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New Complex Military and Civil UAV[1]/RPA[2] Classification System for Registration, Administrative Purposes, and Special Operation Preparation

In addition to the existing different UAV classification terms (e.g. NATO JAPCC,[3] UVSI,[4] US ARMY, EASA,[5] CAA,[6] etc.), the article deals with the necessity and possibilities of creating a new, more sophisticated and unified classification system, combined with a high security labelling system that provides a more professional registry of UAVs (both civilian and military). Based on the new unique code system, it is possible to clearly identify the most essential properties and specification data (e.g. payload, armaments, hanging points, sensors, range, endurance, speed and altitude ranges, weather minimums, etc.), nature of use (e.g. military recon/assault, SAR,[7] agriculture, law enforcement, recreation, hobby, commercial, etc.), type of flight modes, risk level (combined with accident statistics), cost of the unit, VIN,[8] etc. It also helps the efficient work of law enforcement agencies/authorities to check the lawfulness of UAV operation onsite (database contains photos, insurance status and other detailed information), avoiding corrupt identification of the unit.

Keywords: *UAV, classification, RFID,[9] authority, onsite, inspection, police, identification, registration, insurance*

1. The need for classification of UAVs

It is not a novelty finding that the development and spread of UAVs is unstoppably progressing, which has now become part of everyday life. The improvement of technology and science, the emergence and research of new lighter and higher tensile strength materials, the development

1 Unmanned Aerial Vehicle.
2 Remotely Piloted Aircraft.
3 Joint Air Power Competence Centre.
4 UVS International: The association represents Unmanned Aerial System (UAS) manufacturers and operators, etc.
5 European Union Aviation Safety Agency.
6 Civil Aviation Authority.
7 Search and Rescue.
8 Vehicle Identification Number.
9 Radio Frequency Identification.

of batteries, engines (electronic, piston, gas turbine, hybrid, CO_2, nuclear, etc.), the lower production costs and higher performances of advanced sensors, control systems, spares and subsystems and last but not least the rapid development of optical systems resulted in smaller and cheaper UAVs, so they became common and available for everyone.

Table 1.
UAV definitions [1]

UAV definition by Act XCVII of 1995 on Aviation	
UAV	A civil **aerial vehicle**, which is designed and operated in such a way that its driving is not carried out by a person on board.
Aerial vehicle	**Any structure** whose atmospheric residence is due to interaction with air other than the effects of airborne forces on the ground.
State UAV	Aerial vehicle for military, customs, police and border control bodies, which are designed and operated in such a way that they are not driven by a person on board.
UAV definition by the U.S. Department of Defense	
UAV	A powered, aerial vehicle that does not carry a human operator, uses aerodynamic forces to provide vehicle lift, can fly autonomously or be piloted remotely, can be expendable or recoverable, and can carry a lethal or non-lethal payload. Ballistic or semi-ballistic vehicles, cruise missiles, and artillery projectiles are not considered unmanned aerial vehicles [2].
UAV definition by ICAO circular no 328 AN/190	
UAV	An unmanned aerial vehicle is a pilotless aircraft, in the sense of Article 8 of the Convention on International Civil Aviation, which is flown without a pilot-in-command on-board and is either remotely and fully controlled from another place (ground, another aircraft, space) or programmed and fully autonomous.

According to the current (6 April 2016) Hungarian law (see Table 1), the following devices can also be identified or classified as an UAV (see Figure 1).

Figure 1.
Interesting objects that can be classified as UAVs by the current Hungarian law [3]

Although a multimillion-dollar state-of-the-art military attack UAV according to the present legislation is legally similar to an 8-dollar children's toy drone, they are completely different in nearly every aspect (see Figure 2).

