Synopsys' Next-Generation Embedded Vision Processors Boost Performance up to 100X

DesignWare EV6x Family Integrates Scalar, Vector Processors and a Convolution Neural Network Engine for High Accuracy Vision Processing

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Highlights:

- New DesignWare EV6x processors deliver up to 100X higher performance on common vision processing tasks than the previous generation EV5x vision processors to address high throughput applications such as ADAS, video surveillance and virtual/augmented reality
- New scalable vector DSP architecture supports full range of vision algorithms for 1080p to 4K resolutions to meet high definition requirements
- Programmable convolutional neural network provides up to 800 MACs/cycle for fast and accurate object detection and 5X better power efficiency than other vision processors
- Comprehensive software development tools based on OpenCL C and OpenVX embedded vision standards simplify application software development

Synopsys, Inc. (Nasdaq:SNPS), today announced the DesignWare® EV6x family, its newest generation of processor cores optimized for embedded vision applications requiring high definition resolutions. The fully programmable and configurable EV61, EV62 and EV64 embedded vision processors integrate one, two or four vision CPU cores and a programmable convolution neural network (CNN) engine. The CNN engine operates in parallel with the vision CPUs for highly accurate object detection, image classification and semantic segmentation at a fraction of the power consumption of competing vision solutions. The EV6x processor family is supported by a comprehensive software programming environment based on common embedded vision standards including OpenVX™ and OpenCL™ C, as well as Synopsys' MetaWare Development Toolkit. The combination of high-performance vision CPU cores and CNN engine with high productivity programming tools make the EV6x processors ideal for a broad range of embedded vision applications including advanced driver assist systems (ADAS), video surveillance, augmented and virtual reality, and simultaneous localization and mapping (SLAM).

"Synopsys' DesignWare EV61 embedded vision processor with CNN engine enables us to address the growing interest in the market for deep machine learning and related applications," said Dor Zepeniuk, vice president of R&D at Inuitive. "The power/performance/area characteristics of Synopsys' embedded vision solution will help us design products that meet our ambitious high-performance vision processing requirements while staying within a low-power budget."

The EV6x processors have a heterogeneous multicore architecture including one to four high-performance vision CPU cores. Each vision CPU includes a 32-bit scalar unit and a 512-bit wide vector DSP and can be configured for 8-, 16- or 32-bit operations. In the maximum configuration of four vision CPU cores, the processor delivers up to 620 GOPS/s with full scatter-gather and predication capabilities. In addition, the EV6x processors are available with an optional CNN engine that delivers scalable performance up to 800 MACs/cycle and supports image resolutions up to 4K. The vision CPU and the CNN engine can work on tasks in parallel, making the EV6x particularly efficient for applications such as autonomous vehicles and drones where multiple cameras and vision algorithms are used concurrently.

"Embedded vision is at the heart of many new devices targeting automotive, industrial and consumer applications, and rapid software development is a critical element to enabling the vision ecosystem," said

Nikos Fragoulis, CTO at Irida Labs. "By providing leading edge embedded vision software for surveillance and the OpenVX runtime for Synopsys' EV processors, we are helping system developers deploy highly integrated solutions optimized for their target markets in less time and with less effort."

"Synopsys' next-generation DesignWare EV6x processors enable the design community to easily and reliably implement vision capabilities in their embedded systems," said AGK Karunakaran, president and CEO, MulticoreWare, Inc. "Synopsys' embedded deep neural network engine supports highly optimized CNN graphs that are helping users incorporate vision into a wide range of low-power, high-performance applications requiring real-time, highly accurate identification and recognition."

A complete software programming environment including OpenCV and OpenVX libraries, OpenVX runtime, and Synopsys' MetaWare Development Toolkit with OpenCL C vectorizing compiler speeds the development of application software for the DesignWare EV6x processor family. The OpenVX framework simplifies the programming of the EV6x processors by automatically distributing tiled kernel execution over multiple scalar, vector DSP and CNN execution units. The OpenVX framework includes 43 standard computer vision kernels that have been optimized to run on the EV6x Processors. Users can define new kernels, giving them flexibility for their current vision applications and the ability to address future application requirements. The OpenCV vision function library has been ported for use with the EV6x family processors. The MetaWare OpenCL C compiler offers automatic whole function vectorization for data-level parallelism and is used for creating kernels for the vector DSPs. This compiler supports all of the programmability of the 512-bit wide vector DSP and greatly simplifies the programming of the unit. In addition, a CNN-specific programming toolkit provides automatic mapping of a high-level description of a CNN graph onto the CNN engine. Support for Synopsys' HAPS® FPGA-based prototyping system enables validation of new designs and early software development, at-speed operation of real world I/O, and debug of code running on the EV6x processors in the user's system. The full suite of tools and libraries with available reference designs enables programmers to efficiently build, debug, profile and optimize their embedded vision systems.

