Implementation of the Quantum BCD-to-Excess-3 Code Converter using New Quantum Reversible Circuit Block

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Abstract:
In this article, a new quantum reversible circuit or QRC block has been proposed to implement the quantum BCD-to-Excess-3 code converter using Qiskit, which is used to convert quantum BCD code to Excess-3 code. The proposed quantum BCD-to-Excess-3 or QBEC is most important for quantum information processing. It can be used for quantum cryptography, quantum communication etc. The proposed new quantum reversible circuit is also used to realize the different logic functions such as OR, XOR, XNOR, NOR, NAND, NOT and other logic functions. The proposed QRC is represented by quantum implementation with quantum cost 8. The QRC is implemented and verified using IBM Qiskit. The quantum cost, garbage output and delay of the QBEC converter circuit are 8, 1 and 1. The improvement % of quantum cost and delay w.r.t. previously reported results are 27.27% and 50% respectively.

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