New Embedded GPU Platform for General-Purpose Computing Delivers the Highest Performance per Energy or Area

The versatile Nema™ Platform for General-Purpose Computing on an embedded GPU (GPGPU) is designed by Think Silicon for excellent performance with ultra-low energy consumption and silicon footprint, and is available now from CAST, Inc.

Nuremberg, Germany — Embedded World — February 25, 2014 — A new platform for general-purpose computing on an embedded graphics processing unit called the Nema™ GPU is now available from semiconductor intellectual property provider CAST, Inc.

Designed by graphics processing experts Think Silicon Ltd., the Nema GPU is a scalable, many-core, multi-threaded, state-of-the-art, data processing design blending both graphics rendering and general computing capabilities. It offers easy configuration, rapid programming, and straightforward system integration in a reusable soft IP core suitable for ASIC or FPGA implementation.

Nema’s combination of processing capability and speed plus energy- and area-saving techniques reflects Think Silicon’s beliefs that multi-purpose embedded designs are the best solution for many systems, and that full hardware utilization is the key to decreasing their energy consumption. Nema yields what the company believes is the highest performance per square millimeter available today, with reference designs delivering performance up to 16 GFLOPS/mm² in a 28nm process.

Nema’s performance and scalability make it ideal not just for graphics processing but also for many embedded data- and computation-intensive tasks in industrial, medical, scientific, automotive, and other applications. Examples include augmented reality, computer vision, or surveillance systems that need to display graphics but also must perform video analytics algorithms such as object recognition or image processing tasks such as features extraction.
“The Nema Platform is great at typical embedded graphics rendering and acceleration tasks, but we’ve really optimized Nema’s architecture to be the best available solution for systems that need both graphics processing and a lot of data manipulation at the lowest power and silicon area usage,” said George Sidiropoulos, managing director of Think Silicon. “We’ve poured years of graphics processing design experience into a flexible architecture combining MIMD floating point processors, rendering accelerators, optimized memory usage, and intelligent power management, and we believe that Nema provides exactly what many system designers need.”

The Nema GPU employs multiple processing cores in clusters, and multiple clusters can be connected via a proprietary adaptive network-on-chip (NoC). This plus an innovative memory subsystem design allows Nema to be scaled to a multicore GPU of any size meeting any processing requirement customers may have. Designers can readily configure an arbitrary number of floating point and/or integer vector processing cores; dedicated hardware accelerators for graphics, image, and video processing; and a variety of on-chip memory components (caches, buffers, and scratchpads). Techniques such as built-in lossy or lossless compression of memory traffic reduce processing load and hence lower energy consumption.

The scalable Nema™ Embedded GPU combines multiple clusters in a network-on-chip architecture, with each cluster having from one to four processing cores and each core running up to 128 threads.
Development for Nema is made straightforward through included industry-standard APIs and an in-house LLVM/Clang compiler tool chain that is adaptable to the changing architecture. Support for C/C+ programming is available now. Nema’s OpenCL™ support is awaiting certification, and future releases will see the addition of OpenGL® ES and OpenVX (for machine vision).

“Introducing the Nema GPU platform is the next step in our strategy of making CAST the smartest choice around for the IP cores and subsystems required by today’s leading designers,” said Nikos Zervas, chief operating officer for CAST. “Nema can execute graphics and/or general computing tasks by itself, or it can be easily integrated with processors in a heterogeneous SoC and as such is an especially good complement to our range of processor IP.”

The Nema GPU IP Platform is available now in Verilog source code or FPGA netlists. Royalty-free licensing is available. Deliverables include a complete compiler tool chain (LLVM, Clang, GNU Binutils), an optional NoC architecture, scripts, and testbenchs. Reference design systems and IP integration design services are also available. Visit the CAST site (www.cast-inc.com) or call (+1 201.391.8300) to learn more.

Representatives of Think Silicon and CAST will demonstrate the Nema GPU Platform in CAST’s booth at Embedded World (stand 2-659).

Think Silicon Ltd. designs computer graphics and multimedia IP cores and delivers complete hardware/software solutions around them, especially for the mobile and embedded system markets. The company was founded in 2007, is based in Patras, Greece, and counts as customers both fabless and physical semiconductor manufacturers. Learn more at www.think-silicon.com.

CAST, Inc. is a 20-year-old developer, integrator, and aggregator of IP cores and subsystems. The company’s royalty-free product line features 8- and 32-bit controllers and processors with peripherals; video and image compression codecs; and graphics, encryption, interconnect, and interface IP for quickly building complete systems. See www.cast-inc.com for details.

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