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Nota di contenuto	SMART SENSORSYSTEMS; Contents; Preface; About the Authors; 1 Smart Sensor Systems: Why? Where? How?; 1.1 Third Industrial Revolution; 1.2 Definitions for Several Kinds of Sensors; 1.2.1 Definition of Sensors; 1.2.2 Definition of Smart Sensors; 1.2.3 Definition of Integrated Smart Sensors; 1.2.4 Definition of Integrated Smart Sensor Systems; 1.3 Automated Production Machines; 1.4 Automated Consumer Products; 1.4.1 Smart Cars; 1.4.2 Smart Homes; 1.4.3 Smart Domestic Appliances; 1.4.4 Smart Toys; 1.5 Conclusion; References 2 Interface Electronics and Measurement Techniques for Smart Sensor Systems2.1 Introduction; 2.2 Object-oriented Design of Sensor Systems; 2.3 Sensing Elements and Their Parasitic Effects; 2.3.1 Compatibility of Packaging; 2.3.2 Effect of Cable and Wire Impedances; 2.3.3 Parasitic and Cross-effects in Sensing Elements; 2.3.4 Excitation Signals for Sensing Elements; 2.4 Analog-to-digital Conversion; 2.5 High Accuracy Over a Wide Dynamic Range; 2.5.1 Systematic, Random and Multi-path Errors; 2.5.2 Advanced Chopping Techniques; 2.5.3

Autocalibration; 2.5.4 Dynamic Amplification
2.5.5 Dynamic Division and Other Dynamic Signal-processing Techniques2.6 A Universal Transducer Interface; 2.6.1 Description of the Interface Chip and the Applied Measurement Techniques; 2.6.2 Realization and Experimental Results; 2.7 Summary and Future Trends; 2.7.1 Summary; 2.7.2 Future Trends; Problems; References; 3 Silicon Sensors: An Introduction; 3.1 Introduction; 3.2 Measurement and Control Systems; 3.3 Transducers; 3.3.1 Form of Signal-carrying Energy; 3.3.2 Signal Conversion in Transducers; 3.3.3 Smart Silicon Sensors; 3.3.4 Self-generating and Modulating Transducers
3.4 Transducer Technologies3.4.1 Introduction; 3.4.2 Generic Nonsilicon Technologies; 3.4.3 Silicon; 3.5 Examples of Silicon Sensors; 3.5.1 Radiation Domain; 3.5.2 Mechanical Domain; 3.5.3 Thermal Domain; 3.5.4 Magnetic Domain; 3.5.5 Chemical Domain; 3.6 Summary and Future Trends; 3.6.1 Summary; 3.6.2 Future Trends; References; 4 Optical Sensors Based on Photon Detection; 4.1 Introduction; 4.2 Photon Absorption in Silicon; 4.3 The Interface: Photon Transmission Into Silicon; 4.4 Photon Detection in Silicon Photoconductors; 4.4.1 Photoconductors in Silicon: Operation and Static Performance
4.4.2 Photoconductors in Silicon: Dynamic Performance4.5 Photon Detection in Silicon pn Junctions; 4.5.1 Defining the Depletion Layer at a pn Junction; 4.5.2 Electron-hole Collection in the Depletion Layer; 4.5.3 Electron-hole Collection in the Substrate; 4.5.4 Electron-hole Collection Close to the Surface; 4.5.5 Backside-illuminated Pin Photodiode; 4.5.6 Electron-hole Collection in Two Stacked pn Junctions; 4.6 Detection Limit; 4.6.1 Noise in the Optical Signal; 4.6.2 Photon Detector Noise; 4.6.3 Photon Detector Readout; 4.7 Photon Detectors with Gain; 4.7.1 The Phototransistor
4.7.2 The Avalanche Photodiode

Sommario/riassunto

Information processing systems need sensors to acquire the physical, mechanical and chemical information to be able to function. For extended use of sensors in industrial production tools and consumer components, such as smart cars and smart homes, the reliability of the sensors should be improved and the cost dramatically reduced. The improvement of reliability, together with a reduction of cost, can only be achieved with smart sensor systems. These systems combine the functions of sensors and interfaces, including sensors, signal conditioning A-D (analog to digital) conversion, and bus int