INTEL IS ACCELERATING COMPUTER VISION

AI Solutions for Any Business, in Any Industry

The Evolving Landscape of Artificial Intelligence in Business

Our world is changing.

And with it, so too is the way we think about the capabilities of the Internet of Things. What began as a conversation about connecting the unconnected has turned into a larger conversation about data—how connected devices can capture it and how businesses can analyze it to make better, faster decisions. It's not surprising, then, that this emphasis on the importance of data has resulted in technology that has evolved to usher in an era of AI that is not only changing the way we interact with one another, but also the way that companies interact with us.

In order to provide the market with the most innovative products and software possible, businesses today require solutions that help them react quickly to the needs of their customers. While traditionally the primary use cases for artificial intelligence have been solely in data centers, where applications have been focused on better managing infrastructure or on monitoring, analyzing, and eventually improving enterprise operations, AI is no longer so limited.

Instead, with Intel® Vision Products, a portfolio of acceleration tools designed specifically for AI at the edge, businesses can take advantage of near real-time information to help them make better decisions in a timely manner.
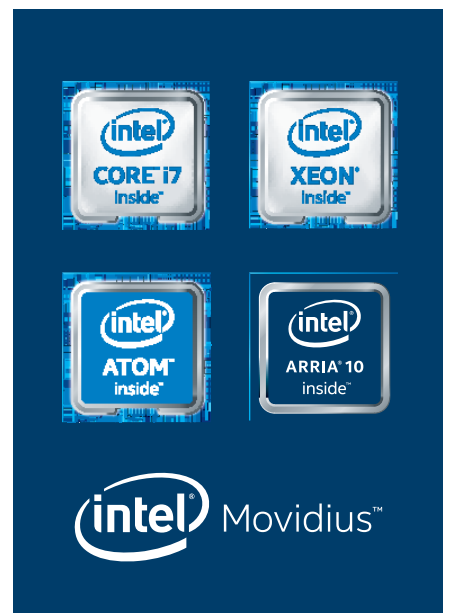
The Important Role of Computer Vision in Artificial Intelligence

AI is possible because of the convergence of an immense amount of data and increased, sophisticated compute. And if we can agree that the paradigm shift in technology-fueled business and industry is artificial intelligence at the edge, then there's no question that the lynchpin to the success of this shift is computer vision technology.

Computer vision-based solutions utilize enhanced deep learning neural networks that allow data to be collected in more sophisticated ways, taking analytics to the next level: nonlinear, contextual, and accessible from multiple vantage points. Artificial intelligence methodologies, such as deep learning, use trained algorithms to model various levels of abstraction within data via layered neural networks. But what does this mean?

Think of analyzing large-scale, diverse datasets for patterns vs. conducting specific tasks. These patterns can inform intricate processes such as computer vision, natural language processing, and image recognition. This capability is described as nonlinear processing, and this type of processing is ideal for analyzing complex data—such as rich, contextual audio and video data captured throughout an IoT ecosystem.

Intel is leading the evolution of edge compute and computer vision solutions, helping organizations unlock new possibilities for their data with a comprehensive stack of products designed for AI.

> *Think of analyzing large-scale, diverse datasets for patterns vs. conducting specific tasks.*

