

BLUE BRAIN PROJECT

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Abstract: This paper describes about **BLUE BRAIN PROJECT**. Human Brain is the most remarkable creation of God. The man is intelligent because of the brain. Blue Brain is the name of the world's first virtual brain. This means that the machine can function as the human brain. So; even after the death of the person his intelligence can be used.

Keywords: Nanobots, Blue Gene supercomputer, IBM

1. INTRODUCTION

This project was started in May 2005 by HENRY MARKRAM at the EPFL in Lausanne, Switzerland. The goals and objectives of this project are to upload the contents of the natural brain in a computer. Mind uploading can be done by either of the two methods: 1.copy and transfer.2. Slow and steady replacement of neurons. To keep the intelligence of the person forever. That is machine can function as a brain. It can think and make decisions. The research involves studying about living brain tissue using microscopes and patch clamp electrodes. Data about neuron is collected. The simulations are carried out by BLUE GENE SUPERCOMPUTER built by IBM, hence the name **Blue Brain**.

2. NEED FOR VIRTUAL BRAIN

Intelligence of the individual is an inborn quality which is lost after the death. The virtual brain is a solution to it. The intelligence of a person can be used even after their death.

In this fast moving world it is difficult to remember everything. So by using virtual brain we can upload them into a computer.

3. NANOBOTS

Nanobots are small robots that are capable of travelling through our circulatory system into our spine and brain. They monitor the activity of the Central nervous system. They will be able to provide an interface with computer s .Nanobots will scan the structure of the brain, providing a complete readout of the connections between each neuron and it would also record the current state of the brain. This information after entering into the computer could be able to function like our brain. A computer with large storage space and processing power is required.

5. COMPARISON OF NATURAL AND SIMULATED BRAIN

Natural Brain4.WORKING OF HUMAN BRAIN

The human brain is an amazing organ.its functioning is given by

Sensory input:

Receiving input such as sound, image,etc. through the sensory cell.ie,whenever our eyes see somrthing or our ears hear or our hands touch something the sensory cells,known as neurons,send message to our brain.This method of getting information from our surroundings is called the sensory input.

Interpretation:

Interpretation of the received input by the brain by defining states of neurons in the brain.In this process the neurons work together to understand the environment.

Motor Output:

Receiving of the electrical responses from the brain to perform any action.ie, how we feel,hear smell and take decisions.

The input is through the natural neurons and interpretation is by different states of neurons in the brain. The output is through the natural neurons. The processing is through the arithmetic and logical calculations. The memory is through the permanent states of neurons in the brain.

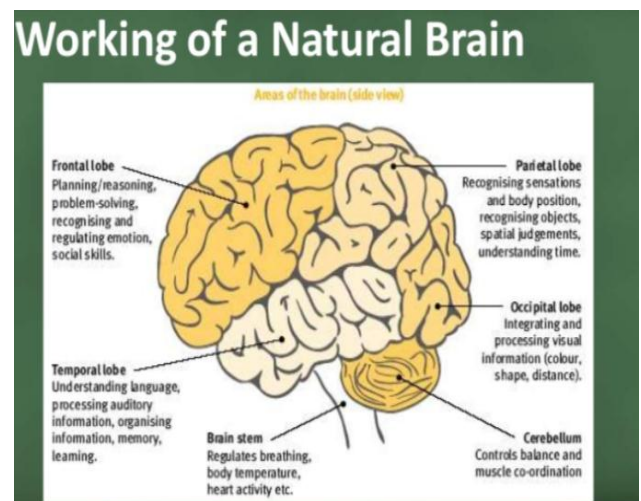


Fig 1.Human Brain

Simulated Brain

The input is through the silicon chip or artificial neurons and the interpretation is by a set of bits in the set of register. The output is through the silicon chip. The processing is through the arithmetic and logical calculation and artificial intelligence. The memory is through the secondary memory.

6. SOFTWARE USED

The primary software used by the **Blue Brain Project** for neural simulations is a package called **NEURON**. It is written in C, C++ and FORTRAN. The BBP-SDK (Blue Brain Project –Software Development Kit) is a set of software classes that allows researchers to utilize and inspect models and simulations. The SDK is a C++ library wrapped in JAVA and PYTHON. Neural simulation is basically used for building and using computational models of neurons and networks of neurons. The main factors on which the simulation depends are:

1. Simulation speed
2. Work flow

RT Neuron is the primary application used by the BBP for visualization of neural simulations. It is written in C++ and OpenGL. RT Neuron is ad-hoc software written specifically for neural simulations. RT Neuron takes the output from Hodgkin-Huxley simulations in NEURON and renders them in 3D. This allows researchers to watch as activation potentials propagate through a neuron and between neurons. The animations can be stopped, started and zoomed thus letting researchers interact with the model. The image right was rendered in RT Neuron.

7. HARDWARE OR SUPERCOMPUTERS

The major machine used by Blue Brain Project is a Blue Gene Supercomputer built by **IBM**. This is it got its name as Blue Brain. Its specifications are it has 4096 quad-core nodes. Each core is a power is a PowerPC 450,850 MHZ .It has 56 teraflops, 16 terabytes of memory and 4 racks ,one row, wired as a16*16*16 3D torus. It also has1PBof disk space, GPFS parallel file system. Its operating system is Linux SuSE SLES 10.This machine is the 99th fastest supercomputer In the world in November 2009.Silicon Graphics- A 32-proceesor silicon Graphics Inc.(SGI) system with 300GB of shared memory is used for visualization of results. Clusters of commodity PCs have been used for visualization tasks with the RT Neuron software. Due to the usage of large memory system in blue gene supercomputer, the computer becomes over heated in order to cool the system during the data storage the IBM invented a new method in 2015.A special room was built for the blue gene super computer at the EPFL and the machine site on the top of a large room that holds the cooling equipment and the computer cabels. Ice cold water from lakes. Geneva is pumped into support the cooling system.



Fig 2.Blue Gene Supercomputer

8. HUMAN BRAIN UPLOADING

The uploading is possible by the use of small robots called **NANOBOTS**. These robots are small enough to travel throughout the circulatory system and it travel s via spine and brain. These robots will be able to monitor the activity and structure of the CNS. They provides an interface with the computer.

9. ADVANTAGES

This helps to remember things without any effort. It may be used in making decision without the presence of a person. Intelligence of a person can be used even after their death. It helps the deaf to hear via direct nerve simulation. It can be used as a tool for the drug delivery for brain disorders and it is also used in curing **Parkinson's** disease. Business analysis, attending conferences, reporting etc. are very significant functions that an intelligent machine can do. It is successful in rat and some other animals which are considered as the sign of success.

10. DISADVANTAGES

We may become dependent on the computer. Technical knowledge of a person may be stolen. There is fear of human cloning. Once a Blue Brain related to a particular person's neural schema is hacked, the brain could be used against the person. There is a great risk of machines conducting war against humans. It is costly.

11. CONCLUSION

We may be able to transform ourselves into the computers. It will bring back some lost talents to the human society. Sometimes it may be harmful. Despite all the issues it is expected that the project will be capable by the year 2023.

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