Dozler module

Technology, Computer

As we progress in our technological world where everyone is interested in the next phone or Samsung Galaxy, quantum computers are still moving forward. It seems that only computer " nerds" seem to care and understand this wonder. What if all of the theories, concepts, and everything else that makes up what quantum computers are and will be, is presented in a way that everyone can understand. The way that quantum computers can be divided is into three main areas: quantum physics, mutant bits or (sublets), and their future goals.

To better understand how quantum computers work, you need to start with what clearly defines a quantum computer: A quantum computer Is a computer design which uses the principles of quantum physics to increase the computational power beyond what is attainable by a traditional computer. Quantum computers use two fundamental principles of quantum physics: superposition and entanglement. Quantum superposition Is where the state of a physical system exists in all possible states at the same time. Then the physical system is only giving one state to the election device.

A good example of this is the famous ScarΓ¶dinner's Cat, a thought experiment purposed by Erwin ScarΓ¶dinner in 1935, where ScarΓ¶dinner talks about having a cat In a closed box with a vial of poisonous acid with a hammer that will break the vial If any radioactivity is detected (ScarΓ¶dinner, E. , 1935). After a period and If the box stays completely sealed, you cannot one hundred percent know the current state of the cat; It Is both alive and dead at the same time, until the box Is opened and inspected. Only then would you know the current state of the cat.

The ext part of quantum physics that is used in quantum computers is quantum entanglement. " Quantum entanglement is when two particles act together in an entangled system. This means that they behave like one object even though they are physically apart. It suggests that space is Just the construct that gives the illusion that there are separate objects. " (Walla, 2013, p. 1). If you were to have two basketballs, but a great distance separated them, whatever you would do to one basketball the same thing would happen to the other basketball instantaneously, and that is quantum entanglement.

Everything in our universe is entangled with each other and reacts with each other. Cubits are entangled with each other and that Is one of the special things about using a quantum computer. Client's are still doing experiments on quantum entanglement and superposition, even though the concepts have been around for a while, and each year we get a better understanding of them and get of the theories that make up quantum computers, we can move on to what makes up a quantum computer. Quantum computers use what are called cubits to store data. They are similar to traditional computer bits, but they are bits in a quantum state.

In Quantum Computing with Molecules, Neil Greenfield and Isaac Chuan (1998) best describe the difference: The state of a bit in a classical digital computer is specified by one number, O or 1. An n-bit binary word in a typical computer is by a string of n zeros and ones. A quantum bit, called a cubit, is represented by an atom in one of two different states, which can also be denoted as O or 1, 1 and O. Unlike classical bits, cubits can exist simultaneously as O and 1, with a probability for each state given by a numerical coefficient or " a number found in from of the variable.

With quantum computers being able to use the cubits that are in multiple states at the same time, this will allow us to exponentially increase processing power used by our current status of digital computers. Since current digital computers only think in ones and zeros, and there is a limit on how fast we can process that information. When comparing the two types of bits, given the same processing speed, cubits will allow a quantum computer to process more information than a digital computer. Because quantum computers have the special ability to be in two states simultaneously.

Cubits can be controlled in many different ways, such as photonic systems, laser ion traps, and quantum dots. Currently, quantum physicists are working on a new process, solid state cubits. Ion traps control cubits by using magnetic fields or optical fields. On the other hand, optical traps use light waves. Then quantum dots, which are made from semiconductors material, are used to contain the cubits. Now that cubits have been explained, the next step is to see how quantum computers will be used to shape the future. The future of quantum computers is being debated every day.

On one hand, we have rover theories that show quantum computers can be thousands of times better than our current supercomputers. On the other hand, people are trying to build these computers and having a very difficult time in proving these theories practical. Using algorithms, such as Shore's algorithm, we have been able to construct quantum computers that calculate prime factors of very large integers. The only issues we have with it right now is that we are having difficulties controlling and using cubits for long periods of time.

Because of this, regular computers can calculate the same prime factors in about the same time. Even though we are having this kind of success with quantum computers, people are still questioning them, as we phase out digital computers with nearly identical abilities. The other aspect where quantum computers would come in useful is in areas where many probabilities need to be calculated. For example, ethical hacking, where federal or local law enforcement needs a password. Where multiple passwords are used over and over again until the correct one is found.

Currently we can do this with digital computers available today, but the time required for these kinds of tasks could be decreased exponentially. It dramatically. There can also be almost limitless procedures in cryptography where quantum computers can be used to generate nearly unsolvable cryptographic keys to encrypt classified information. These are Just a few examples of how quantum computers can be used, there are people working on algorithms and machines to make this kind of technology an actuality.

Although we are still far from having desktop quantum computers in our offices, the quantum computational paradigm could soon be more than mere theoretical exercise. As we progress in technology and research, we are coming closer to having the control we need to move quantum amputees further into reality. Now we have a basic understanding of the base of quantum computers, which is quantum physics, the type of data storage they use, cubits, and the possible future use of them.

With this information, we can have a better understanding of what is going on with quantum computers and can help push them to be better. Soon we will see these quantum computers solve complex problems in minutes, which would take our greatest supercomputers years to calculate.