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SMART FARMING AS AN INNOVATION IN MODERN AGRICULTURE

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Annotation. "Smart farming" is considered as a prospect of growing crops in new ways with the help of modern technologies. The advantages and disadvantages of such technology are also evaluated. The analysis of the introduction of these technologies into the life of the modern state is carried out.

Keywords: electronic systems, smart farm, single-board computer, greenhouse, agriculture, solar panels.

Introduction. The topic "Innovations in electronic systems and technologies" is very extensive and includes many areas. As we all know, the world is developing rapidly, and electronic systems and technologies play a crucial role in this progress. The impact of technology on our daily lives - from ubiquitous smartphones to self-driving cars - is difficult to overestimate.

Innovations in electronic systems and technologies have changed various industries, including healthcare, transportation and communications. One of the most important and exciting areas will be the "smart farm". Surprisingly, there you can use the latest developments in the field of robotics, wearable devices and virtual reality.

However, as with any new technology, there are challenges and obstacles that need to be taken into account. Below we will identify and solve the problems associated with innovations in the "smart farm", as well as talk about its widespread implementation.

Main part. First you need to figure out what smart farming is and the reasons for its occurrence. Scientists have estimated that by 2030 the world's population will be 8.5 billion people. Most of the population lives in agglomerations, megacities or just big cities. It is there that the largest concentration of people is located. And one of the main questions arises about how much cities are growing. How to feed such a city? Climate change, water reduction, environmental pollution and so on should also be taken into account. All these are the reasons for the development of agriculture. Fortunately, agricultural scientists are pushing the boundaries of agriculture.

Today we can grow crops anywhere with vertical farming. These smart farms have appeared all over the world. The smart farming system is agriculture with a controlled environment. This is a greenhouse that uses hydroponics, aquaponics and aeroponics technologies. In addition, crop growth factors such as temperature and co2 are regulated to optimize production. The CEA system includes many sensors that transmit data to the control system. Next, the controller regulates the supply of nutrients, cooling and other factors of crop growth.

The best solution for embedded systems, such as the VEST E2I single-board computer, is great for implementing a management system. CEA is a processor platform that supports touch screen and wireless connectivity. The built-in VEST system takes sensor measurements over an Ethernet or Wi-Fi network to determine which growth factors should be adjusted. In addition, engineers can create user-friendly interactive dashboards. For CEA, the best embedded system is ready to work in the cloud, which means that the system can transfer data from multiple farms to the cloud using the vest connect 360 service.

The cloud computing of the Internet of Things offers many possibilities, for example, farmer scientists can analyze data from numerous farms, compare crop growth factors and optimize parameters for growing a particular crop. Vest connect 360 can also warn farmers about deviations from the norm and help them make timely decisions. For example, a smart farm using natural sunlight may encounter weather changes that will lead to a sharp change in the intensity of ultraviolet radiation. In response, the farmer can activate a backup LED lighting system or adjust the electrochromatic glass to reduce natural ultraviolet radiation using his mobile phone.

At the moment, such farms have several disadvantages. For example, high cost. As mentioned above, CEA is a modern bio system that includes many technically complex elements. In such a system, it is impossible to remove elements or replace them with cheaper ones, otherwise the harvest will suffer. Also, this price is due to electricity consumption. Really smart farms consumes very little water, but at the same time an insanely large amount of electricity. Of course, we can use solar panels, but this will not be enough and such panels will not work in all regions. So we need to wait until we find an alternative energy source or reduce the consumption of an existing one. It is the last disadvantage of such system. Unfortunately, at the moment we can only grow greens, mushrooms and berries in such systems. While the system is only being improved, tuberous vegetables such as potatoes or beets and trees cannot be grown in it.

Home smart farms should also be mentioned. I am sure that many people have cottages where grandparents or parents grow organic food for the family. But innovations in the field of smart farms have reached such a scale that it has become possible to grow some vegetables and herbs at home independently. Moving crops indoors has many advantages over growing outdoors: severe weather conditions, animals and pests, unpredictable drought or heavy rains. There are so many things that can go wrong outdoors. At the moment, you can find special "pots" on sale that regulate humidity, illumination and trace elements for each plant.

It is also important to mention the introduction of home smart farms occurs not only in private homes but also in schools, gymnasiums, universities. This type of farming has greatly influenced the emergence of interest in agriculture on the part of the growing generation. Young loves to study and explore living organisms, especially when you can do it with your own hands. So such farms greatly affect not only the economy of the country, but also the interest of young people in agriculture.

Agriculture is an important branch of the economy of the Republic of Belarus, providing food security and export potential. While the economy shows a decline in GDP (in January-September – by 4.7%), agriculture remains the driver that compensates for the decline in a number of other industries. Thus, in 9 months of 2022, the production of agricultural products in Belarus increased by 4.9%. Based on statistics, we see that agriculture is an integral branch of the Belarusian economy.

Also, one of the main achievements of Belarus is the creation of a high-tech park. What if not a smart farm would be an ideal synthesis of high technology and agriculture. By introducing smart farm technologies into our production, we will be able to increase the number of products supplied. it will also give a huge boost in the training of new IT specialists. It is this technology that will really be able to bring Belarus as a country to a new level of development.

Conclusion. In conclusion, we can say that the concept of a "smart farm" has become a promising solution to solve the problems that the agricultural industry is facing today. Using advanced technologies such as the Internet of Things (IoT), artificial intelligence (AI) and big data, farmers can now optimize their operations and increase productivity while reducing costs and environmental impacts.

Despite the advantages of "smart farming", there are still problems that need to be solved, such as the high cost of implementation and the need for specialized technical knowledge. However, with the development of technology and the growing demand for efficient farming methods, intelligent agriculture is expected to play an increasingly important role in the future of agriculture.

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