



Unmanned Aerial Vehicles in the Security Service and as a New Tool in the Hands of Criminals

Ewelina Krakowiak*

National Security and Logistics Faculty, Polish Air Force Academy, ul. Dywizjonu 303 nr 35, 08-521 Dęblin, Poland

Abstract

The aim of the article is to show areas in which unmanned aerial vehicles are used for protection purposes and to show that drones are increasingly used for criminal purposes, an important aspect is also to present the possibilities offered by these devices. Increasingly, new technologies are used daily in human activities. They become supportive, and at the same time, they facilitate many activities. With the introduction of unmanned aerial vehicles, they have become an object that has been adopted in many industries, from simple flight operations, to filming and shooting, to complex transport or search. Due to the many constraints inherent in the human factor, the necessity of introducing drones into many everyday industries has been recognized. Particular attention has been paid to unmanned aerial vehicles in the area of security and protection, where daily activities involve a high risk of human loss. For this purpose, new technologies are introduced, but drones, due to their characteristics and many other factors, a tool used by criminals for the purposes of trade, data theft, illegal shooting and photographing. These are just a few of the offences committed by means of unmanned aerial vehicles. This poses a threat and conducive to the emergence illegal market using drones.

Keywords: UAV, security, smuggling, search and rescue, terrorism

1. Introduction

The dynamic development of unmanned aerial vehicles, commonly referred to as drones, observed over the past years, has contributed to the emergence of more and more innovative applications of these structures. The commonly known areas in which UAV are exploited include: the media, transport, agriculture, forestry, search and rescue, business, geodesy and many others where their exploitation permits achieving better results and reducing costs compared to more traditional methods previously used (Zieliński Tadeusz, 2014). Their potential has also been noticed in the sectors related to security. At present, many services and entities operating in this area have implemented tasks in their daily activities with the help of UAV. More and more often in the media you can hear about life saving drones, transporting medicines and monitoring state borders or elements of critical infrastructure. With the increase in the number of unmanned aircraft users and new applications, new, uncontrolled, areas of their exploitation appear. The UAV in the

hands of people who do not know the principles of safe navigation in the sky, lacking experience or appropriate qualifications, appearing in airports, transporting illegal materials and flying over people pose a great threat, and in the context of aviation, are a great challenge itself. The features of UAV, such as the variety of constructions, the uncomplicated service system and fairly low operating costs, have led to UAV being used for activities such as smuggling of illegal materials such as drugs, commerce, espionage and violations of privacy and data protection. A big influence on the emergence and spread of these areas of exploitation are due to the fact that both at the European and national level there is a lack of appropriate legal provisions that would comprehensively regulate all issues related to UAV, and above all those related to criminal liability, for all manifestations of using drones for criminal activity. The use of UAV for security and safety purposes, and on the other hand a growing number of incidents showing their inadequate use, show how wide the possibilities these devices have and how wide their use is.

*Corresponding author

Email address: e.krakowiak@wsosp.pl (Ewelina Krakowiak)



Figure 1: Polish policemen using UAV [1], access: 03/12/2018).



Figure 2: Firefighters with the drone [5], access: 2018.03.13

2. Police

One of the first services that implemented the idea of UAV exploitation in both Poland and around the world is the police. In 2016, the Road Traffic Department of the Provincial Police Headquarters in Katowice started to test drones designed by the Silesian University of Technology. The high number of accidents on the road forces the use of new technologies. Due to the characteristics of accidents, the region which will be ideal for UAV operation is defined. At first, it was tested on pedestrian crossings in the vicinity of Katowice.

