USING MODERN TECHNOLOGIES TO ENSURE STATE SECURITY

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Abstract: *State security has an important role of maintaining a stable and secure environment in the society. Using modern technologies, e.g. like technologies supporting the concept of the smart city, increase public security. The paper is focused on using modern technologies to ensure state security. The possibilities of ensuring state security are included. The article describes world trends in security. Two case studies regarding public security in the Czech Republic are listed, too. The first case study is focused on the utilization of unmanned aerial vehicle (UAV). The second one case study is focused on using biometrics at the airports. The article contains recommendations for future safety improvements. The aim of the article is to evaluate the use of modern technologies for security in the public sector. Because the security is one of the key parts not only of the concept of smart cities.*

Keywords: *Smart cities, innovation, UAV, biometrics, state security.*

JEL Classification*: O30, D80.*

Preface

The concept of the smart city belongs to principles of sustainable development. It means a city which for their own organization use modern technologies for increasing the life quality and doing more effective government. About the intelligent city is possible speaks after using whole 16 components. The components include whole problematic of implementation various frames (organization, community, infrastructure and resulting). The city can be considered as smart after implementation of all frames. [24]

As it was mentioned above, modern technologies are one of the key parts of the smart city. They are used to support sustainable development of the city. Therefore, this is the reason why the article is focused on modern technologies, which are used by the public administration. Methods to ensure state security are presented. The article presents an overview of various modern technologies used in various areas of research. Next, the two case studies are included. The case studies are focused on the situation and utilization of modern technologies for increasing the security level in the Czech Republic. The first case study is focused on utilization of unmanned aerial vehicles (UAV). The second case study is focused on utilization of biometric measures at airports. Current requirements to constantly improve aviation security are the pillars for changing and improving the security processes at the airports. Recommendations for the future are included in the case studies, too. The aim of the paper is to evaluate utilization of modern technologies to assure or increase security in the public sector.

1 Using modern technologies for increasing state security

Smart cities are comprised of diverse and interconnected components constantly exchanging data and facilitating improved living for a nation's population. More than 50 % of the world's population today reside in urban areas and this percentage is expected to increase because of population migration to these regions in the quest for better jobs and education. [20]

The urbanization rate is approximately 73.1 % in the Czech Republic, so only a quarter of the population lives outside the cities [13]. This is the reason why more and more scientific institutions deals with the problem of a smart city. The areas of intelligent city services are [44]:

- Waste management – efficient and economical waste management. Electronic solutions to support sorting, ecology and cost optimization.
- Transport – introducing modern ways of driving and regulating road traffic in cities. Support for the introduction of transport zones. Modernization of city parking services. Integration of modern payment methods.
- Energy – reducing the energy intensity of urban public systems and buildings. Support for the transformation of public lighting in the modern communication infrastructure of the city.
- Safety – to ensure the security of the city's residents.
- Information – increasing the effectiveness of communication between the city and citizens. Digitizing administrative agendas and city furniture. Integration of modern payment methods.
- Environment – Measuring environmental quality in cities and buildings interiors. Supporting compliance with environmental requirements and standards and overall environmental improvement.
- ICT infrastructure – a flexible portfolio of cloud, data, sensory and communication technologies.

Tab. 1 provides a selection of examples of modern technologies, which improve the quality of life in smart cities.

Tab. 1: Examples of modern technologies in smart cities

Category	Description
Smart parking [22]	Monitoring of parking spaces available in the city.
Smart street lights [5]	Movement of vehicles and humans is detected on highways to switch on of street lights ahead of them and switch off the trailing lights. Indicates street light failure by sending SMS.
Tracking and optimizing traffic [21]	Displaying an alternative route with smart signs during traffic jams.
UAV [25]	Using UAV for forest mapping and prevention of hazardous situations.
Smart Airport [23, 34]	Utilization of multimodal biometric systems to ensure greater passengers safety
Waste management [3, 27]	Fill indication of bins and carriage optimization.
Smart Administration [24]	Using mobile applications to better target citizens at offices. Using SMS for an alert system.