The EV6x family processors are configurable and can be used to address the full range of vision requirements operating either standalone or in parallel with a host processor. The vision CPUs and CNN engine in the EV6x processors communicate using an internal shared low-latency memory, and portions of this memory can be visible to the host processor. In addition, synchronization signals can be used by the programmer to enable the host processor to exercise as much control over the EV6x processor as needed, from full control to autonomous operation. The vision processors connect to an AXI bus interface to enable high-speed communication with a host processor and other blocks on the SoC, and fast access to frame data. A vision-specific streaming transfer unit in the EV6x processor facilitates background connection to the frame buffer to efficiently access the next frame while the current frame is being analyzed. The EV6x processors can access image data stored in a memory mapped area on the SoC or from off-chip sources independently from the host processor.

"Vision-based products such as advanced driver assistance systems, surveillance and virtual reality require a combination of accuracy, reliability and performance that is difficult to achieve within the power consumption constraints of embedded applications," said John Koeter, vice president of marketing for IP and prototyping at Synopsys. "By extending our embedded vision processor portfolio with the new EV6x family and delivering high-productivity software programming tools, Synopsys enables designers of embedded systems to quickly incorporate state-of-the-art visual intelligence into their systems with the performance and power efficiency necessary to differentiate in their markets."

Availability

The DesignWare EV61, EV62 and EV64 processors are scheduled to be available in October 2016. The

MetaWare Development Toolkit and EV SDK Option (which includes the OpenCV library, OpenVX runtime framework and OpenCL C compiler) will be available in June 2016.

Learn more about Synopsys' Embedded Vision Processors: DesignWare EV6x Processor Family

About DesignWare IP

Synopsys is a leading provider of high-quality, silicon-proven IP solutions for SoC designs. The broad DesignWare IP portfolio includes logic libraries, embedded memories, embedded test, analog IP, wired and wireless interface IP, security IP, embedded processors and subsystems. To accelerate prototyping, software development and integration of IP into SoCs, Synopsys' IP Accelerated initiative offers IP prototyping kits, IP software development kits and IP subsystems. Synopsys' extensive investment in IP quality, comprehensive technical support and robust IP development methodology enables designers to reduce integration risk and accelerate time-to-market. For more information on DesignWare IP, visit http://www.synopsys.com/designware.

About Synopsys

Synopsys, Inc. (Nasdaq:SNPS) is the Silicon to Software™ partner for innovative companies developing the electronic products and software applications we rely on every day. As the world's 15th largest software company, Synopsys has a long history of being a global leader in electronic design automation (EDA) and semiconductor IP and is also growing its leadership in software quality and security solutions. Whether you're a system-on-chip (SoC) designer creating advanced semiconductors, or a software developer writing applications that require the highest quality and security, Synopsys has the solutions needed to deliver innovative, high-quality, secure products. Learn more at www.synopsys.com.

Forward-Looking Statements

This press release contains forward-looking statements within the meaning of Section 21E of the Securities Exchange Act of 1934, including statements regarding the expected release and benefits of the DesignWare EVx Processors, the MetaWare Development Toolkit and EV SDK Option. Any statements that are not statements of historical fact may be deemed to be forward-looking statements. These statements involve known and unknown risks, uncertainties and other factors that could cause actual results, time frames or achievements to differ materially from those expressed or implied in the forward-looking statements. Other risks and uncertainties that may apply are set forth in the "Risk Factors" section of Synopsys' most recently filed Annual Quarterly Report on Form 10-Q. Synopsys undertakes no obligation to update publicly any forward-looking statements, or to update the reasons actual results could differ materially from those anticipated in these forward-looking statements, even if new information becomes available in the future.

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