The operation of the drone is based on the registration of pedestrian and driver behavior. Particular attention is paid to the reaction of traffic users to the changing traffic lights, which allows registration of the most frequent offenses. At a distance of several hundred meters from the place of surveillance, the police patrol is equipped with a computer, thanks to which it has the ability to view images captured by the camera placed on the drone, which allows stopping the drivers and pedestrians who did not comply with the provisions of the Highway Code a few seconds earlier (Municipal Police Headquarters, 2018). Also, other Polish police officers in the course of tests performed tasks using UAV, this time in order to chase after a fleeing driver. In this particular case, the drone allowed them to accurately locate the pursued vehicle. [2]

Policemen from the British Isles were able to check the possibilities of drones in the context of searching for missing persons, patrolling and photographing terrain, and securing places where a crime or an accident occurred. Police officers admit that the main factor that decides about the use of drones in their activities are issues related to finances. Sending an unmanned aerial vehicle on a mission is much cheaper than posting officers and police vehicles there. At the same time, the saved forces can be directed to perform other activities. [3] Moreover, in Dubai, drones attracted the attention of the police, namely the Russian drone of the Hoverboard company, which is piloted like a motorcycle. A machine with a policeman on board is able to rise to a height of five meters and spend twenty-five minutes in the air, and the maximum speed that can be reached is seventy km/h. The "dron-motorcycle" can successfully hunt down criminals

in a difficult geographic shape characteristic of this region. The drone "Scorpion 3 Hoverboard" is a quadcopter, i.e. a drone equipped with four propellers, while the saddle and position behind the wheel are typically motorcycle, and the load capacity of the vehicle is three hundred kilograms. [4]

The above-mentioned possibilities of using unmanned aerial vehicles in services such as the police, show how new technologies, such as drones, can support the operation of services, primarily by increasing their mobility and range of operations, and by limiting human factors in operations, they influence on minimizing risk of incurring personal losses as a result of participation in shares.

3. Fire brigade

Another service that sees the need to use UAV in its activities is the fire brigade. Drones are devices that can perform tasks in difficult weather conditions as well as terrains with difficult geographic shape, and because of their size, they are able to make flights and obtain information from places with more difficult accessibility. Therefore, they can help firefighters fight fires, assess the effects of natural disasters, and search for missing people. Fire drones are already among others equipped with the Volunteer Fire Brigade in Roczyń near Andrychów in Lesser Poland. Often services and formations using unmanned aerial vehicles cooperate with companies dealing with UAV, not only to gain experience and information about UAV. This is also the case here, the firefighters in cooperation with the company "Sky Tronic" from Wrocław will also test drones in their daily service. For example in firefighting operations of buildings, forest and grasslands, search and rescue, and road accidents with a large number of injured people, missing persons and victims of fires. In accordance with the letter of intent, "Sky Tronic" and the Volunteer Fire Brigade Roczyń established cooperation, consisting in the creation of a specialized drone for the fire brigade.

As it results from the initial assumptions, UAV will be equipped with an observation system with a video camera and a thermal imaging camera with an optical zoom that allows viewing, zooming in and sending information from the

scene of the event in real time to the ground rescue command station. Thanks to the image from the air, it is easier to estimate the scope of the threat and direct the appropriate services to the area at risk of a natural disaster, which increases the chances of faster detection and rescue of endangered persons. The infrared observation system that operates in the infrared allows to locate heat sources, and thus to detect the source of fire hazard, find a lost person in the forest, in high bushes or in a densely overgrown field, and coordinate search and rescue activities during day and night in large areas. The fire drones, thanks to the use of new technology of more precise flight control and stabilization based on fuzzy flight stabilization regulators FLC - Fuzzy Logic Controller will significantly facilitate monitoring areas threatened by fires, in difficult weather conditions, for example in strong wind, dense smoke or fog. As part of preventive actions, the "patrol from the air" may monitor the areas of the commune in terms of detecting dangerous situations that may pose a threat to residents such as illegal burning of grasses. Drones rising above the ground and making a stable hail can record and take pictures of perpetrators of dangerous actions such as people who set fire to the grass, steal a tree from forests or poachers, which will allow punishing those responsible and also warning other people against committing similar crimes. [5]

