International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 04 | Apr 2020 www.irjet.net p-ISSN: 2395-0072

Blue Brain Technology - Review

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Abstract - *The blue brain is the first virtual brain in the world. It is a machine that can work like the human brain. At present scientists are trying to make a virtual brain that will be able to make decisions and keep information in the memory. The idea is to upload the human brain into the machine. So that man can think without any efforts. The main advantage of this project is that even after the death of the person, we can use the knowledge and intelligence of that person.*

The blue brain is based on reverse engineering. Reverse engineering is used to know how brain functions work through detailed supercomputer-based reconstructions and simulations. Blue brain project is used to create a digital reconstruction of the brain. This project can help in memorizing the things which we often forget.

Key Words: Blue-brain, Brain, Neurons, artificial neurons, Sensory system Nanobots.

2. INTRODUCTION

Blue Gens supercomputer is used in the blue brain project which is developed by IBM.

At present scientists are trying to make a brain that can think, store information, respond and make decisions. The object of this project is to use the brain of the people even after death. When a person dies at that time the brain stops working so we cannot use his/her brain but we can use his/her brain after his/her death by using blue brain technology. In this technology, a person's brain is uploaded into the computer. It makes computer able to think and take decisions [1]. This project aim is to reuse the knowledge and intelligence of the person. This technology can help a lot in continue the pending work.

The human brain is a very complex system in this world. It is a system with more than trillion of neurons (nerve cells) and synapses. The work of neuron is to transmit information to other neurons or cells. The work of synapses is to help neurons to speak with one another. Is it really possible to reuse the brain of the person even after death? Yes, it is possible with the help of the blue brain project.

Today is the era of Artificial Intelligence, robots, computer game and Blue eyes technology. Artificial Intelligence is a very advanced and emerging technology. Artificial Intelligence is used in this project. It is hoping that this project will be completed by 2023. And this will be the first primary virtual brain. This Project uses a method of reverse engineering. It uses the fastest type of supercomputer which are developed for performing some special tasks and which require a huge amount of mathematical computation [2]. Artificial Intelligence is the backbone of this technology, a technology which has power to change the entire world.

2. WHAT IS AVIRTUAL BRAIN?

A virtual brain is a brain which can think just like the natural human brain. It can make decisions and store information like a natural brain. A virtual brain can be created by using supercomputers, with the large amount of processing power, storage capacity. Also, an interface is required between the artificial brain and human brain. By using this interface, the information stored in the human brain is uploaded in the personal computers.

3. WHY DO WE NEED A VIRTUAL BRAIN?

Intelligence is something that we cannot create, it is an inborn quality. Some people born with intelligence and they can think up to such an extent where other cannot reach. Intelligence is required for development. Human always require such intelligence. But after the death, intelligence is lost along with the body. Blue brain is solution to it. It makes sure that intelligence will be alive even after the death. We can upload the knowledge of a person on a computer with the help of blue brain [4]. We often forget things such as people names, spellings of words, important dates. Can't we use machine to remember things? Blue brain may be a better solution

4. BASIC STEPS OF BLUE BRAIN

I. Information collection

II. Information simulation

III. Visualization of result

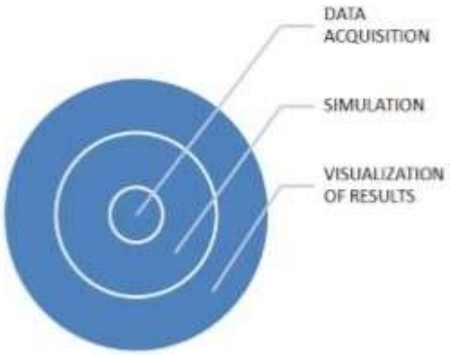

Figure 1: Building Steps

I. Information Collection- It is the process of collection of brain portions. The neurons are captured by their physiological, electrical activity and their shape. This information is converted into algorithms. It defines function, method and position methods of neurons. Algorithms generate virtual neurons that look biologically-real and ready for simulation.

II. Information simulation- It is used to deal with two major aspects-

- Simulation workflow
- Simulation speed

BBP-SDK allows the researchers to use simulations and prototypes. BBP-SDK is a C++ library that is wrapped in python and java. The primary software is NEURON for neural simulations. It is developed by john Moore and Michael Hines at the starting of the 1990s. It uses Fortran, C++, and C. It is a free open source software that is freely available. The website provides the code and therefore the binary data freely [5].

III. Visualization of results: This Project uses RT Neuron which helps in visualization of neural simulations. This software is developed by the BBP team. It is coded using OpenGL, C, and C++. Mostly this software is used for neural simulations. RT Neuron delivers the output in 3D. This software help programmers to analyze things between neurons. Many times, these animations are, stopped, started, paused and zoomed [5]. So that it can allow researchers to interact with the model. Generally, visualizations are multi-scale.

