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Intelligent Sensors for Positioning, Tracking, Monitoring, Navigation and Smart Sensing in Smart Cities Jul 09 2021 The rapid development of advanced, arguably, intelligent sensors and their massive deployment provide a foundation for new paradigms to combat the challenges that arise in significant tasks such as positioning, tracking, navigation, and smart sensing in various environments. Relevant advances in artificial intelligence (AI) and machine learning (ML) are also finding rapid adoption by industry and fan the fire. Consequently, research on intelligent sensing systems and technologies has attracted considerable attention during the past decade, leading to a variety of effective applications related to intelligent transportation, autonomous vehicles, wearable computing, wireless sensor networks (WSN), and the internet of things (IoT). In particular, the sensors community has a great interest in novel, intelligent information fusion, and data mining methods coupling AI and ML for substantial performance enhancement, especially for the challenging scenarios that make traditional approaches inappropriate. This reprint book has collected 14 excellent papers that represent state-of-the-art achievements in the relevant topics and provides cutting-edge coverage of recent advances in sensor signal and data mining techniques, algorithms, and approaches, particularly applied for positioning, tracking, navigation, and smart sensing.

Advances in Sensors: Reviews, Vol. 5 Sep 30 2020 The Vol. 5 of this Book Series contains 22 chapters written by 79 contributors-experts from universities, research centres and industry from 15 countries: Australia, Canada, China, France, Germany, Italy, Malaysia, Mexico, Poland, Portugal, Russia, Slovenia, Spain, Ukraine and USA. This volume contains information at the cutting edge of sensor research and related topics from the following three areas: Physical Sensors, Sensor Networks and Remote Sensing. Coverage includes current developments in various sensors, sensor instrumentation and applications. In order to offer a fast and easy reading of each topic, every chapter in this volume is independent and self-contained. With the unique combination of information in this volume,

the 'Advances in Sensors: Reviews' Book Series will be of value for scientists and engineers in industry and at universities, to sensors developers, distributors, and end users.

Introduction to Biosensors Jun 08 2021 This book equips students with a thorough understanding of various types of sensors and biosensors that can be used for chemical, biological, and biomedical applications, including but not limited to temperature sensors, strain sensor, light sensors, spectrophotometric sensors, pulse oximeter, optical fiber probes, fluorescence sensors, pH sensor, ion-selective electrodes, piezoelectric sensors, glucose sensors, DNA and immunosensors, lab-on-a-chip biosensors, paper-based lab-on-a-chip biosensors, and microcontroller-based sensors. The author treats the study of biosensors with an applications-based approach, including over 15 extensive, hands-on labs given at the end of each chapter. The material is presented using a building-block approach, beginning with the fundamentals of sensor design and temperature sensors, and ending with more complicated biosensors. New to this second edition are sections on op-amp filters, pulse oximetry, meat quality monitoring, advanced fluorescent dyes, autofluorescence, various fluorescence detection methods, fluoride ion-selective electrode, advanced glucose sensing methods including continuous glucose monitoring, paper-based lab-on-a-chip, etc. A new chapter on nano-biosensors and an appendix on microcontrollers make this textbook ideal for undergraduate engineering students studying biosensors. It can also serve as a hands-on guide for scientists and engineers working in the sensor or biosensor industries.

The Art of Wireless Sensor Networks Mar 25 2020 During the last one and a half decades, wireless sensor networks have witnessed significant growth and tremendous development in both academia and industry. "The Art of Wireless Sensor Networks: Volume 1: Fundamentals" focuses on the fundamentals concepts in the design, analysis, and implementation of wireless sensor networks. It covers the various layers of the lifecycle of this type of network from the physical layer up to the application layer. Its rationale is that the first volume covers contemporary design issues, tools, and protocols for radio-based two-dimensional terrestrial sensor networks. All the book chapters in this volume include up-to-date research work spanning various classic facets of the physical properties and functional behavior of wireless sensor

networks, including physical layer, medium access control, data routing, topology management, mobility management, localization, task management, data management, data gathering, security, middleware, sensor technology, standards, and operating systems. This book will be an excellent source of information for both senior undergraduate and graduate students majoring in computer science, computer engineering, electrical engineering, or any related discipline. In addition, computer scientists, researchers, and practitioners in both academia and industry will find this book useful and interesting.

