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WHEN EVERYTHING RUNS LIKE A CLOCKWORK

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THE HANGING GARDENS OF MODERN BABYLON

ACCORDING TO FAO FORECASTS, THE URBAN POPULATION WILL ONLY BE GROWING UNTIL 2030. THEREFORE, EXPERTS ARE CONVINCED THAT GROWING VEGETABLES IN URBAN CONDITIONS WILL GAIN MORE POPULARITY. THIS TREND WILL BE STRENGTHENED BY THE DESIRE TO CONSUME PRODUCTS, GROWN DIRECTLY IN THE REGION OF RESIDENCE WITHOUT DAMAGE TO THE ENVIRONMENT.

SVITLANA TSYBULSKA

FASHION TREND OR REAL FUTURE?

City farming (urban farming) is a new trend that is evolving at a frantic pace. In big cities, balconies and roofs of houses are already being adapted for small farms and gardens. “Roofs are actively being greened in many European countries. In Zurich, Switzerland, for example, I saw loggias and balconies where people grow real gardens. They are highly organic addition to modern buildings,” said **Kateryna Zvierieva, agricultural market expert, Development Director of the Ukrainian Horticultural Association**, during the “City Farming – the future of our time” webinar. In her opinion, by growing food, residents of megacities become not just observers, but active participants in the food system. Therefore, it is necessary to create modern eco-spaces for citizens through joint efforts.

FAO (Food and Agriculture Organization of the United Nations) analyst, Andrii Yarmak notes in his blog that in a very short time, literally in 5-10 years, every resident of a high-rise building, regardless of the climatic zone, will be able to provide his family with fresh greenery, salads, and perhaps even berries. All this primarily referred to the owners of apartments in smart houses, which are basically equipped with automatic watering systems, plant lighting, and humidity sensors. Under such conditions “gardens” will not require active care – they can be left unattended during the vacation. For sure, such projects are economically unprofitable as they require large amounts of electricity. However, technologies are constantly being

modernized and, according to Andrii Yarmak, in a short time, city farming will successfully compete with the traditional method of agricultural product cultivation. After all, a berry or a salad, picked up a few minutes before serving cannot be compared by the taste with products packed in polyethylene that have traveled hundreds or even thousands of kilometers in the refrigerator.

Valerii Yakovenko, CEO of DroneUA

ITALIAN “HIVE”?

Building a vertical farm requires millions of investments and a considerable amount of time. Therefore, the Italian **Felipe Hernandez, CEO of Hexagro Urban Farming**, decided to create a compact module system in the form of a beehive. “We were inspired by the nature itself,” he told during the Travel-free digital conference series. Hexagonal blocks that resemble beehives can be connected in different ways, for example, to form an urban tree. They can be organically “fitted” into any interior. “We help everyone anywhere in the world to get access to healthy food,” adds the developer.

Greenery and aromatic herbs can be grown in such modules using aeroponics technology. Pesticides are not required and water savings are up to 90% compared to the traditional approach. Water and nutrients are sprayed onto the roots, if necessary, so the resources are not wasted. The lighting is provided with LED lamps.

With the help of sensors, the farm is managed by an IoT platform that selects the nourishment and care scheme. The owner of the garden can monitor the process using a mobile application. “It’s a sort of Tamagotchi,” jokes the expert. All you need to connect is an electrical network and Wi-Fi.

The “Hive” for plants – an invention of Italian company Hexadro Urban Farming

FARMBOT — UKRAINIAN KNOW-HOW

It’s great that mobile mini-farms, which can be installed in any convenient place, were also developed in Ukraine. We are talking about the FarmBot system from the DroneUA company. “This is an agricultural robot with open-source code. It means that all components

and software are open to anyone who wants to create their own modification of the automated system. It's like Linus, but a farm," explains **the company's CEO Valerii Yakovenko** in an exclusive interview with iFarming.

FarmBot became one of the next DroneUA projects. This is the brainchild of a division of engineers who create new modules for drones and robots. Developers sought to find a new

solution that would help automate everyday processes in greenhouses. "We were directly led to the idea of FarmBot by social networks. We communicate with engineers all over the world and exchange interesting ideas. We realized that this is a high-perspective technology when we saw a similar robotic farm in one of the NASA centers. There are about 3,000 installations of such type around the world. And we strived to develop our own Ukrainian solution," adds the CEO of DroneUA.

The first prototype of the FarmBot mini-farm appeared in September last year, and it was presented at the InterAgro exhibition in October. This installation was exclusively made of foreign components. However, the next prototype for the 95%

Reference information

Currently, FarmBot monitors only the soil moisture. However, the range of indicators will be expanded soon due to the use of the Agrocares scanner. This solution for urban farms allows to analyze soil acidity, NPK and organic content in minutes.

consisted of Ukrainian "hardware". As Valerii Yakovenko notes, the company was not able to replace only one central board: "To be more precise, we designed it anew, but we are still working on it. Software components, as well as the hardware part, are open-source. Now the primary objective is just to modify it for our tasks."

The basis of the technology is the CNC spatial manipulator, which is widely used in producing wooden and metal products. However, in the FarmBot farm instead of diamond drill or laser, a manipulator – a mechanical arm – is used to take care of plants. If extraneous plants, that were not planted, appear, the system removes them. A camera installed on top determines whether a plant is 'domestic' or 'alien'. This technology can be scaled from a small garden to an entire greenhouse of hundreds of square meters.

FROM SALADS TO SEEDLINGS

What can be grown in such an installation?

First of all, greenery and various salads. Two prototypes, where greenery is grown experimentally, have already been installed in the Kyiv office of DroneUA (by the way, one module can provide greenery to one person for the whole year). Today developers are testing the full cycle of growing a variety of crops in FarmBot. "We even experimented with growing potatoes. I really love the film 'The Martian' with Matt Damon, so I just could not help but grow potatoes on our farm," admits Valerii Yakovenko. Provided that medical cannabis is legalized, even hemp can be successfully planted on such installations.

The bot will make it easier to perform repetitive operations, such as growing seedlings or preparing slots for hydroponic systems. "Our task is to relieve a person of a routine, and fully automate the process," DroneUA emphasizes.

The domestic installation occupies an area of 1.5 by 3 m and is suitable for growing plants no higher than 70 cm. If it is necessary to grow higher

plants, the farm can be modernized. Power consumption depends on the configuration. Surely, working indoors, the installation is very demanding on ‘power’, as it has artificial lighting installed. Therefore, it is more optimal to use such a system outdoors or in the greenhouse located on the roof of the building. Regarding the volume of water consumption, the engineers equipped the current configuration with a 100-liter water tank under the table, where the plant containers are installed. “We counted that this is the maximum amount of water, required for one production cycle, and currently we are testing this theory,” add the developers.

URBAN FARM IN A BOX

In the US, similar systems cost between $2,300 and $5,500. The systems designed in Ukraine will be two to three times cheaper depending on the modification. By the end of the year, Ukrainian engineers plan to assemble up to 50 installations. According to them, the project will be successful primarily in the regions with a high degree of urbanization. It will be a farm in a box that can be delivered to any part of the world. The construction is based on the guide rails that are installed on open ground or on a box (in case of office placement). So, the installation is very simple.

The agrorobot takes care of the plants in FarmBot installation

DroneUA has already got an order for this invention. The first users are innovators eager to test the latest developments. “We continue working in this direction. For example, from our friends in Singapore, we got a number of insights about the technologies being at the peak of popularity now. We are planning to implement them all,” Valerii Yakovenko shares his immediate plans.