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DRONES AND THEIR APPLICATION IN LOGISTICS

LEVENTE BONCSÉR[1]–ÁKOS CSERVENÁK[2]–PATRICK KRÖPFL[3]– CHRISTIAN LANDSCHÜTZER[4]

Abstract: *The widespread adoption and utilization of drones often raise questions regarding what exactly constitutes a drone and the characteristics that categorize a device into this category. In the first section, we attempt to define the concept of a drone, emphasizing its diversity and the misconceptions surrounding its terminology. The second section introduces classifications based on the main features of drones to better understand their application areas. The third and fourth sections examine daily and military uses, as well as the logistical role of drones, highlighting emerging challenges and limitations. Finally, we summarize the potential dangers of drone use, legal restrictions, as well as public opinion and cybersecurity concerns, which frequently hinder their broader adoption and application.*

Keywords: *drones, logistics, applicability*

1. INTRODUCTION

Due to the terminology misunderstandings that occur and the variety of devices, clarifying the concept of a drone is crucial for industry experts and users. Confusion between the names of certain types is particularly common, and it is not uncommon for some devices to be mistakenly referred to as drones, while others are incorrectly labeled exclusively with this term. This is due to the diverse design and functions of drones, which vary across a wide spectrum and sizes. In the second chapter of the article, accordingly, the groupings of drones, highlighting the most important characteristics are reviewed. In the third part, the everyday and military applications of drones are examined and their role in the logistics sector is detailed, highlighting the diversity and efficiency of the tasks that can be performed with these devices. The study also highlights the potential dangers of drone use and legal restrictions that often hinder their wider adoption. Public opinion and cybersecurity risks are also important considerations to consider when using drones in logistics.

2. EXPLORING DRONE TECHNOLOGY: DEFINITIONS AND VARIATIONS

The question may be raised regarding what exactly constitutes a drone, as various definitions are encountered in daily reading and conversation. The increasing popularity of drones also results in a growing familiarity with incorrect definitions. For instance, several synonymous terms, such as unmanned aircraft, remotely piloted aircraft, and drones, are used, but these definitions are not entirely accurate, as there are drones that operate not only in the air but also underwater. Drones encompass a wide range of vehicles, each with its own definition,

[1]BSc student, University of Miskolc, Institute of Logistics
boncser.levente@gmail.com
[2]senior lecturer, University of Miskolc, Institute of Logistics
akos.cservenak@uni-miskolc.hu
[3]university assistant, Graz University of Technology, Institute of Logistics Engineering
kroepfl@tugraz.at
[4]associate professor, deputy head, Graz University of Technology, Institute of Logistics Engineering
landschuetzer@tugraz.at

but they all share one common characteristic: the ability to move autonomously without direct human intervention. It should be noted that although they are often operated by humans, however, human is not physically present in the vehicle [1].

2.1. Technical possibilities

A drone system typically consists of four main components, including an onboard processor; onboard sensors; an autopilot system; and drone hardware. A drone can fly on autopilot along a pre-programmed route, passing through so-called waypoints. A drone flying on autopilot continuously monitors its position and corrects it even thousands of times per second. An extremely important function is the ability to detect and avoid. This feature can help detect collaborative and non-collaborative objects, including machines, people, and structures close the drone, and perform evasive maneuvers if a collision threatens its route. The collision avoidance function should also be considered as a precautionary safety measure and should therefore be integrated into drones. [2]

2.2. Classification of aerial drones

Since there are drones of different sizes and equipment, they can be grouped according to many criteria. The following are the most common classifications.

2.2.1. Classification by weight

Drones can also be divided into groups based on weight, including as follows. The more weight it has, the higher its payload, flight time and range [3]:

- Super heavy: This group includes drones that weigh over 2000 kg.
- Heavy: These include those that are lighter than super heavy drones, i.e., under 2000 kg, but over 200 kg.
- Medium: This category includes drones that weigh between 50 and 200 kg.
- Lightweight: Drones weighing between 5 and 50 kg can be found here.
- Micro: Within this grouping, the types with the lowest weight are included, those under 5 kg

2.2.2. Classification according to buoyancy generation

The most common types are fixed-wing drones and multi-rotor drones. The most important properties and areas of use of these are detailed as below.

Fixed-wing system. Fixed-wing, or rigid wing, is an aerospace term used to describe an aircraft that uses a combination of fixed, static wing and forward velocity to generate buoyancy. Such rigid wing aircraft are also aircraft in the traditional sense. Drones with this system are usually used in the military industry.

