SOLUTION BRIEF

AI for Edge Computing
Developer Kits for Edge AI

Vecow Accelerates Edge AI Solution with All-in-One Edge Developer Offering

Accelerating edge solutions for AI developers and system integrators with an all-in-one edge developer offering optimized by Intel® Edge Insights for Vision software

Vecow

"With preintegrated and optimized IoT software components and pretrained models, Intel® Edge Insights for Vision saved weeks for our developers."[1]

—Thomas Su, Vice President, Vecow

From manufacturing to retail to smart cities, businesses are implementing Internet of Things (IoT) applications to collect data, improve operations and experiences, and deliver business results. But manually programming these systems limits flexibility and slows the pace of innovation. With artificial intelligence (AI), businesses can quickly and efficiently implement advanced capabilities that decrease development costs and expedite time to market.

Adding AI capabilities in edge computing is critical in applications that collect and process massive amounts of data and require real-time responses. For example, identifying defective parts in a factory must occur instantly to avoid shutting down the production line. The Vecow VHub AI Developer, optimized using software tools in **Intel® Edge Insights for Vision** (available through the Intel® Edge Software Hub) and built on Intel® technologies, helps system integrators accelerate AI and IoT implementation in use cases like machine vision, intelligent automation, and access control. The development kit delivers a robust AI foundation that speeds deployment of edge intelligence and reduces total cost of ownership.

Challenges: Building and training AI models can be confusing and time consuming

Developing AI for edge applications can be daunting. Developers need to integrate application-specific software and run it on purpose-built hardware. System integrators traditionally developed the hardware and software independently, then integrated the designs with each other and the AI platform. That's when the real work begins: building and training AI models.

AI models lie at the heart of computer vision and image recognition systems. They provide the foundation for key capabilities, such as object detection, motion tracking, and facial recognition. AI models also let systems accommodate unanticipated circumstances and learn new capabilities. By updating the models based on real-world data, the AI systems improve accuracy and capabilities over time.

However, starting from scratch to design an optimal model for an AI scenario can be challenging and time consuming. The major cost of a vision-AI development project involves training models and integrating various software stacks. What system integrators and developers need is a platform that provides faster model training, prevalidated software packages, and a scalable design that speeds time to market.

INTEL® EDGE SOFTWARE HUB
intel.com/edgesoftwarehub

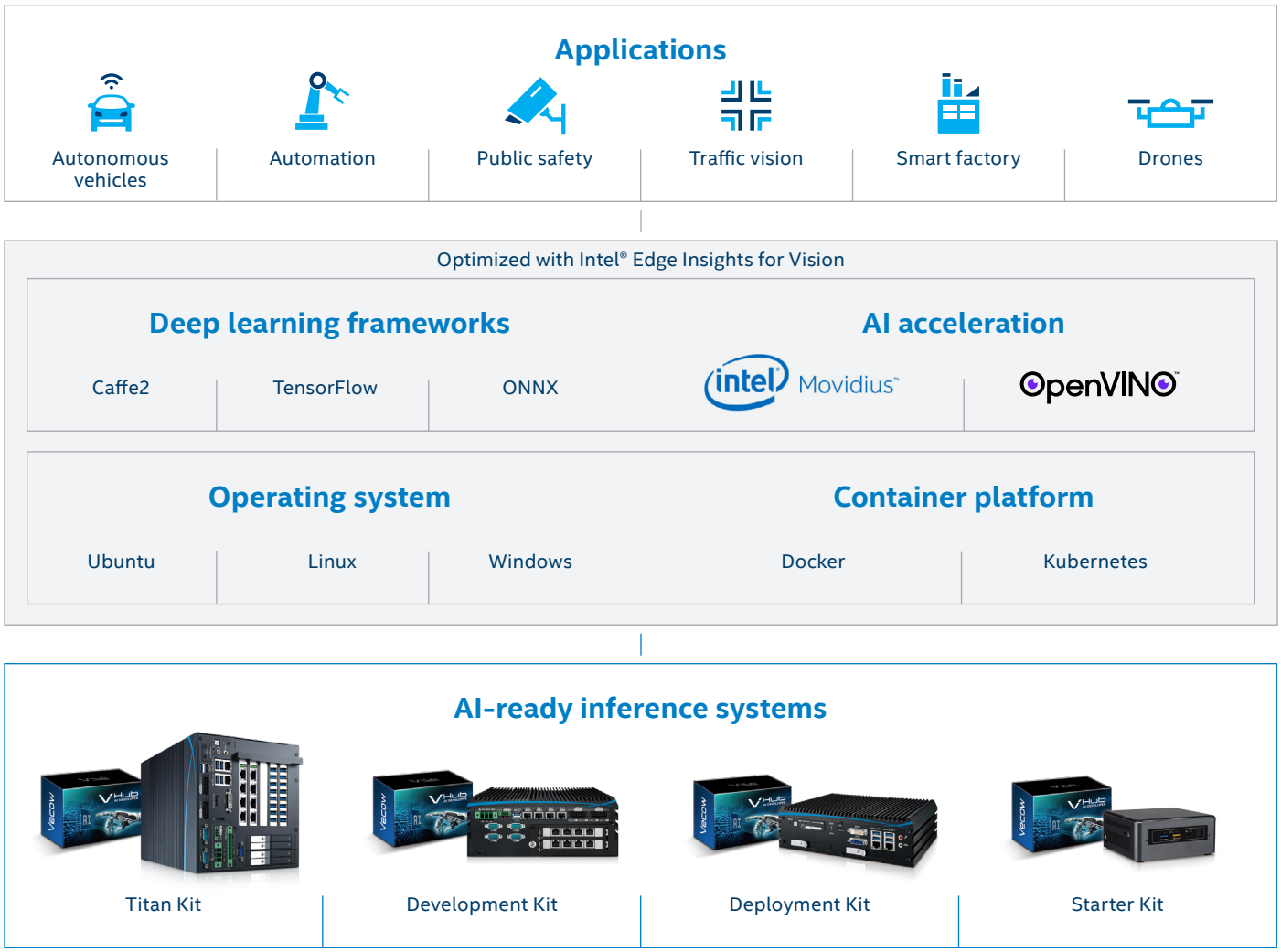
Solution: Integrated hardware and software with pretrained AI models and comprehensive tools