Ad Hoc and Sensor Wireless Networks: Architectures, Algorithms and Protocols Jul 29 2020 "This Ebook brings together the latest developments and studies of Mobile Ad Hoc Networks (MANETs) and Wireless Sensor Networks (WSNs), which should provide a seedbed for new breakthroughs. It focuses on the most representative topics in MANETs and WSNs, s"

Design and Implementation of Real-Time Multi-Sensor Vision Systems Jan 15 2022 This book discusses the design of multi-camera systems and their application to fields such as the virtual reality, gaming, film industry, medicine, automotive industry, drones, etc. The authors cover the basics of image formation, algorithms for stitching a panoramic image from multiple cameras, and multiple real-time hardware system architectures, in order to have panoramic videos. Several specific applications of multi-camera systems are presented, such as depth estimation, high dynamic range imaging, and medical imaging.

Sensors for Health Monitoring Feb 22 2020 Sensors for Health Monitoring discusses the characteristics of U-Healthcare systems in different domains, providing a foundation for working professionals and undergraduate and postgraduate students. The book provides information and advice on how to choose the best sensors for a U-Healthcare system, advises and guides readers on how to overcome challenges relating to data acquisition and signal processing, and presents comprehensive coverage of up-to-date requirements in hardware, communication and calculation for next-generation uHealth systems. It then compares new technological and technical trends and discusses how they address expected u-Health requirements. In addition, detailed information on system operations is presented and challenges in ubiquitous computing are highlighted. The book not only helps beginners with a holistic

approach toward understanding u-Health systems, but also presents researchers with the technological trends and design challenges they may face when designing such systems. Presents an outstanding update on the use of U-Health data analysis and management tools in different applications, highlighting sensor systems Highlights Internet of Things enabled U-Healthcare Covers different data transmission techniques, applications and challenges with extensive case studies for U-Healthcare systems

Body Sensor Networking, Design and Algorithms Feb 04 2021 A complete guide to the state of the art theoretical and manufacturing developments of body sensor network, design, and algorithms In Body Sensor Networking, Design, and Algorithms, professionals in the field of Biomedical Engineering and e-health get an in-depth look at advancements, changes, and developments. When it comes to advances in the industry, the text looks at cooperative networks, noninvasive and implantable sensor microelectronics, wireless sensor networks, platforms, and optimization—to name a few. Each chapter provides essential information needed to understand the current landscape of technology and mechanical developments. It covers subjects including Physiological Sensors, Sleep Stage Classification, Contactless Monitoring, and much more. Among the many topics covered, the text also includes additions such as: ● Over 120 figures, charts, and tables to assist with the understanding of complex topics ● Design examples and detailed experimental works ● A companion website featuring MATLAB and selected data sets Additionally, readers will learn about wearable and implantable devices, invasive and noninvasive monitoring, biocompatibility, and the tools and platforms for long-term, low-power deployment of wireless communications. It's an essential resource for understanding the applications and practical implementation of BSN when it comes to elderly care, how to manage patients with chronic illnesses and diseases, and use cases for rehabilitation.

