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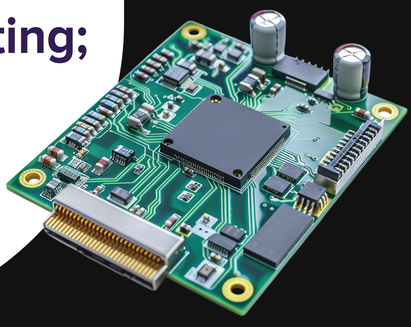
Industry Futures: **Semiconductor & Computing; Storage & Peripherals**

Wipro's Industry Futures for Semiconductor & Computing; Storage & Peripherals report examines the dramatic transformation driven by the global push for sustainability, semiconductor smart manufacturing, semiconductor operations, semiconductor supply chain and the relentless advance of autonomous technologies. By 2030, enterprises in this sector must strategically evolve to embrace fully autonomous, intelligent, resilient and sustainable operations to maintain a competitive edge. This report examines the key technological drivers, use cases, and strategic imperatives for achieving this evolution.



01 Cognitive Architecture and Design

In the future, hi-tech enterprises will excel through cognitive architecture and design spearheaded by AI-driven semiconductor operations, GenAI automation and advanced materials. Nanotechnology, quantum materials, and metamaterials will enable energy-efficient assets optimized via integrated simulations for better semiconductor engineering services. 3D chip architecture, advanced nodes, advanced chip packaging, and hybrid bonding will streamline processes and reduce defects. Quantum computing integration, aided by cryogenics and advanced lithography, will leverage semiconductor fabrication for scalable processers. These trends will redefine semiconductors operations and semiconductor supply chain.

02 Semiconductor Smart Manufacturing

Computing enterprises will thrive in semiconductor design services through semiconductor smart manufacturing, driven by virtual simulations, AI-driven production, semiconductor operations and decentralized micro-factories. Digital twins and IoT-enabled modeling will optimize chip designs and predict defects in real-time, while GenAI automation creates layouts for advanced nodes and 3D architectures. Agile micro-factories, leveraging 3D printing and distributed ledger technology, will enable localized, resilient semiconductor supply chain. Autonomous robots with machine vision and smart logistics will streamline assembly and sorting. These innovations will accelerate time-to-market, enhance sustainability, and redefine precision in chip manufacturing.

03 Data-Driven Intelligence

By 2030, data-driven intelligence will redefine semiconductor and computing operations through real-time process monitoring powered by IIoT, AI, GenAI automation and edge computing. Predictive maintenance will leverage IoT and machine learning to anticipate equipment failures, minimizing downtime. Automated warehousing systems with robotics, Automated Guided Vehicles, and computer vision will streamline inventory management. An augmented connected workforce equipped with AR/VR, wearable tech, and gesture recognition will enhance productivity and collaboration. These advancements will drive efficiency, scalability, and sustainability across the sector.

04 Adaptive and Resilient Semiconductors

The future of semiconductors will be defined by adaptive and resilient architectures, integrating hardware-embedded security through cryptography, blockchain, and true random number generators. Supply chain resilience will be enhanced with zero-trust frameworks, leveraging AI-driven threat detection and network segmentation. Proactive threat detection systems using ML and intrusion prevention will minimize vulnerabilities. Granular access control powered by AI and automation will secure component tracking in supply chains. These advancements will ensure robust, secure, and agile semiconductor ecosystems capable of withstanding evolving operational challenges.

05 Sustainable Computing

The future of sustainable computing will be driven by energy-efficient chip designs using EDA tools, low-power ICs, and adaptive voltage scaling. Green chemistry and closed-loop manufacturing will revolutionize production processes, reducing waste and emissions. Power management optimization through advanced ICs and adaptive algorithms will enhance energy efficiency across devices. Circular economy practices, including reverse logistics and materials recovery, will extend product lifecycles. These innovations will align the semiconductor industry with global sustainability goals while fostering operational excellence.

By 2030, the semiconductor industry will face rapid technological shifts, demanding innovation in AI, materials, and manufacturing. Competitiveness requires investments in sustainability, quantum computing, and resilient supply chains. Partnering with leaders like Wipro will enable firms to adopt advanced technologies and navigate the evolving landscape.

About the Authors

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Varun Dube is the Head of Tech Strategy at Wipro. He is a seasoned technology consultant, advising CXOs on transformative business outcomes. With a deep understanding of emerging technologies and their potential to disrupt industries, Varun drives innovation and digital transformation for Wipro clients. His expertise in crafting and executing technology strategies, combined with his focus on emerging tech and co-innovation, helps organizations achieve sustainable growth and competitive advantage

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