ADLINK
Leading EDGE COMPUTING

Application Story

Facial Recognition Gates Increase Security and Efficiency

The ADLINK MVP-5100-MXM series powered by NVIDIA GPU delivers the high performance and low latency required by Edge AI applications



www.adlinktech.com

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Situation

Many industries are employing video analytics to extract actionable information for a wide variety of use cases (Fig. 1), such as:

Surveillance: monitor infrastructure to recognize threats
- Commercial buildings and smart cities

Navigation: identify optimal travel paths and detect obstructions
- Autonomous vehicles and autonomous mobile robots (AMRs)

Anomaly Detection: recognize deviations from expected patterns
- Manufacturing defects and debris on airport runways

Gate Access Control: allow entry at checkpoints based on facial recognition
- Transportation ticket validation (e.g., bus, subway, and plane) and facility entrance control

Significant efficiency gains in these use cases and others will help drive an impressive 29 percent compound annual growth rate (CAGR) in the video analytics market from 2020 to 2025.[1]

Some video analytics use cases require high levels of computing power in order to deliver timely and accurate results. For example, a facial recognition gate at a factory entrance must quickly and precisely identify those permitted to enter to avoid long queues and unauthorized admittance.

To satisfy stringent speed and bandwidth requirements, systems integrators are implementing edge video analysis (EVA) solutions on-site, where the data is generated, instead of off-site in a data center or the cloud. Many EVA solutions will implement artificial intelligence (AI) algorithms that can be trained to analyze video data faster and more accurately than other data analysis methods.

As a result, EVA minimizes latency and does not need a persistent network connection, making it suitable for both mobile and stationary deployments. EVA also alleviates privacy and security concerns over confidential data.



Figure 1. Industries are employing video analytics to extract actionable information.

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Facial Recognition Gate Requirements

Systems integrators developing facial recognition gate solutions need to address design challenges with respect to speed, accuracy, and physical size. The solution should distinguish a real human face from a photo and recognize a person despite their wearing glasses or a cap. The solution should yield results within a half second, after capturing and comparing an individual's image to other facial images in a database. An acceptable error rate can be as low as on the order of 10 per million, made more challenging by lighting conditions that may vary throughout the day.

To ease installation into existing, poorly-ventilated entry points of industrial complexes, facial recognition gate solutions should be small and fanless, capable of dissipating the heat generated by compute-intensive video analysis applications.

"A major benefit of installing video analytics on-premises is companies can customize and modify the hardware based on their requirements and security purpose, like keeping confidential data secure and private. Moreover, the demand for improved efficiency levels in video surveillance and the growing interest in advanced technologies, such as IoT and AI, are expected to provide significant opportunities to video analytics vendors." [2]

Solution Overview

To deliver timely and accurate results, AI-based video analytics requires diverse and high levels of computing power that can be satisfied by computing platforms with different types of computing cores, a design approach called heterogeneous computing. Fig. 2 shows video application workloads that are best handled by CPUs and graphics processing units (GPUs); a platform with both types of processors is equipped to maximize inferencing speed.

Optimized for AI-based EVA solutions, the ADLINK MVP-5100-MXM series is a heterogeneous computing platform that integrates powerful CPUs and GPUs:

- CPU: 9th generation Intel® Core™ processors
- GPU: NVIDIA® Quadro® P5000

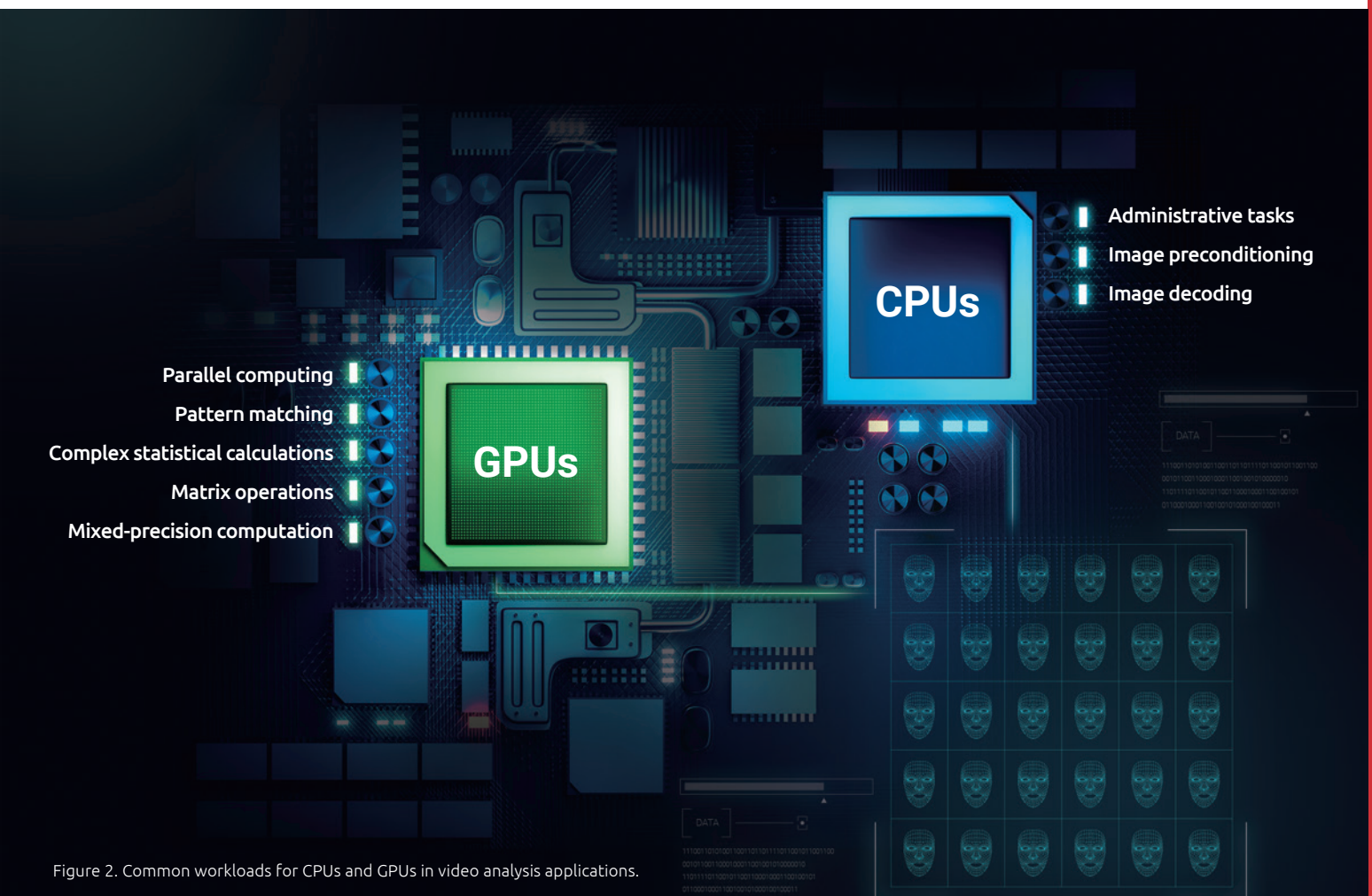


Figure 2. Common workloads for CPUs and GPUs in video analysis applications.

Solution Benefits

The ADLINK MVP-5100-MXM series was designed for high-performance AI-based video applications (Fig. 3). To meet demanding EVA speed and accuracy requirements, a 9th generation Intel Core processor is used to suppress unwanted image distortions that can affect the accuracy of subsequent facial recognition and to enhance image features crucial to the identification of authorized personnel. The NVIDIA Quadro P5000 GPU with 2,048 CUDA cores can deliver 6.4 TFLOPS of peak FP32 performance, enabling it to compare tens of thousands of three-dimensional data points in a live facial image against a database within half a second. ADLINK tested the accuracy of the platform using a generative adversarial network (GAN) to generate millions of realistic images that verified the platform's ability to meet a 10 per million error rate.

