Supercomputer on a chip

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By Chris Ayres

A chip which its makers claim is 70 times quicker than rivals may revolutionise home entertainment

IN what is promised to be a gigantic leap forward for the iPod-era of digital entertainment, a consortium led by Sony Corporation unveiled a low-cost "supercomputer" that will be able to operate at up to ten times the speed of conventional microchips.

The breakthrough calls for a new definition of Moore's Law, the theory devised by Intel's Gordon Moore in 1965, that the power of computer chips doubles every 18 months. It could also finally challenge the dominance of Intel and Microsoft in the personal computer industry.

Blueprints for the chip, known as "the Cell", were shown at the International Solid State Circuits Conference in San Francisco.

The chip, developed with IBM and Toshiba, is designed to be used in Sony's PlayStation 3 video games console, but could also revolutionise the way people watch television and listen to music.

"This chip takes what used to be available only in high-end supercomputers and brings it into your home," said Lisa Su, a vice-president at IBM's systems and technology division.

Ms Su said the Cell's most impressive feature was its nine "cores", which mean it can perform nine separate tasks simultaneously. Most conventional microchips can perform only one task at a time. Each one of the Cell's 234 million transistors, meanwhile, has been highly tuned to handle video and music data.

The transistors in today's computers, Ms Su said, were still designed for the era of word processors, spreadsheets and business presentations.

The Cell's so-called "clock speed" is said to be over 4 Gigahertz, meaning it can handle four billion calculations per second. That makes it faster than Intel's Pentium 4 line of products, which run at up to 3.8 Gigahertz. IBM has also experimented by putting the Cell chips together, which allowed them to handle an astonishing 16 trillion calcuations per second.

Digital entertainment technology – in particular, the'streaming' of movies and music to television sets from home computers – has been hampered by relatively limited computing power. One of the problems with conventional microchips is that the faster they get, the more power they consume and the hotter they become, creating a fire hazard.

As a result, Intel has largely given up on the race for so-called "clock speed", instead concentrating on putting two "brains" on a single chip, while reducing power consumption.

Its new "dual-core" Montecito is expected to run at 2 Gigahertz while using 23 percent less power than its predecessors. The chip is also expected to contain 1.7 billion transistors, giving it huge amounts of "flash memory", or the ability to store data on the chip itself, without having to send it to another part of the computer. Flash memory, as well as the quality of the connection between the chip and other parts of the computer, is now considered as important as clock speed.

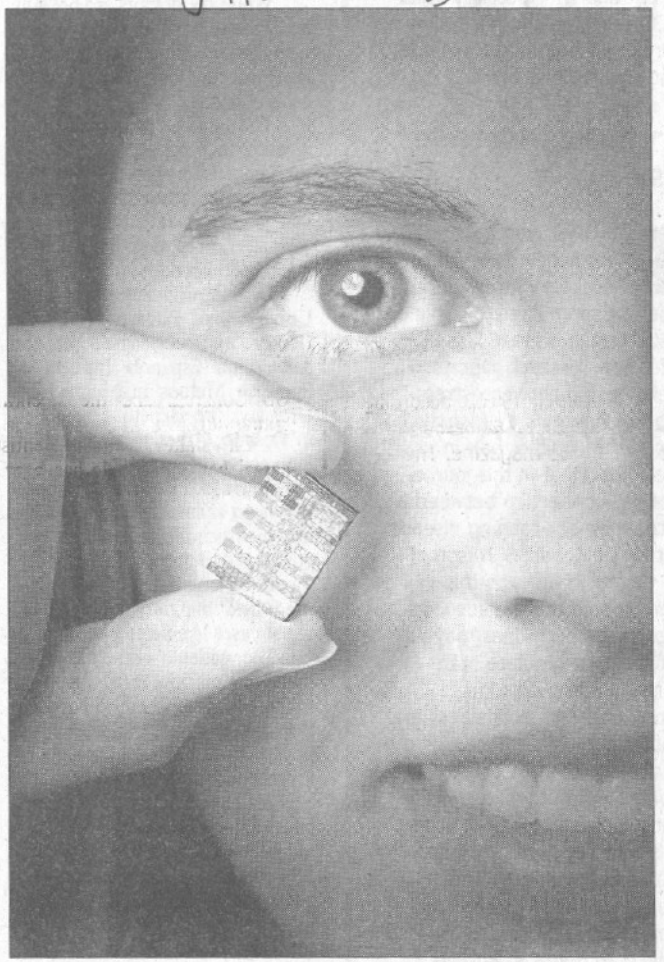
The companies behind the Cell, however, claim it is the first chip built "from the ground up" to handle digital home entertainment. "It will make possible a transformation in entertainment like that from novels to movies," said Ken Kutaragi, Sony's chief operating officer, before the product was unveiled.

Sony's PlayStation 3 – expected to hit the shops in 2006, with a prototype to be unveiled at the E3 trade show this May – will be so powerful that video games producers hope they will be able to import special effects and graphics directly from Hollywood blockbusters. "In the future, all forms of digital content will be converged and fused on to the broadband network," Mr Kutaragi said.

Industry analysts caution, however, that the Cell will require software companies to write new programs from scratch which, traditionally, they have been unwilling to do. This lack of software was one of the reasons the original Apple computer failed to catch on the 1980.

Quick Thinking

1944: IBM's Mark I computer is 51ft long, weighs five tonnes and makes three calculations per second
1946: ENIAC computer, 30 tonnes, can make 5,000 calculations per second
1960s: "second generation" computers rise to 10,000 calculations per second
1980s: "fifth generation" computers can operate at 10 to 15 million calculations per second
1996: SGI Challenge capable of 4.32 billion calculations per second
2002: Hewlett Packard computer, costing $24.5 million, makes 8.3 trillion calculations per second
2005: new "cell" chip could make 256 billion calculations per second



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