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Journal of Theoretical & Computational Science

Commentary

Novel Technology in Quantum Computing

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DESCRIPTION

"Quantum computing" refers to a system that computes results using quantum physics. The tiniest discrete representation of any physical property is called a quantum. The properties of atomic or subatomic particles like electrons, neutrinos, and photons are most frequently mentioned. The principles of quantum physics can be used to tackle problems that are too complicated for conventional computers, due to a fast developing field known as quantum computing. Thanks to IBM Quantum, thousands of developers may now use the real quantum hardware tools that scientists could only begin to imagine thirty years ago. Our engineers occasionally produce superconducting quantum processors that are ever more powerful, moving closer to the speed and capacity of quantum computing necessary to revolutionize the world. These devices are considerably different from the traditional computers that have been around for more than 50 years.

The development of computer-based technologies based on the concepts of quantum theory is the focus of the research of quantum computing. Quantum theory explains the nature and behavior of matter and energy at the quantum (atomic and subatomic) level. Quantum computing uses a combination of bits to perform certain computational tasks. Compared to their traditional counterparts, each of them performs noticeably better. A major improvement in computing power has been made with the development of quantum computers, which offer tremendous performance benefits for specific application scenarios. For instance, quantum computing is particularly successful in simulations.

Quantum computers are technological systems that use the laws of quantum physics to store data and perform calculations. This might be quite beneficial for particular activities as they might be completed far more effectively than our best supercomputers. On conventional computers, including laptops and smartphones, information is stored in binary "bits" that can either be 0s or 1s. A quantum bit, also known as a qubit, is the basic memory element of a quantum computer.

Qubits are made using physical processes like the spin of an electron or the direction of a photon. These systems can coexist simultaneously in a multitude of configurations thanks to quantum superposition. Another phenomena that can be exploited to unquestionably connect qubits is called quantum entanglement. As a result, a collection of qubits can hold many representations at once. You can see why quantum computers will be required in the future from the aforementioned scenario. Technical constraints prevent us from having greater computational power. Quantum tunneling is intended to increase the power efficiency of quantum computing over conventional computation. They are expected to reduce electricity consumption by 100-1000 times.

In 1997, IBM's Deep Blue computer defeated chess champion Garry Kasparov by processing 200 million moves per second. In a quantum computer, these computations could be carried out a trillion times per second. Actually, quantum computing has a lot of benefits to offer. For instance, employing quantum devices will hasten the analysis and pattern identification of massive datasets given that we are currently in the big data era. This technique can also be used to construct extraordinarily accurate medical sensors, enhance communications, and train artificial intelligence systems. The field of quantum computing is rapidly developing since research on the topic is being carried out by a large number of the world's leading computer corporations, academic institutions, post-secondary institutions, and all of the major IT suppliers. This pace is projected to increase when additional research is used in practical contexts. This formerly outlandish idea is starting to look plausible, despite the fact that practical devices remain years away.

Quantum computing will enable a new wave of technological applications that will create new business opportunities and aid in resolving some of the most pressing global problems of our day. Formerly unresearched effects of quantum theory can now be used as a resource in technologies with extensive applications, such as secure communication networks, incredibly precise sensors, the study of chemical reactions for medicine, innovative materials, and fundamentally new paradigms of computation. Global governments and corporations, such as Google, Microsoft, Intel, Toshiba, and IBM, have been making significant investments lately to tap into this potential. Despite the fact that quantum computing has made great progress, the

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Received: 01-Mar-2023, Manuscript No. JTCO-23-23295; **Editor assigned:** 03-Mar-2023, PreQC No. JTCO-23-23295 (PQ); **Reviewed:** 17-Mar-2023, QC No. JTCO-23-23295; **Revised:** 24-Mar-2023, Manuscript No. JTCO-23-23295 (R); **Published:** 31-Mar-2023, DOI: 10.35248/2376-130X.23.09.177

Citation: Tang Z (2023) Novel Technology in Quantum Computing. J Theor Comput Sci. 9:177.

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field still faces a number of challenges, including the challenges of building a large-scale quantum computer, developing unique quantum algorithms, and construction costs.