Sensors for Gait, Posture, and Health Monitoring Volume 2 Mar 29 2023 In recent years, many technologies for gait and posture assessments have emerged. Wearable sensors, active and passive in-house monitors, and many combinations thereof all promise to provide accurate measures of physical activity, gait, and posture parameters. Motivated by market projections for wearable technologies and driven by recent technological

innovations in wearable sensors (MEMs, electronic textiles, wireless communications, etc.), wearable health/performance research is growing rapidly and has the potential to transform future healthcare from disease treatment to disease prevention. The objective of this Special Issue is to address and disseminate the latest gait, posture, and activity monitoring systems as well as various mathematical models/methods that characterize mobility functions. This Special Issue focuses on wearable monitoring systems and physical sensors, and its mathematical models can be utilized in varied environments under varied conditions to monitor health and performance

The Rise of Smart Cities Oct 24 2022 The Rise of Smart Cities: Advanced Structural Sensing and Monitoring Systems provides engineers and researchers with a guide to the latest breakthroughs in the deployment of smart sensing and monitoring technologies. The book introduces readers to the latest innovations in the area of smart infrastructure-enabling technologies and how they can be integrated into the planning and design of smart cities. With this book in hand, readers will find a valuable reference in terms of civil infrastructure health monitoring, advanced sensor network architectures, smart sensing materials, multifunctional material and structures, crowdsourced/social sensing, remote sensing and aerial sensing, and advanced computation in sensor networks. Reviews the latest development in smart structural health monitoring (SHM) systems Introduces all major algorithms, with a focus on practical implementation Includes real-world applications and case studies Opens up a new horizon for robust structural sensing methods and their applications in smart cities

Sensor Technologies for Civil Infrastructures Nov 01 2020 Sensor Technologies for Civil Infrastructure, Volume 2: Applications in Structural Health Monitoring, Second Edition, provides an overview of sensor applications and a new section on future and emerging technologies. Part one is made up of case studies in assessing and monitoring specific structures such as bridges, towers, buildings, dams, tunnels, pipelines, and roads. The new edition also includes sensing solutions for assessing and monitoring of naval systems. Part two reviews emerging technologies for sensing and data analysis including diagnostic solutions for assessing and monitoring sensors, unmanned aerial systems, and UAV application in post-hazard event reconnaissance and site assessment. Includes case

studies in assessing structures such as bridges, buildings, super-tall towers, dams, tunnels, wind turbines, railroad tracks, nuclear power plants, offshore structures, naval systems, levees, and pipelines Reviews future and emerging technologies and techniques including unmanned aerial systems, LIDAR, and ultrasonic and infrared sensing Describes latest emerging techniques in data analysis such as diagnostic solutions for assessing and monitoring sensors and big data analysis

Wearable Sensor Technology for Monitoring Training Load and Health in the Athletic Population May 07 2021 Several internal and external factors have been identified to estimate and control the psycho-biological stress of training in order to optimize training responses and to avoid fatigue, overtraining and other undesirable health effects of an athlete. An increasing number of lightweight sensor-based wearable technologies ("wearables") have entered the sports technology market. Non-invasive sensor-based wearable technologies could transmit physical, physiological and biological data to computing platform and may provide through human-machine interaction (smart watch, smartphone, tablet) bio-feedback of various parameters for training load management and health. However, in theory, several wearable technologies may assist to control training load but the assessment of accuracy, reliability, validity, usability and practical relevance of new upcoming technologies for the management of training load is paramount for optimal adaptation and health.

Understanding Virtual Reality Mar 17 2022 Of interest to developers of virtual reality applications and others interested in potential uses for virtual reality, this book presents a selection of useful VR applications and gives readers guidance on how VR might be applied.

Make: Sensors Apr 18 2022 Make: Sensors is the definitive introduction and guide to the sometimes-tricky world of using sensors to monitor the physical world. With dozens of projects and experiments for you to build, this book shows you how to build sensor projects with both Arduino and Raspberry Pi. Use Arduino when you need a low-power, low-complexity brain for your sensor, and choose Raspberry Pi when you need to perform additional processing using the Linux operating system running on that device. You'll learn about touch sensors, light sensors, accelerometers, gyroscopes, magnetic sensors, as well as temperature, humidity, and gas sensors.