Intel® Vision Products: Powering AI from Edge to Cloud

Intel's diverse portfolio simplifies the complexity of developing AI solutions ranging from the data center to the edge. With Intel® technologies, companies will be able to innovate AI models and solutions that are high performance, low power, and easy to scale.
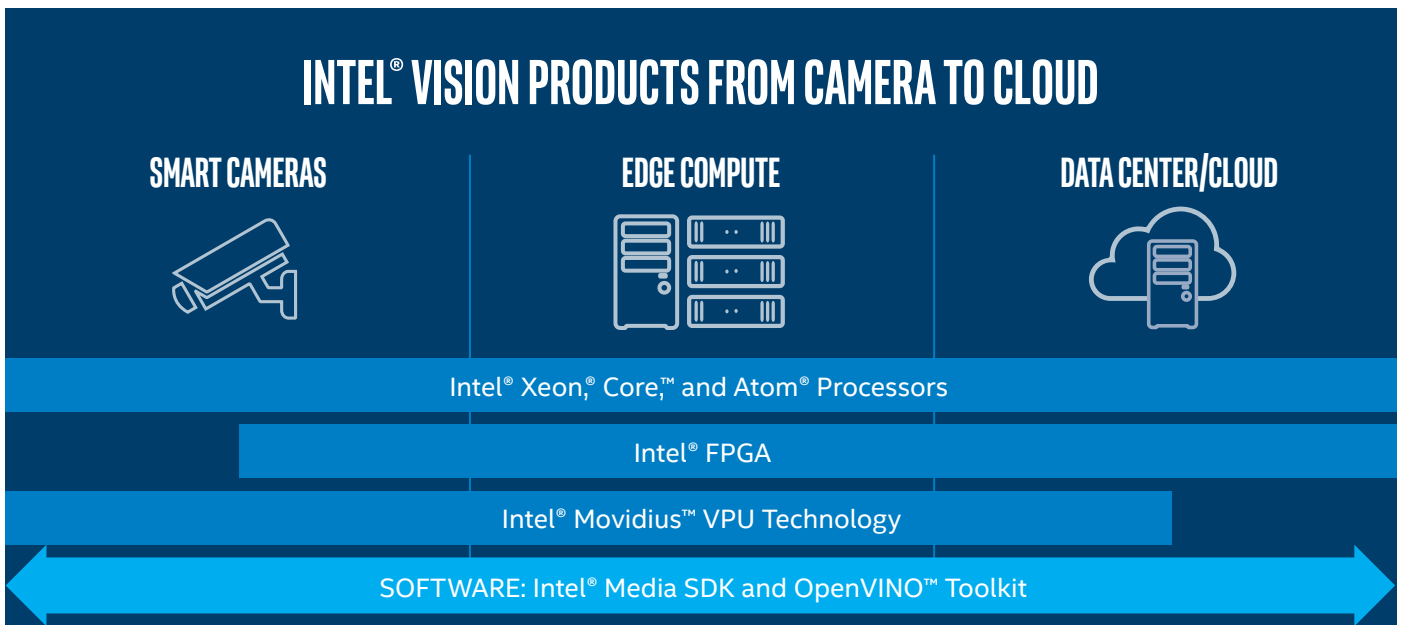
From smart cameras built on Intel® silicon, to edge compute devices (e.g., Network Video Recorders, gateways, video analytics appliances, etc.) powered by Intel acceleration silicon, to the cloud—where training and analytics run—Intel now offers the industry's broadest portfolio of assets to cover artificial intelligence use cases from the camera to the cloud.

Beyond its core architecture, Intel has made significant investments in AI, specifically in IoT, in order to enhance its computer vision portfolio—including Intel® Nervana™ platforms, Altera® devices, and Movidius™ technologies to complement its core product lines.

The Intel® Movidius™ VPU (Vision Processing Unit) product line offers key capabilities for computer vision at the edge. It features high performance inferencing, low power, low cost, a small footprint, and broad and easy scalability. Intel FPGAs parallel hardware enables developers to customize Real Time AI engines optimized for performance, power, and cost.

These two technologies, combined with the existing Intel® architecture portfolio, create a continuum of training to inferencing capabilities from the camera to the cloud, providing the right choice of silicon to match acceleration to the desired use case.

Finally, in order to accelerate development across Intel's wide range of Intel® processors and accelerators, Intel offers rich software tools, including the OpenVINO™ toolkit designed to fast-track development of computer vision applications and streamline deep learning inference. The toolkit allows developers to quickly scale workloads across multiple types of silicon to leverage the best choice of Intel technologies across their designs.[1]

INTEL® VISION PRODUCTS FROM CAMERA TO CLOUD

SMART CAMERAS	EDGE COMPUTE	DATA CENTER/CLOUD

Intel® Xeon,® Core,™ and Atom® Processors

Intel® FPGA

Intel® Movidius™ VPU Technology

SOFTWARE: Intel® Media SDK and OpenVINO™ Toolkit

Intel Delivers a Holistic AI Solution with a Strong Ecosystem

As AI continues to evolve, both deep learning and machine learning will need highly scalable architectures. Intel® Vision Products bring all the advantages of Intel IoT architecture, including scalability, security, manageability, exceptional performance per watt, a robust development environment, and reliable roadmap, plus a vibrant and growing ecosystem. These solutions deliver increased efficiency and support a versatile array of small form factors to enable near-real-time analytics at the edge.

Transform Business with Intel Vision Products in Any Industry

Often, right before our eyes, there is crucial information that will allow businesses to make data-driven decisions, capitalize on opportunity, and succeed where the competition can't. The only thing standing in their way is that they don't have the right technology to match their given use case. Intel's portfolio of vision-based AI technologies can help businesses in any industry tackle highly complex data challenges and turn that data into action.