Multi-rotor system. Multi-rotor drones are a subset of rotary-wing vehicles. Rotary-wing vehicles are aircraft that use rotary wings to generate buoyancy. Typically, drones of this type can use at least four, but even six or eight rotors for stability. An example of this type of vehicle is a conventional helicopter. Such drones are widely used, and average drone users also have such devices most of the time.

Some drones cannot be classified as either fixed-wing or multi-rotor drones, either because they do not belong to either category or because they are hybrid, meaning that both systems' characteristics are present on them.

Hybrid type. This type uses both systems at the same time, so advantage of both can be taken. A hybrid quadcopter (see Fig. 1) is a type that uses multiple rotors for take-off and landing, and can travel longer distances using its fixed wings.

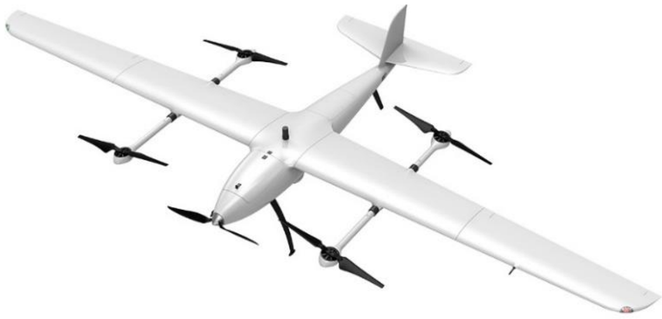

Figure 1. *Hybrid quadcopter [4]*

Neither fixed-wing nor multi-rotor. A good example of a drone that is neither fixed-wing nor multi-rotor is the ornithopter shown in Figure 2, which mimics the wing movements of insects or birds. They are similar in size to the bird or insect whose movements they imitate. For the most part, these are still under development. There is also a drone with a ducted fan, which includes a propeller surrounded by a tubular casing for easier control and increased efficiency. An example of such a drone is the T-Hawk illustrated in Figure 3, previously used in the United States.

***Figure 2**. Ornithopter [5]*

Figure 3. *T-Hawk [6]*

2.2.3. Categorization by automation level

Since drones are unmanned vehicles, there is a certain level of autonomy for each type. Four levels of autonomy are distinguished in this case [26]:

- The first level is a fully human-controlled system, where all decisions are made by the operator.
- The second level is a human-mandated system that can perform multiple operations independent of human control.

- The third level is the human-supervised system, this system can perform many tasks if it receives permission and instructions from a human. Both the system and the monitor can initiate actions based on the detected data.
- The last level is the fully autonomous system, this system receives instructions from a human and translates it into specific tasks without requiring further human intervention. In case of emergency, human intervention is possible. These systems can be divided into further two groups as below.
  - *Automatic:* An automatic system is a fully pre-programmed system that can perform pre-programmed tasks independently. The automatic system also includes aspects such as automatic flight stabilization.
  - *Autonomous:* Autonomous drones are able to respond to unexpected situations using a pre-programmed set of rules that support decision-making. The automatic system is not capable of such autonomy.

2.2.4. Categorization by energy source

The energy source of a drone depends heavily on its wing type, as a multi-rotor system usually cannot move as much mass as a fixed-wing one. There are four main groups of energy sources: conventional aviation fuel, battery cells, fuel cells and solar cells [27].

Aviation fuel (kerosene). It is mainly used for large, fixed-wing drones. Such drones are used by the military in most cases.

Accumulator. It mainly serves to power smaller, multi-rotor drones. These drones have a short range and shorter operating time than drones that use kerosene. These drones are often for entertainment purposes, so it is practical to operate the drone with a rechargeable battery cell.

Fuel cell. A fuel cell is an electrochemical device that converts chemical energy into electrical energy. This conversion is efficient and environmentally friendly. Fuel cells are currently rarely used in drones. Only fixed-wing drones can be equipped with such a cell, due to the relatively large mass of the cell. A significant advantage of using a fuel cell is that drones can fly longer distances without recharging.

Solar cell. In the current drone industry, drones using solar energy are rare. Drones using solar energy are mainly fixed-wing. Due to the low efficiency of current solar cells, these cells are generally not suitable for many multi-rotor drones. However, solar cells are suitable for smaller drones that mimic the wing movements of birds/insects. Solar-powered drones received a lot of media attention when Google and Facebook did deals with the makers of these drones. Their goal was to permanently release solar-powered drones into the atmosphere to make it easier and massively for people to connect to the Internet [7]. An example is shown in Figure 4.

