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DRONE'S SAFETY AND SECURITY QUESTIONS I.

Abstract

Unmanned aerial vehicles (UAV) gained significant popularity in the past few years. Manufactured worldwide, used by both civilians and the military, as they are very versatile. Certain people and criminal organisations use them for nefarious purposes. Thousands of types are in existence, their sizes can range from the tiny mosquito to several meters. The author will describe the positive and criminal usages of UAVs, and will visit the life- and property safety questions regarding them.

A pilóta nélküli légi járművek (PNR) az elmúlt néhány évben jelentős népszerűsége tettek szert. Világszerte gyártják és fejlesztik, a katonai és civil szervezetek egyaránt használják, hiszen számos területen alkalmazhatóak. Sajnos egyes személyek és bűnszervezetek kifejezetten bűnös célokra használják fel. Jelenleg több ezer típusuk létezik, amelyek az egészen apró szúnyog mérettől a több méteres nagyságig elérhetőek. A szerző a cikkben röviden ismerteti kereskedelemben elérhető PNR-ek jó és bűnös szándékú felhasználási lehetőségeit, továbbá kitér PNR-rel kapcsolatos élet és vagyonbiztonsági kérdésekre.

Keywords: UAV, drone, safety and security, terrorism ~ UAV, drón, PNR, élet- és vagyonbiztonság, terrorizmus

DRONE'S SAFETY QUESTIONS

An unmanned aircraft¹ or drone is an aerial vehicle designed to be used without a human pilot on board. That makes it so impressive. Drones can be remote controlled, half automated and full automated. If you use half or full automated mode you don't need to watch and control continuously the flying machine because of the global positioning system (GPS) module communicating with the Flight Controller (FC) to hold the right course. Electronic speed controller (ESC) manages the rotation speed of motors.

Many people say if you want to drive you need to practice a few hours then you are ready. I think they are right and wrong at the same time. Why do I say that? Some hours are enough to learn the standard rules of flying with a UAV but not for safe flying. [1]

The most significant (working) categories of UAVs:

- home UAV,
- hobby UAV,
- hobby film and photo making UAV,
- professional film and photo making, surveying UAV,
- surveillance UAV,
- racing UAV,
- supplier UAV,
- construction UAV.

Each type of UAV has specific abilities, parameters and additional parts. Usages of the environments are greatly different from each other. Summarizing these differences you can recognize that all of them have variable usage risk.

Categories of UAVs

Home UAV

It is the simplest vehicle which is cheap and easy to fly. It has only manual control and comes without any remarkably useful payload, but hard to crash and the most of owners have.

It can be used only 1 to 15, or maximum 50 m with a flying time of maximum 7 minutes. The newest have gyro control so they are stable enough to hold position in the air without continuously controlling. Those which have integrated or portable cameras give more utility.

The most of mobile phones system (Android, iOS) have their own applications which give the possibility to capture video and photo if the phone is connected to the UAV. (see *Picture 1*) Place of usage are the garden or inside the home.



Picture 1: UAV with camera [2]

¹ Note: Author uses own definitions and categories (not NATO definition and categories).

Hobby UAV



Picture 2: Hobby UAV [3]

It is a more expensive category than the home UAV. Parts can be purchased separately or in a ready to fly kit. The practice is that UAVs built by owner is more frequent so it could have a wider range of add on equipment, for example GPS, camera, camera combined with transfer module and first person view (FPV) system. People who has hobby UAVs are most likely skilled because they enjoy controlling air vehicles. Place of usage are larger parks or large fields where there is nothing and nobody. (see Picture 2)

Hobby and professional photo, video (media) making, surveying UAV

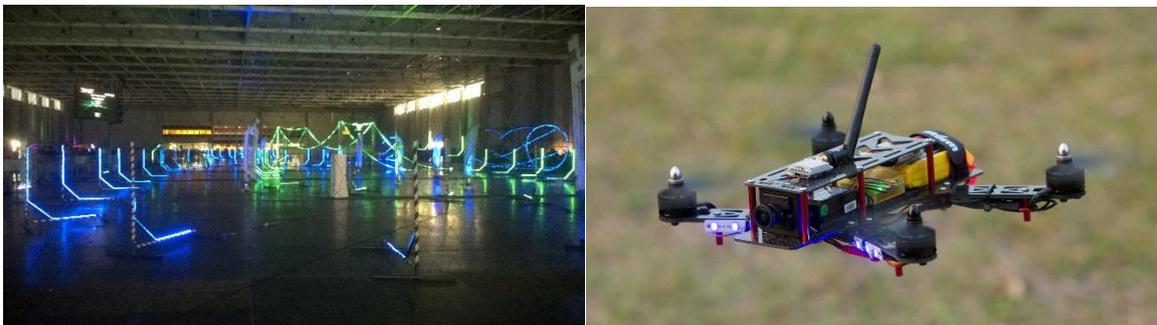
Hobby and professional media making category are similar, but professional equipment is 1 to 10 or more times expensive. Usually the UAVs have a lot of safety of software and hardware solutions to protect the vehicle from erratic flight, communications and to prevent crashes.