Thanks to the use of UAV, firefighters can count on a better identification of the area of operations and the possibility of faster access with the appropriate equipment to places requiring urgent intervention and to people waiting for assistance. With the help of drones it will be possible to search a much larger area faster and more precisely. Air monitoring will significantly increase the level of security, because the rapid detection of airborne hazards can reduce the spread of fires and other incidents, reduce losses and allow faster identification of perpetrators. In addition, UAV successfully performs activities related to fire protection, counteracting other threats during mass outdoor events such as festivities, state celebrations, sports matches, rallies, and concerts. Firefighting drones may become an important and widely used element of support for firefighting operations in the distant future. Thanks to these devices, the commanding rescuer will be able to quickly and efficiently estimate the degree and extent of the threat. Firemen will be able to reach important places much faster and this will cause that firefighters will not be forced to expose their health or even life, it will improve the search and rescue process and will also allow for constant monitoring of threats.

4. Border guards

Due to the large number of people moving across European borders, including refugees and illegal immigrants, the European Union is trying to seal the borders. Also, these services, whose task is to ensure security and protection of state borders and European borders, use UAV in their activities. To monitor the border in the East from the Kaliningrad Oblast to the Bieszczady Mountains, the most modern

equipment worth hundred million zlotys was purchased and financed mainly from the European Union External Borders Fund. [6] Six million zlotys was earmarked for the purchase of four unmanned aerial vehicles, which will go to units of the Border Guards of the Bug Border Police. The drones purchased are equipped with optoelectronic systems that allow observation at any time of the day and in any weather conditions, including thermovision. The Stemme aircraft was also purchased, whose design and equipment allows both manned and unmanned flights, and allows for some time a flight with the engine off. They have special real-time data transmission systems that will protect one of the most difficult and most vulnerable sections of the Polish border in the Bieszczady Mountains. Thanks to modern technology, officers will be able to recognize early preparations for illegal border crossing, fix footage on the medium confirming the violation of the law, and at the same time using the means available to prevent criminals from escaping.

Also, the Chinese Border Guard in its actions has set on unmanned aircraft, purchased from the Swedish company "CybAero" unmanned mini helicopters "APID 60". Mini helicopters were purchased to perform operations from customs vessels to combat smuggling. The Chinese indicates that the decision about this purchase was made due to the lack of space on board of vessels for manned helicopters. In addition, the decision was motivated by the costs of conducting reconnaissance operations.

On the other side of the Atlantic, US border guards use unmanned aerial vehicles to detect smuggling for a decade. They are mainly used to locate people crossing the US-Mexico border illegally. This area is particularly important not only for illegal border crossing, but in particular drug smuggling. In these operations unmanned aerial vehicles "Predator", known for performing aerial tasks in Iraq, Afghanistan and Pakistan, are involved.

5. Emergency services

With the development of unmanned aircraft applications, their potential in search and rescue was recognized. One of the UAV usage formations is the Tatra Mountain Volunteer Rescue Service. In cooperation with the company "FlytTech" UAV, they have the task of creating an innovative system supporting rescue operations. Drones communicate with a mobile command center equipped with specialized GIS software supporting the planning and course of rescue operations and the Ground Control Station for unmanned aerial vehicles. [7]

Alec Momont, a university student at the Belgian Delf, created the Ambulance Drone prototype, or medical emergency drone. The machine is to check in a quick medical aid for the injured person, until the ambulance arrives. The ambulance drone is able to reach a patient within three minutes from the moment of starting, located on an area of twelve kilometers per minute at a speed of one hundred km/h, which increases his chances of survival from eight to eighty percent. The launching of the flying ambulance should take place using a



Figure 3: Ambulance Drone [8], access: 2018.03.17



Figure 5: Drone "Lifeguard" [10], access: 2018.03.17



Figure 4: Drone "Pars" [9], access: 2018.03.17

6. Illegal Industry

The development of the construction of unmanned aircrafts, and in particular the emergence of the possibility of transporting items using UAVs, in addition to innovative ideas to which we include the ideas of Amazon, have led to the ability to transport illegal items that range from drugs and anti-abortion pills. One such event took place in Frankfurt am Main, where a drone tried to transport the abovementioned abortion pills. It was also tried to smuggle cigarettes across the Russian-Lithuanian border. The UAV dropped cardboard boxes with cigarettes in specially selected places during the flight. The unmanned aircraft captured by the Russians had about ten kilos of illegal cigarettes on board. Oleg Džurajew, a press officer of the Federal Security Service who intercepted the machine, said that the drone was built by a gang operating in Lithuania and Russia and could be used for other criminal purposes. [11]