Figure 4. *Solar drone [8]*

3. TYPICAL AREAS OF USE OF DRONES

The development of unmanned aerial vehicles (UAV) for civil (non-military) use has accelerated significantly in the last two decades. The control and orientation capabilities of drones have improved a lot in recent years, while the performance of the devices has also increased. From hobby flying to industrial, commercial and disaster prevention tasks, devices of different categories, sizes can be found anywhere.

3.1. Security tasks

Drones offer a security solution in the case of mass events, where, similarly to cameras in public areas, drone footage can be combined with a facial recognition system to obtain hitherto inaccessible information. In such cases, by using several drones simultaneously and using the multi-camera data processing system known from football stadiums, different persons and groups can be identified and tracked that pose a threat to security, as in the case of illegal border crossers, for example, it is already used by Hungarian police to identify irregular vehicle maneuvers, for example to detect drivers using the emergency lane irregularly on congested motorways.

3.2. Environmental use

Drones can play a very important role in performing environmental tasks in order to perform the given tasks as sustainably and efficiently as possible.
Aquatic habitat survey. This is a particularly difficult task, but it can be done much more easily from above. If this task is performed with conventional flying vehicles, it must be taken into account that it causes a lot of noise, and the movement of the vehicles can easily disturb the living creatures in the area. For this reason, normally a picture cannot be obtained as accurately during the survey as when it is done with the help of a drone.
Aerial surveillance. The initiation of aerial surveillance is necessitated by illegal actions carried out by humans in specially protected areas. Drones are often used to preserve protected areas and wildlife. In such cases, the effectiveness of the observation depends largely on the visibility and sound of the monitoring device. Since drones are often difficult to spot, the number of such actions may decrease. [9]

3.3. Military tasks

Very small drones (up to 50 cm in size) are perfect for espionage and, in theory, chemical or biological warfare. Large drones (small plane size) are usually used to gather information and perform tasks where minimizing the loss of own forces is a priority. Drones used at close distances (range up to 50 km and operating time from 1 to 6 hours) often perform surveillance tasks. Long-range drones can reach altitudes of nearly 10000 meters above sea altitude and can make observations from an altitude of 7600 meters at speeds of up to 130 km/h. [10]

3.4. Meteorology

In the field of meteorology, various tasks can be carried out using unmanned aerial vehicles. Some of these tasks is discussed in this chapter.

Boundary layer measurement. The planetary boundary layer is that part of the troposphere that is about 0.1-2.5 kilometers close to the surface, in which thermal and mechanical factors on the surface affect the atmosphere. The height of the boundary layer can vary, so it is important to measure it, from which turbulent currents can be inferred. During measurements, temperature, air humidity and wind profiles are determined.

Wind measurement. There are sonic anemometers, as shown in Figure 5, without moving parts [11], i.e., anemometers using sound pulses, which are specially optimized for unmanned aircraft. There is also a separate methodology for measurements made by rotary-wing and fixed-wing drones.

***Figure 5**. Sonic anemometer [11]*

Weather detection. To carry out this measurement, a special radio probe, namely the seeding probe, is used. The measurement starts from an aircraft that flies towards the area to be measured, and after release, a parachute connected to the seeding probe ensures even descent. The seeding probe includes GPS receiver, radio transmitter, temperature sensor and humidity sensor. Such measurements are made by the Global Hawk fixed-wing unmanned aircraft used by NASA [12].

3.5. Humanitarian tasks

For various reasons, drones have enormous potential for humanitarian tasks. They can also be useful in urgent public health areas, as they can easily transport medical tests, vaccines or medicines to remote and hard-to-reach areas that are difficult or impossible to reach by other vehicles. Drones may also be able to save the lives of disaster victims, reaching remote and isolated areas due to their high speed and accessibility. In disaster situations, drones can be used to distribute humanitarian aid, assess damage and search for survivors. Drones equipped with infrared cameras enable rapid search for missing persons, provide better guidance to rescue forces, and reduce overall rescue time [13].

