

MAIN DIRECTIONS OF SOFTWARE DEVELOPMENT IN THE FIELD OF
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Annotation. The work examines the development of software for drone control. It describes its features and ways of further development.

Formulation of the problem. Identifying innovative trends and directions for software development in drone control is necessary. Also, among these areas, it is necessary to characterize them and show the features of their influence on software development in the future.

Introduction. Several innovative trends and developments in drone control reflect both technological progress and changes in user needs and market demands. Let's look at some critical areas of development (Fig. 1) for software-based drone control in more detail.

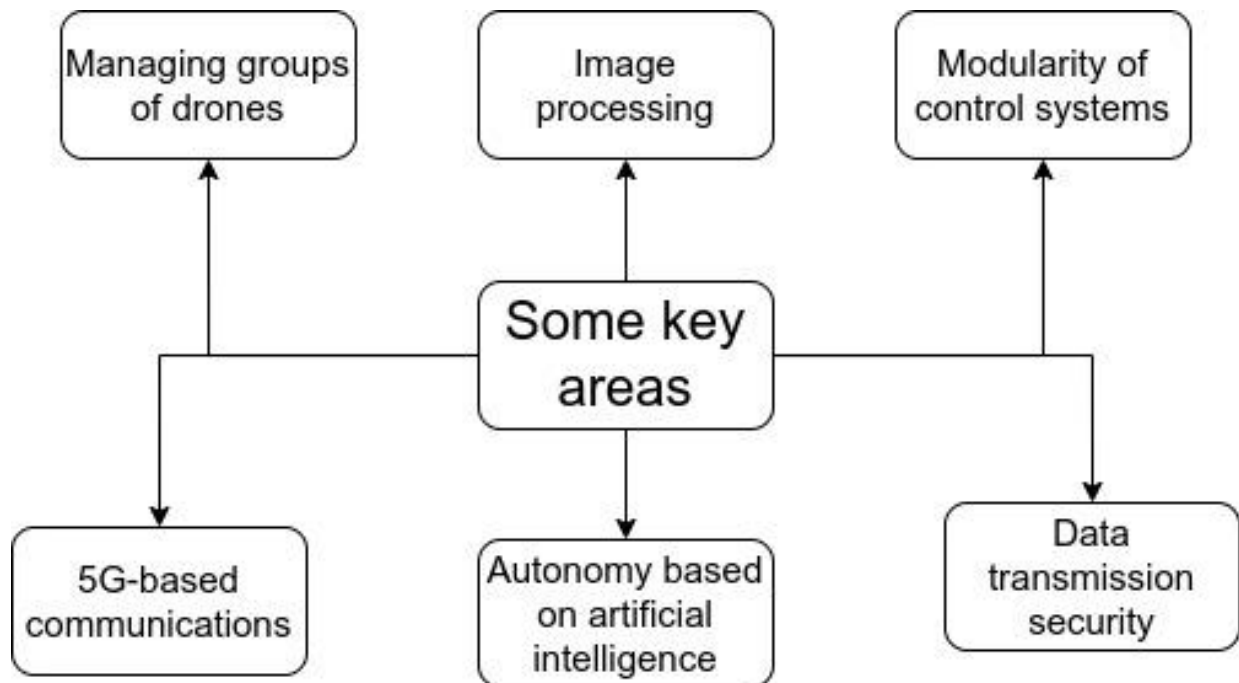


Figure 1. Some key developments for software-based drone control.

Description of some critical directions in the development of software-based drone control. Autonomy is based on artificial intelligence, which includes the development of algorithms to improve the autonomy of drones, promote independent decision-making, overcome obstacles, and complete tasks without operator intervention.

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Machine learning algorithms allow drones to adapt to environments and scenarios by learning from previous experiences. This facilitates more accurate decision-making in real-time. Drones with artificial intelligence software can perform complex tasks such as inspections, photography, and delivery, automatically adjusting their actions to achieve their goals. AI-powered algorithms analyze collected data in real-time to route, determine the best path to achieve a goal, and make action decisions without human intervention. Using such algorithms to detect and avoid obstacles, drones can autonomously avoid collisions, ensuring safe flight in challenging environments.

5G-based communications, which must integrate with 5G networks to provide fast and reliable communications, must effectively control drones over long distances and with minimal latency. 5G provides significantly higher data transfer speeds than previous generations of networks. This allows high-definition video and large amounts of data to be transmitted in real-time, which is critical for monitoring and controlling drones. One of the key benefits of 5G is its extremely low latency, which allows for almost instantaneous response to control commands. This is critical for tasks that require high precision and fast response, such as avoiding obstacles. Also, 5G provides a stable and reliable connection even in conditions with a high density of network devices. This ensures continuous drone control without loss of communication. Thanks to 5G's high throughput and low latency, drones can be controlled over much longer distances, expanding their potential applications, such as delivering goods or monitoring areas. Because 5G networks are designed to support many connected devices on a single network, these drones can scale image and video operations without compromising call quality. Data transmission security, based on advanced encryption methods and data protection from unauthorized access, is necessary to ensure the safe control of drones.

Creating modular and adaptable control systems for drones allows them to be easily and quickly configured for different tasks. This modularity ensures high efficiency in integrating the latest technologies and improvements. Thus, modular and adaptable control systems make drones more flexible and multifunctional, expanding their applications and simplifying innovation.

Developing algorithms to coordinate groups of drones to work together effectively is a critical management task. Coordinated teams of drones can perform complex missions more efficiently than single drones by distributing task processing and covering large areas together. Coordination algorithms also help prevent collisions between drones during flight and ensure safe interaction within the group and with other objects in the airspace. This coordination allows for optimal distribution of tasks and resources between drones, increasing overall efficiency and reducing mission costs.

Conclusions. The work identifies innovative trends and directions for software development in drone control. Characteristics were obtained for these areas, and their influence on software development in the future was shown.