**Сельскохозяйственные дроны**

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**Agricultural drones**

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*Аннотация.* В статье рассматриваются преимущества использования дронов в сельском хозяйстве. Отмечается, что сельскохозяйственные дроны дают новые возможности для увеличения урожая и оптимизации процессов его выращивания.

*Ключевые слова:* сельскохозяйственные дроны, изображения, сенсоры, модули GPS, инфракрасный спектр.

*Abstract.* The article discusses the advantages of using drones in agriculture. It is noted that agricultural drones provide new opportunities to increase the yield and optimize the processes of its cultivation.

*Keywords:* agricultural drones, images, sensors, GPS modules, infrared spectrum

Agricultural drone is a relatively cheap device with advanced sensors and imaging capabilities. These green-tech tools are giving farmers new ways to increase yields and reduce crop damage.

Drone is simply a low-cost aerial camera platform: either miniature airplanes or, more commonly, quadcopters and other small helicopters. This aircraft is equipped with an autopilot using GPS and a point-and-shoot camera; software on the ground can stitch aerial shots into a high-­resolution mosaic map. Whereas a traditional radio-controlled aircraft needs to be flown by a pilot on the ground, in drone the autopilot does all the flying, from auto takeoff to landing. Its software plans the flight path, aiming for maximum coverage of the vineyards, and controls the camera to optimize the images for later analysis.

This low-altitude view gives a perspective that farmers have never had before. Compared with satellite imagery, it’s much cheaper and offers higher resolution. It’s also much cheaper than crop imaging with a manned aircraft, which can run $1,000 an hour. Farmers can buy the drones outright for less than $1,000 each.

The advent of drones is due largely to remarkable advances in technology: tiny MEMS sensors (accelerometers, gyros, magnetometers, and often pressure sensors), small GPS modules, incredibly powerful processors, and a range of digital radios. All those components are now getting better and cheaper at an unprecedented rate, thanks to their use in smartphones and the extraordinary economies of scale of that industry.

Drones can provide farmers with three types of detailed views. First, seeing a crop from the air can reveal patterns that expose everything from irrigation problems to soil variation and even pest and fungal infestations that aren’t apparent at eye level. Second, airborne cameras can take multispectral images, capturing data from the infrared as well as the visual spectrum, which can be combined to create a view of the crop that highlights differences between healthy and distressed plants in a way that can’t be seen with the naked eye. Finally, a drone can survey a crop every week, every day, or even every hour. To create a time-series animation, that imagery can show changes in the crop, revealing trouble spots or opportunities for better crop management.

Agricultural drones are becoming a tool like any other consumer device, and what started as a military technology may end up better known as a green-tech tool. Likely, before long on every farm we will see flying robots buzzing over our heads.

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