In April 2014, a drone crashed into a prison in South Carolina [12], which was used to smuggle marijuana, cigarettes and mobile phones to the prisoners. A similar case took place a month earlier in the Australian city of Ravenhall. [13] The operator of the drone was captured in a car parked nearby. In the United States and Canada, the use of drones in the transport of medical and narcotic drugs is very popular. American Thaddeus Shortz was delivering drones to an American prison of heightened security, such as cell phones, pornographic material, drugs and tobacco. [14] Another incident was recorded in Mexico, where the wreck of the drone was found in the supermarket parking lot in Tijuana, whose pilot tried to flee over the US border. The reason the drone crashed was that the machine was overloaded with illegal cargo. More than three kilograms of methamphetamine, divided into six packs, was attached to the UAV. The six-rotor, remote-controlled machine was unable to cope with such a load and to cross the San Ysidro border crossing with it. The representative of the American Drug Enforcement Administration reported that in 2012 no less than one hundred and fifty attempts were made to cross the border by drones, carrying illegal substances. [15]

Unmanned aerial vehicles are increasingly becoming a

smartphone and a GPS tracking system, and there should be a person who can handle the defibrillator on the spot. [8]

Unmanned aerial vehicles also work well in water rescue. The Iranian company "RTS Lab" has constructed a UAV based on a quadcopter, which can save the lives of those drowning faster than a lifeguard. Drone "Pars" has attached lifebuoys that are dropped near the sinking. It can float in the air for about ten minutes, it can also operate at night, and it is equipped with a thermal camera to detect the human body in the water. It has appropriate lighting with LED lamps, a camera with current preview from the deck, autopilot and GPS. It is stabilized with a three-axis gyroscope, barometer and compass. It also has a water platform on which it stays in the period between rescue operations. [9]

Researchers at Stanford University have also built an unmanned aerial rescue vehicle that is able to reach a sinking victim in less than a minute, provided that the sinker is no more than about one kilometer from the shore. Created UAV is equipped with special floats, which will automatically fill the air as a result of contact with water, which makes it easier for the drowner to reach the shore. [10]

These are just a few innovative applications of drones in the broadly understood rescue and search. They are becoming more and more popular in this field, because they significantly limit the role of the human factor, so far the most unreliable cell in search and rescue operations.



Figure 6: UAV transporting drugs across the Mexican-American border just after the accident [16], access: 2018.03.19

tool used in the hands of criminals, illegal traffickers and smugglers. The aforementioned incidents are just a few of those faced by both the aviation authorities and the security services of many countries.

7. Drones in Fight Against Terrorism

Unmanned aerial vehicles are one of the most important elements of the fight against terrorism in the world. According to Herfried Münkler, a political scientist and professor at the Humboldt University in Berlin, unmanned aerial vehicles are the perfect weapon for Western societies that want maximum security, but are not ready to pay blood prices for them. [17] With the use of unmanned aerial vehicles, selective elimination is carried out, i.e. the use of lethal force by a subject of international law (state, international organization) in a planned and deliberate manner, leading to the killing of specific persons, not free from any targeted killing. [18] Intensifying the fight against terrorism using unmanned aerial vehicle is dated to the beginning of the 21st century. Since 2001, after the attacks of September 11, the United States, as a result of support for its fight against terrorism from around the world, began the fight against terrorism by means of drones. For the first time, drones were used to eliminate the opponent according to official and media data on November 5, 2002 the CIA liquidated six Taliban suspected of ties with Al-Qaeda in Yemen with their help. [19] The main place of attacks are places such as hiding places and training camps in which future terrorists train. During the presidency of Barack Obama, the US eliminated more than 3,300 Islamic terrorists, Al-Qaeda members and other terrorist groups operating in Pakistan and Yemen using drone. [20]