Early adopters of AI across industries and organizations are uncovering significant breakthroughs based on deep information within data. AI is paving the way to solve difficult problems in cities, automate complex manufacturing processes, and even more accurately predict events and human behavior.

Intel's end-to-end approach and strong portfolio enable innovative, new experiences across industries—smart cities, industrial and manufacturing, retail, medicine, transportation—wherever solution providers and enterprises can leverage technology for the benefit of companies, customers, and society.

Intel® Vision Products deliver fast performance, increased efficiency, and support a versatile array of small form factors to enable near-real-time analytics at the edge.

TRANSFORMING DATA INTO ACTION ACROSS INDUSTRIES

INTEL AND PARTNERS

Intel Works with Ecosystem Partners to Create Holistic Solutions

AI TECHNOLOGIES

Intel® Nervana™ Platform for Deep Learning Studio | OpenVINO™ Toolkit | Intel® AI Silicon and Accelerators

OUR DIVERSE ECOSYSTEM ENABLES THESE NEW EXPERIENCES

HEALTHCARE
- Monitoring vitals
- Medical imaging
- Patient diagnostics

RETAIL
- Customer recognition
- Layout optimization
- In-Store traffic patterns

MANUFACTURING
- Pattern analysis
- Improved quality
- Op efficiency

SMART CITIES
- Traffic flow
- Emergency response
- Smart parking

RETAIL Improve Customer Service and Loyalty, and Streamline Operational Management

In today's competitive market, a growing number of retailers are turning to artificial intelligence to help transform their businesses. For retailers, winning means harnessing the vast collection of data they have available to them in order to gain valuable insights that can help them compete more effectively by increasing productivity, reducing costs and inefficiencies, boosting revenues, and improving customer satisfaction.


With Intel® AI technology, in-store vision systems can work quickly to alleviate the time constraint that so many retailers face as data being captured by video feeds makes its way to the distant data center. Now, retailers using Intel computer vision solutions at the edge can quickly recognize specific customers, and by doing so, can increase sales by more precisely marketing to consumers, recommending and promoting products and services where and how they want to hear about them. Fast, efficient processing by Intel technologies in the store instantly delivers sales information to an associate's fingertips, empowering them with revenue-driving tools.

By using a computer vision solution based on Intel® architecture, retailers can streamline operations and improve merchandising with better planning through accelerated and expanded insight into consumer buying patterns. In turn, they can get more value from their data through scalability, greater efficiency and effectiveness, and lower total cost of ownership while reducing time to market for intelligent solutions that can give them a competitive market advantage.