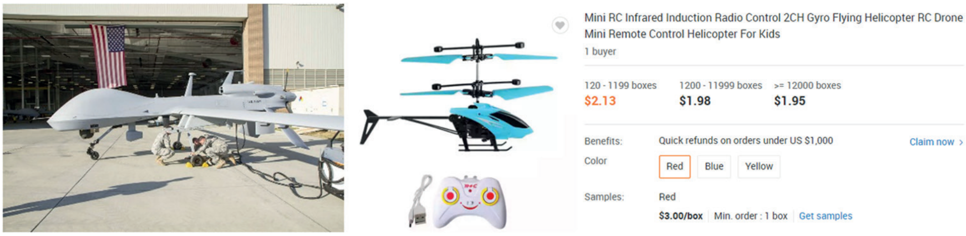

Figure 2.
Price range: General Atomics MQ-1C Gray Eagle (unit cost: 21.5 million USD FY2013[10]) vs a Mini RC Infrared Induction Radio Control 2CH Gyro Flying Helicopter for Kids from Alibaba (unit cost: 1.95 USD) [4], [5]

We will demonstrate in the following pages, that the existing classification systems are neither able to fulfil all the requirements of a modern legislation and regulation system, nor able to classify even the present and future drones according to their real risk factor.

If we want to analyse a UAV, we need to consider – among others – the following main aspects:

- construction (fix/rotor wing, electric/jet powered, size, materials, number of rotors, etc.);
- performance (max. altitude, speed, MTOW,[11] payload, etc.);
- capabilities (onboard sensors, armament, utilities, filming, etc.);
- legal conditions (legal limitations, required insurance, licenses, etc.);
- financial conditions (price and availability, etc.).

Usually the construction (as a carrier of the sensors, armament, etc.) is subordinated to performance, it is not a goal, it is only a tool for achieving the goal. In these cases, the most important aspect is always the capability for the specified task. All other properties are subordinate. This statement is not necessarily true for private users, often the construction itself is the most important aspect (e.g. RC[12] modellers). Summarising the preferences of different end-users for construction, performance, capabilities, legal and financial conditions, the following table would be created (see Table 2) based on market research.

Table 2.
Importance level of different users [6]

Average importance levels of main factors (1: not important, 2: moderately important, 3: important 4: very important					
Type of user	**Construction**	**Performance**	**Capabilities**	**Legal conditions**	**Financial conditions**
Military/state user	1	4	4	2	2
Professional and company user	1	3	3	2	3
Private user	3	2	2	1	4

10 Fiscal year.
11 Maximum take-off weight.
12 Radio controlled.

For their strategic importance, military systems operate independently (in practice, in parallel with civilian systems), in line with military specifications and requirements. As a result of the liberalisation of the aviation market, private owners/operators are present in both aerodrome infrastructure and aircraft, as well as in air traffic or service areas [7].

The legislation system cannot work effectively without identifying the potential different risk factors based on several aspects. UAVs are getting more and more common in our life. We would like to demonstrate some examples, why regulations and classification are important.

2. Applied classification systems

The currently used classification systems usually form groups based on 1 to 3 aspects only. These tables are usually suitable to enlist each of these devices into 1 category, but in most cases useless for clearly placing them upon variable criteria of more categories.

Case (see next tables): We have a special UAV with the following specification:

- MTOW: 20 grams;
- Max. speed: 18 knots;
- Max operating altitude: 1,000 feet AMSL[13];
- Max. range: 2 km;
- On board equipment: built in 4K camera, deployable container for 2-gram payload (e.g. for Novichok poison used in the U.K. to eliminate Russian MI6 agent).

Question: Which group does this UAV belong to, based on the classification tables? Can we specify the risk level from the following tables (see Tables 3–11)?

Answer

Table 3.
Device identification according to different classification systems [6]

Classification system	Category	Suitable to determine risk level?
U.S. Army	N/A	No
EASA	A1 / C0 **("No regulation" category!!!)**	No
U.S. DoD	Group 3	No
Scientific article	N/A	No
CAA	Class II Micro	No
NATO JAPCC	N/A	No
UVSI	N/A	No

The newest technology allows us to have/buy this special utility UAV. In most cases we cannot specify obviously the right group, as some parameters fit into different groups. If a regulation will be set for this device, it will be extremely difficult to determine what group's (e.g. safety) regulation would be valid for this.