Smart Sensors for Structural Health Monitoring Dec 14 2021 Smart sensors are technologies designed to facilitate the monitoring operations. For instance, power consumption can be minimized through on-board processing and smart interrogation algorithms, and state detection enhanced through collaboration between sensor nodes. Applied to structural health monitoring, smart sensors are key enablers of sparse and dense sensor networks capable of monitoring full-scale structures and components. They are also critical in empowering operators with decision making capabilities. The objective of this Special Issue is to generate discussions on the latest advances in research on smart sensing technologies for structural health monitoring applications, with a focus on decision-enabling systems. This Special Issue covers a wide range of related topics such as innovative sensors and sensing technologies for crack, displacement, and sudden event monitoring, sensor optimization, and novel sensor data processing algorithms for damage and defect detection, operational modal analysis, and system identification of a wide variety of structures (bridges, transmission line towers, high-speed trains, masonry light houses, etc.).

Smart Sensors for Healthcare and Medical Applications Mar 05 2021 This book focuses on new sensing technologies, measurement techniques, and their applications in medicine and healthcare. Specifically, the book briefly describes the potential of smart sensors in the aforementioned applications, collecting 24 articles selected and published in the Special Issue "Smart Sensors for Healthcare and Medical Applications". We proposed this topic, being aware of the pivotal role that smart sensors can play in the improvement of healthcare services in both acute and chronic conditions as well as in prevention for a healthy life and active aging. The articles selected in this book cover a variety of topics related to the design, validation, and application of smart sensors to healthcare.

Wearable and Nearable Biosensors and Systems for Healthcare Oct 12 2021 Biosensors and systems in the form of wearables and "nearables" (i.e., everyday sensorized objects with transmitting capabilities such as smartphones) are rapidly evolving for use in healthcare. Unlike conventional approaches, these technologies can enable seamless or on-demand physiological monitoring, anytime and anywhere. Such monitoring can help transform healthcare from the current reactive, one-size-fits-all, hospital-centered approach into a future proactive,

personalized, decentralized structure. Wearable and nearable biosensors and systems have been made possible through integrated innovations in sensor design, electronics, data transmission, power management, and signal processing. Although much progress has been made in this field, many open challenges for the scientific community remain, especially for those applications requiring high accuracy. This book contains the 12 papers that constituted a recent Special Issue of Sensors sharing the same title. The aim of the initiative was to provide a collection of state-of-the-art investigations on wearables and nearables, in order to stimulate technological advances and the use of the technology to benefit healthcare. The topics covered by the book offer both depth and breadth pertaining to wearable and nearable technology. They include new biosensors and data transmission techniques, studies on accelerometers, signal processing, and cardiovascular monitoring, clinical applications, and validation of commercial devices.

Contactless Human Activity Analysis Nov 13 2021 This book is a truly comprehensive, timely, and very much needed treatise on the conceptualization of analysis, and design of contactless & multimodal sensor-based human activities, behavior understanding & intervention. From an interaction design perspective, the book provides views and methods that allow for more safe, trustworthy, efficient, and more natural interaction with technology that will be embedded in our daily living environments. The chapters in this book cover sufficient grounds and depth in related challenges and advances in sensing, signal processing, computer vision, and mathematical modeling. It covers multi-domain applications, including surveillance and elderly care that will be an asset to entry-level and practicing engineers and scientists.(See inside for the reviews from top experts)

Sensor-Based Human Activity Recognition for Assistive Health Technologies May 27 2020 The average age of people has increased due to advances in health sciences, which has led to an increase in the elderly population. This is positive news, but it also raises questions about the quality of independent living for older people. Clinicians use Activities of Daily Living (ADLs) to assess older people's ability to live independently. In recent years, portable computing devices have become more present in our daily lives. Therefore, a software system that can detect ADLs based on sensor data collected from wearable devices is beneficial for

detecting health problems and supporting health care. In this context, this book presents several machine learning-based approaches for human activity recognition (HAR) using time-series data collected by wearable sensors in the home environment. In the first part of the book, machine learning-based approaches for atomic activity recognition are presented, which are relatively simple and short-term activities. In the second part, the algorithms for detecting long-term and complex ADLs are presented. In this part, a two-stage recognition framework is also presented, as well as an online recognition system for continuous monitoring of HAR. In the third and final part, a novel approach is proposed that not only solves the problem of data scarcity but also improves the performance of HAR by implementing multitask learning-based methods. The proposed approach simultaneously trains the models of short- and long-term activities, regardless of their temporal scale. The results show that the proposed approach improves classification performance compared to single-task learning.