3.6. Other uses

In addition to traditional applications, drones can also be used for some unusual tasks. For example, Tokyo police have unveiled anti-drones designed to neutralize unwanted or offensive drones. If a suspicious drone is detected, the controlling person is firstly alerted. In the event when the operator is not found or the flight continues despite warning, an interceptor drone, similar to that shown in Figure 6 [14], is launched to intercept the suspicious drone. In addition, drones can serve as runways for other drones, remove or scare birds away from airport runways, or provide the ability to clean windows, stormwater drains and solar panels [15].

Figure 6. *Interceptor drone [14]*

4. DRONES USE IN LOGISTICS

The approval of drones for commercial use has boosted development in several industries, including logistics and parcel delivery.

4.1. Parcel delivery

According to statistics from parcel delivery companies and major e-commerce companies, 80% of parcels weigh less than 2.3 kg, so even a drone can deliver it to the customer within 30 minutes in an average populated country [28]. However, the role of logistics drones can be significant primarily in the case of isolated settlements, where the work of courier services may be hindered by various limitations. Such difficulties can include adverse road conditions, traffic obstacles, large elevation differences or bad weather. Islands, mountain settlements and even areas affected by natural disasters can become more easily accessible, which can only be reached very slowly or not at all by conventional road or watercraft. In 2017, a drone was successfully tested which can be launched from the roof of a courier car, delivers the package autonomously and then returns to the vehicle, while the courier person can arrange further deliveries along its route.

Figure 7. *UPS delivery drone that can land on top of a courier car [16]*

The courier car shown in Figure 7 has a dock on top, where the drone charges itself and lands here with a special basket mounted on the bottom of the drone hanging in the car, so the courier car can attach the package to be delivered to the drone from the interior of the vehicle [16]. The maximum flight time of this drone is 30 minutes, so it can deliver a package weighing up to 4.5 kg to a target 10 km away and then get back to the dock [17].

4.2. Passenger transport

A Chinese-made drone successfully conducted several test flights in Dubai in 2017. The drone taxi "Ehang 184" illustrated in Figure 8 is electrically powered and capable of a speed of 63 km/h, transporting a person weighing 100 kg and a small suitcase [18]-[19].

Figure 8. *Ehang 184 [19]*

4.3. Inventory record

There are companies where it is possible to keep stock with a drone. In [20], a drone inventory monitoring system at the decenter of a logistics service company in Slovakia was tested. The used drone included a proximity sensor, gyroscope, camera, and GPS receiver. In this case, the drone could not be controlled via GPS position, since no GPS signal entered the warehouse under examination. Hence, the positioning issue could only be resolved by tracking the drone's movement. The unit loads placed on the shelves of the utilized shelving system were equipped with QR code identifiers, which the system could recognize and interpret. This was achieved by halting the drone upon detection and capturing an image within the live feed, which could be interpreted by the scanning software of the operating device. An illustration of such a drone is provided in Figure 9.

Figure 9. *Inventory control drone [21]*

4.4. Transport in healthcare

In the Netherlands, prototype rescue drones demonstrated the delivery of defibrillators. Flying at around 97 km/h, drones can reach patients within a radius of nearly 12 square kilometers within 1 minute. This takes an average of 10 minutes for conventional emergency services. The drones track emergency calls back and use GPS to navigate. A paramedic can use the image broadcast live by a camera on the drone to instruct a layman from a control room on what to do to properly care for the patient. Most of the medical items carried by drones are medicines, blood, and vaccines. It is possible that the transport of defibrillators, oxygen and insulin can also be solved in this way with the rescue drone.

From January to March 2016, DHL's third-generation Parcelcopter transported more than 130 packages of urgently needed medicines or sports equipment between two alpine villages. The transport took 8 minutes, while by car, in winter normally it is a 30-minute journey. This time difference can be significant in a medical emergency [22].

5. Drone use challenge

The use of drones raises complex moral and legal aspects. Regulations related to drone operations, including airspace restrictions and privacy concerns, should be carefully examined to ensure responsible use.

5.1. Cybersecurity threats

Military drones are vulnerable to cyberattacks, which poses a risk to the security of used data. Large-scale cybersecurity measures need to be put in place to protect drone systems and prevent unauthorized access or control.

5.2. Public opinion

The use of military drones raises public concerns about civilian casualties, invasions of privacy, and the possibility of autonomous decision-making. Transparent communication and cooperation with the public are key to building public trust and tackling misconceptions [23].