It should be noted that in Pakistan and Afghanistan as well as in Iraq, Yemen and Somalia, the US authorities have entrusted the conduct of combat operations using drone to a civilian entity, i.e the Central Intelligence Agency. [22] As more use of drones in combat operations by the US and Israel, as well as Great Britain, which have the most advanced technologies enabling them to build drones, many other countries have developed or bought appropriate technologies and joined their unmanned aerial vehicles reconnaissance and fighting. Exploitation of the UAV for counter-



Figure 7: Drone MQ-1 Predator [21], access: 2018.06.27

terrorism purposes also raises many controversies and disputes on the international arena. The disputes mainly concern issues related to the use of UAVs outside the area covered by the armed conflict, the effectiveness of these operations, but above all it is about ethical issues.

8. Conclusion

Affordable prices, easy accessibility and relatively simple operating rules enable small unmanned aerial vehicles to become more and more common, which also affects the emergence of new applications and an increase in the number of users. An unmanned aerial vehicle is a device that can offer a lot of good. However, when in the hands of inexperienced people who do not have appropriate qualifications, operator's certificate and knowledge of the basic rules of air traffic, they can become a device that can do a lot of harm ranging from property damage to permanent injury. However, unmanned aerial vehicles used for security and safety purposes, operated by trained personnel with their advanced technology as they are equipped, are able to perform tasks can perform high level of complexity operations in places with difficult terrain These advantages make it possible to see the potential that they bring with them all over the world. It is worth remembering that there are also areas of drone applications that have nothing to do with safety and security. The scale and scope of UAV's operation are still expanding, and despite the technological development in their scope, the legislative process in many countries is still not able to keep up and accept the presence of these devices in the airspace. As statistics from aviation authorities around the world show, unmanned aerial vehicles should be regarded as an equal object functioning in the airspace and their integration should be sought not only with manned aviation, but above all, preventive and control measures should be introduced to reduce the use of aircraft UAV for illegal purposes.

