalable, reliable Intel® architecture and software. These solutions range from sensors and gateways to server and cloud technologies to data analytics algorithms and applications. Intel provides essential end-to-end capabilities—performance, manageability, connectivity, analytics, and advanced security—to help accelerate innovation and increase revenue for enterprises, service providers, and industry.

Conclusion

iOmniscient's unique approach is centered around meeting the specific needs of individual customers—allowing for targeted solutions (at zero incremental cost relative to a recording system) that work with virtually any camera, NVR, or sensor from the edge to the cloud. With iOmniscient and Intel, organizations can achieve the insight of AI-based analytics—all with fewer cameras, less storage and bandwidth requirements, fast response times, and better quality, accurate information.

About iOmniscient

As a pioneer in video analytics with more than 18 years of commercial experience, iOmniscient is dedicated to developing revolutionary and intelligent multisensory analytics.

iOmniscient provides a comprehensive suite of detection, recognition, and automated surveillance and response systems, from simple intrusion and counting systems to unique object detection in a crowd, multilingual license plate recognition, and non-cooperative facial recognition for crowded scenes. Its more than 50 international patents include the ability to perform behavior analysis and facial recognition in crowded scenes and to perform detection and recognition simultaneously on the same camera.

iOmniscient has won many international awards, including the IFSEC Best CCTV System of the Year for face recognition in a crowd and the Global Challenge for Crowded Scenes. Wealth and Finance magazine named iOmniscient its 2018 Analytics Company of the Year.

iOmniscient offers the unique value proposition that it can implement a smart system at a lower cost than others can provide a simple recording system. This is achieved through the ability to attain results with less infrastructure: fewer cameras, 90 percent less storage and network bandwidth, and less computing power.

With its global footprint and distributed support centers, iOmniscient offers 24/7 worldwide support and professional services.

iomni.ai

Learn more

For more information about iOmniscient, please visit iomni.ai or contact us at info@iomni.ai.

For more information about Intel IoT Technology and the Intel® IoT Solutions Alliance, please visit intel.com/iot.

1. "iQ-Smart City: A Guide on How to Maximize the Value of Your Investment in a Smart City System," iOmniscient, 2018, iomniscient.com/wp-content/uploads/2018/01/iQ-SmartCity_book20121204lowres.pdf.

2. iomniscient.com/taking-high-resolution-video-to-the-cloud.

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