Abstract

Moving toward nanotechnology, many brand new applications are emerging in order to make synergy and mutual benefits from different knowledge areas. In this era, many efforts have been devoted to Quantum-dot cellular automata (QCA) technology as one of the main substitution for conventional Complementary-Metal-Oxide-Semiconductor (CMOS).

On the other hand, rather than focusing on minimizing devices and area, other groups were working on increasing functionality speed. One of the main fields that many researchers investigated on was Residue number system (RNS).

Working on Cell designs for improving QCA cell functionality and circuit implementing, a novel method named SE QCA has been proposed which was reducing critical path and power consumption in advance. [1] Because of applying these cells on inverter and majority gates as basic components of QCA logics, a well-optimized design with minimum cell numbers are proposed. Accordingly, based on the fundamental and significant role of full adder modules in
Implementing RNS Arithmetic unit through Single Electron Quantum-dot Cellular Automata
digital systems, a novel efficient full adder is presented as well.

Hence, in this article, mentioned above concept is used and it is tried to optimize the
implementation of RNS arithmetic unit through QCA. The simplified arithmetic unit of RNS, is
designed in QCADesigner 2.0, and is optimized through single quantum-dot cellular as a result.

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Index Terms

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Keywords