

The development of an automatic research station for urban environment monitoring

S.S. Shesterina

Samara National Research University, Samara, Russia

Background. Currently, the issue of ecological situation in the urban environment is acute. At present, environmental monitoring of urban environment is carried out mainly with the help of stations operating according to outdated methods. Therefore, the improvement of urban environment monitoring systems becomes a necessity. Due to the abundance of variations of tools for environmental monitoring, the ecologist faces the problem of choosing the best tool for the job. In this case, drones become a useful and convenient tool with rich functionality. For example, in 2020, drones began to be used for environmental monitoring of the Port of Vladivostok [1]. However, the main problem of introducing drones into ecological monitoring of urban environment is people's reaction to it.

Aim. To develop an automatic research station for ecological monitoring of the urban environment based on the work of unmanned aerial vehicles. To analyze the opinion of Samara residents regarding the introduction of drones in the ecological monitoring of the urban environment by means of a survey.

Methods. The goal was solved by creating a three-dimensional model in the Compass three-dimensional design system. The drone for environmental monitoring is presented as a six-rotor drone with the functionality of collecting air, water or soil samples, monitoring the cleaning of garbage cans with the help of a camera, and emergency landing to warn residents of danger. The automatic research station is presented as a hemisphere with a research module in the center. The research module consists of an automatic laboratory and a compartment for storing and charging the drone. In order to find out the reaction of Samara citizens to the use of drones in environmental monitoring of the urban environment, an electronic survey was developed. The survey data were processed and analyzed.

Results. At the first stage of the research, three-dimensional models of the drone and the automatic research station were developed. At the second stage, the basic principles of the device's operation were outlined. A survey was also conducted among the residents of Samara. The survey data showed that the majority of respondents believe that they live in a place with poor environmental conditions and would like to familiarize themselves with the environmental indicators of the city. More than 80 % of respondents are interested in the work of an automatic research station for environmental monitoring, but only half of respondents are ready for drones to work in the city.

Conclusions. The automated research station and drones were designed with the Compass three-dimensional design environment. All their functionality was also outlined. The data obtained during the survey showed that the majority are interested in the work of the research station, but only half of them are loyal to the work of drones in the urban environment, which slows down the development of the industry.

Keywords: ecology; automatic research station; urban environmental monitoring systems; drones; environmental monitoring.

References

1. Дрон начали использовать для экологического мониторинга акватории порта Владивосток [Internet]. В: Interfax. Россия. Режим доступа: <https://www.interfax-russia.ru/index.php/far-east/news/dron-nachali-ispolzovat-dlya-ekologicheskogo-monitoringa-akvatorii-porta-vladivostok>. Дата обращения: 01.02.2024.

Information about author:

Sofia S. Shesterina — student, group 6104-010302D, Informatics and Cybernetics Institute; Samara National Research University, Samara, Russia. E-mail: sofia.djera@gmail.com

Information about the scientific supervisor:

Yulia E. Mishina — PhD (Philology), Associate Professor, Department of Foreign Languages and Russian as a Foreign Language; Samara National Research University, Samara, Russia. E-mail: mishina.yue@ssau.ru