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**REVIEW OF THE POSSIBILITIES OF USING  
UNMANNED AIRCRAFT**

**Abstract:** This article presents the possibilities of using unmanned aircraft for transport and inspection purposes. The article is a kind of introduction to the subject of aircraft, which are developed more in the article titled "Analysis of the possibility of using autonomous aircraft to deliver parcels - route optimization".

## **1. Introduction**

Nowadays, the popularity and interest in courier services among customers is constantly growing. This is the reason for introducing new or improving current services by courier companies to the market.

The main idea of the courier service has been the same for many years - fast picking up the parcel from the sender and delivering it to the recipient in the shortest possible time. In these days, information systems for shipment tracking are not enough, now the latest trend is the implementation of autonomous aircraft carrying out the delivery process itself.

In the last few years, the costs of electronic components and their minimization have resulted in a significant increase in the use of so-called drones. The production of more efficient batteries with shorter charging times and less mass increased the flight time and enabled the transport of more shipments.

In this article, the author will present current trends related to the use of unmanned aerial vehicles for inspection purposes and as systems supporting the delivery of goods. The main goal of current research is to optimize the operational parameters of such a system, consisting in shortening delivery time, planning a collision-free path, choosing a safe height or minimizing energy consumption are key parameters that should be subjected to detailed analysis.

## 2. Possibilities of using unmanned aerial vehicles

By word drone it is determined an unmanned airship, remotely controlled or operating autonomously. The first devices of this type were created and tested since the First World War in the form of maneuvering missiles. An example of such construction solutions can be maneuvering missiles with a jet propulsion marked as V-1. Currently used IT techniques and the development of engineering thought have resulted in the creation of innovative techniques for targeting and controlling the trajectory of unmanned airships.

The difference between the currently used drones and the maneuvering missiles mentioned above depended mainly on this that the latter could be used repeatedly. The controlled maneuvering missiles were often used to learn and train anti-aircraft units and were usually not reused.

In the old days, war was won mainly by parties that had a significant and larger well-equipped army. Currently, apart from the number of fighting soldiers, what counts above all is modern innovative equipment, which can undoubtedly include the unmanned airships, which are currently equipped with technical solutions, e.g. for detecting the enemy on the basis of monitoring or programs for computer identification of objects with elements of artificial intelligence.

Works concerning the identification and control of objects are carried out by numerous scientific and research units around the world. Particularly noteworthy are the work of Professor Ivan Gostev [1,2], scientist of the National Research University Higher School of Economics, Faculty of Business Informatics, from Moscow. His most important works concern:

- Pattern Recognition,
- Signal, Image and Video Processing,
- Image Segmentation,
- Image Recognition, and others.

The image can be recorded directly from monitoring using high resolution cameras, satellites or drones. Despite the fact that airships called drones were reserved exclusively for military purposes, the drones are now very often used in the civil sphere. Currently, mainly civilian applications of drones include:

- taking pictures from above,
- monitoring of hard to reach places and areas,
- specialized measurements and analyzes of particularly hazardous chemicals, including very popular measurements of air pollution. Thanks to these measurements, numerous smog maps are created in areas particularly at risk of this phenomenon,
- inspection flights, for example construction infrastructure, roads, bridges, high chimneys.

The use of drones contains a very wide spectrum of possibilities, and the only limit is the resourcefulness of constructors and designers.

Leading the review of the literature concerning the civilian applications of the drones, there have been noticed numerous innovative designs. The most interesting include the project of doctoral student Alec Momont from Delft University of Technology entitled "Flying defibrillator". Design of an unmanned, autonomously navigating flying drone that can quickly deliver a defibrillator where it is needed [5].



*Fig. 1. Dron ambulanse [5]*

On Fig. 1, there is shown the drone prototype that can quickly deliver a defibrillator to the place of an accident, finds the location of the patient using the caller's cell phone signal and reaches it using the GPS location. Another solution is the Iranian project Pars [2], dedicated for use in water rescue. The main purpose is to transport rescue equipment to drowning people.



*Fig. 2. Pars robot developed by RTS Ideas in Iran [3]*

The next type of modern drones are the drones for transporting parcels and packages at courier companies. This application was the reason to undertake scientific research on the analysis and the possibility of optimizing the trajectories of the unmanned airships. At amazon.com, an American online sales company, you can read about the ongoing research on this application.

At the largest Polish technical universities [4], there continue works and projects related to the modernization and optimization of technical parameters of the unmanned airships. The Silesian University of Technology present in this group can boast of great

achievements in this field: there was constructed, among others, a drone for search and rescue missions.



*Fig. 3. Drone of the team of the Silesian University of Technology [4]*

Built by the High Flyers team from the Silesian University of Technology, the drone took fifth place in the international UAV Challenge Medical Express competition. The main task of the competition was to carry out a search and rescue mission and transport the patient's blood sample. At the Institute of Engineering Processes Automation and Integrated Manufacturing Systems, Faculty Of Mechanical Engineering, the Silesian University of Technology undertakes research related to the automation of industrial systems and intelligent systems. The Institute's researchers also cooperate in other foreign centers [1,2]. This article is part of the work carried out by the author on the study of the autonomous airships working as a parcel delivery system in an urban environment.

### 3. Conclusions

This article should be considered as a literature review on the current use of unmanned aerial vehicles. It is an introduction to another article, published in the International Journal of Modern Manufacturing Technologies in 2019 under the title "Analysis of the possibility of using autonomous aircraft to deliver parcels - route optimization", in which the authors discuss topics related to optimization of the flight route, minimizing energy consumption, minimizing the weight of the device.

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