PATNA WOMEN'S COLLEGE AUTONOMOUS 1940

IRIS
Journal for Young Scientists
ISSN 2278 – 618X **(Print)**
ISSN 2278 – 6384 **(Online)**

http://www.patnawomenscollege.in/journal

Generalization of two Qubit Quantum Gates

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Received : March 2021
Accepted : July 2021
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Abstract : *In order to study about the quantum computer, are must start from the building blocks which are the quantum gates. These gates are comparatively more flexible and faster in operation than their classical counter parts. In the present work, we have studied the various quantum gates and their working (Pittman et al 2003). The quantum bit known as qubit is the unit of information that could be fed to quantum gates and circuits. We have studied one and two qubits quantum gates & tried to generalized it. This means to construct higher order gates from the two input gates. It is the theoretical attempt to analyse the different possibilities required to implement a four qubit gates, using two qubit gates.*

Keywords: *Qubits, CNOT Gates, Hadamard Gate.*

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Introduction:

The field of quantum computation has gathered much attention in the recent years due to its capabilities to solve the classical NP problems in polynomial time (Nielsen and Chuang 2000). The implementation of quantum computing in hybrid systems is a promising strategy for building for quantum computers, the reason being that it increases the range of possible systems & allow one to combine useful properties of different types of qubits. Quantum computing is the area focused on developing computer technology based on principles of quantum theory which explains the behaviour of energy and matter on quantum levels (Spector et al 1999). It is based on classical phenomenon of electrical circuits being in a single state atom at a given time either ON or OFF. While quantum computing is based on the phenomenon of quantum mechanics. Such as superposition and entanglement, the phenomenon where it is possible to be in more than 1 state at the time.

Qubits:

Classical computers use binary bits for calculations, quantum computers use quantum bits known as Qubits. Bits work on either of two pure states while qubits can work on their superposed states as well.