5.3. Hazards

The high frequency of use of drones carries a high risk. The main danger is a drone falling from a height, which can be caused by battery drain, weather conditions or collision and technical issues. These risks can be prevented, and measures should therefore be taken. Battery status and other telemetry data, including temperature, can be monitored remotely using the system. If any parameter exceeds the safe value, an alert must be raised. This signal allows, for example, an emergency recall of the drone. However, software based on sensors and flight path, as well as constantly updating detected obstacles, is responsible for avoiding obstacles.

In some cases, civilian drones can violate human rights by equipping them with cameras, night vision devices and various sensors that facilitate espionage. While they are widely used in municipal services (including police) to control civilians, they can pose a serious threat to human rights. The potential risks associated with the widespread use of drones require complex solutions and conscious regulation that effectively protect citizens' privacy [24].

5.4. Legal restrictions

In Hungary, the current regulation in force since 2021 applies to the use of drones. The new regulation follows the trend of increasing the number of users today. The Act was amended in 2020 to include the relevant rules, its framework is represented by European Union regulations published in 2019. The drone usage rule is different in each category. There is the open category, which includes many hobby drones, as well as drones for industrial use. The basic requirement for this category is that you can move no more than 120 meters from the nearest point of the earth, the person controlling the drone without binoculars must constantly follow the device. The devices must not fly over crowds of people and also must not approach outside persons. The rule also separates the special category for drones weighing more than 25 kg, which are used to inspect long pipelines, survey highways or other facilities. The use of drones in this category is subject to notification or licensing. The third category is the category subject to authorization, which encompasses cases where flying over crowds of people, for example at a festival or other event, or transporting dangerous goods or passengers is involved. In this case, serious theoretical and practical knowledge is required, and the drone needs appropriate official certification.

By law, all drones which are not toys must also be registered and the operating individual or legal entity must register, too. Drones weighing less than 120 grams, not having a data recorder, and capable of moving within 100 m of the remote pilot are considered toys.

The drone pilot exam covers flight safety, airspace restrictions, air traffic regulation, as well as the limits of human performance, operational procedures, and other related information.

In case of irregular drone use, the authority may impose fines, including fines for flying in built-up areas without occasional airspace, for not registering, flying in prohibited airspace, for failure to report and for unauthorized data recording [25].

6. SUMMARY

Drones are extremely versatile devices that can make work easier and more efficient in many areas, as well as provide people with entertainment. Understanding the various types of drones and their specific applications enables users to unlock their full potential. Drones are capable of performing a diverse range of tasks, including environmental protection, transportation, military reconnaissance, warehouse management, meteorological measurements, and even passenger transport. With advancements in technology, enhanced power efficiency and broader utilization of drones are anticipated, fostering further innovation. Consequently, drones may increasingly play pivotal roles in both everyday life and across diverse industrial sectors.

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References

[1] Szabó, A. (2018). *Drones in our everyday life (in Hungarian).* Vojvodina Hungarian Scientific Society, Subotica, Serbia

[2] Tariq, U. (2021). Applications of drones for safety inspection in the Gulf Cooperation Council construction. *Engineering, Construction and Architectural Management*, **28**(9), 2337-2360, https://doi.org/10.1108/ECAM-05-2020-0369

[3] Chuvilina, O., Veres, P., Cservenák, Á. & Illés, B. (2021). Effective usage of drones in indoor manufacturing sites. *Advanced Logistic Systems - Theory and Practice*, **15**(2), 5-12, https://doi.org/10.32971/als.2021.007

[4] *FDG33-VTOL-UAV-3-KGS payload for surveillance.* Retrieved from https://www.dronefromchina.com/product/FDG33-VTOL-UAV-3-KGS-payload-for-surveillance.html

[5] McMillan, T.: *A major breakthrough could mean realistic autonomous bird-like drones are on the horizon*. Retrieved from https://thedebrief.org/a-major-breakthrough-could-mean-realistic-autonomous-bird-like-drones-are-on-the-horizon/

[6] Paone, T.: *Look! In the sky! It's a bird! It's a plane! It's…a flying beer keg?* Retrieved from https://airandspace.si.edu/stories/editorial/look-sky-its-bird-its-plane-its-flying-beer-keg

[7] Vergouw, B., Nagel, H., Bondt, G. & Custers, B. (2016). Drone Technology: Types, Payloads, Applications, Frequency Spectrum Issues and Future Developments. In: Custers, B. (eds) *The Future of Drone Use. Information Technology and Law Series*, **27**, T. M. C. Asser Press, The Hague. https://doi.org/10.1007/978-94-6265-132-6_2

