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The essence of the paper [1] is that the rate at which the quantum information science has evolved in the past several decades, it is possible to have large scale systems involving quantum computers.

If Quantum computers can be built in large scale it can be used in several applications, few of which are being used currently in small scale. Several algorithms have been developed based on a search based algorithm written by Grover[2] which has proved that the computational time of any NP complete problem is a linear time complexity of *O(2n/2)* . Hence system involving quantum computers in future will be extremely fast. In a recent research at Santa Barbara, it has been demonstrated that it is possible to trap electrons in diamond defects. Diamond being nothing but a compound of a readily available and environment friendly greenhouse gas Carbon, can limit the use of leads as in classical transistors. Recent approach in reading and writing data in quantum device has led to altering a lone electron by manipulating its spin [3]. Since electrons interacts using electrostatic coupling they can reduce the power loss due to charge transfer in conventional devices. Nano-wires made of diamonds can be used to transfer the data across the devices which can practically reduce the crosstalk effects between two interconnects, as in conventional devices, to an almost nonexistent value [4].

Due to the nature of data in quantum computers, they are being used in cryptography in small scale. This if possible in large scale would enable credit card companies to build a large encryption key to secure the data being transferred [5].

There are several limitations that present a road block for developing quantum computers in a large scale. One of the most important limitations is the fabrication of these devices in a large scale. Since the fabrication of these devices requires high precision tools and technology, the cost of fabrication is very expensive. This seems almost impossible if to be done in a large scale. Another limitation is the measurement of the data without disturbing the state of the quantum dot. Due to its high sensitivity to outside environment, the electron trapped in a quantum dot is very hard to control. Operating temperature pose another problem in manufacturing these devices. To maintain the electrons thermally stable, some of these technologies require temperatures near to absolute zero, which seems impossible to be used commercially which would again add to the cost [6].

References

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