**ON THE ISSUE OF PREVENTING THE EMERGENCY OF EMERGENCY SITUATIONS DUE TO THE PENETRATION OF CRITICAL INFRASTRUCTURE FACILITIES OF UKRAINE BY UNMANNED AIRCRAFT**

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Analysis of emergency situations at critical infrastructure facilities [1, 2], which include nuclear, thermal and hydroelectric plants, nuclear, radiation and chemically hazardous facilities, shows that they occur mainly due to the human factor. Experts in the field of anti-terror believe that the possibility of malicious intent cannot be excluded in this factor.

In the conditions of hostilities on the territory of our country, it is necessary to be ready for a sudden terrorist impact on all objects of critical infrastructure of Ukraine. One of the trends in the development of terrorist scenarios at objects protected by critical infrastructure is the use of various small manned and unmanned aerial vehicles to carry out terrorist acts.

To solve the task, the work developed a structural and logical model for managing an emergency situation of a terrorist nature at an object protected by the critical infrastructure of Ukraine, which was caused by the appearance of small unmanned aerial vehicles, designed for the development and constant implementation of procedures of an organizational and technical nature that ensure security of the protected object in the event of the appearance of small unmanned aerial vehicles. It consists of fourteen blocks located on nine hierarchical levels and forms a management circuit for solving one of the separate tasks of managing an emergency situation of a terrorist nature at an object protected by critical infrastructure of Ukraine.

The next step is to create a mathematical model for detecting signals reflected from small unmanned aerial vehicles using active optical systems that use the phenomena of absorption and scattering of light in optically transparent media, which is a system of four analytical dependencies.

The next step was to develop a mathematical model for the detection and identification of small unmanned aerial vehicles using passive optoelectronic systems, which is a system of five analytical dependencies. The first and second dependencies describe the process of identifying the detected reflected signals according to the criterion of the minimum mean square of the error and the criterion of the maximum signal-to-noise ratio, when performing the third dependency, which requires that the time spent by the air target in the detection zone of the lidar is greater than the detection time of the radio electronic system. The fourth dependence shows the dependence of lidar detection time on the speed of its space scanning and the recognition coefficient of its receiving device. The fifth allows you to calculate the value of the recognition coefficient.

The results of all field experiments performed using a specially designed laboratory setup and theoretically calculated values of expected target detection activities as part of numerous experiments are located within the confidence intervals calculated according to the Student's criterion with a reliability of 0.99, which indicates a good convergence of the experimental results and theoretical calculations.

This, in turn, confirms the reliability of the mathematical model for detecting signals reflected from small unmanned aerial vehicles using active optical systems that use the phenomena of light absorption and scattering in optically transparent media and the mathematical model for detecting and identifying small unmanned aerial vehicles using passive optoelectronic systems.

**References**

1. Peter Janku, Zuzana Kominkova Oplatkova, Tomas Dulik, Petr Snopek, Jiri Liba. Fire Detection in Video Stream by Using Simple Artificial Neural Network. MENDEL— Soft Computing Journal, Volume 24, No. 2, 2018

2. Frizzi, S., Kaabi, R., Bouchouicha, M., Ginoux, J., Moreau, E., Fnaiech, F.:Convolutional neural network for video fire and smoke detection. In: IECON 2016 - 42nd Annual Conference of the IEEE Industrial Electronics Society.pp. 877–882 (2016).