Advanced video analytics and AI help keep cities and industries informed, optimized, and safer

“Deep learning is a game changer for the video surveillance industry. Neural network-based deep learning technology dramatically increases the adaptability of video analytics solutions to meet the many diverse video surveillance requirements.”

—Paul Sun, CEO, IronYun

Executive summary

Video analytics and AI bring advances for surveillance, safety, and optimization, but mining the value from massive amounts of streaming data is both complex and costly. When incidents occur, they necessitate fast access to pertinent evidence—something that many businesses do not have the staff or capability to achieve. IronYun offers an innovative software platform designed for video analytics to enhance physical security and increase intelligence from the edge to the cloud. Powered by a robust, high-performance Intel® architecture, the IronYun AI solutions are helping to make cities safer and organizations more efficient.

Challenges

Cities, industries, and businesses want to tap vast amounts of data to increase security and insight and improve operations. Video captured at the edge by smart devices, sensors, and connected equipment represents a huge portion—USD 6 billion—of the overall IoT opportunity for everything from smart manufacturing to smart cities. A Gartner survey of more than 2,500 CIOs revealed that spending on intelligence is the top business investment priority in all types of organizations. However, quickly and accurately retrieving relevant information from video can be challenging. Transmitting 24/7 high-definition video to the cloud is costly. When an incident occurs, it can be difficult to access evidence in a timely manner; systems are often not fully automated, which requires significant manual effort and time to process and analyze data. False positives are high and traditional legacy motion detection system alarms are triggered by any movement, such as that of an animal. Companies managing physical security and surveillance want data on-site and under their control, rather than in the cloud where many analytics solutions run.

Solution

IronYun offers an innovative AI video analytics platform powered by Intel architecture. The solution automatically processes data based on a growing set of AI models for neural network inference. Capabilities include identification and detection of objects, people, guns, and facial features. The AI tool categorizes the people and objects it detects, saves the metadata, supports simple keyword searching, and provides fast results, including the data capture time and location. The solution dramatically reduces false positives as well as time spent verifying whether the alarms are accurate. The intrusion detection systems can set rules for specific criteria, such as detecting people wearing (or not wearing) company-issued clothing.
The hardware-agnostic platform works with connected cameras, network video recorders (NVRs), edge appliances, and on-premise servers. It runs on Ubuntu* Linux* and connects to the existing EMS or video management systems of the user organization, which means organizations maintain complete control of their data.

**One comprehensive platform for AI video analytics**

- **Cost-effective**: No need to purchase expensive, customized cameras with built-in analytics
- **Fast results**: Search in seconds vs. hours with legacy systems
- **Reduce false positives**: Only images with relevant people or objects trigger alerts, to reduce the number of false positives
- **Ease of use**: Requires no formal training or learning curve for security staff or other end users
- **Support**: IronYun experts get the system up and running quickly for customers
- **Upgrades**: Future-proofed Intel architecture supports software upgrades, with any new feature upgrades from IronYun available at no cost during the first year

To help safeguard the data and networks, transactions are limited to the connection between the camera and/or NVR, AI system, and device. User permissions can be controlled, and Iron Yun has no access to an organization's data once the system is installed.

The AI capabilities draw upon IronYun's proprietary, third-party, and open source algorithms. New functions are continually added by IronYun; soon license plate recognition (LPR) and vehicle tracking will be available in addition to video object search, detection, and facial recognition.

The flexibility to easily integrate with other systems allows customers to use data in any way they want.

Likewise, IronYun's open API supports developers building applications on their system. Currently, there are more than 100 types of objects that can be recognized; in the near future, the end users will be able to train AI models to recognize specific objects relevant to their business or industry.

The results are presented in an accessible format via data visualization and can be displayed via the user organization's VMS or dashboard.

Intel architecture-based processors, mini PCs, and rack-mounted servers provide the reliable, scalable, high performance needed to power the AI analytics engine and fast processing of large video files from edge to cloud.

IronYun will be optimizing its solution with the OpenVINO™ toolkit to further increase the edge processing capabilities.

**Sample use cases**

The solution is ideal for use cases based on identifying or recognizing people or objects, including detecting:

- Breaches into secure zones
- Unauthorized activity or movement in specific areas
- Perimeter intrusion
- Loitering in sensitive areas
- Parking space availability
- People falling
- Traffic density in specific areas (heat map)

**Acer reduces intrusion with IronYun and Intel**

IronYun customer Acer supports a large smart city park with two solar farms for diverse businesses, hotels, and residential units. Acer had a legacy intrusion detection system in place that detected objects, but lacked the capability to identify object types, resulting in costly and labor-consuming false alarms. Shaking branches, shifting light and shadow on objects, and unrelated objects could all trigger the system.

IronYun worked closely with Acer to optimize project planning, decrease costs, and reposition legacy equipment to maximize usage. The AI NVR instruction detection solution is increasing surveillance and accuracy for the solar farms. The solution is flexible and works with any ONVIF IP-based camera to expand the monitoring area. Smart object detection based on pretrained AI engine identifies objects by type through a deep learning mechanism and filters irrelevant observations.

IronYun’s AI NVR* intrusion detection solution powered by Intel® architecture increases surveillance and accuracy for two large solar farms
to reduce false alarms. The solution demonstrates that the AI video analysis can be applied in complex environments where identification is difficult. The AI NVR solution provides a short return on investment (ROI) of three to six months.

