

2. Edge computing in the automation of production processes

Pavlo Kreschenko, Nataliia Duzhyk

National University of Food Technologies, Kyiv, Ukraine

Introduction. Edge computing plays an increasingly important role in industrial automation, providing fast and reliable data exchange. This why it is important to examine the status and prospects of edge computing in industrial automation.

Materials and methods. To prepare this report, an exhaustive review of the literature on edge computing in industrial automation was conducted using databases, such as IEEE Xplore, ACM Digital Library, ScienceDirect, and others. Based on the collected data, a detailed analysis of the architecture, challenges and prospects of edge computing in industrial automation was carried out.

Results. The review of the literature revealed that the number of publications on edge computing in industrial automation has been growing every year, which is indicative of the growing interest in applying edge computing to industrial automation.

Edge computing is a promising technology for industrial automation because it can significantly reduce data processing time, increase equipment reliability, and reduce data transmission costs. It can also provide more reliable hardware operation by allowing processing data locally, without the need to transfer data to cloud systems. This is especially important for applications where speed and reliability of data processing are critical, such as those in quality control systems or in security-related applications.

The architecture of edge computing in industrial automation consists of edge devices, gateways, controllers, and cloud systems. These components must be standardized and compatible with each other, which is one of the major challenges and obstacles to using edge computing in industrial automation. Edge computing is impossible without reliable and secure operation of edge devices, effective data management strategies, and interoperability between different edge devices and systems. In addition, significant research efforts are to be made in a number of directions, namely in development of new data processing algorithms at the edge, in improvement of software and hardware for edge computing, as well as in integration of edge computing with other technologies, such as artificial intelligence, machine learning, and the Internet of Things. It also follows from our review that further study is necessary for a number of other topics, such as the development of effective data management strategies, the reliability and security of edge computing, and the development of standards and protocols for interoperability between edge devices and systems.

Conclusion. Edge computing has a great potential to improve the efficiency and competitiveness of enterprises by automating production processes. In particular, it can provide a significant reduction in data processing time and an increase in equipment reliability.

However, further research and development are required to exploit the benefits of edge computing in full. It is necessary to develop effective strategies for the implementation of edge computing in industrial automation, which would take into account the challenges associated with the reliability, security and compatibility of edge devices and systems.

It is also necessary to continue developing effective algorithms for data processing at the edge and software and hardware tools for edge computing.