This self-contained solution can operate without continuous connection to a network, so it is well-suited for network-edge, stationary, and mobile applications. In order to withstand challenging operating environments at the edge, the platform offers a high level of reliability and endurance and features passive fanless cooling, an extended temperature range from -20 to 60 degrees Celsius, and a corrosion-resistant chassis. Its compact size of 240mm (9.4") x 125mm (5") x 210mm (8.3") allows it to fit into many existing small cabinets.

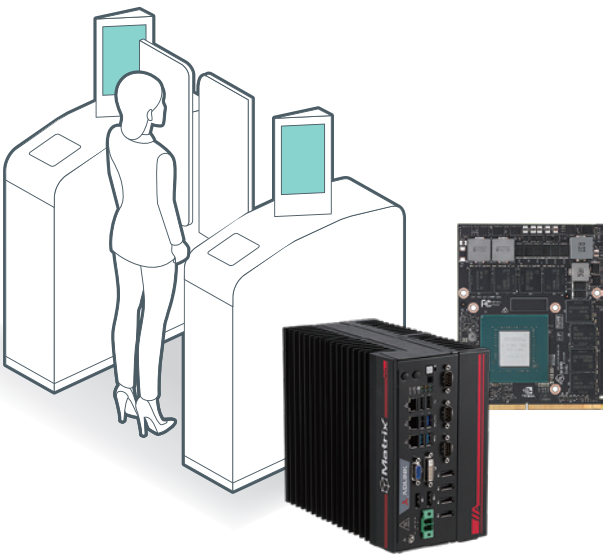
The platform is being deployed by a global Fortune 500 company in an industrial complex spanning more than 2,600 hectares and containing many gate control points. The platform will send inference results to the industrial complex's control center.

Quickly Add Edge Video Analysis (EVA) to Your Portfolio

ADLINK offers a diverse product portfolio that provides scalable computing and GPU performance, passive cooling options, and deep learning profiling services to help system developers, OEMs, and systems integrators build a solution optimized for their application needs. ADLINK's competitive building blocks enable developers of EVA applications to address the diverse challenges faced by different industries with respect to size, weight, and power (SWaP); computing power; number of camera streams; operating temperatures; etc.

System developers, OEMs, and systems integrators can leverage ADLINK's extensive portfolio of computing products to quickly offer EVA solutions to meet growing demand in the embedded market. ADLINK, closely aligned with NVIDIA and Intel, is delivering high-performance, long-life, AI-based graphics solutions to many market segments.

Top 4 Challenges of Facial Recognition Gate



Speed

Yield results within a half second after capturing and comparing an individual's image to other facial images in a database.

Accuracy

An low error rate on the order of 10 per million.

Size

Compact in size to ease installation into existing entry points.

Power-Efficiency

Fanless and capable of dissipating the heat generated by compute-intensive video analysis applications.

Figure 3. MVP-5100-MXM with heterogeneous computing architecture delivers speed and precision despite SWaP constraints.

1. Mordor Intelligence, "Video Analytics Market - Growth, Trends, and Forecast (–2020 - 2025)," https://www.mordorintelligence.com/industry-reports/video-analytics-market.
2. MarketsandMarkets™ Research Private Ltd, "Video Analytics Market by Type (Software and Services), Application (Intrusion Management, Incident Detection, People/Crowd Counting, Traffic Monitoring), Deployment (On-Premises and Cloud), Vertical, and Region - Global Forecast to 2023," https://www.marketsandmarkets.com/Market-Reports/intelligent-video-analytics-market-778.html.

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