- Increases accuracy of the analytics engine for virtual fence
- Customizable detection condition setting utilizes single FOV to support multiple regions of interest with different criteria, such as time, object type, quantity, and color
- Flexible region-of-interest setting supports irregular (e.g., polygonal) detection area settings
- Detects even small-size objects (60 x 60 pixels) and partially visible objects

How it works in brief

Artificial Intelligence Video Search Appliance* (VSA*)

IronYun’s VSA provides a breakthrough solution for the chronic pain point of the video surveillance industry—searching for objects of interest from hours or terabytes of video data. The VSA is a deep learning-based video search appliance purpose-built for the video surveillance industry. It analyzes both near-real-time video streams and stored video files to detect and recognize objects, animals, guns, persons, or faces. The AI software and hardware video search capability is built in for fast, efficient search of video objects directly from streaming camera data at the edge. It can also search video data stored in external NVR-like storage devices.

The search engine is intuitive and based on an easy-to-use natural language interface. Search engine keywords include many types of vehicles (e.g., sedans, buses, motorcycles, bicycles, and airplanes), people, faces, colors, animals, and numbers of objects (e.g., video scenes with four cars).

The solution can accurately detect diverse object types and even partially visible objects.

Detection of guns helps alert law enforcement and safeguard citizens even in crowded urban environments.

Streamline video analytics application development

With Intel® Vision Accelerator Designs and the OpenVINO™ toolkit, Intel offers a broad portfolio of hardware and software to accelerate deep inference.

OpenVINO toolkit

The OpenVINO toolkit 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.

Intel Vision Accelerator Design products

Intel Vision Accelerator Design products provide power-efficient deep neural network inference for fast, accurate video analytics and computer vision applications in edge servers, NVRs, and edge appliances. The reference designs include PCIe®, mini PCIe, and M.2 plugin cards based on Intel® Movidius™ VPUs or Intel® Arria® 10 FPGAs. They bring an array of essential features, including I/O, multistream aggregation, in-line processing, and a mix of deep inference and traditional sensor processing acceleration to edge devices.

Intel® Vision Products

Intel Vision Products accelerate the capabilities of IoT vision systems and deep learning inference from the camera to the cloud through leading heterogeneous hardware and software combinations. Intel offers a broad range of vision products and software tools to help solution providers scale vision technology across infrastructure, matching specific needs with the right performance, cost, and power efficiency at every point in an AI solution. By providing essential insights when and where they are needed, Intel is helping businesses unlock new possibilities for their visual data.
AI NVR Virtual Fence* (VF)

IronYun’s rapid video search engine based on deep learning—the AI NVR—now has the added function of virtual fence detection and intrusion alert. The AI system automates the monitoring tasks for high-risk sites to provide a high level of security and personnel monitoring efficiency. The simple plug-and-play setup enables AI intrusion detection to be deployed in real-world applications. Because AI NVR VF can be easily integrated with any existing system and has high accuracy from deep learning, it also works well with infrared and thermal cameras.

Traditional intrusion detection systems detect objects based on size and location, but they do not recognize the types of objects. AI intrusion detection uses built-in AI algorithms to recognize more than 100 types of objects. It can distinguish objects of interest, such as a person, from irrelevant objects in the region of interest (e.g., animals, plastic bags, moving shadows at dawn or dusk). Thus, AI Intrusion Detection can significantly decrease the rate of false positives.

In the camera view frame, users can draw a virtual-fence zone, which generates an alarm if a vehicle, person, or boat crosses a virtual tripwire. The system can categorize objects and determine their position relative to the region of interest independently of the camera position. For instance, a person standing between the camera and the region of interest will not trigger an alert until he physically enters this area.

Deep learning can customize the types of objects recognized by AI NVR to suit any type of application.

AI NVR Face Recognition* (FR)

AI NVR Face Recognition continuously detects and recognizes faces from IP video surveillance cameras, at a distance, on the move, and in natural settings. The Face Recognition solution relieves human operators from continuous manual monitoring. The AI NVR system provides a user-friendly interface to quickly access the collection of events registered by the system. The solution enables the simultaneous identification of multiple people of interest in real time across several live camera streams.

Face Search is a subfunction of AI NVR Face Recognition, enabling the rapid search of video footage based on an input image of a person’s face. It offers a simple, lightweight solution for venues such as shopping centers, schools, resorts, and airports to increase business efficiency and minimize manual effort in searching for people when incidents occur on-site. With the capability of the search engine based on AI and deep learning, each search query can yield results within seconds, helping to locate an individual nearly instantly in near-real time.

Face Search addresses privacy concerns by not storing any faces in the search database (i.e., there is no list of prestored faces to compare). Names are not stored to support compliance with privacy regulations and restrictions.

With IronYun AI NVR Face Recognition organizations do not need to purchase expensive FR-built-in facial recognition cameras and multiple cameras can share the face recognition software running on the platform to save on licensing costs.
The IronYun solution includes intelligent filtering and feeds only images with human faces to the Face Recognition engine to maximize efficiency.

**Conclusion**

IronYun customers include cities, enterprises, hotels, airports, and schools where physical surveillance and safety are primary concerns, as well as sectors such as manufacturing and retail that require new levels of business intelligence to operate efficiently and competitively in the marketplace.

AI NVR provides an all-in-one solution to increase ease of use and decrease TCO. With IronYun AI video analytics solutions powered by Intel architecture, extracting value from video data can become a core component of organizational strategy and security policies.

**Learn more**

For more information about IronYun, please visit ironyun.com or contact us at sales@ironyun.com or 1-203-273-7089.

Explore Intel® Vision Products at intel.com/visionproducts.

Find out more about Intel innovation for AI at intel.com/ai.

Download the free OpenVINO toolkit.

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

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2. gartner.com/newsroom/id/3481117.

Performance results are based on testing as of September 2018 and may not reflect all publicly available security updates. See configuration disclosure for details. No product can be absolutely secure.

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