



Vlad Enache

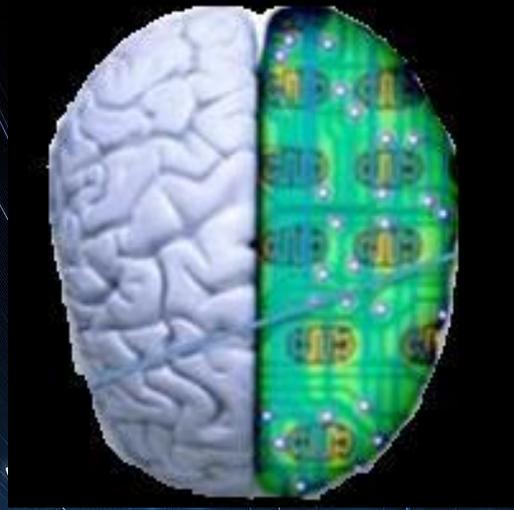
Cosmin Manolescu

“C.A. Rosetii” Highschool
Bucharest, Romania

Special thanks to: prof. Niculescu Elisabeta

HUMAN BRAIN
-
BASIS FOR
COMPUTER
EVOLUTION





In the 21st Century, the
personal computer has become a
mundane object, used by the
majority of the population for:
entertainment,
communication,
artistic and scientific
work ,
data transfer.

Introduction to the world of IT

The computer, in its current state, is based on the features described by John von Neumann:

1. It has to have an entry point, through which we can introduce an infinite number of variables and instructions.

DECLARE

2. It has to have a memory, from which it can read the variables and instructions and in which it can store the results.

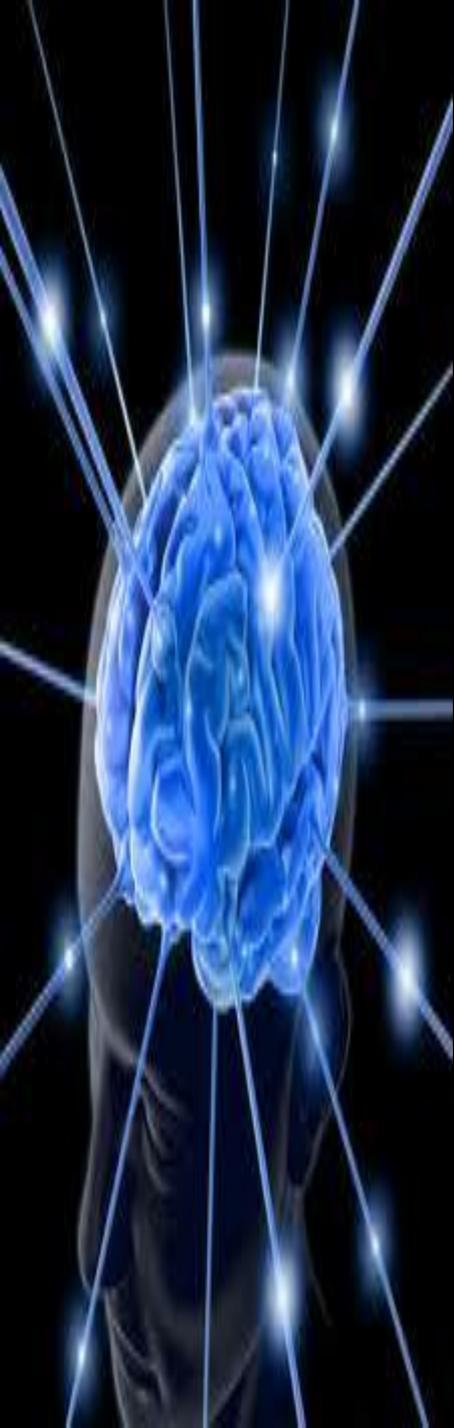
READ

3. It has to have a computing unit, capable of doing arithmetical and logical operations with the variables from the memory.

PROCESS

4. It also has to have an exit point, through which an unlimited number of results can be transmitted to the user.

WRITE



These features are the logical basis of the way a computer is organised, as well as at Software level and also at Hardware level.

- The inspiration for the computer is the human brain.
- This idea was first expressed by the romanian doctor and psychologist Stefan Odobleja.

