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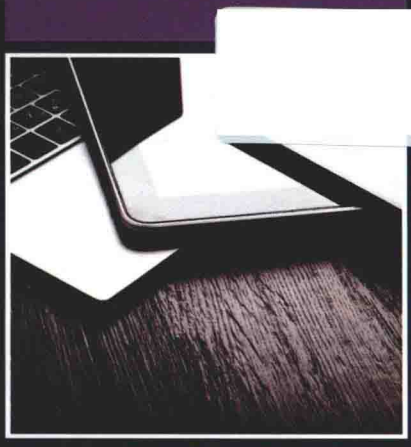

Wireless MEMS Networks and Applications

Edited by Deepak Uttamchandani

WP
WOODHEAD PUBLISHING

Woodhead Publishing Series in Electronic and Optical Materials: Number 87

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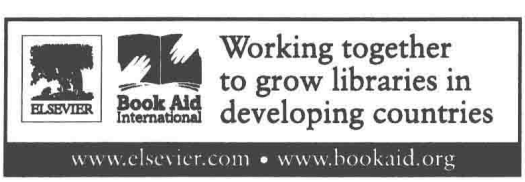
Library of Congress Cataloging-in-Publication Data
A catalog record for this book is available from the Library of Congress

British Library Cataloguing-in-Publication Data
A catalogue record for this book is available from the British Library

ISBN: 978-0-08-100449-4 (print)
ISBN: 978-0-08-100450-0 (online)

For information on all Woodhead publications visit our website at https://www.elsevier.com/



Publisher: Matthew Deans
Acquisition Editor: Kayla Dos Santos
Editorial Project Manager: Heather Cain
Production Project Manager: Poulouse Joseph
Cover Designer: Maria Inês Cruz

Typeset by SPi Global, India

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To Barbara for your patience and support and to Arun for your hard work and perseverance

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Preface

From the early days of micro-electromechanical systems (MEMS) in the 1980s, great strides have been made in the commercialization of MEMS, from discrete structures fabricated in academic and industrial laboratories around the world into fully engineered devices integrated within a wide range of commercial, industrial, and consumer products and appliances. In parallel with the growth of MEMS, there have also been rapid and impressive advances in ultra-low-power electronics, low-power wireless networks, energy-harvesting technologies, software, cloud computing, data-security, and data-analytics. The fusion of all these technologies has paved the way for the Internet of Things (IoT) through which vast quantities of data are collected, exchanged, stored, and processed in order to extract information from the local to the global scale. MEMS devices, with their small-size, ruggedness, low unit-cost, and low power-consumption, are key enablers in wireless sensor networks (WSNs), which themselves are a key technology in delivering the vision of the IoT.

This book aims to provide new entrants to the field of wireless MEMS and WSNs with a one-stop learning resource focussing on a range of applications where MEMS and related sensors are being used for the measurement of a range of physical, chemical, and bio-medical parameters, with the measurements transmitted onwards, using wireless technologies and networks, for analysis and information extraction. The opening two chapters of the book address the "basics" by way of providing an overview of wireless techniques and of fuel cells as an emerging energy supply technology for wireless MEMS. The remaining nine chapters address "applications" through specific examples, which can be broadly grouped into infrastructure (Chapter 3), biomedical (Chapters 4–7), physical (Chapter 8), space (Chapter 9), farming (Chapter 10), and energy (Chapter 11).

I believe that this book presents a very informative and up-to-date assessment of the field of wireless MEMS and also provides insight into the future applications of this technology. I am indebted to the very busy chapter authors who have still found the time to provide their valued and expert contributions. Finally, I would like to record my thanks to the staff at Woodhead Publishing Ltd and Elsevier for their professionalism and dedication in bringing this project to completion.

Deepak Uttamchandani

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