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TECHNOPHILE

Devices are getting thinner, shorter, smarter and more powerful. What next? **p8**

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Form and function: The holy grail of computing

Though devices have become thinner, shorter, smarter and more powerful, the radical changes look set to continue

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Computing devices come in all kinds of shapes and styles now, all thanks to transformations the form-factor has gone through over the years. In fact, the changes in the 'form factor' in computers and other electronic gadgets are an interesting case study by themselves. No doubt, the experiments in form (and function) have transformed the market in unimaginable ways. The Moore's law is reportedly losing its mojo. For starters, Moore's Law states that the number of transistors per square inch on integrated circuits had doubled every year since the IC was invented, or simply put, computer power doubles every two years at the same cost. This means devices are getting smaller and more powerful. But where is it all heading to, especially considering that the obsession around going lean is forcing gadget-makers to compromise on function?

"In only a few decades, gadgets have gone from literally filling a room to being able to be carried around in your pocket," says Chandras Panigrahi, CMO and Consumer Business Head, Acer India.

"Over the last decade, the pace of Moore's law has slowed down, placing a premium on innovation, chip design and micro-architecture improvements," says Vinay Sinha, Managing Director, Sales, AMD India. A leading chip-maker, AMD focusses on, according to Sinha, the efficiency of a device without being restricted by form or function.

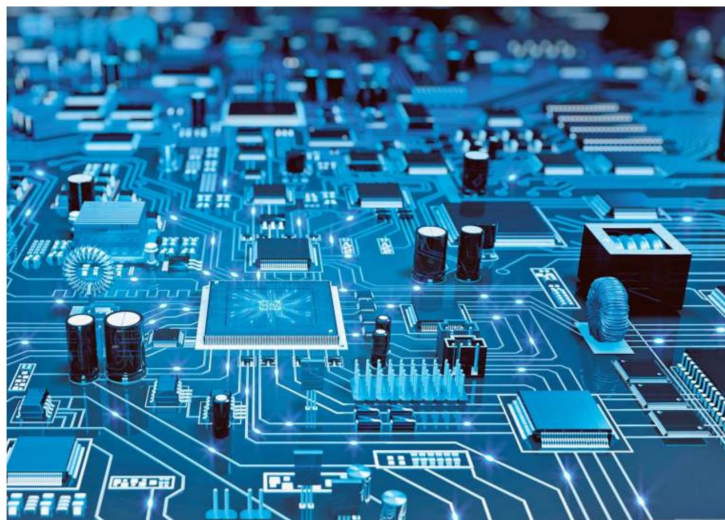
"Performance should not be restricted to size. But consumers today seek sleek and ultra-thin designs that deliver performance on the go," says Sinha. "Improvements and efficiency under this category will pave the way for even more attractive form factors in the future."

Sinha's optimism is shared by Subraneel Bose, Director, Product Marketing, Commercial BU, Lenovo India. He says end users' computing requirements in the market vary from content absorption to content creation. This influences form. For content absorption, smartphones and tablets fit the bill, he notes. Whereas for content creation, one would require devices such as desktops, notebooks and workstations. "In the case of laptops, in between there was a deluge of detachables. But that did not catch a high demand. The convertible form factor, however, is still quite popular," says Bose.

What's the latest?

Chip-makers are still trying to make devices smaller and stronger. But AMD's Sinha says performance, visual experience and the capability to work faster or play longer matter to all devices irrespective of the form factor. "With an advanced approach to high performance computing, chip-makers are designing smaller, yet more efficient and powerful chips with more cores for the next generation of devices."

AMD's 7-nm technology approach is a step in this direction. "Small 7-nm CPU chiplets are not only efficient and cost effective, but they also enable



Evolution Chips are now becoming task-specific and have many cores

unprecedented cost and power configurability of the computing device," says Sinha.

Lenovo's Bose says mobile workstations are becoming thinner and lighter now. "We have the P1 mobile workstations and the Xi ThinkPad and Xi Extreme laptops."

Acer's Panigrahi says new technologies such as artificial

intelligence (AI), edge computing, 5G, etc, are now forcing device-makers to rethink form and performance again. PC and chip-makers have started to use AI to allocate a device's resources to optimise performance and prolong battery life. "Massive data is being used in machine learning, while computing capacity has increased to train larger and more complex models faster," says

Panigrahi. Chips now have many cores and they have gone task-specific (GPUs, etc).

Task-specific chips

It looks like they are going to be more specific from here on, triggering innovation. AMD's Sinha says the chip-maker already has a series of task-specific GPUs, CPUs and APUs in place

that are catering to the specific requirements based on the needs of serious content creators, creative professionals to intense gamers, entertainment seekers and entry level users. AMD's Accelerated Processing Unit (APU) concept — merging the CPU and GPU on a single die — is an example. "The APU provides more efficient computing performance along with cutting-edge graphic performance at substantial cost-savings to the end user," says Sinha.

GPUs are becoming more popular, says Lenovo's Bose. "Few quarters ago, the crypto was a top demand generator," he says.

But now machine learning and other AI streams like Natural Language Processing and Deep Learning are also the key demand generators for more GPU power in graphic cards, notes Bose.

Bose observes that the industry is trying to bring in the thin and light concept into laptops while increasing the performance at the same time. The focus is in managing power consumption, because if you pack more performance capability then it should not be the case that a higher power requirement pushes up the battery specs and hence increases the weight of the device.

Acer's Panigrahi feels PC-makers are following smartphone features to make their laptops stand out, just as phones keep trying to become more like computers. And this is forcing them to experiment with form again. "Our contemporary world is filled with technology that is the product of miniaturisation," he says. Without miniaturisation, the modern world would look very different, observes Panigrahi. So, in all likelihood, devices are going to get smaller, leaner and, well, stronger.