Source: [3], [5], [21], [22], [23], [24], [25], [27], [34]

Two modern technologies listed in Tab. 1 are discussed in the case studies. The first one is focused on utilization of unmanned aerial vehicles (UAV) for various purposes. The second one is focused on utilization of biometric measurements for security management in the traffic (airports).

2 Case studies

The article contains two case studies. Both are focused on the area of the Czech Republic. The first case study is focused on utilization of UAV because of a potential of UAVs for various purposes in the public safety. The second case study is focused on increasing security at the airport by using biometrics.

2.1 Using unmanned aerial vehicles in the Czech Republic

The term UAV is explained as flying vehicles, which can fly without a pilot [43]. The vehicles are divided into three groups [43]:

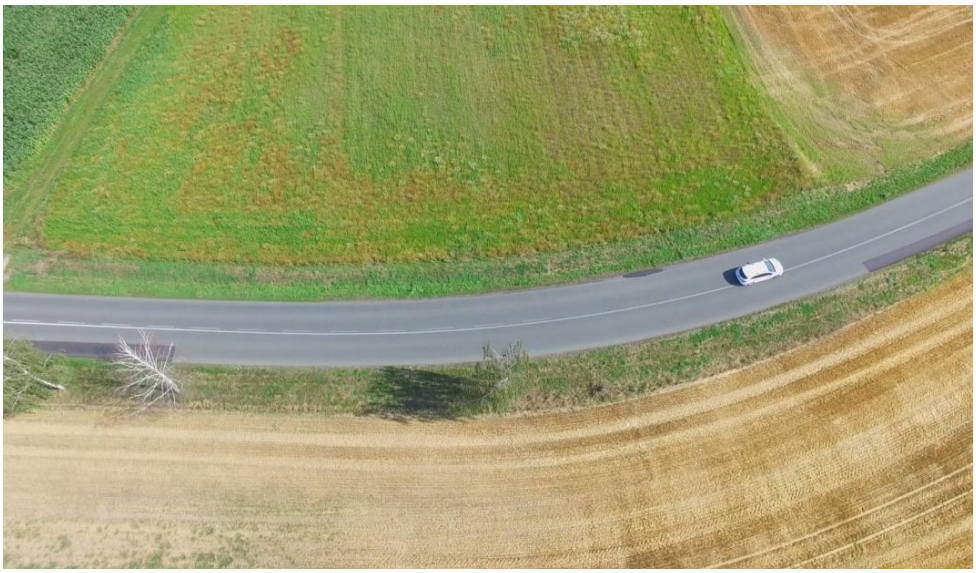
- UAV,
- RPVs – remotely piloted vehicles,
- drones.

All the groups are without a pilot, the general public all vehicles understand all of them as UAV. The professional public distinguishes terms RPV and UAV. RPV is a remotely piloted vehicle, which is remotely controlled. On the other hand, UAV can execute autonomous and pre-programmed missions. So, an RPV is always a UAV, but a UAV may not be an RPV. [16]

Utilization of UAVs in the Czech Republic is increasing. Civil Aviation Authority Czech Republic (Úřad pro civilní letectví – UCL) publishes all regulations regarding utilization of UAVs [12]. For society, utilization of UAVs by the police is mostly known but other parts of the public administration use UAVs, too.

