AI for Edge Computing

A platform-based approach for faster time-to-market

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AI for Edge Computing: A platform-based approach for faster time-to-market

Artificial Intelligence (AI) is the critical technology that will enable next-generation IoT systems across every application and industry. Having to program these systems manually limits their flexibility as well as slows the rate at which innovation can be deployed. AI makes it possible to implement advanced capabilities quickly and efficiently to reduce development costs and speed time-to-market.

Bringing AI out to the edge is important for applications where there is a great deal of data to process and real-time responsiveness is essential. Developing robust AI for edge applications, however, can be extremely complex and requires the integration of application-specific system and analysis software running on specialized hardware such as Intel-based video processing units (VPU) working alongside GPUs like those from NVIDIA.

The most difficult part of the design process is training the AI model that will provide core capabilities like object detection, motion tracking, and facial recognition. These models are the heart of next-generation computer vision and image recognition systems such as machine vision, intelligent surveillance, and vehicle computing. AI models allow these systems to accommodate circumstances that programmers may have never considered. With such flexibility, systems can continue to learn new capabilities, effectively updating themselves based on real-world data and improving their accuracy over time. Model training also has a significant impact on system cost: the more efficient the model, the fewer resources required to use it. Designing an optimal model for a specific AI scenario, however, can be time-confusing and challenging.

> **“With VHub AI Developer, system integrators can expect up to a 25% reduction in overall system design time.**

A Platform-based Approach to AI

With a traditional design approach, system integrators have to develop hardware and software independently. After integrating these designs with each other and with various AI platforms comes the time-consuming process of building and training AI models. Designing in this way requires system integrators to invest time and money in developing their own AI expertise. Building models from the ground up also slows development, leading to a much longer design cycle.

To help system integrators take full advantage of AI technology, Vecow offers VHub AI Developer, a platform-based approach to AI for edge computing that accelerates development and enables faster time-to-market. VHub AI Developer is an end-to-end solution which system integrators and solution owners can use to accelerate their AI development and deployment. By taking a platform-based approach, Vecow delivers both hardware and software already integrated with each other for a wide range of applications, including Smart Retail, Traffic Vision, Smart Factory, Access Control, and Public Surveillance, to name a few.

In particular, the VHub AI Developer platform substantially reduces the complexity, time, and effort required to create AI models. Model training is typically the stage of AI development that consumes the most time and resources. VHub AI Developer provides a one-stop solution for key AI capabilities, including deep learning, model training, and labeling. It achieves this by bringing together a comprehensive set of development tools combined with pre-trained models.

Having all of these capabilities available in the same development platform simplifies model design and training as well as eliminates confusion and delay that arise from issues such as needing to managing multiple versions of labeling tools. For example, most mainstream AI training environments are open source, introducing potential version control issues. VHub AI Developer supports these AI training environments in a manner that guarantees stable version management. In addition, VHub AI Developer delivers more than 200+ pre-trained models of commonly used capabilities.

Figure 1. Benefit Performance improvement with adopting VHub AI Developer

The benefits of taking VHub AI Developer's platform-based approach to AI can be tremendous. The use of pre-trained models can save up to 60% of development time, with additional savings of 20% to 40% for model training. With VHub AI Developer, system integrators can expect up to a 25% reduction in overall system design time (see Figure 1).

The VHub AI Developer Framework

VHub AI Developer delivers a complete development framework for the design and deployment of AI for edge computing (see Figure 2). Running on Ubuntu, Linux, or Windows, it supports the leading deep learning computing platforms and container platforms in a way that supports a low learning curve and simplifies development effort.