Wearable Electronics Sensors May 19 2022 This edited book contains invited papers from renowned experts working in the field of Wearable Electronics Sensors. It includes 14 chapters describing recent advancements in the area of Wearable Sensors, Wireless Sensors and Sensor Networks, Protocols, Topologies, Instrumentation architectures, Measurement techniques, Energy harvesting and scavenging, Signal processing, Design and Prototyping. The book will be useful for engineers, scientist and post-graduate students as a reference book for their research on wearable sensors, devices and technologies which is experiencing a period of rapid growth driven by new applications such as heart rate monitors, smart watches, tracking devices and smart glasses.

Smart Sensors for Real-Time Water Quality Monitoring Dec 22 2019 Sensors are being utilized to increasing degrees in all forms of industry. Researchers and industrial practitioners in all fields seek to obtain a better understanding of appropriate processes so as to improve quality of service and efficiency. The quality of water is no exception, and the water industry is faced with a wide array of water quality issues being present world-wide. Thus, the need for sensors to tackle this diverse subject is paramount. The aim of this book is to combine, for the first time, international expertise in the area of water quality monitoring using smart sensors and systems in order that a better understanding of the

challenges faced and solutions posed may be available to all in a single text.

Structural Health Monitoring with Piezoelectric Wafer Active Sensors Jul 21 2022 Structural Health Monitoring with Piezoelectric Wafer Active Sensors, Second Edition provides an authoritative theoretical and experimental guide to this fast-paced, interdisciplinary area with exciting applications across a range of industries. The book begins with a detailed yet digestible consolidation of the fundamental theory relating to structural health monitoring (SHM). Coverage of fracture and failure basics, relevant piezoelectric material properties, vibration modes in different structures, and different wave types provide all the background needed to understand SHM and apply it to real-world structural challenges. Moving from theory to experimental practice, the book then provides the most comprehensive coverage available on using piezoelectric wafer active sensors (PWAS) to detect and quantify damage in structures. Updates to this edition include circular and straight-crested Lamb waves from first principle, and the interaction between PWAS and Lamb waves in 1-D and 2-D geometries. Effective shear stress is described, and tuning expressions between PWAS and Lamb waves has been extended to cover axisymmetric geometries with a complete Hankel-transform-based derivation. New chapters have been added including hands-on SHM case studies of PWAS stress, strain, vibration, and wave sensing applications, along with new sections covering essential aspects of vibration and wave propagation in axisymmetric geometries.

Comprehensive coverage of underlying theory such as piezoelectricity, vibration, and wave propagation alongside experimental techniques Includes step-by-step guidance on the use of piezoelectric wafer active sensors (PWAS) to detect and quantify damage in structures, including clear information on how to interpret sensor signal patterns Updates to this edition include a new chapter on composites and new sections on advances in vibration and wave theory, bringing this established reference in line with the cutting edge in this emerging area

