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Review on Security trends in Internet of Things

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Abstract: Influences in the area of safety and security, there is perhaps no greater trend than IoT, which is about more and more devices being smart and connected to the internet, collecting and transmitting an ever-increasing amount of data from a growing number of sensors. Cameras in particular are playing an increasingly important role due to extensive capabilities in processing visual data. Video surveillance systems with computer vision and machine learning can dramatically improve the general security situation and contribute to an optimal level of human-machine communication in our society.

Keywords: security, sensors, internet, IoT, surveillance.

I. INTRODUCTION

Security is a fundamental issue in today's world. In this chapter we discuss various aspects of security in daily life that can be solved using image processing techniques by grouping in three main categories: visual tracking, biometrics and digital media security. Visual tracking refers to computer vision techniques that analyses the scene to extract features representing objects (e.g., pedestrian) and track them to provide input to analyse any anomalous behaviour. Biometrics is the technology of detecting, extracting and analysing human's physical or behavioural features for identification purposes. Digital media security typically includes multimedia signal processing techniques that can protect copyright by embedding information within the media content using watermarking approaches. Individual topics are discussed referring recent literature.

TRENDS IN SAFETY AND SECURITY

The most important developments in safety and security that will impact visual application markets in the future.

A. *Increasing computing power on devices reduces data transfer and storage*

Growing capabilities and shrinking costs in IT technology have made it no longer necessary to upload all of the video data recorded by an IP camera – compressed or uncompressed – to an on-premise video recording system, video storage or cloud-based system. This has become possible with edge computing, i.e. decentralized data processing at the edge of the network on the devices. As a result, numerous calculations and recognition steps are carried out in the camera itself and by cooperating sensors. The resulting metadata is then transferred to the cloud and merged with the data from other cameras and other sensors using the much higher computing performance available there.

B. *AI and machine learning: a megatrend appearing in all sectors and verticals*

AI and machine learning are among the important topics that will dominate all fields of technology in the future. Regardless of where evaluation and data processing take place, especially in the area of recognition and image data, AI in cameras will be able to make determinations about characteristics and other descriptive elements, in comparison to other people. This will be in addition to its ability to compare an individual to others already known to the system. Going beyond the ability to interpret safe behavior , a machine-learning routine can gradually accumulate a wealth of experience and data. In retail, when it comes to researching customer preferences and behaviors, as well as in the logistics and transportation sector, AI helps systems to progress further in their ability not only to recognise actions, but also assess them and draw conclusions.

C. *5G helps advance the processing of camera content into new dimensions*

In the long term, 5G networks will become an important success factor for IoT and video processing. Whether in the automotive sector, medicine or smart cities – 5G is becoming the basis for successful value-added services everywhere. Especially when it comes to camera images that quickly reach a large volume of data in high-resolution quality, there is no alternative to 5G. Not only are the high data transmission speeds important, but 5G's low latency and consistent and

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interruption-free connections, which are secure against hacker attacks, are particularly relevant in case of emergencies where reliable information and a swift response are of the essence.

D. ***IT security: the decisive factor for the success of IoT and video applications***

IoT devices will increasingly become a target for hackers over the next few years, as both their computing power as well as the intelligence they collect and transmit is valuable assets in cybercrime and espionage. Smart connected devices also serve as potential access points to other more sensitive parts of the network. On the other hand, interrupting the functionality of IP-based cameras can open loopholes in physical security. Reliable security technologies, especially in the camera sector, will determine how strong and sustainable the trust of users will be in IoT and image processing applications. Programmers and integrators of IoT apps should be clear about priorities and security guidelines as part of their security measures. In contrast to earlier years, where malware and Trojans were used to attack security infrastructure, in the future, individual camera types will be targeted, and in some cases even individual devices will be attacked. Unsecured IoT devices can present serious security vulnerabilities, especially for industrial facilities, but also for the infrastructure of an airport or public building.

E. ***Innovation from B2B and B2C create synergies for each other***

In the digital camera market, there is a convergence between B2B and B2C devices and the related technology. On the one hand, the smart home sector is seeing more powerful cameras coming from manufacturers directly aimed at the consumer market. Featuring powerful components that have become cheaper in recent years, these are now even suitable for demanding applications that were previously available for professional equipment only. Meanwhile, the companies producing these professional devices for the security and safety sector are also producing more cost effective cameras, thus expanding their portfolio in the direction of residential IoT. The cameras are not only suitable for recording image content, but often also include, for example, sensors for motion detection or night-view sensors.

II. CONCLUSION

Although there is much research to be done, one thing is clear: there is a market here which opens up immense opportunities. Compare the development of cameras to that of mobile phones – probably the most commonplace IoT devices. New mobile applications and use cases beyond calling and texting emerged as mobile phones became increasingly smart and connected. Innovation exploded though, once Google and Apple launched their platforms that allowed any developer to provide added functionality through their application stores. On the camera side, the processing of visual data can create enormous added value for security applications in the retail, smart cities and public spaces industries. The required processing power and connectivity is already there. What will take this to the next level are shared standards and open platforms that empower a worldwide community of developers to invent and publish applications lifting smart cameras to their full potential.

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