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ПЕРСПЕКТИВИ: АВТОМАТИЗАЦІЇ ВИМІРЮВАННЯ УМОВ У ЖИТЛОВИХ ТА РОБОЧИХ ПРИМІЩЕННЯХ З ВИКОРИСТАННЯМ КОМП'ЮТЕРНО-ІНТЕГРОВАНИХ РІШЕНЬ

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Анотація: У даній статті проведено огляд сучасних модулів для автоматизованого вимірювання умов у житлових та робочих приміщеннях. Розглянуто необхідності застосування автоматизованих систем, актуальність їх використання, як для приватних осель, так і для корпоративних просторів. Виділено чотири базових перспективи: автоматизації вимірювання умов у житлових та робочих приміщеннях з використанням комп'ютерно-інтегрованих рішень.

Ключові слова: модуль, автоматизація, умови, приміщення, система.

PERSPECTIVES: AUTOMATION OF MEASURING CONDITIONS IN RESIDENTIAL AND WORKING PREMISES USING COMPUTER-INTEGRATED SOLUTIONS

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Abstract: This article provides overview of modern modules for automated measurement of conditions in living and working premises. The need for use of automated systems, relevance of their use, both for private homes and for corporate spaces, is considered. Four basic perspectives are highlighted: automation of conditions measurement in living and working premises using computer-integrated solutions.

Keywords: module, automation, conditions, premises, system.

Automation is defined as crucial step in ensuring efficiency, accuracy, and optimization in various domains, contributing to increased productivity and rational resource utilization [1-3].

Modern technologies allow automation of measurement and control processes in residential and commercial spaces, providing significant advantages for owners, managers, residents, and workers in terms of efficiency, convenience, and resource savings. One of key advantages of modern automation technologies is ability to provide users with accurate real-time information. Automated systems enable real-time monitoring of temperature, humidity, illumination, noise levels, presence of harmful substances, and other important parameters. Through sensors and computer algorithms, it is possible to promptly respond to deviations from norm and prevent hazardous situations. This not only allows for timely response to danger but also creates sense of calm and security among users.

In more detail, creation and implementation of modules not only enable collection of data from sensors but also their analysis, prediction of situation development, and even autonomous decision-making to optimize conditions. For example, timely regulation of temperature, humidity, ventilation, or lighting. An example of module for monitoring indoor conditions is shown in Figure 1 [4-6]. Let's define prospects of automating measurement of conditions in residential and workspaces using computer-integrated solutions. Firstly, climate change and rapid growth of population lead to increased demand for convenient and efficient environmental control systems. Automated modules for measuring temperature, humidity, lighting, and other factors allow for effective monitoring of microclimate, ensuring comfort and enhancing productivity of spaces.

Figure 1 – Example of module for monitoring conditions in indoor spaces

Ensuring optimal climatic conditions (Figure 2) is achieved through control and regulation of microclimate parameters. Automation of processes of collecting, processing, and analyzing meteorological data allows for effective monitoring of microclimate indicators and timely response to its changes. Secondly, application of such systems also contributes to energy savings, as automatic regulation of conditions can avoid unnecessary consumption of electricity and other resources. This is crucial in context of contemporary environmental challenges and pursuit of sustainable development.

Figure 2 – Monitoring module control

Ukraine is not staying aloof from global trends in field of automated control systems. Consumers and businesses are seeking ways to optimize their energy consumption and enhance comfort. Various manufacturers of automated modules are present in market, offering solutions for different segments, from private homes to corporate spaces. However, it is important to note that there are certain challenges faced by users in Ukraine. For example, high installation and maintenance costs of such systems may hinder their widespread adoption. Additionally, absence of standards and regulations that definitively govern use of automated modules in households and businesses is worth considering.

In Ukraine, such systems have not yet gained wide application due to relatively high cost of equipment. However, in coming years, with development of Internet of Things (IoT) technologies, cost of automated solutions is expected to decrease. This will allow for implementation of these systems in offices and residential buildings to enhance comfort and safety. Abroad, such systems are already actively used, especially in EU and North American countries, where they have become standard for new constructions [6-9]. Integration of data from various sensors and systems for comprehensive analysis is one of key aspects of implementation, but it is crucial to ensure appropriate level of security for these devices and protection of users' personal data. Thirdly, important aspect is ability to integrate automated monitoring systems with other solutions for "smart buildings" and "smart cities." Information about indoor conditions can be used in conjunction with data on energy consumption, security, logistics, and more.

Such "intelligent" systems will become integral part of concept of "smart home" or "smart office." They will provide maximum comfort and safety for people with minimal resource consumption. However, balanced approach to data privacy and cybersecurity is essential.

Automated modules are particularly relevant during seasonal changes when heating or cooling needs may fluctuate. These modules enable systems to adapt independently to changes in external environment, ensuring continuous comfort. Fourthly, it is important to monitor microclimate in

industrial premises as it is crucial for work and efficient operation of machinery and equipment. For example, in manufacturing facilities using heat sources, air conditioning system may be needed, along with maintaining stable temperature and humidity to ensure optimal working conditions. This helps prevent overheating of premises and provides comfortable conditions for workers.

Furthermore, appropriate climatic conditions can help reduce energy costs and increase productivity. Thus, creating suitable microclimatic conditions in such spaces is essential for ensuring comfort and safety of individuals and enhancing efficiency of production process.

Automated control and measurement modules for environmental conditions in residential and workspaces are used to ensure comfortable and safe environment, providing safe and efficient working conditions. Therefore, automated monitoring systems for indoor conditions represent promising direction that significantly enhances comfort and safety in our homes and offices. The key is to make these technologies more accessible and reliably protected. The potential of automated monitoring systems is vast, and ensuring their accessibility, reliability, and ethical compliance will make them crucial component for creating comfortable and safe working and living conditions.

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