Book Review:

Smart Cameras

Ahmed Nabil Belbachir (Editor)
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The computer vision based applications market is increasing since several years ago. A lot of new application areas are incorporating this type of systems to solve particular problems. An emergent trend in last decades is incorporate dedicated devices to particular problems. A smart camera can be defined as a standalone device which can take decisions by itself, since have the ability of understand images. It is composed by an image sensor and processing logic to perform the task, without the use of PCs. The smart cameras can be found, for example, in surveillance, automotive and industry.

The book *Smart Cameras* covers all aspects for these devices from this history and applications, to market trends. The book is composed by 20 chapters organized in eight parts detailed below.

The part one presents an *Introduction to Smart Cameras* in three chapters including a survey on the evolution of smart cameras from the first concepts to actual technologies (*Chapter 1:"A Historical Evolution", Ahmed Nabil Belbachir and Peter Michael Göbel*), technical definition of smart cameras, their advantages and a tentative classification (*Chapter2: "Fundamentals and Classification", Yu Shi and Fábio Dias Real*); and a review on technologies, including hardware devices, design, and application of systems (*Chapter 3: "Technologies and Applications", Fábio Dias Real and Francois Berry*)

The second part describes *Imaging Technologies and Architecture of Smart Cameras*. Inside this, a chapter dedicated to concepts of vision sensor technologies of photoreceptors, pixels, and signal processing circuits is presented (*Chapter 4: "Detectors, Pixels, and Signal Processing", Christoph Posch*) and a review on vision sensor architectures and physical structures, including concepts of vision system-on-chip (*Chapter 5: "Image Sensor Architectures", Alireza Moini*)

The next part of the book is dedicated to *Embedded Vision*, involving the design and challenges of smart cameras development from memory access considerations to the use of high-level vision library (*Chapter 6 : "Embedded Vision Challenges", Oliver Sidla, Norbert Brändle, Wanda Benesova, Marcin Rosner, and Yuriy Lypetskyy*), high performance smart linescan camera development analyzing design factors such as resolution, speed, throughput, and inspection quality (*Chapter 7: "High-Performance Smart Cameras", Johannes Fürtler, Ernst Bodenstorfer, Michael Rubik, Konrad J. Mayer, Jörg Brodersen, and Christian Eckel*), and detailed description of the implementation of two real-time stereo vision on smart cameras (*Chapter 8: "Embedded Stereo Vision", Kristian Ambrosch, Martin Humenberger, Sven Olufs, and Stephan Schraml*)

The part four presents examples of *Computer Vision for Smart Cameras.* The chapters involve automatic methods for calibration (*Chapter 9: "Self Calibrating Cameras in Video Surveillance", Roman Pflugfelder and Branislav Micusík*), object segmentation based on motion or change detection, covering static and non static cameras (*Chapter 10: "Change Detection for Object Segmentation", Andrea Cavallaro*), object tracking achievements over the past years as well as research trends and a summary of tracking evaluation frameworks, associated metrics, strengths and weaknesses (*Chapter 11: "Object Tracking on Embedded Hardware", Gustavo Fernández Domínguez, Csaba Beleznai, Martin Lizenberger, and Tobi Delbrück*)

The complexity of visual systems is increasing, forcing to use more than one cam to perform the task. The section five is related to *Distributed Smart Cameras.* The chapters included in the section describe the design, architecture, and application of a high-performance wireless system(*Chapter 12: "Designing a Wireless Smart Camera with a High-Performance Vision System", Richard Kleihorst*), aspects of geo-registration and inter-sensor calibration in sensor networks (*Chapter 13: "Automatic Geo-registration and Inter-sensor Calibration in Large Sensor Networks", Khurram Shafique, Feng Guo, Gaurav Aggarwal, Zeeshan Rasheed, Xiaochun Cao, and Niels Haering*), methodologies of large information management in a visual distributed system (*Chapter 14: "Application Development and Management of*

Smart Camera Networks", Wolfgang Beer, Werner Kurschl, Florian Matusek, Bernhard Moser, Stefan Mitsch, and Stephan Sutor), and object localization on a given ground-plane test map using heterogeneous stereo vision (*Chapter 15: "Stereo Vision in a Network of Co-operative Cameras", Sanjeev Kumar, Christian Micheloni, and Gian Luca Foresti*)

Selected Applications of Smart Cameras are presented in part six. This book section arises three principal consumers: industries (*Chapter 16: "Smart Cameras for Machine Vision", Yu Shi*), surveillance (*Chapter 17: "Smart Cameras for Visual Surveillance", Khurram Shafique and Omar Javed*) and automotive (*Chapter 18: "Camera-Based Automotive Systems", Massimo Bertozzi, Luca Bombini, Alberto Broggi, Paolo Grisleri and Pier Paolo Porta*).

The seventh part of the book is an overview of the current *Smart Cameras Markets* and future demands. Most of the information is based on two market studies and a survey conducted among smart camera producers and distributors, illustrating the current market situation and requirements for smart cameras (*Chapter 19: "Market Demands and Analysis", Bernhard Kohn and Raffael Binder*)

The final part is focused on *The Future of Smart Cameras*. The last chapter of this book (*Chapter 20:"Future Directions of Smart Cameras", Ahmed Nabil Belbachir*) summarizes future directions and prospects of smart cameras in three underlying dimensions: the scientific interest and trends; application needs and expansions; and the market evolution, impulses, and trends.

The book is reader friendly, and is useful for both students and professionals. For students, a wide range of knowledge is transmitted in terms of considerations in smart camera development. As for professionals, detailed information about emerging technologies and trends is presented. The review carried out by the editor is complete, covering all aspects of this technology. In addition, the book contains a large set of examples making the understanding easy.

Lucas Leiva and Nelson Acosta
INCA/INTIA, UNCPBA
{lleiva,nacosta}@exa.unicen.edu.ar