[13] Above Mean Sea Level.

The existing tables are usually not very effective, they are nice and seem scientific, but the level of practicality and usability is often limited (see the case before). The quantity and quality of available information are also limited, and sometimes it is impossible to fit the device into one category, as properties cannot make clear justification (so, tables become more or less useless).

We would like to show you some examples of current classification systems [8].

Table 4.
UAV classification system by the U.S. Army [8]

	Class I UAV	Class II UAV	Class III UAV	Class IV UAV
Level	Platoon	Company	Battalion	Brigade
Weight	2–5 kg	50–75 kg	150–250 kg	>1,500 kg
Flight endurance	50 min	2 h	6 h	24 h
Range	8 km	16 km	40 km	75 km

Table 5.
Classification of EASA UAV categories [9]

Operation		Remote pilot competency (age according to MS legislation)	UAS				UAS operator registration
Sub-category	Area of operation (far from aerodromes, maximum height 120 m)		Class	MTOM / Joule (J)	Main technical requirements (CE marking)	Electronic ID / Geo awareness	
A1 Fly over people	You can fly over uninvolved people (not over clouds)	Read consumer info	Privately built	<250 g	N/A	No	No
			C0		Consumer information, Toy directive or < 19 m/s, no sharp edges, selectable height limit.		
		Consumer info Online training, Online test,	C1	<80 J or <900 g	Consumer information, < 19 m/s, kinetic energy, mechanical strength, lost-link management, no sharp edges, selectable height limit.		
A2 Fly close to people	You can fly at a safe distance from uninvolved people	Consumer info Online training, online test, theoretical test in center recognised by the aviation authority	C2	< 4 kg	Consumer information, mechanical strength, no sharp edges, lost-link management, selectable height limit, frangibility, low speed mode.	**Yes + unique SN for identification**	Yes

<table>
<tr><th colspan="2">Operation</th><th rowspan="2">Remote pilot competency (age according to MS legislation)</th><th colspan="4">UAS</th><th rowspan="2">UAS operator registration</th></tr>
<tr><th>Sub-category</th><th>Area of operation (far from aerodromes, maximum height 120 m)</th><th>Class</th><th>MTOM / Joule (J)</th><th>Main technical requirements (CE marking)</th><th>Electronic ID / Geo awareness</th></tr>
<tr><td rowspan="3">A3 Fly far from people</td><td rowspan="3">You should:
• fly in an area where it is reasonably expected that no uninvolved people will be endangered
• keep safe distance from urban areas</td><td rowspan="3">Consumer info
Online training,
Online test,</td><td>C3</td><td rowspan="3">< 25 kg</td><td>Consumer information, lost-link management, selectable height limit, frangibility.</td><td></td><td rowspan="3"></td></tr>
<tr><td>C4</td><td>Consumer information, no automatic flight</td><td rowspan="2">If required by zone of operations</td></tr>
<tr><td>Privately built</td><td>N/A</td></tr>
</table>

Table 6.
U.S. Department of Defense (DoD) – UAV classification system [10]

