Motorola DragonBall Adds More Scales

Motorola has upgraded its modest but very popular 68328 integrated microprocessor—usually known as DragonBall—by releasing the 68EZ328. The DragonBall EZ, as the company calls it, has the same performance as the old DragonBall but adds a DRAM controller and upgrades the built-in LCD controller from 4 to 16 gray scales. The only sacrifice is the original chip's PCMCIA interface. The new chip comes in a physically smaller package than the old one, although the EZ actually has more pins than its predecessor. At $8.95, the EZ is also $1 cheaper than the original 68328.

Although the 'EZ328 uses the same 68EC000 processor core as the '328, a shift to a more modern 0.35-micron process and some circuit tweaks make the chip fully static and more power efficient. Users can now ramp the processor's clock rate from DC to just over 16 MHz. Typical power consumption is now rated at 66 mW, according to Motorola.

The DragonBall has been a sleeper hit among battery-powered processors. Motorola brags that it has sold over three million 68328 processors, two-thirds of which have gone into 3Com's PalmPilot. The chip is far slower than the MIPS and SuperH processors prevalent in Windows CE handheld devices, yet users generally prefer the Pilot to its competitors. DragonBall's integration, small size, and modest cost have won out over the added performance—and complexity—of more "advanced" devices in this segment. —*J.T.*

Sharp Spins Second Standalone ARM Chip

Turning the trickle to a dribble, Sharp (*www.sharpsma.com*) has joined Atmel and Samsung in rolling out a standalone ARM7-based chip for embedded applications. The new LH79402, optimistically named the "universal microcontroller" by Sharp, includes integrated peripheral logic that will make the chip suitable for consumer items when it ships in 1Q99.

Apart from the chip's 66-MHz ARM7TDMI core, the '402 has 8K of unified cache, a memory controller (for DRAM or SRAM), two UARTs, a two-channel DMA controller, three counter/timers, and as many as 40 general-purpose I/O pins. The device is housed in a TQFP-176 package.

The most unusual feature of the '402 is its programmable pin assignment. The chip's 176-pin package doesn't have enough I/O pins for all 64 of the processor's I/O signals, so users are required to decide which I/O signals will be routed to which pins by means of a programmable switch matrix inside the part. This crossbar switch's configuration is not persistent, so it must be reprogrammed every time the processor boots, potentially allowing in-system customization of the chip's I/O assignments. Sharp has a patent pending on the implementation of its switch matrix.

The '402 complements Sharp's only other standalone ARM chip, the LH77790 (see MPR 3/27/95, p. 9), which has a gray-scale LCD controller. Given Sharp's corporate emphasis on flash memories and LCD displays, ARM-based chips with either or both seem likely in the near future. In the meantime, the $12 LH79402 makes a fine microcontroller for general-purpose embedded systems that need moderate performance, low cost, and a flexible choice of peripherals. —*J.T.*

Toshiba Tweaks R4300 for Lower Power

Quiet MIPS licensee Toshiba has modified the R4300 processor chip it acquired in a second-source agreement with NEC a year ago (see MPR 8/25/97, p. 5). The new TMPR4951F is completely pin- and software-compatible with NEC's (and Toshiba's) R4300 processor (see MPR 5/8/95, p. 1), but it has lower power consumption and some upgraded cache and MMU features. At 133 MHz, the 4951 consumes about 1.2 W (typical) from its 3.3-V supply, according to Toshiba. This level is significantly lower than Toshiba's previous 2-W rating at 100 MHz.

Apart from its static circuit design and reorganized clock trees, the 4951 includes more TLB entries (48) and a double-size (16K) data cache. Both caches are now four-way set-associative instead of direct mapped, and they allow cache-line locking, a useful feature for many embedded designers, because it eliminates the uncertainty of cache-access times for critical code or data.

Toshiba is sampling the 4951 now, with production scheduled for 1Q99. In 10,000-unit quantities, the chip is priced at $20, about the same as the R4300 it will inevitably replace in Toshiba's lineup. —*J.T.*

Hitachi Makes SuperH Flash Splash

Hitachi announced a plethora of 8-bit, 16-bit, and 32-bit microprocessors and microcontrollers with on-chip flash memory. The bulk announcement is part of a strategic move by Hitachi to differentiate its chips from a crowded field by showcasing the company's flash technology. In the 32-bit arena, Hitachi rolled out four new variations of its SuperH line, all of them upgrades of existing SuperH parts.

The new chips are the SH7017F, SH7055F, SH7410F, and SH7065F. The "F" suffix, not surprisingly, indicates the presence of flash memory. The 7017F is a pin-compatible replacement for the existing SH7040, '42, and '44 parts, but adds 128K of flash memory. The SH7055F is a much higher-end device that competes with Motorola's PowerPC-based MPC555 (see MPR 4/20/98, p. 11) for automotive engine-control applications. The SH7055F has a whopping 512K of flash memory, setting the current record for a 32-bit chip. The SH7410F is a drop-in replacement for the normally mask-programmed SH7410 (aka the SH-DSP). Finally, the SH7065F is an industrial controller similar to the SH7040 series, but with 256K of flash memory.

Hitachi intends to replace OTP (one-time programmable) ROM with flash memory throughout its entire line of microcontrollers and microprocessors within a few years as its process geometries fall below 0.5 microns. This is a bit sooner than most of its competitors will make the switch, a fact Hitachi hopes to turn to its advantage. All four devices will begin sampling in 4Q98, with production scheduled for mid-1999. At this rate, many embedded designers may soon get their first taste of high-density flash memory in 32-bit microcontrollers. —*J.T.*

Motorola Unwraps Project X

Some of the first tangible evidence to emerge from VM Labs' Project X technology (see MPR 6/22/98, p. 6) is an evaluation board code-named Blackbird, from Motorola. Blackbird combines a PowerPC 860SAR processor with VM Labs' media-accelerator chip, memory, and several television and communications I/O interfaces to create an all-in-one development board for consumer-electronics OEMs.

Blackbird promises to combine about half a dozen television-related devices into an all-in-one set-top box, functioning as a combination satellite receiver, cable decoder, DVD player, and video game. Motorola believes some of its unnamed customers may release commercial products as early as 1Q99.

The concept of merging disparate TV appliances into a single unit is a sound one (see MPR 6/22/98, p. 3), and it is being pursued by cable, satellite, and game companies alike. Of all these competitors, it appears that the game companies, such as Sega, Nintendo, and Sony, have the upper hand. Game systems have valuable software content, whereas the other functions are merely commodity hardware implementations. Sega's Dreamcast (see MPR 6/1/98, p. 8) will begin fulfilling this role when it enters the market in Japan later this year. Although VM Labs claims to have the interest of top-tier video-game software developers, it's unlikely that the established game makers will give up without a protracted battle. —*J.T.*

Tundra Building PCI Chip for MPC8260

Hot on the heels of Motorola's Voyager announcement (see MPR 9/14/98, p. 12), Tundra Semi (*www.tundra.com*) is producing a companion chip that adds a PCI interface to the PowerPC communications controller. Tundra's PowerSpan chip will connect the MPC8260's processor bus to a 33-MHz, 32-bit PCI bus, enabling easier expansion to commonly available peripheral chips. Pricing and availability for the new chip were not announced.

The chip is most attractive with the new Voyager chips; Motorola plans to upgrade the MPC8260 shortly to give the chip its own PCI interface. Indeed, Voyager was originally intended to have a PCI interface all along, but schedule commitments forced Motorola to release the part before it was ready. The PCI-enabled chip may simply replace the current MPC8260 in Motorola's product line, or it may be offered as a slightly higher-cost alternative. —*J.T.*