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AGRICULTURE ROBOTICS

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Since ancient times, mankind has sought to improve their work, to make it easier and more efficient, and today we are witnessing the beginning of a new type of production - the production without human intervention. Machines have become mediators in the interaction with the object of human labor. As a result we are seeing a widespread use of robots in science, industry, medicine and other fields requiring maximum accuracy.

So what does agriculture robotics bring to us and whether is it necessary to us? Agriculture is one of our most important industries. It provides food, feed and fuel necessary for our survival. With the global population expected to reach 9 billion by 2050, agricultural production must double to meet the demand. And because of limited arable land, productivity must increase 25% to help meet this goal.

Agricultural sphere of production is an important part of the Belarusian economy it involved 8.5% of the population generating 8.4% of GDP. The first attempt to use robotics in agriculture was the introduction of milking units. First commercial use of the milking unit took place 20 years ago - it was a milking unit, designed by Dutch firm «Lely». Currently eight companies in the world are engaged in the production of milking units.

Driveless machines

The robot Crop Scout

With the extensive development of robotics in the 21st century, there is the possibility of introducing high-tech multi-functional agriculture machinery. The robot Crop Scout shown in the picture, for example, could be used for a variety of tasks like weeding and spraying pesticides. In trials the robot reduced the amount of pesticides used by 98% by applying it only to areas that needed it. Some ideas for the robot include shape recognition to detect weeds, seed mapping and height adjustment to lower or raise the robot depending on the need.

The advanced technology used in Belarus as well. Automated machinery of domestic production is being actively implemented in the livestock sector, and they are not inferior to foreign analogues. In the crop sector there is an idea to create the so-called “smart farming”. It involves the management of land productivity, crops, labor and financial resources, the formation of an optimal logistics based on market conditions. Smart farming presupposes to create e-maps of fields including the information based on each field, its geographic area, crop capacity, agrochemical and agrotechnical properties (normative and actual), the state of plants in the appropriate phase of vegetation, and so on.

Moreover, the smart farming implies to develop special software for the analysis and acceptance of managerial decisions, as well as the sending of commands to the smart card, which load robotic devices and agricultural machinery for different agricultural operations. The concept of agriculture robotics provides the transition to intensive technologies of cultivation of agricultural crops, calculated on grain yields of 40-50 t / ha and obtaining high-quality products, to the so-called high technology, designed to achieve crop yields close to its biological potential (80- 100 kg / ha of grain). It gives an opportunity for the development of synergistic combination of mechanical engineering, electronic engineering, computer research, control theory and engineering systems, which aim to create, design and implement a system of machines and equipment of the new generation, based on the technology platform of mechatronics interests in agriculture, and to create a technological concept of an accurate crop and livestock production on the basis of local integrated digital control systems in conjunction with identification systems.

Smart farming provides a new level of creation of robotic systems, such as crops and livestock. As a result, it will equip agricultural sector with robotics machinery and equipment increasing ipso facto its productivity in 1.5-1.7 times and reducing the level of resource and energy consumption by 30-35%, which will contribute to the competitiveness of products in the domestic and foreign markets.

The main problems of the modern robotics are to create algorithms that would be synchronized with GPS data and to unify the chassis to work with any type of soil. The popular stereotype of farming as a low-tech sector is woefully out of date. Modern farmers should be considered as high-tech operators: they use GPS software to plan their fields, to guide field operations, and auto-steer systems to make tractors follow that GPS guidance without human hands (driveless machines). By the way, the transition to “smart farming” in agriculture is already in progress leveraging commodity parts and advanced software.

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