SMART CITIES Enhance the Community and Protect Citizens

Smart City solutions, based on Intel IoT vision technology, offer end-to-end intelligence and exceptional performance to help cities become smarter, safer, and more livable.
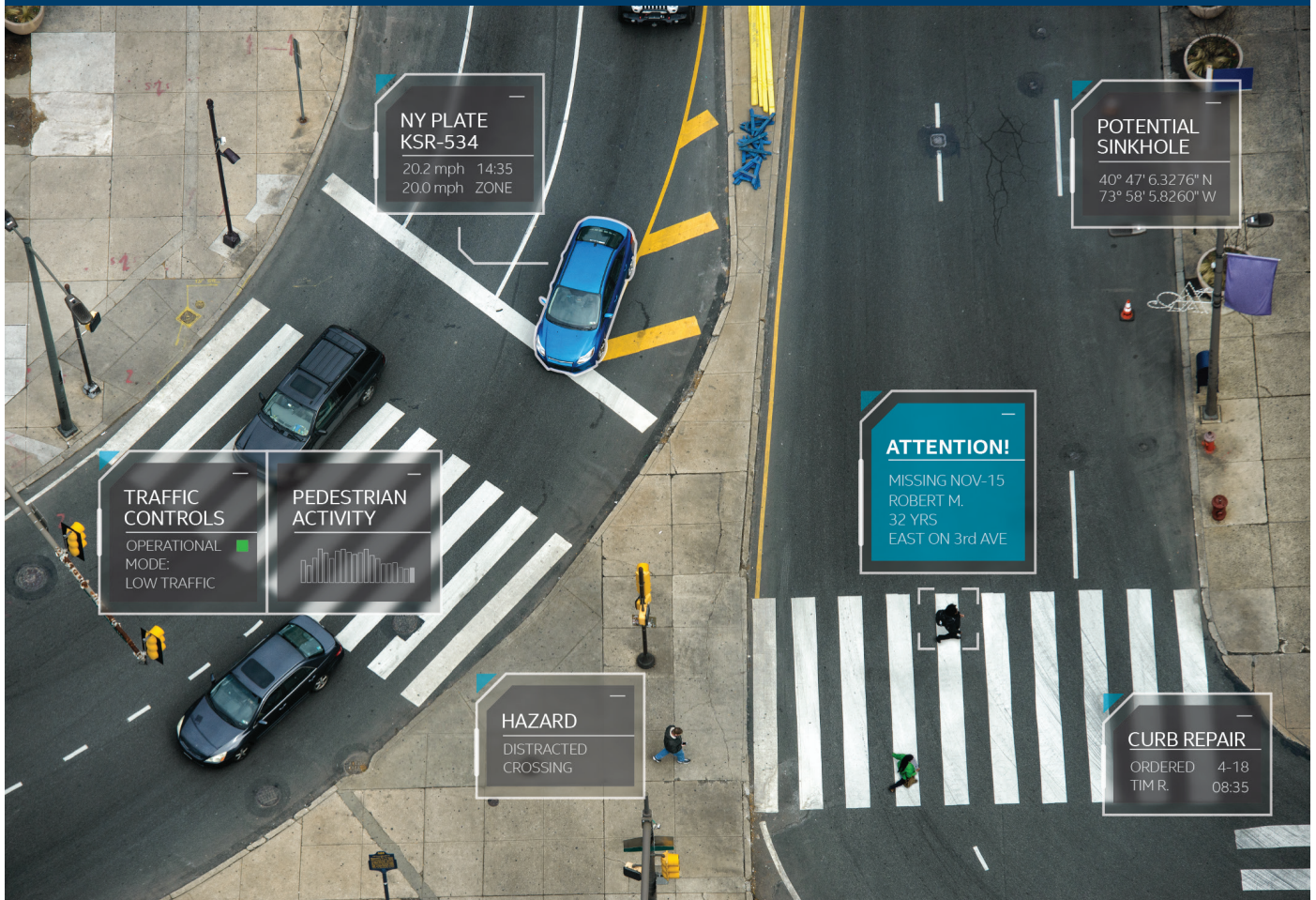

Cities can use vision solutions to monitor traffic flow and make real-time decisions to help reduce congestion by optimizing traffic patterns. Intel-powered cameras with Intel-enabled gateways can capture, analyze data, and automatically send results or data to traffic intersections downstream so they can plan ahead and optimize traffic patterns. In turn, this information can be directly communicated with drivers via in-car systems or apps to provide insight and help them plan their routes.

AI also helps keep citizens safe. Last year alone, the FBI reported 465,676 entries for missing children in the United States.[2] Many of those children are runaways—either from their homes or the care of a social services agency. Using data captured by Intel-based smart cameras and algorithms developed via OpenVINO toolkit, trained deep neural networks now have the inferencing capabilities to analyze and identify missing children. Cities equipped with the technology can be alerted when these trained datasets match a face in a crowd with a reported missing child, alerting law enforcement agencies immediately.