Timeline:

1. 1938-"The Consonantist Psychology"- Ştefan Odobleja
2. 1948-Norbert Wiener officially named the new science Cybernetics.
3. 1970-Cybernetics emerges in multiple fields, especially biology.
4. In 2012, Cybernetics becomes one of the most important science.

The Brain-Computer relation

- The brain is the central part of the nervous system.
- He is composed by a multitude of neurons bound together through synapses.
- Through these synapses passes all the data in the form of electrochemical pulses, creating electrical fields.

Using his functions, the brain controls:

1. The sight, the hearing
2. The taste, the smell
3. The equilibrium.

He is also the location of the human conscience and ability to reason.



The Brain-Computer relation

- Although the neurons composing the brain are all identical, upon the multitude of tasks they have, the neurons are grouped in lobes:
 1. The frontal lobe,
 2. The occipital lobe,
 3. The parietal lobe,
 4. The temporal lobe.
- The signals coming to the brain have a very distinct, based on their type (i.e. visual), destination in one of the lobes.
- **The way the brain operates it's not different than the way the computer operates, again showing that the brain was the original model.**



1. **DECLARE**: The stimuli coming from the outer environment are picked by the sensory organs, which then transform them in electrical pulses. These pulses will be transmitted, based on their type, through the specialized nerves to the brain, to the specific lobe.

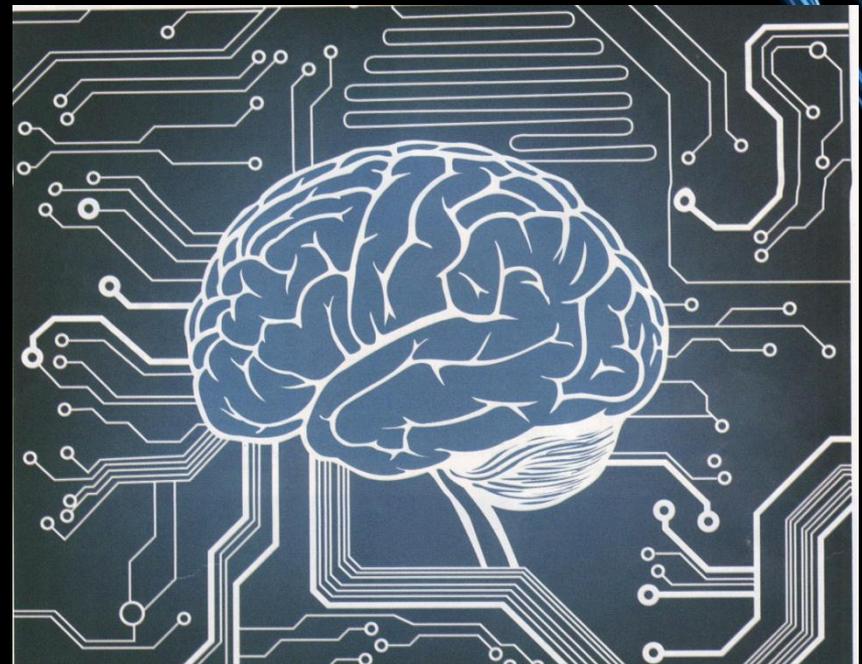
2. **READ**: Upon the arrival of the new stimuli, the brain begins comparing them memory. It is because of this reason that we do not wander with other similar data from his when we see , say, a new lamp, because our brain recognizes the pattern, no matter it's colour or size.



3. **PROCESS**: After the brain recognizes or understands (new phenomenon) the brute pulses of the stimuli, he begins to operate with the new informations : combining them (the process of imagination), sorting, stocking them and, in the end, erasing them completely from the memory.

4. **WRITE**: This phase refers to, on one hand, providing of commands, based on the content of the stimuli, to the internal systems (i.e. the endocrine or muscular system) and communicating with the outside world (the processed data is presented to other human beings through language, writing etc.).

The brain shares many aspects with the computer: he is responsible for processing informations, and also coordination of our entire systems and actions, the way the microprocessor governs all the actions made by a computer.



Possible evolutions regarding the IT

1. A network of neuronal style organized computers

A first improvement, which does not require modifications to the hardware, is the development of a computer network, capable of sharing their tasks in order to solve complex projects.

