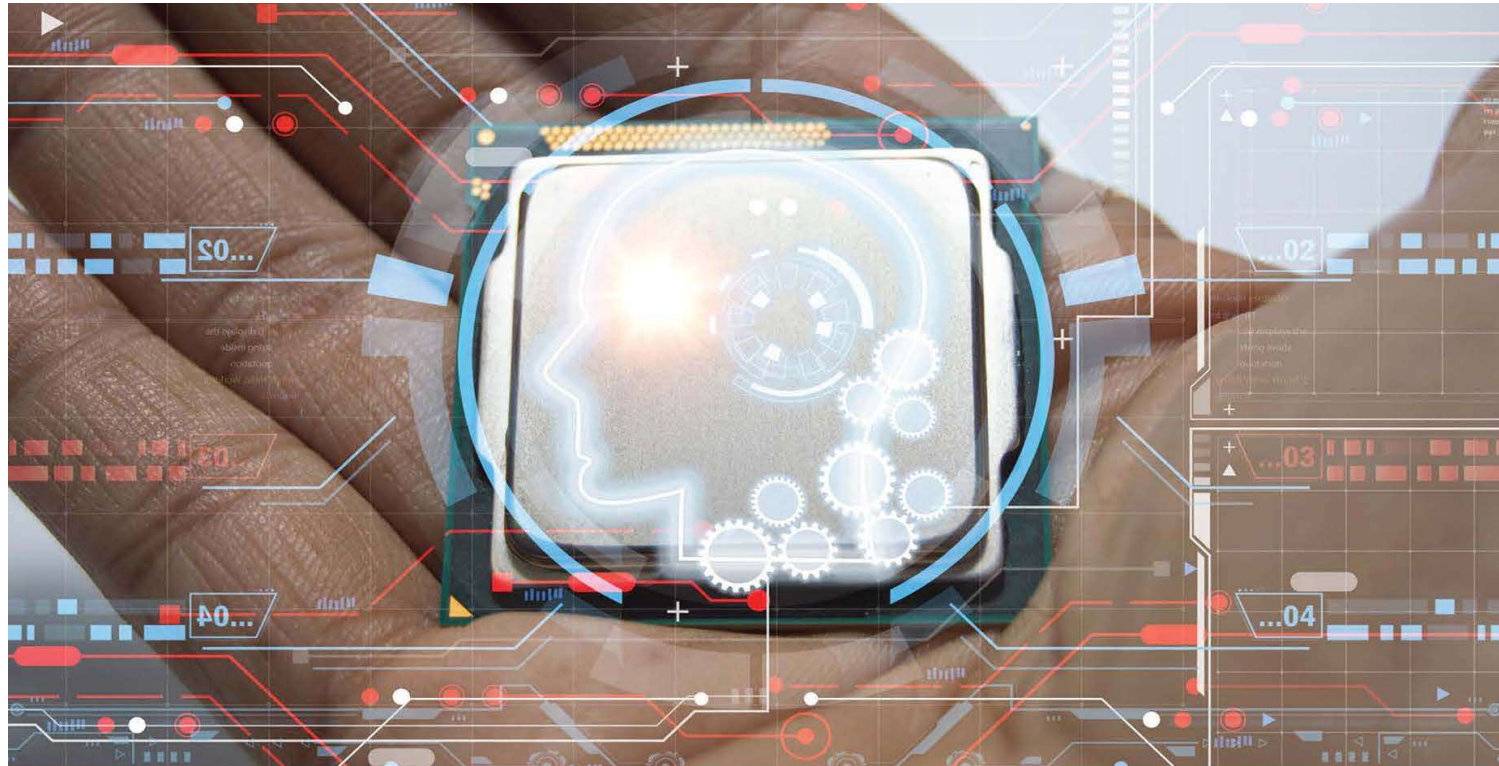




SMART ELECTRONICS, COMPUTING, AND INTERNET OF THINGS

Smart Electronics Devices and Models for Healthcare Systems

Edited by Shasanka Sekhar Rout,
Akash Saxena and
Suman Lata Tripathi



CRC Press
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Smart Electronics Devices and Models for Healthcare Systems

In light of recent environmental catastrophes and the COVID-19 pandemic, healthcare has received renewed focus and consideration from researchers across disciplines. *Smart Electronics Devices and Models for Healthcare Systems* offers a comprehensive exploration of the intersection between technology and healthcare, providing insights into the design, implementation, and impact of smart electronic devices and models in modern healthcare systems.

With special emphasis on the Internet of Medical Things and Internet of Things technologies, this book delves into sensors design, measuring equipment, signal processing blocks, medical data processing blocks, and assistive technologies. Major focus areas include:

- Use of 5G technologies for the design and development of smart electronic devices and applications.
- Development of wireless sensor networks-based real-time healthcare infrastructure and e-health platform.
- Design and deployment of medical devices for the Internet of Things and Internet of Medical Things platforms such as remote patient monitoring technology.
- Illustrate the design and development of devices for emergent digital technologies such as telemedicine, artificial intelligence, and augmented reality.
- Explore robotic assistance models for medical practices, in order to improve patient care and accessibility.