The police primarily use the UAV for monitoring traffic. The hazardous behaviour of car drivers is the key part of using UAV in these days. It means that the police finds out, which areas are suitable for monitoring the traffic offences. The area should be chosen by a few criteria. One of the criteria is visibility. It means that the monitored area is completely visible, so there are not for example trees, which should blockade the view. An area where the traffic offences are often committed represents the next criterion. For example, it is a place where car drivers overtake other cars regardless of traffic regulations. This behaviour is hazardous and often ends as a car crash. It is necessary to meet criteria of secure flying also. It means secure fly of the UAV, not in windy or snowy weather or close to the people or building. The suitable places for monitoring the traffic offences are chosen after. In the Pardubice region, they are the road between Pardubice city and Hradec Králové city, the road between Pardubice city and Dašice city and roads close to Lanškroun city. The UAV is located above the critical part of the road. When the car driver commits a traffic offence, the policeman can see it thanks to the camera fixed on the UAV. The view can be seen in the Fig. 1. The policeman stands 300 metres along the monitored place or area and when he can see the traffic offence he has enough time to stop the car driver who committed the traffic offence. So, the policeman controls traffic situation and he can immediately intervene. The police want to use the UAV for traffic control, for help with mass traffic accidents and natural disasters. [1], [41]

Fig. 1: Using police UAV for monitoring traffic offences



Source: [1]

UAVs are also used in forestry in the Czech Republic [33]. It is usually used for monitoring afforestation, forest health mapping, and calamity mapping. Faculties focused on forestry with cooperation with forest industry are working on possibilities of utilization of UAVs in forestry. The low endurance of batteries is the key problem of cheaper UAVs. Therefore, the main research is focused on increasing endurance of batteries. Possibilities of afforestation monitoring by UAV belongs to other ways of UAVs utilization. [17], [25], [33]

In agriculture, the main objective is crop monitoring and monitoring of natural disasters, e.g. floods or droughts. The early crop monitoring can prevent devastation of a crop. Early utilization of chemical insecticide or increasing watering in warm days can be given as examples of prevention. Water sources monitoring is important as well. Early monitoring before floods can help to decrease damages. Water sources and water streams (e.g. rivers or ponds) monitoring can help to the next planning of the sustainability of water in the landscape. [11], [19]

Increase the security of UAVs utilization is the key issue for the future. Increasing number of attacks by drones, misuse of UAVs, and flying without permission and in places where the flying is not allowed, e.g. near to the airport represent the key problematic issues. Therefore, the development in various countries is focused on secure catching of unpermitted UAVs by taking down drones by larger drones, eagles trained to catch a drone, and catching UAVs to the net [42]. The problem is with catching the owner of the UAV. It means how to find the pilot or owner of the UAV. And owner/pilot takes full responsibility for the flying with drone. Using UAVs for the forensic analysis should be possible in the Czech Republic in the future. It should help with the reconstruction of the unlawful action in the civil and criminal law [7].

2.2 Using biometric systems on the airport (border control)

Biometric authentication works on the principle**: Every person is identical only by himself.** Biometric systems use unique physical or behavioural characteristics to people authenticate. Physiological biometrics refers to a person's physical attribute [18]:

- iris,
- retina,
- face,
- fingerprints, palmprint,

- hand geometry,
- DNA.

Due to the increased security risk at international airports, biometric systems are being used. These are intended to increase the security of airport border controls but also to facilitate and speed up the clearance of legal passengers.

There are three major factors influencing the performance of the automatic identity recognition [35]:

- Quality of the reference image digitally stored on the passport or visa information system.
- Quality of the image live recorded at the gate or tunnel.
- Quality of the used algorithm for recognition.

2.2.1 Czech Republic (Václav Havel Airport Prague)

The Prague Airport at Ruzyně uses biometric gateway E-Gate when carrying out security checks in the border inspection. The automatic system uses biometric data stored in the chip of a travel document. E-Gate acquires biometric face information from the travel document and then it verifies the identity of the passenger. [31]

The first passengers used the gate in 2012. The project 'Strengthening automated e-Pass control systems at international airports' was funded by the Norwegian Funds, the 'Programme CZ14 – Schengen Cooperation and Combating Cross-border and Organized Crime, including Trafficking and Itinerant Criminal Groups'. [15]

