ENHANCED DESIGN OF BINARY TO GRAY AND GRAY TO BINARY CODE CONVERTERS USING QUANTUM DOT CELLULAR AUTOMATA (QCA)

M.Jeyalakshmi[*1], *D.Muthulakshmi*[*2], *V.Keerthana Shri*[*2], *M.Maryam Shahana*[*2]
[*1]Assistant Professor,Department*of Electronics and Communication Engineering*
SSM Institute of Engineering and Technology, Dindigul, Tamilnadu
[*2]Students,Department *of Electronics and Communication Engineering*
SSM Institute of Engineering and Technology, Dindigul, Tamilnadu

Abstract-Nanotechnology has contributed to major developments in computing and electronics which results in quicker, smaller and more movable systems that can handle and store more amounts of data. Quantum dot Cellular Automata (QCA) is one of the emerging trends in the field of nanotechnology for designing digital circuits. It has the potential features such as faster speed, smaller size, and low power consumption than transistor based CMOS technology. The proposed work implements an efficient 3-bit,4-bit,5-bit binary to gray and 3-bit,4-bit gray to binary code convertors using Quantum dot Cellular Automata.

Keywords- QCA designer; quantum dots; majority gate; cell interaction; reversible logic.

I.INTRODUCTION

A Quantum dot Cellular Automata (QCA) is a nanostructure of square shape which is able to perform computational functions.QCA technology transfers information through the polarization state of various cells instead of passing the information through current and voltage.QCA have gained a lot of attention as a result of its extremely small feature size and its ultra power consumption made it a replacement solution of CMOS technology. In CMOS logic gates, size of circuits cannot be scaled down further which shows inauspicious consequence not only from physical and technological frame of reference but also from material and economic perspective like tunnel currents, subthreshold leakage, etc. Logical Operations and data transfers takes place via columbic interaction between adjacent QCA cells rather than current flow. Quantum Dot Cellular Automata provides an original information processing and communication. It has been acknowledged as one of the complete nano scale computing devices. A crucial advantage of QCA over other nano electronic architectural scales is that the same cells are used for making Logic Gates. The QCA permits operating frequencies of about few Tera hertz and the circuit does not need extra power supply for its operation, which is not possible in current CMOS technologies. By taking this favorable superior position of QCA, it can be able to design fascinating computational architectures. The device pattern based on QCA cells offers the chance to escape from FET based logic and to make use of the quantum effects that come with nanoscopic dimensions.QCA cells are able to measure molecular sizes and hence the behavior improves as the size minimizes.