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Descrizione fisica	1 online resource (303 p.)
Collana	Artech House series smart materials, structures, and systems
Altri autori (Persone)	BeebyStephen WhiteNeil (Neil M.)
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Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references at the end of each chapters and index.
Nota di contenuto	Energy Harvesting for Autonomous Systems; Contents; Chapter 1 Introduction; 1.1 Background and Motivation; 1.2 Typical System Architecture; 1.3 Intended Readership for This Book; Reference; Chapter 2 Wireless Devices and Sensor Networks; 2.1 Introduction; 2.2 Energy Requirements of Autonomous Devices; 2.2.1 From Mobile Phones to MP3 Players; 2.2.2 Radio Frequency Identification (RFID); 2.2.3 Wireless Sensor Networks; 2.3 Enabling Technologies: Devices and Peripherals; 2.3.1 Low-Power Microcontrollers and Transceivers; 2.3.2 Sensors, Peripherals, and Interfaces; 2.4 Wireless Communication. 2.4.1 Communication Protocols and Power Requirements2.4.2 Energy-Aware Communication Protocols; 2.5 Energy-Awareness in Embedded Software; 2.5.1 Operating Systems and Software Architectures; 2.6 Alternative Nonrenewable Power Sources; 2.6.1 Direct Transmission; 2.7 Discussion; References; Chapter 3 Photovoltaic Energy Harvesting; 3.1 Introduction; 3.2 Background; 3.2.1 Semiconductor Basics; 3.3 Solar Cell Characteristics; 3.4 Module Characteristics; 3.5 Irradiance

Standards; 3.5.1 Outdoor Operation; 3.5.2 Indoor Operation; 3.6 Efficiency Losses; 3.6.1 Intrinsic Losses; 3.6.2 Extrinsic Losses. 3.6.3 Module Losses 3.7 Device Technologies; 3.7.1 Silicon Wafers; 3.7.2 Single Crystal and Multicrystalline Devices; 3.7.3 Amorphous Silicon; 3.7.4 Thin Film Polycrystalline Silicon; 3.7.5 Multijunction Silicon; 3.7.6 Cadmium Telluride/Cadmium Sulphide; 3.7.7 Copper Indium (Gallium) Disselenide; 3.7.8 Single and Multijunction III-V Cells; 3.7.9 Emergent Technologies; 3.8 Photovoltaic Systems; 3.8.1 Basic System; 3.8.2 Charge Controllers; 3.8.3 DC-DC Converters and Maximum Power Point Tracking; 3.8.4 Miniaturization and Low-Power Systems; 3.8.5 Device Technology; 3.8.6 Systems Considerations. 3.9 SummaryReferences; Chapter 4 Kinetic Energy Harvesting; 4.1 Introduction; 4.2 Kinetic Energy-Harvesting Applications; 4.2.1 Human; 4.2.2 Industrial; 4.2.3 Transport; 4.2.4 Structural; 4.3 Inertial Generators; 4.4 Transduction Mechanisms; 4.4.1 Piezoelectric Generators; 4.4.2 Electromagnetic Transduction; 4.4.3 Electrostatic Generators; 4.4.4 Transduction Damping Coefficients; 4.4.5 Microscale Implementations; 4.5 Operating Frequency Range; 4.5.1 Frequency Tuning; 4.5.2 Strategies to Broaden the Bandwidth; 4.6 Rotary Generators; 4.7 Example Devices; 4.7.1 Human-Powered Harvesters. 4.7.2 Conventional Generators for Industrial and Transport Applications 4.7.3 Microscale Generators; 4.7.4 Tuneable Generators; 4.8 Conclusions and Future Possibilities; 4.8.1 Piezoelectric Generators; 4.8.1 Piezoelectric Generators; 4.8.2 Electromagnetic Generators; 4.8.3 Electrostatic Generators; 4.8.4 Summary; Acknowledgments; References; Chapter 5 Thermoelectric Energy Harvesting; 5.1 Introduction; 5.2 Principles of Thermoelectric Devices; 5.2.1 Thermoelectric Effects; 5.2.2 Thermoelectric Devices; 5.3 Influence of Materials, Contacts, and Geometry.

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## Sommario/riassunto

This unique resource provides a detailed understanding of the options for harvesting energy from localized, renewable sources to supply power to autonomous wireless systems. You are introduced to a variety of types of autonomous system and wireless networks and discover the capabilities of existing battery-based solutions, RF solutions, and fuel cells. The book focuses on the most promising harvesting techniques, including solar, kinetic, and thermal energy. You also learn the implications of the energy harvesting techniques on the design of the power management electronics in a system. This i.

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