To better understand the concept, here is the way a computer functions:



The brain consists of numerous identical neurons, which can make similar tasks. These neurons are grouped into clusters (lobes) which are designed to fulfill certain tasks (vision, speech, etc.). Similarly, we can talk about a network of identical computers grouped so as to distribute among themselves certain sub-tasks, within a more complex task or project.





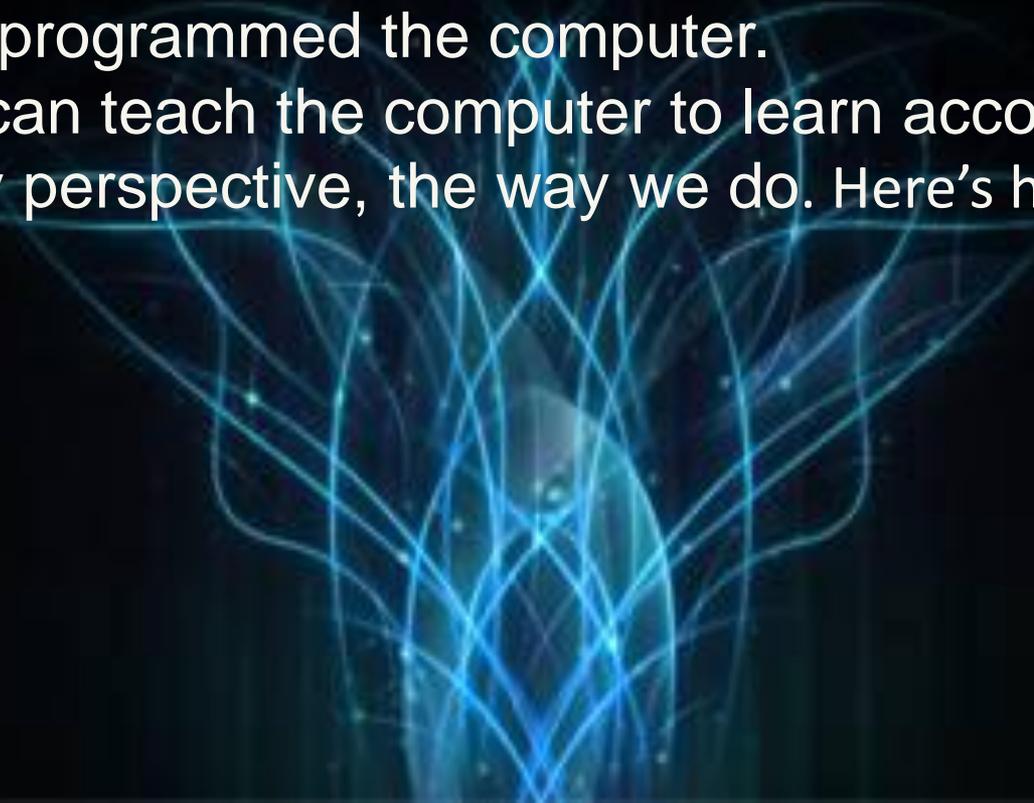
- **Example** : A factory : one central server to which a human allocates a complex project. The server shall communicate with all the computers within the network, allocating to each of them smaller and simpler tasks. Eventually, the server will collect the results of the other computers' activity and shall aggregate a final result, and present it back to the human.

2. Ability to produce new ideas (Artificial intelligence)

The ability to create is a very important characteristic of the humans.

Today, the computers learn according to the creationist theory. Thus, everything the computer knows comes from the human that programmed the computer.

But, we can teach the computer to learn according to the evolutionary perspective, the way we do. Here's how:





We can teach the computer to collect information from the external environment, to process and combine it, aiming at creating and imagining new things.

Imagination is about recombining information stored in our memory.

Therefore, a computer could combine elements from its memory by himself, creatively, starting from a certain task given by a programmer.

3. Conscience

It would be the ultimate development in a computer, this giving it the ability to think absolutely everything that we think.

It requires combining the logic and processing speed of a computer with our abilities to understand the phenomena in the environment, to adapt to them and create new ones.





We believe that though it would mean a great technological and biological achievement, giving the computer a conscience might not be a such a good idea.

Thus, we would create a being with our mental prowess, with no interest in serving us; its own will and far more adaptive than us, able to think deeper and faster than us, probably seeing us as rivals.

Ultimately, the
computer's improvement
should be a priority for us but
it should never be allowed to
exceed its condition as a tool
for humankind.

