

عنوان مقاله:

Optimizing Majority Gate Design in Quantum-dot Cellular Automata for Enhanced Computational Efficiency

محل انتشار:

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خلاصه مقاله:

Quantum-dot Cellular Automata (QCA) are a promising candidate for next-generation computing technologies due to their potential for high-speed and low-power operation. As the majority gate is a fundamental component in QCA circuits, optimizing its design is crucial for enhancing computational efficiency. This paper presents a comprehensive study aimed at optimizing majority gate designs within QCA circuits. We explore various architectural modifications, including cell arrangement, clocking schemes, and defect tolerance, and evaluate their impact on performance metrics such as speed, power consumption, and area. Simulations using QCA Designer-E software demonstrate that our optimized designs show significant improvements over conventional designs. These advancements represent a significant step towards the practical deployment of QCA-based computational architectures. This paper focuses on the design and optimization of logic gate circuits using Quantum-dot Cellular Automata (QCA) technology, emphasizing the majority voter gate. By presenting new layouts and design methodologies, it demonstrates significant improvements in performance, area reduction, and power consumption over traditional CMOS technology.

کلمات کلیدی:

Quantum-dot Cellular Automata, majority gate, CMOS

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