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Testosterone Chips: The End of an Era

Silicon Valley VCs are backing a new breed of engineer who make chips that are cheap and usable for the whole planet—not just speed junkies

by Drew Lanza

The tech geek in me still gets excited when I read that Intel has developed a new chip that performs 1 trillion calculations per second (see BusinessWeek.com, 2/12/07, "Intel Builds the Fastest Chip Ever") or other big-headline semiconductor announcements that have appeared in recent weeks (see BusinessWeek.com, 2/15/07, "To Add Speed, Chipmakers Tune Structure").

But the venture capitalist in me equates it all to men walking on the moon: Interesting, but not relevant to my day-to-day work.

That's because such feats of engineering testosterone are becoming far less likely to have widespread economic impact. Building ever more powerful chips is now too expensive for all but the largest of companies.

Huge leaps in performance require huge advances in semiconductor density. We're talking circuitry-line widths of 45 nanometers and shrinking. The prickliness of working with circuit features only 100 times larger than a water molecule is forcing semiconductor companies to seriously weigh, case by case, what they can really afford to make.

CHIPPING AWAY AT CHANGE

The same week Intel (INTC) announced its big new prototype chip, for example, Texas Instruments (TXN) announced that it was shutting down a new fabrication facility originally intended to make next-generation chips.

These changes have altered the face of VC chip investing. Ten or 15 years ago, VCs could give $10 million to $20 million to a bright team of engineers to design the next cool chip. Some of these companies hit home runs: Microchip Technology (MCHP) and PMC-Sierra (PMCS) now support market capitalizations in the billions of dollars. Back then, even base hits were routinely acquired for $75 million or more.

Today, developing just one state-of-the-art chip takes $20 million to $30 million. But our exit prices for base hits are still no higher than they were a decade ago. The resulting equation no longer makes financial sense to most VCs, nor to the many blue-chip companies that design chips for use in their own products.

Such changes weigh heavily on Silicon Valley's chip-building engineering culture. That culture has always been dominated by developers who live to get high on chip speed. Now those developers are sinking into testosterone withdrawal. Hardly anyone wants to fund their dreams of whiz-bang technology anymore.

You just have to the read the pages of *Electronic Engineering Times*, the semiconductor industry's weekly bible, to feel the gloom. Not only is large-scale chip development growing more difficult but fewer potential customers seem enthralled by the technology. As one CEO told the paper last fall, customers "don't care if we make these things out of peanut butter."

LESS IS MOORE

That's why all the discussion about the continued viability of Moore's Law has lost the interest of the VC community. That law, formulated by Intel co-founder Gordon Moore in 1965, forecast a doubling every 12 months or so of the number of transistors on a chip.

On a technical level, Moore's cycles will no doubt continue to turn (albeit at a pace more like 18 to 24 months). But on a commercial level, Moore's Law is undergoing redefinition. Instead of putting twice as many transistors on a chip, people are asking: "Why not use the same number but make the resulting chip half as expensive and twice as reliable?"

Speaking as a typical business consumer of computer power, I cheer such thoughts. My spreadsheets now run fast enough, thank you. And do I really need to give spam the ability to find me twice as rapidly? My computing needs, along with the bulk of the world's population's, lie elsewhere.

That's why a new breed of engineer—someone who gets excited by creating maximum utility for users around the planet—is coming to prominence. Instead of designing the next Pentium chip at 10 times the speed, these engineers live to build the next wireless standard 802.11 chip that costs a buck and runs on AA batteries for three years.

But cheaper doesn't mean easier. Achieving low cost and reliability is, if anything, more daunting than achieving blazing speed.

High-end cell phones and high-end PCs have all the bells and whistles—just throw in the kitchen sink. Cheap is harder to design. To build a $100 laptop for kids around the world, how many ports do you leave out? (See BusinessWeek.com, 3/1/07, "The Face of the $100 Laptop.")

There's a lot going for us in the cheaper-and-simpler-is-better camp. The semiconductor manufacturing processes and tools for chip technologies that are 5 to 10 years old are surprisingly robust.

Engineers willing to leave their egos at the door and use these "old" technologies can still instill surprising amounts of functionality—antennas, tuners, microcomputers, etc.—on just one chip and get it right the first time. The economics of VC chip investing thus gains new life.

"INTERNET OF THINGS"

These new chips and their applications are leading us to the final stage of the Information Revolution: The Internet Everywhere. Small, cheap, and highly power-efficient chips are beginning to cover the surface of the planet.

These chips will go into products used by billions of emerging consumers in places like China, India, Brazil, and Russia—not only the $100 PC but the $25 cell phone that will enable, for example, a Chinese farmer to communicate with his son in Shanghai, check on the weather and the price of rice, and perhaps even get updates on the 2008 Beijing Olympics.

At the same time, the new, low-power chips will also go into the billions of things accumulated by the more developed world. Expect a $5 wireless night light near your washing machine that glows red when your local utility anticipates a brownout. Or a $3 chip in your automobile that continuously displays traffic and weather. Or a $10 chip that fastens to your lapel and measures caloric intake. This expanding Internet of Things gives eyes, ears, and a voice to the things all around us.

So if testosterone-powered, high-speed chip development is dying in the Valley, I say, "So what?" The new opportunities, frankly, look even more interesting.

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