Vecow's VHub AI Developer features an integrated solution that reduces model training time and provides resources required for engineers to develop their edge AI solutions. The four versions—from the Starter Kit with an Intel® Core™ processor-based Intel® NUC to the Titan Kit with a choice of an Intel Core or Intel® Xeon® processor for compute-intensive applications—include a labeling tool, training platform, inference solution, and 200+ pretrained models for common edge use cases.

VHub AI Developer is optimized with Edge Insights for Vision software. The prevalidated software package includes AI tools and applications required for most common computer vision solutions. Ample pretrained models provide a foundation that reduces model training time and effort, especially for use case-specific AI vision models.

The VHub AI Developer provides a complete development framework for edge computing applications. The single-program solution is easy to deploy, compatible with most platforms for labeling and training, and includes scalable AI models. Instead of integrating and maintaining the entire AI framework, system integrators can focus on developing and training the ideal AI model. The streamlined developer environment is equipped with preintegrated and pretested software tools and packages required to build an end-to-end, plug-and-play AI system.

- **Deep learning platform:** Capabilities like object tracking, facial recognition, and motion detection use recognized training platforms like TensorFlow, Caffe, MXNet, and ONNX.
- **AI accelerator:** Intel® Movidius™ VPUs enable deployment of deep neural networks and computer vision at the edge.
- **Inference engine:** Intel® Distribution of OpenVINO™ toolkit provides high-performance, deep learning inference based on convolutional neural networks.
- **Operating system:** The solution is compatible with Ubuntu, Linux, and Windows operating systems.
- **Container platform:** The solution is also compatible with the Docker container platform and Kubernetes container orchestrator.



Benefits of using the VHub AI Developer offerings include:

- **Simplified setup for the development environment:** The complete development framework, already integrated and tested, helps reduce time and effort and flattens the learning curve.
- **200+ pretrained models:** Developers and system integrators can use models for common capabilities like object tracking, facial recognition, and motion detection as a foundation, especially for challenging AI vision models.
- **Substantially lower complexity, time, and effort to create AI models:** Use of pretrained models can slash 20 to 40 percent off model training time and up to 60 percent off development time.[1] Developers and system integrators can expect up to 25 percent less overall system design time.[1]
- **Stable and reliable version management and technical support:** Open source AI training tools sometimes suffer from version control issues. The VHub AI Developer framework is designed to guarantee stable version management.

Use cases: AI and IoT applications offer benefits across industries

The most-popular use cases for the VHub AI Developer include machine vision and automation, but many other AI and IoT applications are also viable to scale across vertical use cases:

- **Machine vision:** Efficiency and accuracy are critical for classifying defective parts in factories. Preinstalled inspection SDKs with VPU and iGPU accelerators enable high accuracy at low cost.
- **Automation:** Intelligent automation integrates smart technologies and services to carry out critical tasks. With a preinstalled automation monitoring SDK, manufacturers can enhance productivity.
- **Smart retail:** Retail stores need to know and understand customers to increase business profitability. A preinstalled feature recognition SDK allows easy capture of gender, age, customer count, and in-store behavior to create targeted experiences.
- **Access control:** Security often depends on granting access only to those authorized. With a preinstalled facial recognition SDK, data can be stored in a vision library to quickly and conveniently approve or deny access.

