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Quantum Computing :Circuits,Algorithms and Application

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Abstract: *With its potential to completely change computation, quantum computing—a groundbreaking discipline that sprung from computer science and quantum mechanics—has attracted a lot of interest. This essay attempts to cover the foundations of quantum computing and offer a thorough manual for readers who are not specialists in the subject. We start by going over the basic ideas of quantum computing and then take readers through the concepts of qubits, superposition, entanglement, interference, and noise. We study quantum gates, quantum hardware, and fundamental quantum circuits. This paper provides an overview of the present state of quantum computing, focusing on the noisy intermediate-scale quantum (NISQ) era and its possible applications to practical issues. delve into the creation of quantum algorithms and their uses, emphasizing well-known algorithms like as Grover's and Shor's. We also discuss how several fields, like material science, machine learning, encryption, and optimization, are affected by quantum computing. Upon finishing this paper, readers will possess a firm grasp of the fundamentals, practical uses, and procedures of quantum circuit development. Our objective is to offer an invaluable resource for scholars hoping to keep current on this quickly developing topic as well as for those ready to start their adventure with quantum computing.*

Keywords: Quantum Computing, Qubits, Quantum circuits, Noise Measurement