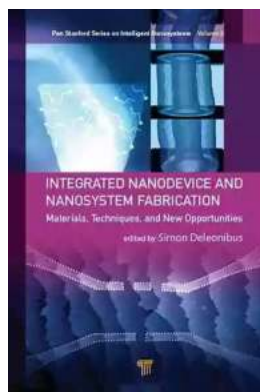


The Convergence of More Moore, More Than Moore, and Beyond Moore

In the ever-evolving field of technology, advancements in semiconductor manufacturing have been the driving force behind our increasingly interconnected world. As we strive for more powerful and efficient devices, three major approaches have emerged to guide this progress: More Moore, More Than Moore, and Beyond Moore.

The More Moore Approach: Pushing the Limits of Miniaturization

For decades, the More Moore approach has focused on the continuous shrinking of transistors and the integration of more components on a single chip. This approach, driven by Moore's Law, has given rise to the rapid increase in computational power and memory capacity witnessed in modern electronic devices.



Convergence of More Moore, More than Moore and Beyond Moore: Materials, Devices, and Nanosystems (Jenny Stanford Series on Intelligent Nanosystems)

by Robert M. Wald(1st Edition, Kindle Edition)

★★★★☆ 4.4 out of 5

Language : English

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Print length : 306 pages



Advancements in lithography techniques, such as deep ultraviolet (DUV) and extreme ultraviolet (EUV) lithography, have played a crucial role in enabling Moore's Law to persist. The ability to print smaller and more densely packed transistors on silicon wafers has allowed for the production of faster, smaller, and more energy-efficient devices.

However, as we approach the physical limitations of silicon-based transistor technology, alternative approaches are becoming necessary to continue the exponential growth predicted by Moore's Law.

More Than Moore: Expanding Beyond Traditional Microelectronics

The More Than Moore approach recognizes that not all technological advancements can be achieved solely through the scaling of transistors. It involves integrating various functionalities onto a single chip, such as sensors, MEMS devices, passive components, and advanced packaging technologies.

By combining different technologies on a chip, More Than Moore enables the creation of highly integrated systems capable of performing a wide range of tasks. For example, the integration of sensors onto a chip enables the development of smart devices that can sense and react to their environment, leading to innovations in areas such as healthcare, transportation, and smart cities.

Furthermore, More Than Moore focuses on improving system-level performance and functionality rather than solely relying on transistor scaling. This approach allows for the development of specialized chips tailored to specific applications, leading to increased efficiency and higher performance in areas such as artificial intelligence, communication systems, and energy management.

Beyond Moore: Exploring Radical New Technologies

With the limitations of traditional silicon-based transistors becoming more apparent, the Beyond Moore approach explores alternative technologies that can continue driving advancements in computing power.

One of the most promising technologies is quantum computing. Quantum computers leverage the principles of quantum mechanics to perform complex calculations at an unprecedented speed. The power of quantum computing lies in its ability to process vast amounts of data simultaneously, promising significant breakthroughs in areas such as cryptography, material science, and optimization problems.

Another technology under the Beyond Moore umbrella is neuromorphic computing. Inspired by the structure and functionality of the human brain, neuromorphic chips aim to mimic the brain's neural networks. These chips are designed to perform tasks requiring high computational power while consuming significantly less energy compared to traditional computing architectures. Neuromorphic computing holds immense potential for applications in artificial intelligence, robotics, and pattern recognition.

The Convergence: Uniting the Three Approaches

While More Moore, More Than Moore, and Beyond Moore have traditionally been pursued independently, there is now a growing realization that the convergence of these approaches is necessary to address the complex challenges facing the semiconductor industry.

The integration of More than Moore technologies onto smaller, denser transistor chips from the More Moore approach can lead to highly capable and energy-

efficient systems. Furthermore, the utilization of Beyond Moore technologies, such as quantum computing and neuromorphic computing, can unlock entirely new possibilities and performance gains previously unimaginable.

The convergence of these three approaches will be critical in pushing the boundaries of technology further. It will pave the way for advancements in areas such as Internet of Things (IoT), artificial intelligence (AI), autonomous vehicles, and more.

The Future of Semiconductor Technology

As we journey into the future, it is clear that the convergence of More Moore, More Than Moore, and Beyond Moore is essential for unlocking new horizons of innovation. By pushing the limits of miniaturization, expanding beyond traditional microelectronics, and exploring radical new technologies, we can shape a world where technology seamlessly integrates into our lives, enabling unprecedented possibilities and experiences.

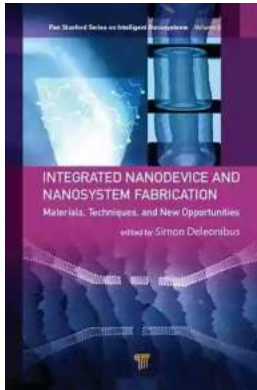
Whether it be faster and more energy-efficient devices, highly integrated systems, or groundbreaking breakthroughs in quantum and neuromorphic computing, the convergence of these approaches will propel us into an era of limitless potential.

Remember, the future lies in the convergence of More Moore, More Than Moore, and Beyond Moore – get ready for an exciting journey into the unknown!

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The era of Sustainable and Energy Efficient Nanoelectronics and Nanosystems has come. The research and development on Scalable and 3D integrated Diversified functions together with new computing architectures is in full swing. Besides data processing, data storage, new sensing modes and communication capabilities need the revision of process architecture to enable the Heterogeneous co integration of add-on devices with CMOS: the new defined functions and paradigms open the way to Augmented Nanosystems. The choices for future breakthroughs will request the study of new devices, circuits and computing architectures and to take new unexplored paths including as well new materials and integration schmes.

This book reviews in two sections, including seven chapters, essential modules to build Diversified Nanosystems based on Nanoelectronics and finally how they pave the way to the definition of Nanofunctions for Augmented Nanosystems.



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