The pilot must be well skilled. Place of usage are forest, parks, plantations, programs inside or outside built in areas.

Surveillance UAV

UAVs are used for field, territory, objects monitoring and person scouting or searching. It needs to be a well-constructed and high performance UAV and Unmanned Aircraft System (UAS). The system is either half or full automatized, has high level safety solutions and it needs to be silent. These UAVs must be capable of long range flight and carrying a night and day camera, thermal camera, etc.

Racing UAV



Picture 3: Race place [4] and racing drone [5]

It is one type of hobby UAV, but the pilot and UAV requirements are higher. The racing UAVs able to fly on high speed (sometimes it is more than 110 km/h), must be low weight (ordinary it is 400-800 g) and have good maneuver ability to change flyway fast. All of them have small camera which connect to FPV google. Pilot must be skilled and have good reflexes. (see *Picture3*)

Supplier UAV

These air vehicles are capable transferring a heavy load (10-15 kg) for a long time.

Delivery shipments depend on the field they are used in. The Table 1 shows some fields and shipment possibilities.

Table 1: Exertions and shipments [6]

Exertions	Shipments or UAV additional equipment
Medical support	blade shape, drug, defibrillator,
SOS support	rope, water, lifebelt, antidote
Systematic logistic support	goods, commodity
Factory and agriculture support	toxic gas and radiation monitor; heat monitor;
Construction support	heat sensor, camera
Military support	weapon, camera

Medical and SOS supplier



Picture 4: Medical [7] and SOS supplier UAVs [8]

Many places on the Earth are hard to approach. High mountains, great deserts, oceans, seas, volcanic lands need lots of time and energy if someone wants to travel through, and last but not least, have potential threats. [9]

If someone receives a snake bite, has a fibrillation problem, falls into water or gets stuck on a mountain has perhaps only hours or minutes until they die.

The UAV's benefit is that it can avoid the most of the potential threats on land, because it moves in the air. They avoid barriers on land so it is possible to send quick help to any problematic event.

Systematic logistic support



Picture 5: Package delivering UAV [10]

Logistics is one of the key competitive factors for companies. The quick delivery by UAVs from a company is a future option parallel to the standard transportation of products and goods.

This task requires high level safety, and constant communication between the start and end point. In the future, UAV flights can be faster, more cost-efficient and more versatile.

Products and goods could be electrical equipment, food, clothes and other necessities, etc.

Factory and agriculture supplier

The UAV could represent a potential solution to monitoring and analysing factories and vehicles (train, truck, ship, etc). It could be a safe solution for disaster recovery organization to scout the area without endangering human and animal life.



Picture 6: Analysing fields [11] [12]

UAV providing with multispectral cameras can take combined pictures from fields of plant and able to highlights differences between healthy and distressed plants. UAV can help measuring status of giant plant field.

Construction



Picture 7: Suspension bridge under construction [13]

One of the future's most advanced technology is going to be the field of construction UAVs.

UAVs which are capable to work in teams and build light constructs without personal controlling. UAV must have accurately programmed and continuously working communication, and positioning systems.

DRONE'S SECURITY QUESTIONS

Military supplier UAV

Military sphere required special features from UAVs. Surveillance and transporting are standard necessities in military life. The most advance UAVs are capable of flying for a long time and distance, they are reliable and can function regardless of weather.



Picture 8: Military supplier UAV [14]

The newest line of UAVs is the tactical UAVs which can support friendly land units in the battlefield. These new machines can easily destroy enemy people in cover or light armoured vehicles. [15][16]

Criminal usage of UAV

Surveillance-, racing-, and supplier UAVs are the wonders of present and future. The delivery systems have wonderful possibilities, but also pose a big threat. [17][18]



Picture 9: Smuggling drugs, weapons [19] [20]

UAVs have been called the ideal “smuggler mules” because they allow drug cartels, smugglers and criminals to transport shipments more quickly, with less of risk of being caught.

Unauthorized surveillance and delivery of illegal items, these are just some of the current concerns.