The Easy Go can only be used by citizens of the European Union, the European Economic Area, and Switzerland, over 15 years of age, fly outside the Schengen area and own a biometric passport. 1 million (50%) of eligible passengers used the possibility of automatic border control in one of 17 gates in 2016. Border control time depends on the behaviour of the passenger, averaging 15 seconds. [28], [31]

Biometric e-passes were required to be implemented by all EU Member States according to EU Council Regulation (EC) No 2252/2004 on standards for security features and biometrics in passports and travel documents issued by the Member States. The first biometric feature (face) in newly issued travel documents had to be introduced by the end of August 2006 and other biometrics (fingerprints) until the end of February 2008. [28], [31]

Fig. 2: E-gate – border control

Source: [28]

2.2.2 Other airports in the Czech Republic (Brno and Pardubice)

Other international airports in the Czech Republic are Pardubice or Brno airports. These airports carry hundreds of thousands of passengers a year. For comparison, Václav Havel Airport Prague annually transports millions of passengers. Nowadays, biometric systems are not used in these smaller Czech airports to increase safety. [36], [37], [40]

2.2.3 New approach at airports outside the Czech Republic

More and more countries are using biometric systems to control airports. An important event that helped to extend biometric systems at airports was a terrorist attack on September 11, 2001 at the Twin Tower in New York. [38]

Among the airports using the latest biometric methods are eight major international airports in Australia. Arrivals SmartGate uses the information in ePassports and facial recognition technology. [4]

Dubai is the place where innovative technology is used. At the airport, identification is performed using the iris and face. [29] In the 2008, they also tested ‘smart tunnel’. It would enable travellers to complete immigration checks in just 15 seconds, while passing through a virtual aquarium where the cameras are installed. [14]

Safety has always been Israel's priority. This is also reflected at Ben Gurion Airport, where passenger identification is used on the basis of hand geometry. The Israeli solution is based on the US solution (INSPASS), which was used at international US airports. Today, US fist traps are used at US airports to identify passengers. [9], [30], [38]

Amsterdam Schiphol is one of Europe's largest airports, according to the number of passengers checked out. Now they use self-service gates. The gate identifies the passenger by the face, after applying the e-passport. Now Schiphol is testing 'biometric boarding'. In this test opportunity to board for this trip without presenting your boarding pass. You will board

the aircraft quickly and easily via a separate gate that will identify you through facial recognition. [2], [8]

2.2.4 Recommendations

Increasing the safety of airport procedures, using biometric systems, is a key solution for the future. Developments in different countries vary greatly, and due to the laws of individual countries. One of the fastest passenger control solutions available in Dubai, identifying is done with the iris and takes 1-2 seconds. The iris-based biometric system is safer than the current system used at Václav Havel Airport, so it is one of the options for the future. The problem, however, is the higher cost of this system and the reference template (iris) that is not in the biometric passports of the European Union. At smaller airports, the future of using the E-Gate system. [29], [32]

3 Discussion

Increasing security precaution by modern technologies is an inherent part of the concept of the smart cities. Problems can be funded with restrictions and law but the government wants to react to actual security trends. As well financial part of this concept can be a problem for small cities, which want to react to the new trend, but their funding is not adequate for establishing the new technologies. In the small cities isn´t used smart traffic management, because the traffic isn´t there overcharged. Problem with secure utilization of modern technologies must be solved, too. It is not only about security regarding the data, which is problematic too, but it is about abusing the technologies, which can evoke hazard situation or human losses. This is the reason why the security regarding using modern technologies must be provided.

Conclusion

The concept of smart cities has increasing significance because of the modern technologies development in these days. One of the ways how to use modern technologies is to ensure state security. Therefore, the paper is focused on the utilization modern technologies in public security. The paper contains a brief overview of utilization of various technologies. In the paper, there are provided two case studies. Both are focused on the Czech Republic. The first one deals with the utilization of UAVs to ensure security. The second one deals with the utilization with biometric measurements in the public security. Both case studies contain recommendations for the future. The problems with the smart cities from the security view are listed also.

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