

SMART TECHNOLOGIES IN SCIENCE

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The rapid development of smart technologies has had a significant positive impact on modern research results. The use of artificial intelligence, big data analytics, and machine learning has greatly improved the accuracy of research results

and their efficiency.

Essential to smart technology are artificial intelligence – technology that allows machines to perform tasks that previously required human intelligence; the Internet of Things – a network of connected devices that exchange and interact with data to automate tasks; and Big Data – large volumes of diverse data that are rapidly generated and processed for analysis and decision-making.

Smart technologies' history began in 1956 at a conference at Dartmouth College, when the concept of artificial intelligence was officially introduced. The main goal was to create machines capable of learning, making decisions and solving tasks that previously required human intelligence. After the first expert systems were created in the 1970s, intelligent technologies began to be actively used in science. Knowledge bases and logic have been used to solve complex problems in specific domains.

One of the oldest expert systems developed by Stanford University was MYCIN. It was written in Lisp as Edward Shortliffe's doctoral dissertation and supervised by Bruce Buchanan, Stanley Cohen, and others (Contributors to Wikimedia projects, 2004). One of the first expert systems developed by artificial intelligence researcher Edward Feigenbaum and geneticist Joshua Ruckberg in 1965, Dendral was designed to help organic chemistry researchers identify unknown molecules from the analysis of mass spectrometry data (Copeland, 2008).

In the 1990s, with the advent of more powerful computers and the development of the Internet, which increased the volume of data, major breakthroughs occurred in the application of smart technology. The introduction of big data to analyze large amounts of scientific information in real time was particularly important. This enabled scientists to make more accurate predictions, discover new patterns, and accelerate scientific research in many fields.

Since the early 2000s, with the development of deep learning and the Internet of Things, smart technologies have become more widely applied, providing new levels of automation and data analysis in science. Currently, the scientific fields most affected by smart technologies include medicine, ecology and climatology,

astronomy, biology, and genetics.

Smart technologies are actively transforming modern medicine, making it more precise and efficient. One of the main areas is the use of artificial intelligence for disease diagnostics. AI analyzes medical images (MRI, X-ray, CT) to quickly detect pathologies such as cancer, heart disease, or stroke, providing accuracy that sometimes surpasses human doctors (5 Examples of Smart Technology in Healthcare, n. d.). For example, AI helps to identify small tumors that may go unnoticed by the human eye, allowing treatment to begin in a timely manner.

The Internet of Things enables the installation of sensors for continuous monitoring of air, water, soil quality, and pollution levels. These devices collect data in real-time on harmful substance emissions, helping to promptly identify ecosystem-threatening changes. For example, IoT networks are used to measure air pollution in large cities and timely inform the population.

In the fields of biology and genetics, AI is helping scientists analyze large amounts of genetic data and identify patterns and correlations that were previously inaccessible (Mathur, H., Joshi, N., & Pandya, I., 2022). For example, AI algorithms are used to sequence the human genome, allowing the detection of genetic mutations associated with certain diseases, such as cancer or hereditary conditions. This enables the creation of personalized treatment methods based on the patient's individual genetic profile.

There are countless other examples of the application of smart technologies in various areas of science, but one thing is clear: smart technologies have become an integral part not only of everyday life but also of the scientific sphere. The future of science is closely tied to the continued development of smart technologies. Their application will help solve complex global problems, accelerate discoveries, and make science more accessible to humanity (Scope and Criteria, n. d.).

References:

1. 5 Examples of Smart Technology in Healthcare | Impact. (n. d.). Impact Networking | Managed Services for Business Growth. Retrieved from <https://www.impactmybiz.com/blog/smart-technology-in-healthcare/>

2. Contributors to Wikipedia projects. (2004, May 12). Mycin. Retrieved from <https://en.wikipedia.org/wiki/Mycin>
3. Copeland, B. J. (2008, October 7). DENDRAL | Artificial Intelligence, Machine Learning & Expert Systems | Britannica. Encyclopedia Britannica. Retrieved from <https://www.britannica.com/technology/DENDRAL>
4. Mathur, H., Joshi, N., & Pandya, I. (2022). Plant biology techniques for smart agricultural crop production: Tradition to advanced technology – A review. *Flora and Fauna*, 28(1), 31-39. Retrieved from <https://doi.org/10.33451/florafaua.v28i1pp31-39>
5. Scope and Criteria. (n. d.). Oxford Academic. Retrieved from https://academic.oup.com/nargab/pages/scope_and_criteria