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Trends of Video Surveillance and Embedded Systems in 2017

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Abstract

Video surveillance is one of the most data intensive applications. A typical video surveillance system consists of one or multiple video cameras, a central storage unit, and a central processing unit. At least two bottlenecks exist: First, the transmission capacity is limited, especially for raw data. Second, the central processing unit has to process the incoming data to give results in real time. Therefore, is proposed an FPGA-based embedded camera system which performs all steps of image acquisition, region of interest extraction, generation of a multiresolution image, and image transmission. The proposed pipeline-based architecture allows a real time wavelet-based image segmentation and a detection of moving objects for surveillance purposes. The system is integrated in a single FPGA using external RAM as storage for images and for a Linux operating system which controls the data flow. With the pipeline concept and a Linux device driver it is possible to create a system for streaming the results of an image processing through a GbE interface. A real time processing is achieved. The camera transmits the captured images with 30 Mpixel/s, but the system is able to process 100 Mpixel/s.

INTRODUCTION AND STORAGE REQUIREMENTS FOR VIDEO SURVEILLANCE:

Storage configured for video surveillance is gaining more industry attention. The RAW capacity shipped of SAN, NAS and DAS storage used fo r video surveillance is increasing at around 40% each year. (CAGR 2014-19). The traditional boxed appliance model, (born out of the death of the VCR) typically included DVRs in a capacity to suit and perhaps external DAS for extra capacity; this was simple and it worked. Yet video surveillance has evolved and this type of approach has been insufficient for an increasing percentage of users.

Average camera resolution continues to increase. HD-compliant 1080p 25/30 fps cameras have established themselves as the minimum expected from new cameras. Panoramic and 4K cameras are two further storage-hungry high-growth categories. Analytics and more efficient compression technologies will reduce some of the storage requirements. However, these technologies are not going to offset the large increase of data from increasing shipments of higher specification cameras, which are capturing much more information than ever before. Also the increasing perceived value of video information will increase the length of time it is stored. Increased storage requirements in video surveillance are the consequence that few want to talk about or to plan for.

Initial cloud storage offerings have made headway in the body-worn camera market, yet IHS believes that the longer-term costs of increased spec. cameras and more widespread deployment mean a hybrid approach will best suit the larger systems. This approach will incorporate multiple storage types and will often be the most cost-efficient solution. In its most basic form, this means a combination of cloud and local storage with one unified platform.

TRENDS ON EMBEDDED SYSTEMS:

According to the World Semiconductor Trade Statistics today about 98 percent of programmable digital devices are actually embedded. Embedded computers are found in nearly all more elaborate technical devices today and these embedded computers are the basis to provide the sophisticated functionalities of such devices. More and more innovative functionalities are added to existing technical devices and even completely new types of gadgets emerge. There are numerous examples. They start by simple everyday appliances in facilities and facility management such as heating, air conditioning, elevators, escalators, and mission control systems and many more. We find them in production units from robotics to production automation systems.

Another important area of application is communication industry where the revolution of mobile phones, handhelds for communication and various forms of new networks are only due to the advances in computer systems and Embedded Systems. Examples for the ubiquitous use of digital technology are numerous. For instance, infotainment is heavily based on digital technology and the possibilities for Embedded Systems are literally unbounded, be it toys, computer games, music players, movie players or all kind of multimedia devices. Often, we do not even realize any more the digital technology in all the kinds of handhelds and mobiles we use.

So, one of the big challenges is to manage the complexity and reliability of the development, operation, and maintenance of Embedded Systems. We have to understand much better how to capture the requirements for systems with embedded devices and how to be able to find out the user demands. For such systems, ways to create adequate human machine interfaces are needed, which are addressing the needs and capabilities of the typical users and to improve the systems' usability and reliability. There are many relevant areas of Embedded Systems with a tight interference with the consumers' interest in environmentally friendly products as well as with the respective regulation. These areas include the biological impact of electromagnetic emissions,

electromagnetic interference (EMI), energy conservation and emissions, and public health, especially prevention of hazards caused by Embedded Systems. The increased amount of intelligence supplied with Embedded Systems and the basic enablers for more intelligent control such as electronic replacements for mechanical linkages are often beneficial for compliance with policy and environmental issues.

Some examples are:

- increased efficiency of power-consuming machines and devices by improved processor technology, RFID technologies and smarter energy management [IEE2005] in plants as well as in office and private buildings,
- less radiation from mobile devices by smart, power-aware wireless protocols that adjust radiation levels to the demands of the wireless link [IEE2005],
- improved emissions and fuel consumption in automotive and avionics through advanced electronic engine controls that are connected to more sensors to incorporate information that helps to minimize the fuel needed reduced emissions and fuel consumption through improvement of traffic flow. Advanced telematics applications in automotive and more intelligent, i.e. networked, traffic management systems could help to reduce traffic jams. [PFH2005] estimate that the European market for complex telematics and traffic control systems are € 3.7 billion in 2005 and that it will reach € 5.8 billion in 2010. The world market, today worth € 25 billion, is expected to grow by six to seven percent per year.
- Also the efficiency of power stations can be increased through better control systems. This is valid for all types of combustion power stations. Also renewable energy sources can be used more efficiently, which increases their cost effectiveness. For example, solar trackers that "follow" the sun across the daytime sky always ensure that solar panels are exposed to the maximum available sun energy. This technology increases the energy output by up to 40%.

POSITIVE EFFECTS OF EMBEDDED SYSTEMS:

Embedded Systems ease environmental research or enable many new investigations. The measurement and tracking of diverse data like weather and climate data paves the way for new research insights. In addition, sensors are used more often to identify early indicators for earthquakes, volcanic eruptions or flood waves. Other sensors and wireless sensor networks are used to observe animals and to track changes of ecosystems to better understand these changes and examine the effects of nature conservation activities.

CONCLUSION:

It is inevitable that the on-board processing power of video surveillance cameras will continue to increase and many applications will be performed at the edge. However,

demand for high-end server based analytics is expected to be sustained. With the future prospects for server-based video analytics looking ever bleaker for more basic applications, I expect that the remaining dedicated software providers will look to partner manufacturers with video surveillance devices to develop the level of intelligence that is embedded on them; this will further drive the trend away from pure server-based analytics in 2017.

REFERENCES

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Profile Of Author:

Ms. Papri Ghosh has completed her M.Sc., M.Tech. and published 8 papers in the field of surveillance with still and video photography. She has also interest on forensic science. At present she is working as a Guest Lecturer in college stated in the beginning under University Of Kalyani, West Bengal. She is a single unmarried lady of 44.5 years.