<table>
<tr><th>UAS Group</th><th>Size</th><th>MTOW (lb.)</th><th>Nominal operating altitude (ft)</th><th>Speed (knots)</th><th>Representative UAS</th></tr>
<tr><td>Group 1</td><td>Small</td><td>0–20</td><td><1,200 AGL</td><td><100</td><td>RQ-11 Raven, WASP</td></tr>
<tr><td>Group 2</td><td>Medium</td><td>21–55</td><td><3,500 AGL</td><td rowspan="2"><250</td><td>ScanEagle</td></tr>
<tr><td>Group 3</td><td>Large</td><td><1,320</td><td rowspan="2"><FL 180</td><td>RQ-7B Shadow,
RQ-21 Blackjack,
NAVMAR RQ-23 Tigershark</td></tr>
<tr><td>Group 4</td><td>Larger</td><td rowspan="2">>1,320</td><td rowspan="2">Any airspeed</td><td>MQ-8B Fire Scout,
MQ-1A/B Predator,
MQ-1C Gray Eagle</td></tr>
<tr><td>Group 5</td><td>Largest</td><td>>FL 180</td><td>MQ-9 Reaper,
RQ-4 Global Hawk,
MQ-4C Triton</td></tr>
</table>

Table 7.
UAV classification by a scientific article [11]

	MTOW (kg)	Distance	Radius (nm)	Alt (feet)
Class 0	<25	close	<10	1,000
Class 1	25–500	short	10–100	15,000
Class 2	501–2,000	medium	101–500	30,000
Class 3	2,000<	long	500<	30,000<

Table 8.
CAA classification system [8]

<table>
<tr><th>Categories</th><th>Description</th><th>Maximum Take-off Mass (kg)</th><th colspan="2">Flight Altitude (m)</th><th>Remarks</th></tr>
<tr><td rowspan="4">Class I
Fix wing
Rotor wing
Lighter than air</td><td>Micro</td><td><1.5/2</td><td rowspan="4"><150 AGL</td><td rowspan="4"><500</td><td rowspan="4">Flight vs. visually perceptible horizon</td></tr>
<tr><td>Group A</td><td>> 1.5 / 2 < 7</td></tr>
<tr><td>Group B</td><td>> 7 < 25</td></tr>
<tr><td>Group C</td><td>> 25 < 150</td></tr>
</table>

Categories	Description	Maximum Take-off Mass (kg)	Flight Altitude (m)		Remarks
Class II Fix wing Rotor wing Lighter than air	Micro	<1.5/2	>150 AGL	>500	Flight over the horizon
	Group A	> 1.5 / 2 < 7			
	Group B	> 7 < 25			
	Group C	> 25 < 150			

Table 9.
UAV classification by NATO JAPCC [12]

Class	Category	Normal employment	Normal Operating Altitude	Normal Mission Radius
Class I (less than 150 kg)	Small (> 20 kg)	Tactical Unit (employs launch system)	<5,000 ft AGL	AGL 50 km (LOS)
	Mini (2–20 kg)	Tactical Sub-unit (manual launch)	<3,000 ft AGL	25 km (LOS)
	Micro (< 2 kg)	Tactical PI, Sect, Individual (single operator)	<200 ft AGL	5 km (LOS)
Class II (150–600 kg)	Tactical	Tactical Formation	<10,000 ft AGL	200 km (LOS)
Class III (>600 kg)	Strike/Combat	Strategic/National	<65,000 ft	Unlimited (BLOS)
	HALE	Strategic/National	<65,000 ft	Unlimited (BLOS)
	MALE	Operational/Theatre	<45,000 ft MSL	Unlimited (BLOS)

Table 10.
UVSI classification system [8]

Description	Abbreviation	MTOM (kg)	Range (km)	Max. Flight Altitude (m)	Flight Endurance (h)
Tactical					
Nano (NAV)	η	<0.025	<1	100	<1
Micro (MAV)	μ	<5	<10	250	1
Mini	MINI	<30	<10	150–300	<2
Close range	CR	150	10–30	3,000	2–4
Short range	SR	200	30–70	3,000	3–6
Medium range	MR	150–500	70–200	3–5,000	6–10
Medium Range, Endurance	MRE	500–1,500	>500	5–8,000	10–18
Low Altitude, Deep Penetration	LADP	350	>250	50–9,000	0.5–1
Low Altitude, Long Endurance	LALE	<30	>500	3,000	>24
Medium Altitude, Long Endurance	MALE	1,000–1,500	>500	14,000	24–48
Strategic					
High Altitude, Long Endurance	HALE	2,500–12,500	>2,000	15–20,000	24–48
Combat UAV	UCAV	10,000	~1,500	10,000	~2
Special task					
Lethal	LET	250	300	3–4,000	3–4
Decoys	DEC	250	<500	50–5,000	>4

