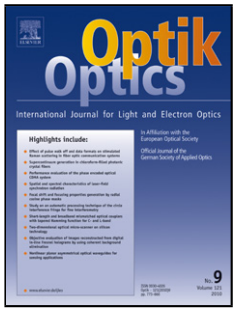

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An optimized design of full adder based on Nanoscale quantum-dot cellular automata

Saeid Seyedi, Nima Jafari Navimipour*

Department of Computer Engineering, Tabriz Branch, Islamic Azad University, Tabriz, Iran

*Corresponding Author

Name : Nima Jafari Navimipour (Ph.D.)

Affiliation : Department of Computer Engineering, Tabriz Branch, Islamic Azad University, Tabriz, Iran

Tel. : +989144021694

Fax. : +984134203292

Email : jafari@iaut.ac.ir

Abstract

Quantum-Dot Cellular Automata (QCA) technology uses quantum dots instead of transistors and diodes for performing the logical operation. Also, in logical circuits, many operations, such as multiplication, subtraction, and division are done using the adders. Therefore, this paper presents an efficient QCA-based adder design based on three layers. In contrast to the previous designs, the outputs in the proposed design come out from another side of the circuit which causes more efficient circuit design. In the proposed design, the input signals are not surrounded by the other cells and can easily be accessed. The simulation results using the QCA Designer approve that the offered circuit acts well and can be used as a high-performance design in the QCA. Also, they show that the design causes very low complexity, small area, short latency and fewer cell numbers.

Keywords: Quantum-Dot Cellular Automata (QCA); Majority function; Full adder; Low power; Cell number; Nanoelectronics.

1. Introduction

Complementary Metal Oxide Semiconductor (CMOS) technology is used to get the basic physical limits in order to research Nano-scale for the future generation integrated circuits [1, 2]. Quantum-dot Cellular Automata (QCA) offers a new method of computation and