This book is primarily written for senior undergraduates, graduate students, and academic researchers in the fields of electrical engineering, electronics and communications engineering, computer science and engineering, and biomedical engineering.

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Series Editor: Suman Lata Tripathi

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Contents

<i>Preface</i>	ix
<i>About the Editors</i>	xi
<i>Contributors</i>	xiii
1 Smart Devices for Effective Tuberculosis Diagnosis: A Comprehensive Survey	1
RANJITA ROUT, PRIYADARSAN PARIDA, BIBHU PRASAD, AND SONALI DASH	
2 The Role of Emerging Technologies in Smart Healthcare	18
SUNIL KUMAR GUPTA, JAVED KHAN BHUTTO, M VENU GOPALA RAO, AND ASHISH RAJ	
3 GNRFETs for Flexible Electronics and Quantum Computing Applications	32
M. MANOJ KUMAR, SUMAN LATA TRIPATHI, AND SUGONDO HADIYOSO	
4 Transforming Healthcare: IoT's Impact on Patient Care and Smart Systems	55
S. HEMA PRIYADARSHINI AND TRUPTI SHRIPAD TAGARE	
5 Distributed Fused Lasso Based Radio Tomographic Imaging for Target Localization and Healthcare Applications	67
ABHIJIT MISHRA, RACHITA TRIPATHY, SATYAKAM BARAHA, AND UPENDRA KUMAR SAHOO	

6 Custom CNN Model for Healthcare Industry IoT Attack Detection and Classification	90
G. SUNEETHA AND D. HARIPRIYA	
7 Recent Developments and Applications of Digital Technologies in Healthcare Systems	102
SWAGAT KUMAR SAMANTARAY, GOPAL SINGH TANDEL, AND SHASANKA SEKHAR ROUT	
8 Web-Based Brain Computer Interface (BCI)	120
R. REMYA, R. REMA, NIRMALA M, NIRMALA MENAGA DEVI M, AND SUMAN LATA TRIPATHI	
9 The Role of Smart Devices for Effective Retinal Disease Diagnosis	133
JAYANTI DANG, PRIYADARSAN PARIDA, AND RANJITA ROUT	
10 Global Health Challenges, Legal and Regulatory Aspects of Implementing Smart Electronic Healthcare	152
SUNIL KUMAR GUPTA, JAVED KHAN BHUTTO, VIJAYAKUMAR GALI, SUNIL KUMAR CHAUDHARY, AND ASHISH RAJ	
11 Design and Development of Textile-Based Wearable Technology for Healthcare Solutions	173
ASWINI KUMAR SAMANTARAY, DEBASIS TRIPATHY, AND SATYAJEET SAHOO	
12 Research Advances in Nanomaterials for Biomedical Applications: A Bibliometric and Thematic Study	195
PURNIMA SHARMA AND SATYAJIT ANAND	
13 Applications of Graphene and Germanene 2D Nanomaterials in Medical Diagnosis and Healthcare Monitoring System	212
INDRANIL MAITY, SOUBARNO CHATTERJEE, AND SOUVIK BHANJA	

14 Present and Future Applications of Electronics for Healthcare Systems	233
M BHUVANESWARI	
15 Design and Investigations on Conformal Vivaldi Antenna for Wireless Capsule Endoscopic System	253
S REKHA, G SHINE LET, S RADHA, AND R BALAMANIKANTA	
<i>Index</i>	273

13. Applications of Graphene and Germanene 2D Nanomaterials in Medical Diagnosis and Healthcare Monitoring System

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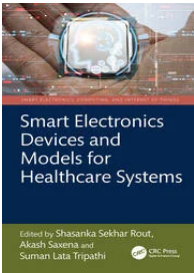
Abstract

The day-by-day increase in unhealthy environments and unhealthy lifestyles has led to a surge in lung cancer, asthma, and renal dysfunction in the human body due to increased exposure to harmful pollutants in recent years. Moreover, detecting diseases like lung cancer and renal failure requires proper laboratory setup, which is expensive, time-consuming, and, in some cases, painful. So, exhale breath (EB) analysis gained popularity because this method has the capability to detect such diseases non-invasively even at their initial stages. From the reported publications, it can be clearly said that formaldehyde (HCHO), nitric oxide (NO), and ammonia (NH₃) are the major biomarkers for lung cancer, asthma and renal dysfunction, respectively. However, the problems remained as the detection of these organic and inorganic vapours at such low concentration levels was challenging, and also required proper lab equipments until miniaturized, portable solid-state gas sensor devices came into the picture. The recent developments in the field of gas sensors have made it possible for the researchers to achieve both accuracy and portability simultaneously at low cost, thereby, making an entry into the domain of medical diagnosis with a proper health monitoring system. The non-invasive nature of the detection process and portability of the solid-state gas sensors have remarkably paved the pathway for the intersection of nanotechnology and healthcare systems. In this book chapter, two novel 2D nanomaterials viz. graphene and germanene are being considered due to their remarkable features as gas/vapour sensing materials. Moreover, a comparative study has been presented between graphene and germanene, when they are supposed to be exposed in the

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Chapter

Applications of Graphene and Germanene 2D Nanomaterials in Medical Diagnosis and Healthcare Monitoring System

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ABSTRACT

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