[8] NASA: *Helios Prototype Flying Wing*. Retrieved from https://www.nasa.gov/image-article/helios-prototype-flying-wing-16/

[9] Bálint, M. & Szűcs, E. (2021). Use of drones for civilian purposes. (in Hungarian). *Biztonságtudományi Szemle*, **3**(1), University of Óbuda

[10] Zulik, R. A. (2017). *A new chapter in military IT: drone swarms (in Hungarian).* Dissertation. Corvinus University of Budapest, Faculty of Economics

[11] AgroSzenzor: *Szonikus anemometer*. Retrieved from https://agroszenzor.hu/termek/szonikus-anemometer/

[12] Lukács, D. B. (2020). *Use of unmanned aerial vehicles in meteorology (in Hungarian).* Dissertation. Eötvös Loránd University, Institute of Geography and Earth Sciences.

[13] Abderahman, R. et al. (2023). Drones for supply chain management and logistics: a review and research agenda. *International Journal of Logistics Research and Applications*, **26**(6), 708-731, https://doi.org/10.1080/13675567.2021.1981273

[14] *Drone vs. drone: The MP200 drone interceptor.* Retrieved from https://eu.usatoday.com/picture-gallery/news/2015/02/25/drone-vs-drone-the-mp200-drone-interceptor/23987559/

[15] Mostafa, H. & Abdelkefi, A. (2017). Classifications, applications, and design challenges of drones: A review. *Progress in Aerospace sciences*, **91**, 99-131, https://doi.org/10.1016/j.paerosci.2017.04.003

[16] Stewart, J. (2017). *A Drone-Slinging UPS Van Delivers the Future*. Retrieved from https://www.wired.com/2017/02/drone-slinging-ups-van-delivers-future/

[17] Hell, P. (2017). *Supporting logistic processes with drones. (in Hungarian). Köztes-Európa*, **9**(1-2), 65-71.

[18] Khan, M. A., Alvi, B. A., Safi, E. A. & Khan, I. U. (2018). Drones for good in smart cities: A review. Proc. of IEEE 2018, 1-7. Retrieved from https://www.researchgate.net/publication/316846331_Drones_for_Good_in_Smart_CitiesA_Review

[19] *First Test Footage Revealed of EHANG 184 Manned Passenger Drone.* Retrieved from https://www.ehang.com/news/325.html

[20] Gubán, Á. & Udvaros, J. (2020). Drone control problem in logistics centres (in Hungarian). *Multidisciplinary Sciences: Publication of the University of Miskolc*, **10**(1), 17-25, https://doi.org/10.35925/j.multi.2020.1.3

[21] Cargo-partner: *Not everything that has wings is a drone. Or is it?* Retrieved from https://www.cargo-partner.com/trendletter/issue-4/drones-in-warehouse-logistics

[22] Scott, J. & Scott, C. (2017). Drone delivery models for healthcare. *Proceedings of the 50th Hawaii International Conference on System Sciences 2017*, 3297-3304, https://doi.org/10.24251/HICSS.2017.399

[23] Emimi, M., Khaleel, M. & Alkrash, A. (2023) The current opportunities and challenges in drone technology. *Int. J. Electr. Eng. and Sustain*. **1**(3), 74-89.

[24] Piotr, K. et al. (2016) Drones and possibilities of their using. *J. Civ. Environ. Eng.*, **6**(3), 1-7. https://doi.org/10.4172/2165-784X.1000233

[25] Csiha, T. N. (2023). Man and drone in the age of the information society (in Hungarian). In: *Educational Kaleidoscope: Study volume of the Institute of Educational Sciences and Psychology of the Benedek Elek Faculty of Pedagogy*. University of Sopron, 97-108, https://doi.org/10.35511/978-963-334-504-7-09

[26] CloudFactory (2021). *Breaking Down The Levels of Drone Autonomy*. Retrieved from https://blog.cloudfactory.com/levels-of-drone-autonomy

[27] Team DRONEII.com (2017). *Drone Energy Sources – Pushing the Boundaries of Electric Flight*. Retrieved from https://droneii.com/drone-energy-sources

[28] Okholm, H. B. et al. (2013). *E-commerce and delivery: A study of the state of play of EU parcel markets with particular emphasis on e-commerce*. European Commission, DG Internal Market and Services, Copenhagen Economics