

TECHNOLOGICAL BREAKTHROUGHS: THE PAST, PRESENT AND FUTURE

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Technology manifests itself in different interpretations, and they all aim to help people complete tasks that they either do not want or cannot do on their own. Technology rules our lives these days. Smartphones, computers, home appliances - without them you cannot go anywhere and do anything. In a short period of time, there has been an explosion of new technologies on the market, great progress, and now many people cannot imagine life without them.

As a person born in 2003, I have witnessed the rapid development of computers. That was an invention of the last century, but no average home can do without it at present. It was really a breakthrough that changed the world. This was 65 years ago. The first "computing monster" in history is considered to be an ancient Greek astronomical device called the Antikythera mechanism, created in about 100 BC, which had no analogues until the Renaissance. The first real Cray-1 supercomputer was designed in 1978 by Seymour Cray, who was later called the "father of supercomputers" (**Malinovsky, 1998, p.317**). Modern supercomputers are so expensive in construction and subsequent maintenance (megawatts of electricity, hundreds of staff) that were "affordable" only for the largest government research institutions and multinational companies (Supercomputers are coming: TOP-10 most powerful computers in the world, 2020). What about today? The first place in the world ranking was taken by the American Summit, developed by IBM. Its power is 148.6 petaflops (1 petaflops = thousands of trillions of operations per second), and its theoretical peak system performance (Rpeak) is 200.8 petaflops. Now the Okrydzka National Laboratory works on it.

Electric cars, 3D printers, rockets and artificial intelligence are improving every day. This is not all. In 2010, a synthetic organism was created by the J. Craig Venter Institute. In 2012 VR headset was invented. In 2019 IBM launches IBM Q System One, the first integrated quantum computing system for commercial use. In 2020, the first FDA-approved RNA vaccine was created, jointly developed by Pfizer and BioNTech (Timeline of historic inventions, 2021). All of these have already happened.

The future is uncertain. The possibilities are endless: artificial intelligence robots, compact hyperPCs, smart machines, etc. The ideas never end. The breakthrough of the past is a computer. But the innovation of the future concerns a human: modification of the human body and especially the human mind. The brain is the largest and most powerful computer in the world. Our brain is much more than just a fragile human organ. It can develop with its own resources and the body's resources. All we need is to learn how to properly develop it (Twenty-six facts about the human brain, 2011). There are about 80-100 billion neurons (nerve cells) in the human brain. The size of the neurons ranges from 4.5 to 100 μm in width. To see how small it is, look at the dot at the end of this sentence, it corresponds to 500 microns in a circle, which means that more than 100 small neurons can fit inside it. The white matter, which makes up 60% of our brain, takes on the color of myelin, which insulates axons and increases the speed of propagation of electrical impulses (**Dispensa, 2017, p. 86-87**). The development of the human brain is the future. But one cannot forget the words of the famous English critic Johnson Samuel: "Future is purchased by the present."

References:

Dispensa, A. (2017). Supernatural mind. How to achieve extraordinary power of mind. p 80-81.

Malinovsky, B. (1998). Essays on the history of computer science and technology in Ukraine, p 315-321.

Supercomputers are coming: TOP-10 most powerful computers in the world (2020). Retrieved from <https://ek.ua/ua/post/1444/170-superkompyutery-nastupayut-top-10-moshchneyshikh-kompyuterov-mira/>

Timeline of historic inventions (20 October, 2021). Retrieved from https://en.wikipedia.org/wiki/Timeline_of_historic_inventions

Twenty six facts about the human brain (2011). Retrieved from: <https://vsviti.com.ua/interesting/tech/32409>