TECHNOLOGICAL BREAKTHROUGHS: PAST INNOVATIONS, CURRENT ADVANCEMENTS, AND FUTURE VISIONS

Bogdan Myleiko, Nazar Pasternak, Daniil Osadchuk

Educational and Research Institute of Nuclear and Heat Power Engineering,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Technological advancements have been the driving force behind human development, shaping our way of life and making it easier. After the invention of the steam engine, people thought "What else can be done?" and they did it. To date, technological advancements have reached unique digital technologies such as artificial intelligence and have also provided an incredible opportunity for various

fields of science.

Technological breakthroughs are a constant process of creating new and improving the applied technologies, means of production and final products using the achievements of science. (I. Ivasiv & G. Mashliy, p. 68) The evolution of the technical can be seen in Table 1. (Gregersen, 2019)

Table 1. The Evolution of Technology

Year	Tech. Breakthrough	Description
3.3 m.y.a.	The First Tools	Early ancestors created sharp stone flakes and unshaped stones for use as knives and hammers.
1 m.y.a.	Fire	Early evidence of controlled use of fire by Homo erectus in caves.
20,000 to 15,000 m.y.a.	Neolithic Revolution	Development of agriculture, pottery, weaving, and possibly the wheel.
6000 BCE	Irrigation	The first organized irrigation systems in Mesopotamia and Egypt, marking advanced social structure.
1455	Printing Press	Johannes Gutenberg printed the Bible using movable type, sparking an information revolution in Europe.
1765	Steam Engine	James Watt's efficient steam engine became pivotal to the Industrial Revolution.
1947	Transistor	Bell Labs developed the transistor, essential for modern electronics.
1974	Internet	Vinton Cerf and Robert Kahn introduced TCP/IP, the foundational protocol for internet data transmission.
2012	CRISPR Gene Editing	A groundbreaking gene-editing technology developed by Doudna and Charpentier, allowing precise changes in DNA.
2017	Artificial Intelligence	AlphaGo demonstrated advanced AI by mastering the game of Go, surpassing human ability through machine learning.

The technology has a thousand-year history, but it is better to pay attention to the 15th century, when the printing press was invented, the industrial revolution of the 19th and 20th centuries, when transport and industrial machines were invented, as well as electricity, television and technology in the 20th century. (Ahmad, 2023)

In our time, we are seeing an incredible breakthrough. Thanks to AI, robotics has evolved, meaning we don't need to send people to dangerous places – robots can do it. (Woodson, 2023) And if it was only in 1971 that e-mail appeared, today we have video meet, AI, virtual reality and augmented reality, the Internet of Things for more efficient use of devices. The development of technology has always had two sides to the coin, one with an incredibly simple life, the other where humanity has been absorbed by technology. Most likely, artificial intelligence will increasingly dominate in the future, because technological evolution is continuous.

References:

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