Computer Vision for Structural Dynamics and Health Monitoring Jun 20 2022 Provides comprehensive coverage of theory and hands-on implementation of computer vision-based sensors for structural health monitoring This book is the first to fill the gap between scientific research of computer vision and its practical applications for structural health

monitoring (SHM). It provides a complete, state-of-the-art review of the collective experience that the SHM community has gained in recent years. It also extensively explores the potentials of the vision sensor as a fast and cost-effective tool for solving SHM problems based on both time and frequency domain analytics, broadening the application of emerging computer vision sensor technology in not only scientific research but also engineering practice. *Computer Vision for Structural Dynamics and Health Monitoring* presents fundamental knowledge, important issues, and practical techniques critical to successful development of vision-based sensors in detail, including robustness of template matching techniques for tracking targets; coordinate conversion methods for determining calibration factors to convert image pixel displacements to physical displacements; sensing by tracking artificial targets vs. natural targets; measurements in real time vs. by post-processing; and field measurement error sources and mitigation methods. The book also features a wide range of tests conducted in both controlled laboratory and complex field environments in order to evaluate the sensor accuracy and demonstrate the unique features and merits of computer vision-based structural displacement measurement. Offers comprehensive understanding of the principles and applications of computer vision for structural dynamics and health monitoring Helps broaden the application of the emerging computer vision sensor technology from scientific research to engineering practice such as field condition assessment of civil engineering structures and infrastructure systems Includes a wide range of laboratory and field testing examples, as well as practical techniques for field application Provides MATLAB code for most of the issues discussed including that of image processing, structural dynamics, and SHM applications *Computer Vision for Structural Dynamics and Health Monitoring* is ideal for graduate students, researchers, and practicing engineers who are interested in learning about this emerging sensor technology and advancing their applications in SHM and other engineering problems. It will also benefit those in civil and aerospace engineering, energy, and computer science.

The Human Hand as an Inspiration for Robot Hand Development Sep 23 2022 "The Human Hand as an Inspiration for Robot Hand Development" presents an edited collection of authoritative contributions in the area of robot hands. The results described in the volume are expected to lead to

more robust, dependable, and inexpensive distributed systems such as those endowed with complex and advanced sensing, actuation, computation, and communication capabilities. The twenty-four chapters discuss the field of robotic grasping and manipulation viewed in light of the human hand's capabilities and push the state-of-the-art in robot hand design and control. Topics discussed include human hand biomechanics, neural control, sensory feedback and perception, and robotic grasp and manipulation. This book will be useful for researchers from diverse areas such as robotics, biomechanics, neuroscience, and anthropologists.

Environmental Monitoring with Arduino Jan 27 2023 "Watching our world with sensors"--Cover.

Emerging Communication Technologies Based on Wireless Sensor Networks Jan 23 2020 Emerging Communication Technologies Based on Wireless Sensor Networks: Current Research and Future Applications fills a gap in the existing literature by combining a plethora of WSN-based emerging technologies into a single source so that researchers can form opinions regarding these technologies. It presents different types of emerging communication technologies based on WSNs and describes how wireless sensor networks can be integrated with other communication technologies. It covers many of the new techniques and demonstrates the application of WSNs. The book's 14 chapters are divided into four parts. The first part covers the basics of wireless sensor networks and their principal working methods. The authors then move on to discuss different types of WSNs, characteristics of different types of emerging technologies based on WSNs, renewable energy sources, battery replenishment strategies, and application-specific energy challenges of WSNs. The second part is dedicated to issues related to wireless body area networks (WBANs). It discusses wearable WSNs and their applications, standards, and research trends. The authors also discuss routing schemes devised for WBANs and thermal-aware routing protocols for WBANs. The third part focuses on different emerging communication technologies based on WSNs, including electromagnetic wireless nanosensor networks, WSNs in the IoT, management of WSNs through satellite networks, WSNs in smart homes, and cognitive radio technology in conjunction with WSNs. The last part of the book covers topics generally related to typical WSNs, including energy-efficient data collection in WSNs, key distribution mechanisms in WSNs, distributed data gathering algorithms for mobile WSNs, and finally,

a novel mobility scheme for WSNs that supports IPv6.