Table 11.
Different UAV regulations in some EU Member States [13]

Country	MTOW	Regulations
Czech Republic	m ≤ 20 kg	Continuous visual contact No license required Banned from residential area and airport vicinities
	m > 20 kg	Special operation license required for commercial activity Approaching people and buildings – except take-off and landing – closer than 100 m is strictly forbidden Must keep min. 150 m horizontal distance from crowded areas No operation allowed over residential areas and roads with heavy traffic Special license can provide exemption from the above mentioned limitations on an ad hoc basis
Poland	m ≤ 25 kg max	No altitude limitations Continuous visual contact Mandatory insurance No operation in the 5 km vicinity of airports without ATC prior permission No operation allowed closer than 100 m from residential areas, No operation allowed closer than 30 m from people, animals and vehicles
Romania	m ≤ 500 g	No limitations
	500 g < m < 150 kg	Prior permission is required (by phone) Prior permission from the Ministry of National Defence required for all operations below 3,000 m over Bucharest
	15 kg ≥ m	Airworthiness Certificate required
	20 kg ≥ m	Insurance required
Croatia	m ≤ 150 kg	Insurance required Operation license required Continuous visual contact Max. operation altitude: 500 m AGL Only day operation allowed No operation in the vicinity of airports closer than 3 km No operation allowed closer than 30 m from people, buildings and residential areas No operation allowed closer than 150 m from group of people
Italy	m ≤ 300 g	Considered risk-free operation if speed is less than 60 km/h Continuous visual contact No operation allowed over and in the vicinity of people, residential and critical infrastructure areas
	300 g < m ≤ 25 kg	Continuous visual contact No operation allowed over and in the vicinity of people, residential and critical infrastructure areas
	25 kg < m ≤ 150 kg	Airworthiness Certificate required Permission from CAA before operation is required
Germany	m ≤ 250 g	Continuous visual contact
	m ≥ 250 g	Continuous visual contact Owner name and address must be attached on a fireproof table
	m > 2 kg	Continuous visual contact Drone pilot license required
	m > 5 kg	Operation license required General license (e.g. operation in restricted airspace, catastrophe site, etc.) Ad-hoc license
	m ≤ 25 kg	Continuous visual contact

Country	MTOW	Regulations
France	m ≤ 25 kg	No altitude limits No pilot license required No type and airworthiness license required No airspace regulations Continuous visual contact
	m > 25 kg	No altitude limits Pilot license required Type and airworthiness license required No airspace regulations Continuous visual contact

Figure 3.
Electronic ID sample: XPS-TR Mode S Transponder with ADS-B Out [14]

The XPS-TR (Figure 3) is a Mode S transponder that incorporates ADS-B Out broadcast technology. Installing the lightweight, compact transponder on UAV will enhance the aircraft's flight safety by adding a continuous means to determine its location.

3. Size vs. potential risk

Most of the existing classification systems are focusing on the size primarily (based on the MTOW), when they want differentiate regulations. It is also valid for the 2019/945 EU regulation. As you can see from the previous tables, the regulations and classifications are all completely different, none of them can help the effective regulations. If a modeller goes to another country within Schengen boundaries, he/she can break the law or hurt the interests of individuals very easily.

We also need to consider the risk factors in a more sophisticated way; therefore, identifying the privacy and terror risks are essential over the standard ground and aerial risks. The weight/speed/altitude, etc. itself should not be the only criteria as a high speed, low weight and small size UAV with an advanced optical device with manual control without autonomous control system and home back function could be much more dangerous, than a 2.1 kg low speed UAV with the state-of-the-art control system and automatic avoidance/ geo awareness system (see the case).