How it works: Intel Edge Insights for Vision enhances speed for solution development

Vecow leverages Edge Insights for Vision with Intel Distribution of OpenVINO toolkit for the VHub AI Developer solution, optimized for a range of Intel®-based hardware. Intel's vast ecosystem offerings and paths for go-to-market scale allow Vecow and partners to accelerate time to market and deployments.

While developing the solution, the Vecow team initially used the Intel Distribution of OpenVINO toolkit as the inference engine for machine vision and deep learning. Integrating Edge Insights for Vision software into VHub AI Developer made more functions of AI vision solutions available and enabled better performance as well. A proof of concept (POC) was deployed for a smart factory solution using pretrained models for OCR inspection (defect detection needed for overall equipment effectiveness) and object detection (part count). With Edge Insights for Vision, the POC delivered a 147 percent improvement on inference, with visioning of parts per hour catapulting from 30,000 to 52,000. Accuracy increased from 90 to 95 percent.[1]

See final page for configuration details. For more complete information about performance and benchmark results, visit www.intel.com/benchmarks. Refer to software.intel.com/articles/optimization-notice for more information regarding performance and optimization choices in Intel software products.

VHub AI Developer integrates the following Edge Insights for Vision elements:

SDK/toolkits	Intel® Distribution of OpenVINO™ Toolkit
Operating system	Ubuntu 16.04 LTS, Linux kernel 4.15, 4.19
Runtime dev languages	Python 3.6
Video ingestion	OpenCV, GStreamer, Edge Insights message bus
Video analytics	High-density deep learning (HDDL), Edge Insights configuration manager and Edge Insights message bus
Image store	InfluxDB
IoT components	Cloud prereqs for AWS, Azure, ONNX
	Docker container
	Orchestration: K3S, Docker Swarm
Reference implementation	Member recognition
	Worker authorization

VHub AI Developer solution also integrates other Intel® technologies:

Function	Component
Computing/inference	Intel® Core™ and Intel® Xeon® processors
Workstation-grade computing/inference	Intel® C246 chipset
AI acceleration	Intel® Movidius™ VPU
Inference	Intel® Iris® Plus Graphics 655
Computing/inference	Intel® UHD Graphics 630 with up to 8K res
Speed access to pretrained models	Intel® Optane™ memory

Conclusion: Intel® software and hardware technologies power edge AI solution development

VHub AI Developer with Intel Edge Insights for Vision and Intel® technologies is optimized for AI and IoT solution development. Preintegrated software tools and packages and choice of hardware let developers and system integrators jump-start their edge AI development with greater confidence, expediting time to market and reducing total cost of ownership.

Learn more

To learn more about how the VHub AI Developer can help developers and system integrators develop AI applications for edge computing, visit **VHub AI Developer** today.

About Vecow

Vecow is a team of global embedded experts. We are dedicated to designing, developing, producing, and selling industrial-grade computer products. All of our products are leading in performance, trusted in reliability, and exhibit advanced technology and innovative concepts. Vecow offers AI-ready inference systems, AI computing systems, fanless embedded systems, vehicle computing systems, robust computing systems, single-board computers, multitouch computers, multitouch displays, frame grabbers, embedded peripherals, and design and manufacturing services with leading performance, trusted reliability, advanced technology, and innovative concepts.

Vecow aims to be your trusted embedded business partner. Our experienced service team is dedicated to creating and maintaining strong partnerships and one-stop integrated solutions. Our services are specific and consider each partner's unique needs for autonomous vehicles, robotic control, rolling stock, public surveillance, traffic vision, smart automation, deep learning, and AIoT/Industry 4.0 applications.

vecow.com

Intel® Edge Software Hub

START YOUR INTELLIGENT EDGE SOLUTIONS HERE

The Intel Edge Software Hub is a one-stop resource to simplify edge solution development and accelerate deployment. With robust software tools and deployment-ready software packages, the Intel Edge Software Hub provides prevalidated, pretested, and interoperable solution ingredients.

Reduce setup time and bring your edge solution vision to life with software optimized for Intel's expansive portfolio of hardware solutions. Each Insights package includes components designed to meet the specific needs of edge use cases:

- **Edge Insights for Retail** improves data accessibility to simplify development of relevant, highly engaging consumer experiences.
- **Edge Insights for Industrial** enables advanced AI workloads at the edge for video and time series data ingestion, analytics, and automation for machine vision solutions.
- **Edge Insights for Vision** accelerates innovation in computer vision applications and edge-to-cloud integration.

Explore the Intel Edge Software Hub ›

1. Source: Internal Vecow data.

Notices and disclaimers

Intel does not control or audit third-party data. You should consult other sources to evaluate accuracy.

Intel® technologies may require enabled hardware, software, or service activation.

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 www.intel.com/benchmarks.

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.

No product or component can be absolutely secure.

Your costs and results may vary.

© Intel Corporation. Intel, the Intel logo, and other Intel marks are trademarks of Intel Corporation or its subsidiaries. Other names and brands may be claimed as the property of others.

0520/MG/CMD/PDF