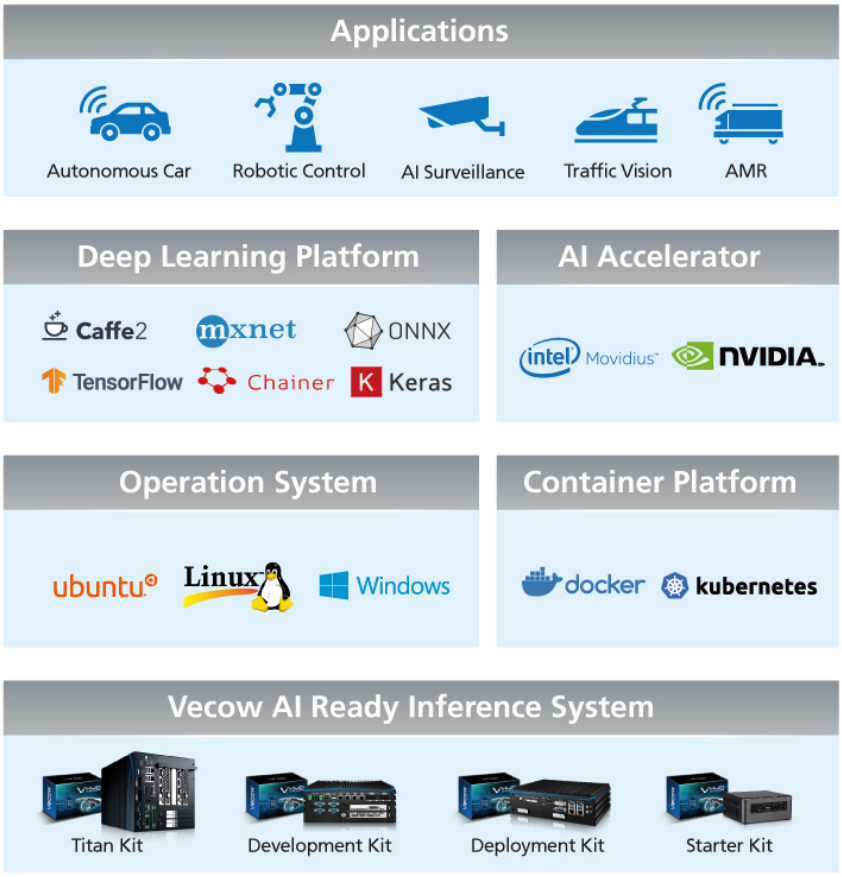

Figure 2. VHub AI Developer delivers a complete development framework for the design and deployment of AI for edge computing.

The framework pre-integrates all of the layers required to build out a fully capable AI system, enabling true “plug in to go” (see Figure 3). This approach gives developers an extensive platform upon which to build intelligent systems at the edge, enabling them to focus on optimizing model development and training rather than having to also integrate and maintain the entire AI framework on their own.

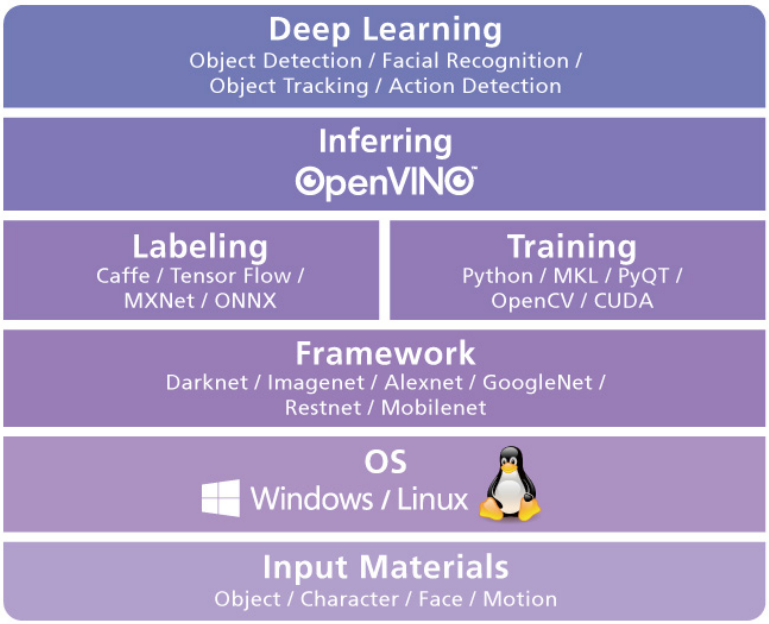

Figure 3. The VHub AI Framework integrates all of the software layers required to build out a fully-capable AI system, enabling true “plug in to go”.

AI processing is accelerated in hardware using arrays of GPUs, and these GPUs need to be managed in conjugation with the application CPU or vision processing unit (VPU). Software must be designed that coordinates CPU/VPU and GPU array processing. Memory and connectivity throughput are also resources that can become bottlenecked.

