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OPTIMIZATION of CODE CONVERTERS using MS GATE IN QUANTUM DOT CELLULAR AUTOMATA

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ABSTRACT

Quantum Dot Cellular Automata (QCA), the most efficient Technology at nanoscale level in quantum electronics has replaced the CMOS technology due to very high Integration density, low power consumption, high speed and low circuit area. This work proposes a novel binary to grey and grey to binary code converters using an optimized MS gate .The proposed low complexity optimized MS gate can overcome the Feynman gate with reduced number of quantum cells thereby reducing the area and power consumption. The proposed MS gate requires only 31number of total cells and total area of 37,772nm^2 whereas the Feynman gate in previous work requires 54 number of total cells 38,880 nm2 areas. The proposed design was compared with the previous work and it was analyzed that about 42% optimization has been achieved in terms of number of QCA cells and area respectively when compared to previous results. Code Converters based on MS gate can be used to realise nanotechnology based architecture which will be used for nano-communication. The efficiency of the nano circuits has been achieved through the proposed work. QCA Designer-2.0.3 tools are used for evaluating the functionality of the digital circuits.

INTRODUCTION

CMOS Technology was one of the most prominent technologies for applications like Microprocessors, Static RAM, Microcontrollers and application specific integrated circuits (ASICs) in the past decades. The features of CMOS technology include noise immunity, static low power consumption, very high operating speeds and efficient usage of energy.

However CMOS technology have practical limitations when subject to nano level scaling.Recently,the most emerging technology at nanoscale called Quantum Dot Cellular Automata(QCA).Highperformance,higher densities, higher operating speed ,low power consumption are the most important features of QCA technology.Here,the method of computation and information transformation in QCA differs from CMOS technology.

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