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Small Victories

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Systems including small UAVs, robotics, mission-specific handheld systems, intelligent munitions and many others have one thing in common: a desire for small form factor embedded computers that draw scant amounts of power. The ongoing march of Moore's Law keeps working its magic such that, today, the definition of "system" has been redefined to where complete computing engines now easily fit within the area of a cocktail napkin. Boards in this category include such form factors as PC/104, EPIC, mini-ITX, StackableUSB, COM Express, MicroETXexpress along with a variety of small non-standard boards.

For a long time this segment of the embedded computing industry was pretty stagnant when it came to new architectures and standards. VITA and PICMG, in contrast, have been far more active in crafting new specs and form factors in recent years. Even while vendors of the PC/104 board community have enjoyed robust business and growth over the years, extensions, follow-ons or spin-off specifications from the PC/104 mothership were few and far between. Stirring the pot somewhat, a new consortium was formed last year—separate from the PC/104 Consortium—called the Small Form Factor Special Interest Group (SFF-SIG), by founding members Octagon, Samtec, Tri-M, VIA and WinSystems. A year later that group has shown some impressive progress. The SIG now includes 18 leading suppliers of embedded components, boards and system technologies.

At last month's Embedded Systems Conferences (ESC) in Boston, the SFF-SIG and its members followed through on promises made back in the spring, and rolled out products based on the SFF-SIG's SUMIT standard. Initially launched by the SFF-SIG in March, SUMIT collects PCI Express, USB, SPI, I2C and LPC Bus expansion into two, footprint-efficient, 52-pin, high-speed rugged Samtec Q2 connectors. The standard is among the very first designed especially to accommodate the new family of ultra-low-power processors such as VIA Nano and Intel Atom.

The products announced at ESC implementing the SUMIT interface include the VIA EPIA P710 Pico-ITXe Single Board Computer. This 72 mm x 100 mm SBC based on the SFF-SIG's soon to be published Pico-ITX form factor standard provides a SUMIT AB interface for I/O expansion. Before SUMIT was available, SBCs as small as the Pico-ITX format were unable to support I/O expansion cards within the outline of the SBC itself. VIA's design is based on a draft version of the Pico-ITXe Specification available to SFF-SIG members. The SFF-SIG expects to publish Version 1.0 of the

Pico-ITXe Specification on their Web site before the end of 2008. Also rolled out at ESC was WinSystems' PCO-UIO48 Digital I/O Card. This 48-line digital I/O card is in the new Pico I/O form factor and uses the SUMIT A interface to an SBC. The Pico I/O form factor specification is available now to members of the SFF-SIG and will be published on the SFF-SIG Web site by the end of 2008. It defines a 60 mm x 72 mm I/O card using the SUMIT A or SUMIT AB interface.

On the standards side, SFF-SIG also announced its intention to adopt and enhance SiliconSystems' SiliconDrive II Blade Specification for small, rugged subsystems such as mass storage and other I/O technologies under the trade name MiniBlade. SFF-SIG is expanding its portfolio of next-generation industry standards that speed and simplify the development of small embedded systems

The design of a small embedded system requires many special technologies beyond small CPU and chipset combinations, small SBCs, small I/O expansion modules and/or small Computer-on-Module products. These designs must also be able to shrink and ruggedize mass storage, power supplies, cooling solutions and other key system component elements. The new MiniBlade Specification, created by various suppliers for embedded applications, takes the first step toward standardizing an ultra-small, mass storage solution for the small form factor embedded system market. A plug-in peripheral card that is retained with latches in its socket withstands embedded environments better than consumer-grade dongles and thumb drives. The SiliconDrive II Blade Specification was jointly developed by SiliconSystems and Samtec.

This new specification now forms the cornerstone of a new SFF-SIG Working Group to define the interfaces to allow a wide array of storage, communications, GPS and other I/O products to be compatible with the MiniBlade socket. The MiniBlade Specification, to be published within the next few months, will define the mechanical form factor and interface pin definitions for MiniBlade devices.

In the other small form factor camp—the PC/104 Consortium—activity has been robust. In the spring the PC/104 Consortium launched a set of new PCI/104-Express and PCIe/104 specifications. A number of vendors showcased products based on these standards at ESC Boston. All in all, it's been a busy and productive year for the small form factor board community. I, for one, am pleased to see this all important segment of the military embedded technology no longer holding its breath, and moving forward.

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