

TECHNOLOGICAL BREAKTHROUGHS: THE PAST, PRESENT AND FUTURE

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The history of technology is a really important topic since it allows us to understand the general mechanisms of human evolution and makes predictions about the further advances of applied science. However, the important thing here is the fact that technology was not developing steadily and monotonously most of the time, instead, it always made really big steps forward when something important was discovered or invented. These steps are usually called “technological breakthroughs”.

It can be confidently stated that the first technological breakthroughs are roughly the same age as humanity – take the stone tools, for example, that were crucial for our ancestors until they learned metallurgy (The Editors of Encyclopaedia Britannica, 2015, 10 Inventions That Changed Your World, para. 2). Other significant prehistoric discoveries and inventions were fire, the wheel and bricks (Gascoigne, 2006, p. 1). As time passed and civilizations started to emerge, there was a huge advance in building techniques – famous Roman roads were probably the biggest breakthrough of the Classical Era, same with Johannes Gutenberg’s invention of western printing and the first firearms for the Middle Ages (Buchanan, 2020, p. 7). Speaking about the Modern Era, the number of inventions, lots of which were really ground-breaking, skyrocketed compared to previous times. Ones that should be named are probably steam engine, daguerreotype (first photograph), Bessemer process, phonograph, radio and telephone, Wright aeroplane, integrated circuit, spaceships and, finally, the first computer named Apple II (The Editors of Encyclopaedia Britannica, 2015, 10 Inventions That Changed Your World, para. 3, 5, 7, 8, 10, 11).

Looking at the modern world, the number of inventions that are done by scientists, engineers and technicians from all over the Earth is even bigger than last

centuries, and most of them can be called breakthroughs. Nowadays technology mostly focuses on digital devices (notable inventions in this area for the past 20 years are augmented reality, blockchain, E-readers, digital assistants, online streaming and tokenization), space exploration (rockets, satellites, telescopes), ecology (renewable power, environmental cleaning technologies) and medical field (capsule endoscopy, artificial organs, gene editing, prostheses and exoskeletons) (Young & Sauter, 2020, p. 2-5).

The list above will only grow as years go on because all of the areas named have great importance for mankind. It is not really hard to predict that we will have even more powerful and useful gadgets, deeper knowledge of our planet and outer space and, hopefully, better healthcare and ecological situation in the future. Talking about technological breakthroughs of coming times, transport and infrastructure should also be mentioned because the foundations for them are being laid now. Besides the named fields of knowledge, important inventions can happen in any other field as well. But, ultimately, all technological breakthroughs happen only due to people who work in the respective spheres and are smart, hard-working and talented enough, and only time can show, who these people will be for future generations and what they will invent.

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ROBOT WITH A DIGITAL WORM BRAIN

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Imagine that you are a neurologist and live in 2030. In the morning, when you wake up, the robot butler brushes your teeth while the 3D printer prints the disposable clothes for you for the day ahead. You happily sit down in your self-driving electric car to travel to your computerized laboratory. Today is the big day: you are running a human brain simulation on a supercomputer for the first time. You turn on the machine, download the software and press "Start".

Applause among your colleagues. This thing works! Each simulated neuron behaves exactly as you would expect from the present. The champagne is open, grandiose plans have been made, and there are lively discussions about the healing of all possible brain diseases. In the evening you feel tired, so you decide to turn off the simulation and drive home. But when you want to close the program, a text message appears on the screen: "Please do not turn off, I am too young to die!"

Suppose that the computer will be able to simulate the human brain with an accuracy of 1:1, will it be possible to communicate with it? What if he even develops the most real consciousness? These questions are so difficult to answer that even humble philosophers have nothing to say.

The microscopic nematode worm *C. elegans* should act as a mediator in the dispute. These individuals, only one millimeter long, are male and also bisexual. They can be found almost everywhere. This worm emphasizes the exact number of cells in its body. Each individual has exactly 302 neurons. The number of cells remaining in the body is also constant – 959 cell nuclei in hermaphrodites and 1031