PROPOSALS FOR IMPROVING THE SAFETY OF FLIGHTS OF A GROUP OF UNMANNED AERIAL VEHICLES (DRONES) IN URBAN AREAS BASED ON MACHINE LEARNING TECHNOLOGIES

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The use of unmanned aerial vehicles (UAVs) of aircraft and multicopter type in urban areas solves the problem of rapid data collection and transmission and allows for shooting (video) in hard-to-reach and dangerous places both in operator-controlled and fully automated modes [1].

Such UAVs are used to monitor the construction (development), technical condition and safe operation of both energy and utility facilities (power lines, gas pipelines and heating mains), infrastructure facilities, including critical infrastructure, railway facilities, road works, etc. In order to increase the efficiency of the work being carried out, several drones (swarms) are used, the full cycle of flight and landing and the collection of the necessary data is controlled by the operator (group). Provided that a group (swarm) of drones performs the task automatically (independently), their flight is pre-planned with the development of appropriate specialised software (SS).

However, such software cannot fully consider all the factors that affect the safety of UAV flight (changes in meteorological conditions, changes in the distance between UAVs and nearby objects, etc.).

Consequently, the development of proposals for improving the safety of UAVs (drones) in urban areas based on machine learning technologies is an urgent scientific task.

The article analyses the main technical characteristics of aircraft and multicopter UAVs used by the world's leading countries to monitor urban development. Three main types of machine learning are considered: supervised learning, or learning with a teacher, unsupervised learning, or learning without a teacher, and reinforcement learning. It is emphasised that such learning methods as active, multitasking, diverse, transfer, etc. are being developed. Scientific and technical proposals for improving the safety of UAVs (drones) in urban areas based on machine learning technologies have been developed.

References:
1. Коломійцев, О., Альошин, Г., Пустоваров, В., Третяк, В., Никорчук, А., & Споришев, К. (2020). Підвищення точності сегментації міських будов на цифрових космічних та аерофотознімках при автоматизованому моніторингу міського середовища. Збірник наукових праць ΛΌГОΣ, 40-45. https://doi.org/10.36074/09.10.2020.v2.10.