MANUFACTURING Drive Efficiency and Productivity with Real-Time Decision Making

As more machines and systems become tightly connected, manufacturing matures into a more intelligent factory model in which OT and IT converge and become more strategically engaged in transformative business decisions.
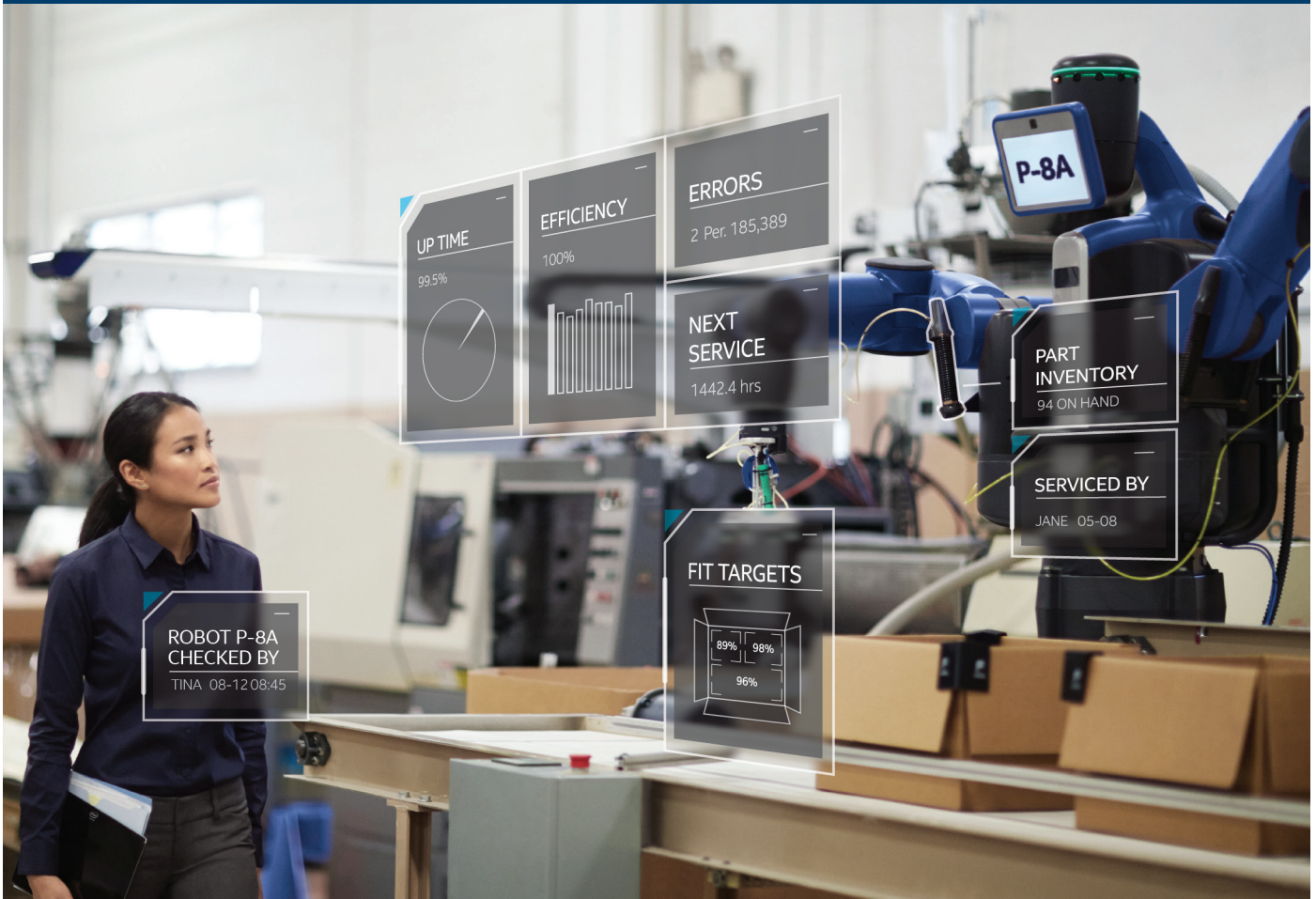
Solutions based on AI technology produce increasingly more detailed, accurate, and meaningful digital models of equipment and processes, enabling more nuanced data-informed planning. Production controls become autonomous and fluid, and new, market-driven business approaches emerge.

Strategically placed smart cameras around a facility, for example, can feed a computer vision analytics appliance in order to give managers the intelligence they need to drive efficiency and productivity. Gateways with inferencing acceleration silicon, such as Intel® Movidius™ Myriad™ X VPUs, and general-purpose processing from Intel® Core™ processors, create a powerful, energy-efficient appliance that can see, understand, and make decisions about a range of diverse processes taking place across the facility.

But it doesn't stop there. Machine vision solutions combine cameras, computers, and algorithms to analyze images and videos and make relevant decisions automatically. For instance, machine vision can be used for equipment maintenance, defect detection, quality control, inventory verification, product labeling, security monitoring, etc. Augmenting industrial machine vision with AI such as machine and deep learning is enabling newer and more accurate factory-automation applications.

Intel® Technologies Power the Future of Computer Vision Edge Solutions

With Intel® Movidius™ Vision Processing Units (VPUs), Intel® FPGAs, a suite of common development and deployment tools—including the OpenVINO toolkit—and Intel® CPUs, solution providers can look to Intel to accelerate inferencing from the camera to the cloud. Intel's wide range of silicon architectures optimized for AI provides the technical ingredients to match performance, cost, and power to the computer vision design needs in the camera, gateway, and Network Video Recorder.

Solution providers can look to Intel to accelerate inferencing from the camera to the cloud.

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