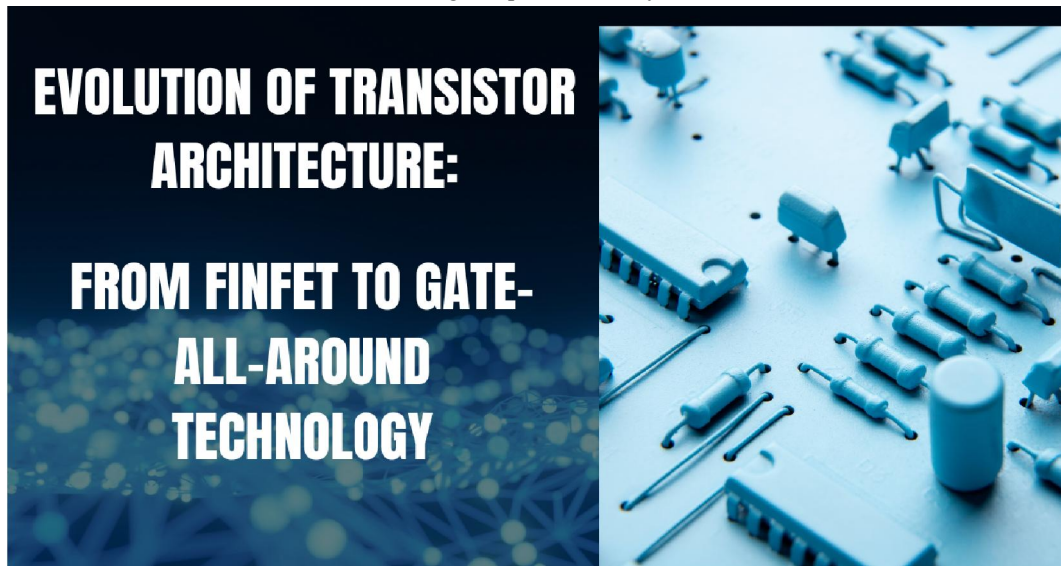


Evolution of Transistor Architecture: From FinFET to Gate-All-Around Technology

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Abstract: *The evolution from FinFET to Gate-All-Around (GAA) technology marks a pivotal advancement in semiconductor manufacturing, addressing critical challenges in transistor scaling and power efficiency. This transition represents a fundamental shift in device architecture, offering superior electrostatic control and enhanced performance characteristics. The GAA design, featuring a gate structure that completely encircles the channel, effectively mitigates short-channel effects while enabling continued dimensional scaling. By incorporating innovative materials and utilizing advanced fabrication techniques, GAA technology demonstrates significant improvements in carrier mobility, leakage current reduction, and overall power efficiency. The implementation of this architecture aligns with industry-wide environmental sustainability initiatives while establishing new benchmarks for computing performance and energy efficiency in next-generation semiconductor devices.*

Keywords: Gate-All-Around transistors, semiconductor scaling, power efficiency, nanosheet architecture, environmental sustainability.