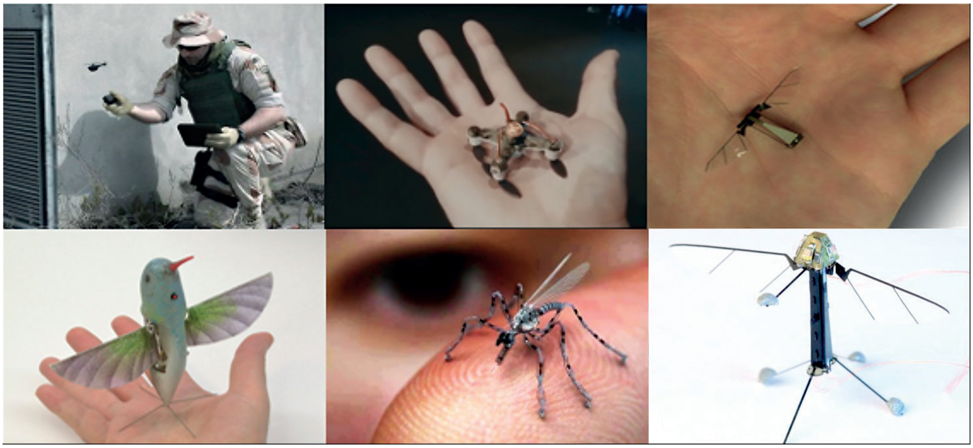

Figure 4.
Unclassified light weight drones under 250 grams [3]

The UAVs shown in Figure 4 are all known to the public (not under secret R+D), all of them have special capabilities (spy drones, can do remote DNA sampling, lethal [suicide] attack missions, swarm technology [see description further], etc.). All these models are real, some of them are older than 10 years. Please remember for the right lower UAV, its weight is only 106 mg (much less than a gram), it will have importance later. We should not forget that today's technology is more developed, and this listing does not include classified newest R+D models.

4. Uncontrolled production and usage

Normally everyone can operate a small toy/hobby/sport UAV by his/her own; being a member of a professional UAV operator organisation or association is not obligatory. Furthermore, everyone can design an UAV, he/she is not obliged to license the home-built UAVs by professional notified bodies (yet), if the maximum take-off weight of the aircraft does not exceed 120 grams and is unable to be operated more than 100 meters from the operator (according to 2009/48/EC Directive). These factors and the lack of professional control could create some risks that should be handled by the law.

Internet acts as an easily reachable effective, but uncontrolled information database and a promotional media, from where the users can buy entire products and systems, or they can download nearly any product specifications, even entire controlled or uncontrolled design plans, demo videos, CBTs,[14] control systems, tools, applications, etc. Today's technology allows users to download existing 3D designs of any parts (except electrical parts like servos, PCBs,[15] etc.) or even full UAV models (Figure 5), helping the home-made production as home-based

[14] Computer Based Training.
[15] Printed circuit board.

3D printers can print the parts directly, allowing cheap and fast part production. It is also obvious that it is impossible to supervise/control all kinds of small UAVs, plans, parts, etc.

Figure 5.
Web portal specialised in 3D printable UAVs [15]

Due to the rapid development of webshop-type sales channels and the connecting CEP[16] shipping services, the new technology solutions and parts can spread rapidly and widely all over the world uncontrolled. There are countless manufacturers/merchants on the market, who do not only produce/sell ready-made drones, but also parts, sensors, control systems, "Mode S" transponders, other professional/consumer quality subsystems, etc.; therefore, anyone can design and assemble a unique UAV at home from numerous components in hours/days. The number of potential configurations is uncountable.