References

- [1] Policemen from the roadster are testing drones (Mar. 2018).
URL <https://www.tvn24.pl/katowice,51/katowice-policjanci-z-drogowki-testuja-drony,641593.html>
- [2] P. Pawlik (Mar. 2018). [link].
URL <http://www.dziennikzachodni.pl/artykul/3525447,policja-w-bielskubialej-dronami-lapie-przestepcow-dron-ceny-rodzaje-zastosowanie,id,t.html>
- [3] Drones will help you catch criminals. The British police are already testing them. (Mar. 2018).
URL <http://wgospodarce.pl/informacje/22850-drony-w-policji-brytyjskie-sluzby-juz-je-testuja>
- [4] Police drone-motorcycle tested in Dubai (Mar. 2018).
URL <https://www.scigacz.pl/Policyjny,dron-motocykl,testowany,w,Dubaju,31524.html>
- [5] Drones will help firefighters fight fires from the air and... (Mar. 2018).
URL <http://www.skytronic.com.pl/pl/2017/06/01/drony-pomoga-z-powietrza-strazakom-walczacym-z-pozarami-i-poszukujacym-osob-zaginionych/>
- [6] Drones will guard the EU border (Mar. 2018).
URL <http://www.rp.pl/Sluzby-mundurowe/312069905-Drony-upilnuja-unijnej-granicy.html>
- [7] Drones are used in emergency services (Mar. 2018).
URL <http://601100300.pl/news/drony-sluza-w-ratownictwie/>
- [8] Flying defibrillator that can reach speeds of 60mph revealed (Mar. 2018).
URL <http://www.dailymail.co.uk/sciencetech/article-2811851/The-ambulance-drone-save-life-Flying-defibrillator-reach-speeds-60mph.html>
- [9] Pars life-saving flying robot is now a reality - New Atlas, n. 2. (Mar. 2018).
URL <https://newatlas.com/pars-life-saving-flying-robot/29831/>
- [10] Project Ryp tide - A Life Saving Drone Accessory - Kickstarter, n. 2. (Mar. 2018).
URL <https://www.kickstarter.com/projects/flying-robots/project-ryptide-a-life-saving-drone-accessory>
- [11] Kaliningrad: Russians intercepted the drone smuggling cigarettes. (Mar. 2018).
URL <http://www.newsweek.pl/swiat/dron-przemyt-papierosow-w-kaliningradzie-newsweek-pl,artykuly,286528,1.html>
- [12] Drones in the service not only in e-commerce (2015).
URL <http://www.propertynews.pl/po-godzina ch/drony-w-sluzbie-nie-tylko-e-commerce,32671.html>
- [13] Drone illegally used to smuggle drugs into Melbourne prison. (2014).
URL <http://www.abc.net.au/news/2014-03-10/police-have-charged-a-man-after-a-drone-was-found-over-a-melbou/5309798>
- [14] 51 years in prison for smuggling with a drone. (Mar. 2018).
URL <https://tech.wp.pl/51-lat-wiezienia-za-przemyt-z-uzyciem-drona-6034812131546241a>
- [15] Mexican drone crashed near the US border. The reason? Overloading with drugs (Mar. 2018).
URL <https://tech.wp.pl/meksykanski-dron-rozbil-sie-przy-granicy-z-usa-powod-przeladowanie-narkotykami-6034806690407553a>
- [16] Here Are The Best Drones For Smuggling Drugs Into The U.S. (Mar. 2018).
URL <http://www.vocativ.com/world/mexico-world/drones-drug-smuggling/index.html>
- [17] Game for a drone. A new face of war. (2017).
URL <https://www.focus.pl/artykul/gra-o-dron>
- [18] Targeted killing. (2018).
URL https://pl.wikipedia.org/wiki/Selektywna_eliminacja
- [19] Drone from the clear sky. (2016).
URL <http://www.rp.pl/Plus-Minus/305059906-Dron-z-jasnego-nieba.html>
- [20] Useful, c. d. (2013).
URL <https://wpolityce.pl/polityka/163834-uzyteczne-kontrowersyjne-drony-krytycy-poslugiwania-sie-dronami>
- [21] MQ-1 Predator Unmanned Aerial Vehicle. (2018).
URL http://www.armyrecognition.com/us_american_unmanned_aerial_ground_vehicle_uk/mq-1_predator_unmanned_aerial_vehicle_uav_data_sheet_specifications_information_description_uk.html
- [22] A. Gwiazda, Strategic Review. (2017).
- [23] Drone "lifeguard" in action. (Mar. 2018).
URL <http://frombork.wm.pl/270782,Dron-ratownik-w-akcji.html>
- [24] FAA Urged To Consider Privacy Issues In Developing Registration Program (Mar. 2018).
URL <https://ontheradar.foxrothschild.com/2015/11/articles/general-uas-news-and-developments/faa-urged-to-consider-privacy-issues-in-developing-registration-program/>
- [25] Five Reasons Armed Domestic Drones Are a Terrible Idea (Mar. 2018).
URL <https://www.aclu.org/blog/privacy-technology/surveillance-technologies/five-reasons-armed-domestic-drones-are-terrible>
- [26] Municipal Police Headquarters (Mar. 2018).
URL <http://www.katowice.slaska.policja.gov.pl/k14/informacje/wiadomosci/171266,Poprawic-bezpieczenstwo-policja-roz poczyna-testy-quotdronowquot.html>
- [27] This drone attachment can save your life. (Mar. 2018).
URL <https://atmelcorporation.wordpress.com/2015/03/11/this-drone-attachment-can-save-your-life/>
- [28] T. Zieliński, Funkcjonowanie bezzałogowych systemów powietrznych w sferze cywilnej., Poznań: Wydawnictwo Naukowe SILVA RERUM. (2014).