Microcontrollers Outperform FPGAs

Atmel® Corporation’s new line of customizable microcontrollers deliver as much as 8X the performance for DSP algorithms that are frequently implemented in FPGAs, with substantially reduced power consumption and unit IC costs that are 30% to 50% lower.

The AT91CAP MCUs include an Atmel processor core, a variety of peripherals and multiple high-speed busses. Uniquely, AT91CAP devices include a metal

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programmable block (MP block) with up to two-million FPGA-equivalent gates that can be used to implement any of the following: 1) DSP algorithms or other IP commonly implemented in FPGAs, 2) one or more additional processor cores or 3) additional peripherals. Atmel’s ARM7- and ARM9-based MCU families are the first to add customizable versions, the AT91CAP7 and the AT91CAP9.

Any existing ARM7/9–plus-FPGA design can be migrated to a AT91CAP device. Worst-case static power consumption is 3 to 4 mW, only 0.2% of the nearly 2 W consumed by a typical FPGA. Depending on the design and application, the dynamic power consumption of logic in a CAP-enabled device can be as low as one tenth of that in an FPGA.

"Atmel’s AT91CAP customizable microcontrollers represent a better solution for embedded designs that need signal processing. They have the power consumption, performance and price characteristics of ASICs, without any extra customer-side engineering, very low NRE and quick turn around. CAP devices provide designers with a higher performance, lower cost and lower power processor alternative to an FPGA," said Jay Johnson, Atmel’s director of ASIC marketing.

All CAP devices also have the company’s system controller with an 8-level, priority, vectored interrupt controller, as well as reset, startup/shutdown, timing, power management, parallel I/O control and debugging.

Based on the ARM7TDMI® processor core, the AT91CAP7S MCUs come with customizable logic equivalent to approximately 28K or 50K FPGA LUTs or 250K or

450K routable ASIC gates. Peripherals include USB device, SPI master and slave, two USARTs, three 16-bit timer counters, an 8-channel/ 10-bit analog to digital converter, plus interrupt control and supervisory functions. Target markets for AT91CAP7 include industrial, medical and automotive.

Developed for deeply embedded, networked systems with man-machine interfaces, the ARM9-based AT91CAP9S integrates a 200 MHz ARM926EJ-S core with 16 Kbytes each of program and data cache, and customizable logic equivalent to approximately 28K or 56K FPGA LUT's (250K or 500K routable ASIC gates). It also has 32 Kbytes of additional SRAM, 32 Kbytes of ROM, External Bus Interface (EBI) with error correction code (ECC) for NAND Flash/SmartMedia®.

Migrating an existing ARM7- or ARM9-plus-FPGA design to a CAP-enabled MCU can be as simple as providing Atmel with the RTL netlist, which Atmel implements in the MP block in the CAP-enabled MCU. Atmel will integrate royalty-free peripherals from its extensive IP library, free of charge.

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