5. UAVs in the transportation sector (passenger and cargo)

Besides classical military, law enforcement, SAR and agricultural air surveillance applications, UAVs are getting involved in daily trade and transport too (see Figure 6 and 7), they are becoming common in the near future. We hear news about the first services of different areas. For example, on 16 November 2016 Domino Pizza in Whangaparaoa, New Zealand completed the first order delivery, which was 2 pizzas (for scientific accuracy and keeping the credibility, let us note that the world's first UAV delivered food order was a "Peri-peri Chicken Pizza" and a "Chicken and Cranberry Pizza" [8]).

Figure 6.
The world's first real food order delivery by a UAV (see the box winching system, avoiding landing over residentials for safety and security reasons). The right picture shows an early model of the same company [3], [16], [17]

[16] Courier Express Parcel: a time guaranteed parcel shipping service, which has a rapidly growing share in the world's shipping services. The abbreviation comes from the German Manner-Romberg Unternehmensberatung GmbH., who used this expression for first time.

A revolution can be predicted in the postal delivery market (CEP), which can significantly reduce delivery time especially in overcrowded, high traffic intensity areas or countryside. There are a lot of issues that should be solved (e.g. interference, sabotage, naughty children, weather phenomena, other outer forces, safety, etc.). Sometimes big companies have failures as well.

Figure 7.
Russian Post launched its first UAV post drone on 2 April 2018. The 20,000 USD drone smashed into a building and tumbled to the ground a few seconds after airborne [18]

The top futuristic, but existing application would be the air taxi/passenger UAV (Figure 8 and 9). More companies made research, and some have made the first tests as well. Two of the most high-profile single-seat passenger drones under test phase are the Ehang 184 and the Volocopter VC200.

Figure 8.
The first UAV designed to carry a passenger was introduced at the Consumer Electronics Show (CES) 2016 by Chinese entrepreneurs and is called the Ehang 184 [19]

Figure 9.
Volocopter VC200 passenger drone with 18 separate rotors, created by the German E-Volo company [20]

As we can see, the task is the same, but the concept, the safety factor and the implementation are completely different.

6. Micro and nano drones, swarm technology

We should not forget to mention the state-of-the-art new technologies about nano and micro UAVs, and swarm technology. UAV Swarming/swarm intelligence is a field of robotics research. Using appropriate software, the UAVs act like "aerial robots", which can ascend synchronously, communicate with each other in mid-air and create cross-references. Fixed formation group flights and complex acrobatic group flights are thus possible.

The U.S. Department of Defense conducted a successful test in October 2016, where 103 Perdix drones were launched from three F/A-18 Super Hornets (Figure 10). The micro-drones demonstrated advanced swarm behaviours such as collective decision-making, adaptive formation flying and self-healing abilities. The drones collectively decide that a mission has been accomplished, fly on to the next mission and carry out that one. The benefit of a swarm is that if one drone drops out – and a few appear to crash – the group can rearrange itself to maintain coverage.

Figure 10.
103 Perdix drones launched from F/A-18 Super Hornets (UAV carrier operation) [21]

"Due to the complex nature of combat, Perdix are not pre-programmed synchronized individuals, they are a collective organism, sharing one distributed brain for decision-making and adapting to each other like swarms in nature", said SCO Director William Roper. "Because every Perdix communicates and collaborates with every other Perdix, the swarm has no leader and can gracefully adapt to drones entering or exiting the team" [22].

This technology opens a wide corridor for further developments not only in military applications, but in several commercial, industrial, law enforcement and SAR applications outdoor and indoor.

7. Summary on classification

We do not want to list all types of UAVs in this article, these were only examples about different types, different safety and risk levels and it shows the extremely wide diversity of UAV applications.

The dramatic increase in the number and types of drones justifies them being classified into certain classes according to certain criteria.

We should make a significant difference between them in many ways, especially when we are talking about legal regulations and the terms of operation. An appropriate differential classification system is an elementary requirement for an effective system, that can help in administration, operation, regulation and supervision.