Wireless Mobile Communication and Healthcare Sep 11 2021 This book constitutes the refereed post-conference proceedings of the 6th International Conference on Mobile Communication and Healthcare, MobiHealth 2016, held in Milan, Italy, in November 2016. The 50 revised full papers were reviewed and selected from numerous submissions and are organized in topical sections covering: Technological development for m-health application user engagement.- IoT - Internet of Things.- Advances in soft wearable technology for mobile-health.- Emerging experiences into receiving and delivering healthcare through mobile and embedded solutions.- Advances in personalized healthcare services.- Mobile monitoring, and social media pervasive technologies.

Smart Sensors Measurement and Instrumentation Dec 02 2020 This book comprises the proceedings of the select peer-reviewed papers presented during the 18th Control Instrumentation System Conference (CISCON 2021). This book highlights the latest trends in instrumentation, sensors and systems, industrial automation and control, image and signal processing, robotics, renewable energy, power systems, and power drives. The research works covered in the book are of high quality and contributed by experts in academia and industry to provide meaningful direction for prolific growth. The book also features a few chapters contributed by the leading policymakers, technologists, farmers, and doctors who help outline the roadmap from the need for technology to policy-making to effect and implement technological advancements for the nation-building process. The book will serve as a valuable reference resource for academics and researchers across the globe.

Sensors Nov 25 2022 This book contains a selection of papers presented at the Second National Conference on Sensors held in Rome 19-21 February 2014. The conference highlighted state-of-the-art results from both theoretical and applied research in the field of sensors and related technologies. This book presents material in an interdisciplinary approach, covering many aspects of the disciplines related to sensors, including physics, chemistry, materials science, biology and applications.

Wearable Sensors Dec 26 2022 Wearable Sensors: Fundamentals, Implementation and Applications has been written by a collection of experts in their field, who each provide you with an understanding of how to design and work with wearable sensors. Together these insights

provide the first single source of information on wearable sensors that would be a fantastic addition to the library of any engineers working in this field. Wearable Sensors covers a wide variety of topics associated with development and applications of wearable sensors. It also provides an overview and a coherent summary of many aspects of wearable sensor technology. Both professionals in industries and academic researchers need this package of information in order to learn the overview and each specific technology at the same time. This book includes the most current knowledge on the advancement of light-weight hardware, energy harvesting, signal processing, and wireless communications and networks. Practical problems with smart fabrics, biomonitoring and health informatics are all addressed, plus end user centric design, ethical and safety issues. The new edition is completely reviewed by key figures in the field, who offer authoritative and comprehensive information on the various topics. A new feature for the second edition is the incorporation of key background information on topics to allow the less advanced user access to the field and to make the title more of an auto-didactic book for undergraduates. Provides a full revision of the first edition, providing a comprehensive and up-to-date resource of all currently used wearable devices in an accessible and structured manner Helps engineers manufacture wearable devices with information on current technologies, with a focus on end user needs and recycling requirements This book provides a fully updated overview of the many aspects of wearable sensor technology in one single volume, enabling engineers and researchers to fully comprehend the field and to identify opportunities

Flexible and Wearable Sensors Jun 27 2020 With rapid technological developments and lifestyle advancements, electronic sensors are being seamlessly integrated into many devices. This comprehensive handbook explores current, state-of-the-art developments in flexible and wearable sensor technology and its future challenges. Numerous recent efforts have improved the sensing capability and functionality of flexible and wearable sensors. However, there are still many challenges in making them super-smart by incorporating features such as self-power, self-healing, and multifunctionality. These features can be developed with the use of multifunctional nanostructured materials, unique architectural designs, and other advanced technologies. This book provides details

about the recent advancements, materials, and technologies used for flexible and wearable sensors. Its wide range of topics addresses the fundamentals of flexible and wearable sensors, their working principles, and their advanced applications. This handbook provides new directions to scientists, researchers, and students to better understand the principles, technologies, and applications of sensors in healthcare, energy, and the environment.