To provide the optimal combination of hardware-based processing resources and software for a particular application, VHub AI Developer is available as a line of four different kits that integrate proven hardware, software, and tools into a single platform (see Figure 4). The VHD NUC Series is a starter kit that serves as an excellent starting point for AI design. The VHD ECX-1000 PoER Series Deployment Kit brings in rich I/O capabilities. The VHD ECX-1400 PEG Series Deployment Kit introduces an GPU computing engine, and the VHD RCX-1520R PEG Series “Titan” Kit delivers even more GPU capabilities for the most compute-intensive applications.

> **With access to more than 200 pre-trained models, system integrators can accelerate their time-to-market for any AI-based vision application.**

Figure 4. VHub AI Developer is available as a line of four different kits that integrate proven hardware, software, and tools into a single platform optimized for different AI requirements.

The pre-trained models that are part of VHub AI Developer are diverse and complex. They provide the foundation for a wide range of capabilities, including object detection and recognition, facial recognition, motion detection, autonomous vehicle capabilities, sign recognition, QR code reading, and optical character recognition (OCR)/optical character verification (OCV).

AI-vision models are particularly difficult to duplicate, making model development and training time-consuming without a pre-trained model as a foundation. With access to more than 200 pre-trained models, system integrators can accelerate their time-to-market for any AI-based vision application (see Figure 5), including machine vision, home pose recognition, smart retail, smart parking, access control, autonomous car, smart manufacturing, rolling stock, and smart logistics. Vecow further simplifies design by providing solution-oriented SKUs. This helps developers know which VHub AI Developer solutions are the best for their application.

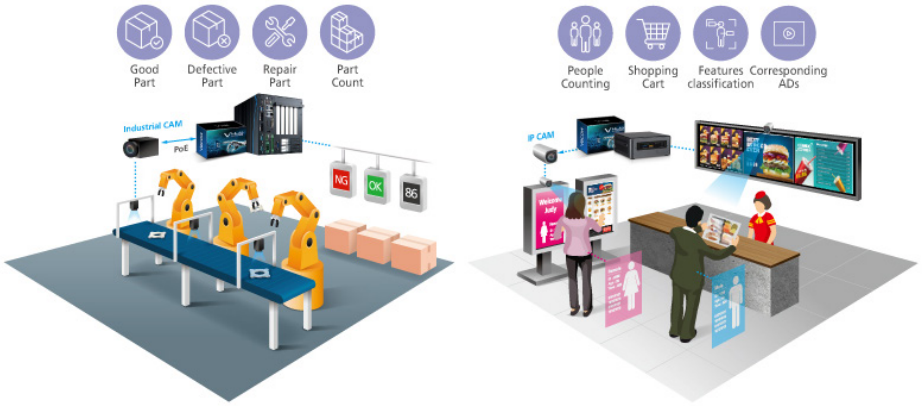

Figure 5. Pre-trained models in VHub AI Developer can be used in applications like machine vision, smart retail, smart parking, and access control.

VHub AI Developer is built on and optimized for Intel Movidius vision processing units (VPU). Intel Movidius VPUs are the leading processor for driving the demanding workloads of modern computer vision and AI applications. Movidius combines highly parallel programmable compute logic with workload-specific hardware acceleration. With a common intelligent memory fabric, Movidius enables systems to deploy deep neural network and computer vision closer to the edge.

VHub AI Developer is part of the larger VHub solution platform which also includes Smart Factory, ROS, and Ethercat. Vecow is an American Industrial Systems, Inc. (AIS) company headquartered in Irvine, California, and is committed to providing the solutions and platforms system integrators need to deliver next-generation AI at the IoT edge.

With its faster time-to-market approach, Vecow provides not just the hardware or software needed for deploying AI-based systems but rather an end-to-end solution that accelerates design and speeds time-to-market. By integrating all of the software layers with hardware and providing pre-trained AI models supported by a comprehensive set of model and development tools, VHub AI Developer delivers a robust AI foundation that optimizes AI deployments and reduces total cost of ownership.

Learn more about VHub AI Developer and how you can deploy next-generation AI capabilities in your application.

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, 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, Multi-Touch Computers, Multi-Touch Displays, Frame Grabbers, Embedded Peripherals and Design & Manufacturing Services with leading performance, trusted reliability, advanced technology, and innovative concept.

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 in regards to: Autonomous Car, Robotic Control, Rolling Stock, Public Surveillance, Traffic Vision, Smart Automation, Deep Learning, and any AIoT/Industry 4.0 applications.

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