AMD

Case Study:

Portable Ultrasound Devices

Application Story

CUSTOMER:
eZono

INDUSTRY:
Medical Imaging

CHALLENGES:
Portable ultrasound devices require a very high level of processing performance to enable high-speed 3-D graphics imaging, yet also require processing solutions that are low power and enable small form factor systems.

SOLUTION:
The AMD Embedded G-Series APU provided the optimal balance of processing performance, 3-D acceleration, low power and cooling efficiency.

RESULTS:
The eZono 4000 portable ultrasound device delivers sharp ultrasound images, helping clinicians deal with the real-life challenges they face every day at the point of care.

AMD TECHNOLOGY AT A GLANCE:
AMD Embedded G-Series APUs

AMD Embedded G-Series APU Boosts 3-D Visualization for Portable Ultrasound Device

eZono 4000 Portable Ultrasound Device Provides Detailed Imagery for Everyday Clinical Practices

Doctors and clinicians rely on portable ultrasound devices in emergency rooms and other points of care to scan for trauma, assist with diagnosis and provide data and guidance during invasive procedures such as administering local anesthesia. Portable ultrasound devices allow for improved patient care and accuracy; for example, for clinicians who use the systems to visualize a needle track and needle tip position before they penetrate a patient's skin. The diagnoses for musculoskeletal disorders can be done fast and with great accuracy when clinicians can get a clear view of anatomical structures both at rest and in motion using a portable ultrasound device.

Ultrasound devices for point-of-care environments need enough processing power to quickly deliver advanced imaging with automated image optimization. What's more, because portable ultrasound devices are often moved from one procedure area to another without a mobile power source, they must operate on a low power budget.

BALANCING PERFORMANCE WITH SIZE, WEIGHT AND POWER

When eZono AG – an ultrasound company that focuses on point-of-care uses of ultrasound for everyday clinical practices – sought a processor for its eZono 4000 portable ultrasound device, the company chose the AMD Embedded G-Series Accelerated Processing Unit (APU) as the underlying platform. AMD's solution provided the optimal balance of processing performance, 3-D acceleration and power efficiency to support eZono's portable ultrasound device.

"Switching to the AMD Embedded G-Series APU processor made the integration of our breakthrough needle guidance technology with the ultrasound system possible; the AMD Embedded G-Series APU handled the very complex algorithms involved in detecting a needle in the air."

Manuel Berrocal, Development Manager, eZono AG

The AMD Embedded G-Series processor combines a low-power CPU and a discrete-level GPU into a single embedded APU. This advanced level of graphics integration builds a foundation for high-performance multimedia content delivery in a small form factor and power-efficient platform, making the solution a good fit for portable medical device solutions such as eZono's portable ultrasound device.

The single-chip combination of a CPU and general-purpose GPU (GPGPU) on a single APU maximizes parallel processing throughput. Conventional graphics-integrated chipsets rely on the CPU to interface with the GPU through a North Bridge connection. This conventional serial data processing approach can add memory latency, consume system power and sacrifice board space.

With an APU architectural approach, the CPU performs scalar processing including storage, networking and memory processing, while simultaneously running the operating system, applications and user interface. Meanwhile, the on-die GPU offloads graphics and multimedia processing, freeing the CPU for compute, memory and I/O requests. The APU architecture reduces processing latency and helps improve real-time graphics processing performance.

Support for OpenGL®, an open standard application program interface (API) for defining 2-D and 3-D graphic images, and OpenCL™, a framework for writing programs that execute across heterogeneous platforms, help enable AMD G-Series APUs to run sophisticated, massively parallelized algorithms necessary for generating the advanced imaging provided by portable ultrasound devices. This enabled eZono AG to implement pioneering onboard reference materials with interactive 2-D and 3-D graphics to help guide the user through each procedure, as well as help accelerate image reconstruction and post-processing.

Using the AMD G-Series APU as the processing platform for its eZono 4000, eZono AG was able to offload most of the image post-processing tasks to the GPU, freeing valuable processing space in the CPU and ensuring that the high-speed processing required for real-time imaging loads performed within expected time frames.

eZono AG was able to replace an older Computer-on-Module Express (COM-Express) solution with one based on the AMD G-Series APU, designed to achieve a substantial processing increase for its eZono 4000 solution without impacting power consumption or heat dissipation.

LOW POWER

Due to sanitization requirements, medical equipment is exposed to stringent cleaning regimens. Passive cooling enables portable ultrasound devices to make use of sealed display panels to help prevent the ingress of particulates and debris, making it easier for devices to comply with these requirements. The elimination of openings in the case necessitates that the system be fanless. The AMD G-Series APU's power efficiency, with average power consumption as low as 2.3W[1] (for the AMD G-T16R APU), enables a system to be passively cooled (no fan required). In addition to enabling the use of a sealed case, removing the fan helps to greatly decrease the risk of system failure due to a worn-out fan.

LIGHT AND COMPACT

To maximize portability, the eZono 4000 needed to be lightweight and compact. The silicon-level integration of a low-power CPU and discrete-class GPU onto a single APU naturally reduces board space demands and eliminates the need for bulky add-on graphics cards. This helped contribute to the design of eZono's portable ultrasound device, which weighs in at only 4.7 kg.

INTEROPERABILITY

While the eZono 4000 supports the storage of up to four hours of video or 240,000 images[2], interoperability with clinical databases is essential. The x86-based APU enables smooth interoperability with back-office IT infrastructure and patient record databases, and introduces additional benefits for applications including remote system maintenance and administration.

The eZono 4000 portable ultrasound device, which was announced in December 2013, achieved FDA clearance in February 2014 and is deployed in hospitals and clinics worldwide. eZono 4000 systems are being used to help physicians in a wide range of applications, especially guiding needles into the body wherever an intravenous line is required.

ABOUT EZONO

eZono AG (www.eZono.com) headquartered in Jena, Germany, designs, develops and distributes state-of-the-art tablet ultrasound systems specifically targeted at point-of-care markets. The company is dedicated to supplying sophisticated imaging solutions to empower point-of-care providers.

ABOUT AMD

AMD (NYSE: AMD) designs and integrates technology that powers millions of intelligent devices, including personal computers, tablets, game consoles, embedded applications and cloud servers that define the new era of surround computing. Embedded solutions from AMD give designers ample flexibility to design intelligent, interactive and immersive experiences with the flexibility to design scalable, low-cost and energy-conservative systems.
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1. While running a Winbench 99 business graphics benchmark the AMD G-T16R APU consumed an average of 2.284W. I/O Controller Hub power is estimated based on the measured average power drawn by the I/OCH of .965W during a run of 3DMark 06. System Configuration: AMD G-T16R APU (DVT) at 30°C, "Inagua" Development Board, 4GB 1.35V DDR3, Windows 7 Ultimate. EMB-26
2. Please visit www.eZono.com for full specifications.