Optical, Acoustic, Magnetic, and Mechanical Sensor Technologies (Devices, Circuits, and Systems)

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Light on physics and math, with a heavy focus on practical applications, **Optical, Acoustic, Magnetic, and Mechanical Sensor Technologies** discusses the developments necessary to realize the growth of truly integrated sensors for use in physical, biological, optical, and chemical sensing, as well as future micro- and nanotechnologies.

Used to pick up sound, movement, and optical or magnetic signals, portable and lightweight sensors are perpetually in demand in consumer electronics, biomedical engineering, military applications, and a wide range of other sectors. However, despite extensive existing developments in computing and communications for integrated microsystems, we are only just now seeing real transformational changes in sensors, which are critical to conducting so many advanced, integrated tasks.

This book is designed in two sections—*Optical and Acoustic Sensors* and *Magnetic and Mechanical Sensors*—that address the latest developments in sensors.

The first part covers:

- Optical and acoustic sensors, particularly those based on polymer optical fibers
- Potential of integrated optical biosensors and silicon photonics
- Luminescent thermometry and solar cell analyses
- Description of research from United States Army Research Laboratory on sensing applications using photoacoustic spectroscopy
- Advances in the design of underwater acoustic modems

The second discusses:

- Magnetic and mechanical sensors, starting with coverage of magnetic field scanning
- Some contributors' personal accomplishments in combining MEMS and CMOS technologies for artificial microsystems used to sense airflow, temperature, and humidity
- MEMS-based micro hot-plate devices

- Vibration energy harvesting with piezoelectric MEMS
- Self-powered wireless sensing

As sensors inevitably become omnipresent elements in most aspects of everyday life, this book assesses their massive potential in the development of interfacing applications for various areas of product design and sciences—including electronics, photonics, mechanics, chemistry, and biology, to name just a few.

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