

## عنوان مقاله:

Optimization of Quantum Cellular Automata Circuits by Genetic Algorithm

## محل انتشار:

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## خلاصه مقاله:

Quantum cellular automata (QCA) enables performing arithmetic and logic operations at the molecular scale. This nanotechnology promises high device density, low power consumption and high computational power. Unlike the CMOS technology where the ON and OFF states of the transistors represent binary information, in QCA, data is represented by the charge configuration. The primary and basic device in this paradigm is the three-input majority gate, thus in QCA, the conventional AND-OR mapping for implementation of logic functions is not effective. We introduce four primitive admissible geometric patterns, which aid in the identification of majority functions. For a non-majority function, a genetic algorithm (GA) is used to map the function to at most four majority gates in a wide range of implementations. We show that the emergence of specific genes will result in a further reduction in the number of majority gates in the network. The GA is intrinsically parallel and results in variety of implementations, which allows merging the layout and logic levels of the design and provides an important approach towards designing high-performance QCA circuits.

## کلمات کلیدی:

Quantum Cellular Automata, Majority Logic Synthesis, Genetic Algorithm, Nanotechnology

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