Picture 10: UAV delivers unidentified box [21]

In the hands of someone with a malicious intent, a box can be a weapon stuffed with hidden, remote-controlled or time controlled explosives. If the box explodes it can cause large damage to people and buildings.

In addition, there are so many ways that drones can be used, as either a supportive component or central part of terrorist attacks against innocent people, government officials, or infrastructure systems.

Without “useful” payload, driving them into airplanes taking off or landing can cause a huge catastrophe. If the plane crashes into a crowded city, many people may die and kerosene will cause a secondary disaster. [22] [23]

CONCLUSION

UAVs can be a great solution for a wide range of engineering problems and can make tasks easier to perform. It has only two “small” questions:

What will be the rules and limits of using an UAV? How can we find a way to encourage good use and prevent catastrophes?

What is the rule of usage of UAV demarcation line? How can make the balance drone technology for a good and bad use?



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Bibliography

- [1] Electronic Privacy Information Center (EPIC) – Domestic Unmanned Aerial Vehicles (UAVs) and Drones. <https://epic.org/privacy/drones/> (08/10/2016)
- [2] UAV with camera: Author's photo
- [3] Picture: Hobby UAV: Author's photo
- [4] Race place: Author's photo
- [5] Racing drone <https://i.ytimg.com/vi/dH9qEJb-c8c/maxresdefault.jpg> (09/10/2016)
- [6] Exertions and shipments: Author's table
- [7] Medical UAV; http://cdn.simplebotics.com/wp-content/uploads/2014/02/pars_drone.jpg?378dbc (09/10/2016)
- [8] SOS supplier UAV;
http://i.dailymail.co.uk/i/pix/2014/10/28/1414540757343_wps_24_epa04466923_A_woman_gives.jpg (09/10/2016)
- [9] Simplebotics <http://www.simplebotics.com/2014/02/lifeguard-drone-could-save-lives.html> (09/10/2016)
- [10] Package delivering UAV; http://i.dailymail.co.uk/i/pix/2013/12/09/article-2520818-19FB489500000578-0_634x345.jpg; (09/10/2016)
- [11] Analyzing fields https://www.youtube.com/watch?v=8e4kcyUR_pw (09/10/2016)
- [12] Analyzing fields; <http://www.britishgas.co.uk/business/blog/wp-content/uploads/2016/08/Firefighting-Drones-jpg.jpeg> (09/10/2016)
- [13] Suspension bridge under construction
<https://www.youtube.com/watch?v=RCXGpEmFbOw> (09/10/2016)
- [14] Military supplier UAV
https://www.avinc.com/images/uploads/prod_thumbs/833/01.png (09/10/2016)
- [15] AV-AeroVironment <https://www.avinc.com/uas/adc/switchblade> (08/10/2016)
- [16] Pető Richárd: Switchblade taktikai UAV a katonai alkalmazásban, Műszaki Katonai Közlöny XXIV. évfolyam, 4. szám; ISSN 2063-4986; pp. 101-108.;
http://www.hhk.uni-nke.hu/downloads/kiadvanyok/mkk.uni-nke.hu/PDF_2014_4sz/ossz_2014_4sz.pdf (09/10/2016)
- [17] Brian McNary: Drones: The Good, The Bad & The Unknown; August 20, 2015;
<https://www.pinkerton.com/blog/drones-the-good-the-bad-the-unknown/> (09/10/2016)

- [18] Pető Richárd: UAV-k alkalmazásában rejlő lehetőségek és veszélyek; Műszaki Katonai Közlöny XXIV. évfolyam, 3. szám; ISSN 2063-4986; pp. 105-115.;
http://www.hhk.uni-nke.hu/downloads/kiadvanyok/mkk.uni-nke.hu/PDF_2014_3sz/10_UAV-k%20alkalmazasban.pdf (09/10/2016)
- [19] mugging drugs, weapons;
<https://sustainablesecurity.files.wordpress.com/2016/02/crahd-drone3.jpg> (09/10/2016)
- [20] Smuggling drugs, weapons;
<https://i14.picdn.net/shutterstock/videos/15257689/thumb/4.jpg> (09/10/2016)
- [21] UAV delivers unidentified boks;
http://i.dailymail.co.uk/i/pix/2015/03/24/15/26F35A5D00000578-0-image-a-25_1427211862103.jpg (09/10/2016)
- [22] Federal Aviation Administration (FAA)-Unmanned Aircraft System;
<https://www.faa.gov/uas/> (09/10/2016)
- [23] Civil Aviation Authority – Flying drones; <https://www.caa.co.uk/Consumers/Model-aircraft-and-drones/Flying-drones/> (09/10/2016)