

## INTEGRATION OF ARTIFICIAL INTELLIGENCE INTO ELECTRONIC CONTROL SYSTEMS OF A SMART HOME

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**Annotation.** The article discusses the effect of integrating artificial intelligence into smart home electronic systems. The main objectives of providing artificial intelligence are discussed. In this direction, measures are taken to develop artificial intelligence. The need for the emergence of new technologies II for the full implementation of smart home systems is emphasized.

**Keywords:** Artificial Intelligence (AI), Smart Home, Automation, Security, Compatibility, Data Privacy, Adaptability.

**Introduction.** In the rapid development of technology, artificial intelligence (AI) has become an indispensable tool for obtaining results in various fields of science. The introduction of artificial intelligence into electronic control systems has made it possible to optimize the process of solving tasks and process more information. It is widely used in areas such as transport, energy and industry, where it helps to adapt to rapidly changing conditions and cope with a number of difficulties. However, new problems arise along with this: security issues require special attention. This study is devoted to the study of existing methods of using AI in Smart Home control systems and the search for their further improvement.

**Main part.** The development of AI began in the 20th century, when the first computers appeared. At that time, the concept of AI was proposed as “thinking machines.” Over time, technology has come a long way from simple algorithms to the modern advanced systems that we have now.

The main goals of implementing AI in a Smart Home system are to increase security, improve the quality of life, control equipment without direct interaction, and optimize energy consumption.

AI helps automate some actions that each person does several times a day, such as: controlling heating, lighting, and other devices [1]. This makes life much easier and also reduces energy costs. As for security, AI allows you to increase the level of security using surveillance cameras, facial recognition, and suspicious movement sensors [2]. This makes it possible to quickly respond to potential threats.

In this regard, many companies are looking to integrate AI into smart home automation components. Here are some examples of integration.

1 Amazon Alexa is a voice assistant that allows you to control your smart home using voice commands. It uses technology to recognize your voice and perform various actions.

2 Google Home is a voice assistant powered by Google Assistant. It allows you to control smart home devices through voice commands and can integrate with various devices, such as thermostats, lighting, and sockets.

3 Yandex.Alice is a virtual assistant that is designed to communicate with users and perform various tasks. It can answer questions, perform search queries, play music, display the weather forecast, and control smart home devices.

4 Nest Learning Thermostat is a device for controlling the temperature in the home. It automatically adjusts the temperature depending on the habits and schedule of residents, and also reacts to changes in the weather.

Companies are trying to improve their Smart Home systems by integrating solutions towards AI. The problem is that at the moment these systems cover only specific components of the Smart Home, without the ability to modify the entire system to the current needs of a person.

The problem of research in the field of AI integration into Smart Home electronic control systems includes several components.

1 Data privacy and cybersecurity. With the growing use of smart technologies, the risk of confidential data leakage increases. Ensuring the security of information from cyber attacks is one of the most important aspects when integrating AI into smart homes.

2 Compatibility with different devices. When different equipment is assembled in the house, difficulties may arise. For example, sensors from one manufacturer may not be compatible with sensors from another manufacturer.

3 Complexity of installation. Setting up smart AI systems requires skills - this is not just connecting a gadget, but working with algorithms. Without high-quality data, the system will not be able to learn: for example, for AI to learn to regulate the temperature, it needs time to understand how the user sets the thermostat.

4 Adaptability and learning ability. A smart home is not able to remember the needs and habits of the user on its own. This complicates the process of using devices. Existing voice assistants cannot think and remember information on their own. They can only give a programmed response or find information on the Internet.

Solving these problems requires effective algorithms, improving security, and ensuring device compatibility.

1 The problem of data privacy and cybersecurity.

Solution. Developing more reliable information protection mechanisms, including double authentication, encryption, and authorization. It is also equally important for users to maintain privacy over their data.

2 The problem of compatibility with various devices.

Solution. Developing a single protocol for various smart home devices. This solution will create a unified system for interaction between devices from different manufacturers and improve the usability of a smart home.

3 The problem of installation complexity.

Solution. Developing a clear and user-friendly interface with the integration of AI for automatic configuration and self-learning.

4 The problem of adaptability and learning.

Solution. Developing AI algorithms that can learn from accumulated information and adapt depending on user preferences. Integrate AI into a voice assistant so that it can think and respond to the user. The operating principle will be similar to that of the Generative Pre-trained Transformer (ChatGPT) [3, 4].

**Conclusion.** The integration of artificial intelligence into smart home electronic systems opens up new opportunities for automation, energy saving and personalization of living conditions. AI allows you to adapt lighting, temperature and security parameters to the individual preferences of residents, analyzing their habits and optimizing resource consumption. However, the implementation of such systems faces serious challenges. Despite the difficulties, the integration of AI into smart homes remains strategically important. Eliminating problems through standardization, enhancing security and simplifying interfaces will make technologies available for mass use while maintaining their functionality and reliability.

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