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UAV APPLICATION FOR ENVIRONMENTAL MONITORING

Recently, research on robotic systems and unmanned aerial vehicles (UAVs) for environmental monitoring has been actively conducted. Among them, research on simultaneous localization and mapping algorithms and visual inertial odometry algorithms are actively conducted [1].

Another prospective issue is application of UAV swarm acting on the 5G network and Internet of things. They are combined through the control terminal, which unite distributed submodels into a single model. Such concept is extremely useful in unstable and dangerous environments and hard weather conditions. In this case the main problem is a control of UAV network in automated, flexible and scalable way.

Ukrainian authors [2] developed a useful model for radiation monitoring. The key feature of this model is remotely controlled multi-channel radio monitoring system. It structurally consists of three subsystems, using control modules and direction finding modules that expand lower limit of the operating frequency range of radio monitoring. In addition such method increase number of broadband reception channels, sensitivity and selectivity, single channel viewing bands and interception channel bands. Therefore the use of network switches, communication channels, control computers, technical analysis of radio emissions and processing provide remote continuous control over the functioning of emissions in a wide frequency range with the same overall characteristics.

Methods of thematic segmentation of images from airborne optical-electronic surveillance (OES) systems based on ant algorithms are also extremely promising for assessing the state of the environment [3]. Features of image formation from airborne OES systems have the following features: presence of a large number of heterogeneous objects that belong to different structural and spatial elements; each type of object has its own characteristics; objects are morphologically complex structures, compact and low-contrast compared to the background; large volume of different data; limited volume or complete absence of a priori information about the number and probabilistic characteristics of objects of interest; presence of factors that distort the OES (noise, scale change and rotation); inhomogeneities of brightness values within the corresponding structural and spatial elements.

Also, multilevel methods of processing electron diffraction and x-ray signals in computerized information and measurement systems are widely used to increase the accuracy and speed of processing electron diffraction and x-ray signals. In [4], the concept of multilevel signal processing in computerized information and measurement systems is proposed, which consists in calculating and analyzing additional signal levels, complex and step-by-step signal processing by a set of interconnected methods, which ensures an increase in their speed or accuracy by an order of magnitude.

Introduction of such methods into the technology of remote environment monitoring allows increasing its efficiency. Taking into account existing environmental challenges and pollution by military dangerous objects (mines, artillery shells, rockets, etc) application of UAV for environmental is an obligatory measure aimed at improvement of safety for humans, animals and nature. Such UAVs can be applied in the dangerous or highly polluted zones in order to get necessary data. It is the first link in the chain of data transmitting, processing and further modeling/forecasting/analysis. Now UAVs are used in the aims to monitor environment. From socio-economic point of view application of UAV for environment monitoring is also beneficial. This sphere is new for our country and active development of this branch will create new highly qualified work places with significant income. So, successful implementation of such type project requires not only enthusiasm of activists but state government support to be efficient and fast growing.

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