Figure 2: Visualization of neurons

5. NEED OF HARDWARE AND SOFTWARE

1. A high speed Super computer.
2. Large storing capacity Memory.
3. Processor.
4. Large Community (network)
5. A program that can understand the function of human brain.
6. Powerful Nanobots.

6. HOW DOES THE NATURAL BRAIN WORK?

The human can feel, taste and can take actions with the help of the nervous system. It's magical because we cannot see it but it works like an electric impulse in the body.

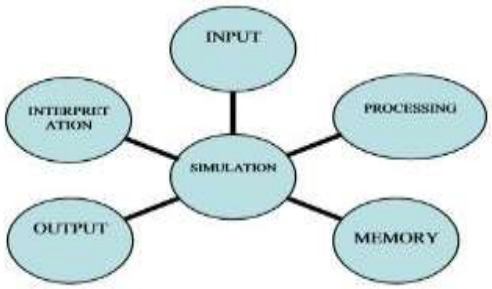

Figure 3: Simulation of Blue Brain

The human brain is a system that uses more than trillion of neurons and 100 trillion synapses. To understand this, we need to understand three simple functions:

1. **Sensory input:** When we see something or when hands touch a surface, neurons send a message to our brain. This is known as sensory input because our mind acts after getting input from neurons.
2. **Integration**: Our sensory cells are responsible of interpretation of things like touch sense and taste. Sensory cells are also referred as Neurons. Neurons are responsible to know the change around us.
3. **Motor Output:** Our brain sends a message using neurons to affect cells when our brain feels some changes either by touching, tasting or by some other medium. Then our neurons work to perform

requests and influence surroundings. It can be understood that we are putting something into the environment and getting the result.

7. UPLOADING HUMAN BRAIN

Artificial brain makes use of small size robots also known as Nanobots. These robots travel throughout our cardiovascular system. These robots monitor the activity and structure of the nervous system [1]. These robots used to provide an interface which will close to our mind. Nanobots are used to scan the structure of our brain so that it can readout the entire connections. Thus, entire information which is stored within the brain, are uploaded into the pc [4].

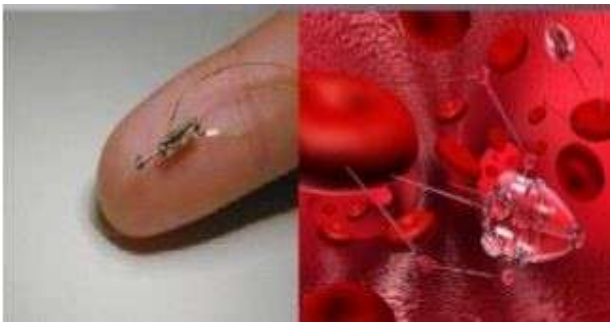

Figure 4: Nanobots

8. DIFFERENCE BETWEEN VIRTUAL BRAIN & BLUE BRAIN

Virtual Brain	Natural Brain
➢ **Input** By artificial neurons. Electric impulse.	➢ **Input** Through neurons Sensory cells
➢ **INTERPRETATIO N-** Through a set of bits (0,1) in the set of register	➢ **INTERPRETATIO N-** Through neurons in the brain.
➢ **OUTPUT-** Silicon chip.	➢ **OUTPUT-** Natural neurons.
➢ **MEMORY-** Secondary memory.	➢ **MEMORY-** By using permanent states of neurons.

ADVANTAGES

1. We can use a person's intelligent even after his death.
2. It can help in the study of the animal's thoughts by interpretation of the electrical impulses from the brain of the animals.
3. This project can help a deaf to get information directly via nerve stimulation.
4. The information of the brain can be used to provide a solution to mental disorder.
5. The blue brain is a project which can help in utilizing the human intelligence present in the mind.
6. This machine will be able to think and make self-decision.
7. We are trying to make an intelligent machine.
8. This can be used as an interface between animal minds and human.

DISADVANTAGES

1. This will increase the dependency on the computer.
2. Computer virus can be a critical threat.
3. This may lead to human cloning.
4. The human can depend on blue brain every time.
5. If a particular person's neural system is hacked then it can create a big problem.
6. The machine can conduct war against humans as we are making machines intelligent.

FUTURE PRESPECTIVE

The first version of the blue brain has been created and stimulated by great researchers. Deep properties and efficiency of the circuit are taking the time. The time required to build a detailed model basically depends on the depth of the study and the amount of detail that is being captured. Fundamentally, we are not facing problems in modeling a brain so it is likely to be completed in the near future.

CONCLUSION

This project success can change the world and technology which we are using at present. There is a lot of research that takes decades, in these cases intelligence and efforts of the scientist can be used even after their death. It is a complex task to create duplicate brain into a system and it may take decades to complete but this project has the potential to change the entire world.

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