If the regulations will be too strict, most of the users will commit violations, most of them will not be ticketed because of the lack of effective control. It would be a mistake. If the rules are too loose, it can be dangerous for the society. Appropriate regulation needs exact classification of the existing diverse devices.

Although it would be obvious, we can hardly find any legal aid to determine the right class of different UAVs in our existing law. The above referred Act on Air Transportation already obliged the CAA to create a public official UAV registration database, but it does not exist yet.

We already asked information from the CAA, and the received questionnaire does not contain any relevant template to create a useful, searchable and sortable database, nor helps any third party or the CAA to make any research or product development or regulation or feedback for UAV services, operation or other applications. Only the following data are asked: UAV's manufacturer, type and VIN/SN[17] and owner's personal data (name, date of birth, mother's maiden name, address, phone number, e-mail). No other information requested by the authority about take-off weight, performance, dimensions, accessories, etc.

Our aim is to create a new, more sophisticated and unified classification system, combined with a high security labelling system that provides a more professional registry of UAVs (both civilian and military). Based on the new unique code system, it is possible to clearly identify the most essential properties and specification data (e.g. payload, armaments, hanging points, sensors, range, endurance, speed and altitude ranges, etc.), nature of use (e.g. military recon/assault, SAR, agriculture, law enforcement, recreation, hobby, commercial, etc.), type of flight modes, weather minimums, risk level (combined with accident statistics), cost of the unit, VIN/SN, etc. It also helps the efficient work of law enforcement agencies/

[17] Vehicle Identification Number/Serial Number.

authorities to check the lawfulness of UAV operation on site (database contains photos, insurance status and other detailed information), avoiding corrupt identification of the unit. We identify further application possibilities for military, law enforcement, commercial and administrative purposes.

References

[1] Act XCVIII of 1995 on Aviation, 71. § 5., 35., 36 points, table made by the authors.

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Új komplex katonai és polgári UAV/RPA osztályozási rendszer regisztrációs és közigazgatási célú felhasználáshoz, valamint különleges műveletek előkészítéséhez

A cikkben megvizsgáljuk egy új, a jelenleg használatos (NATO JAPCC, UVSI, U.S. ARMY, EASA, CAA stb.) pilóta nélküli légi járművek osztályozási rendszerénél kifinomultabb, részletesebb egységesített osztályozási rendszer létrehozásának szükségességét és lehetőségeit, amelyet kombinálunk egy magas biztonsági fokozatú RFID alapú jelölőrendszerrel, amely lehetővé teszi a polgári és katonai UAV-k professzionális szintű regisztrációját. Az új egyedi kódrendszer alapján lehetőség kínálkozik a légi járművek legfontosabb tulajdonságainak és paramétereinek (pl. hasznos terhelhetőség, fegyverzet, függesztőpontok, szenzorok, hatósugár és hatótávolság, sebesség- és magasságtartományok, időjárási minimumok stb.), a felhasználás jellegének (pl. légi felderítő/harcászati, kutató-mentő, katasztrófavédelmi, mezőgazdasági, rendészeti, rekreációs, hobby, kereskedelmi, ipari stb.), a repülési módok, a kockázati szint (baleseti statisztikával), az egységár, azonosítószám stb. gyors meghatározására, azonosítására, valamint a központi adatbázisból ezen szempontok alapján történő leválogatásra is. E rendszer segíti az igazgatásrendészeti és hatósági munkát, a helyszíni ellenőrzések során megállapíthatóvá válik az üzemben tartás és üzemeltetés jogszerűsége (az online adatbázis tartalmaz fotót, biztosítási és egyéb fontos státuszokat stb.), valamint meggátolja az egyedi azonosítóval történő visszaélést is.

Kulcsszavak: *UAV, osztályozás, RFID, hatóság, helyszíni ellenőrzés, rendőrség, azonosítás, regisztráció, biztosítás*

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