Tracking and Hands Motion Detection Approach for Monitoring Hand-hygiene Compliance for Food Handling and Processing Industry Feb 28 2023 Hand-hygiene is a very critical issue for both food handling and processing industry and health care service providers. Poor hand-hygiene practice can easily lead to foodborne illness or large scale disease transmission. In this research, an automatic tracking and monitoring system was developed that used a 3D camera for hand washing and hands motion detection and a sensor-based monitoring system for hand-hygiene activities evaluation. An active Wi-Fi portable Radio Frequency Identification (RFID) tag was used for personal ID tracking. The effective hand washing time, soaping time were measured based on the hands motion detection and hand movement tracking. Water temperature, water flow, paper towel, soap and hand sanitizer usage were also measured for each hand washing event. All the data were forwarded to a system server for data recording, storage and management. Preliminary test data were collected to evaluate the system performance. The results showed that the system could effectively collect most of the hand-hygiene related factors including hand-hygiene product usage, hand washing time and soap lathering time for hand-hygiene evaluation.

Sensors and Actuators in Smart Cities Aug 10 2021 This book is a printed edition of the Special Issue "Sensors and Actuators in Smart Cities" that was published in JSAN

Internet of Things for Indoor Air Quality Monitoring Jan 03 2021 This book provides a synthesis for using IoT for indoor air quality assessment. It will help upcoming researchers to understand the gaps in the literature while identifying the new challenges and opportunities to develop healthy living spaces. On the other hand, this book provides insights about integrating IoT with artificial intelligence to design smart buildings with enhanced air quality. Consequently, this book aims to present future scope for carrying out potential research activities in this domain. Over the past few years,

the Internet of Things (IoT) is proven as the most revolutionizing invention in the field of engineering and design. This technology has wide scope in automation and real-time monitoring. Indoor air quality assessment is one of the most important applications of IoT which helps in the development of smart and healthy living spaces. Numerous methods have been developed for air quality assessment to ensure enhanced public health and well-being. The combination of sensors, microcontrollers, and communication technologies can be used to handle the massive amount of field data to access the condition of building air quality.

Sensors and Microsystems Feb 16 2022 This book showcases the state of the art in the field of sensors and microsystems, revealing the impressive potential of novel methodologies and technologies. It covers a broad range of aspects, including: bio-, physical and chemical sensors, actuators, micro- and nano-structured materials, mechanisms of interaction and signal transduction, polymers and biomaterials, sensor electronics and instrumentation, analytical microsystems, recognition systems and signal analysis and sensor networks as well as manufacturing technologies, environmental, food, energy and biomedical applications. The contents reflect the outcomes of the activities of AISEM (Italian Association of Sensors and Microsystems) in 2021. Co-Edited by B. Andò, F. Baldini, G. Betta, D. Compagnone, S. Conoci, E. Comini, V. Ferrari, E. La Salandra, L. Lorenzelli, A.G. Mignani, G. Marrazza, G. Neri, P. Siciliano.

Emerging Research in Computing, Information, Communication and Applications Apr 25 2020 This book presents the proceedings of the International Conference on Emerging Research in Computing, Information, Communication and Applications, ERCICA 2022. The conference provides an interdisciplinary forum for researchers, professional engineers and scientists, educators, and technologists to discuss, debate, and promote research and technology in the upcoming areas of computing, information, communication, and their applications. The book discusses these emerging research areas, providing a valuable resource for researchers and practicing engineers alike.

Automated Hand Hygiene Monitoring System Using Imagery and Bluetooth Low Energy Sensors Apr 30 2023 This thesis designs and implements a hand hygiene monitoring system using Bluetooth low energy and imagery sensors. As the cost of treating healthcare-

associated infections increases, the need for monitoring and improving hand hygiene compliance percentages for healthcare providers increases. Several techniques for hand hygiene compliance monitoring exist, but it was found that electronic automated systems are the most reliable solution because they provide more accurate continuous compliance measurements for lower cost. Other similar systems based on a variety of technologies exist, however, they are either uniquely evidence based, so that they capture hygiene moments and apply a statistical model for hygiene opportunities, and they, therefore, do not provide real-time information; or they require human interference to determine compliance rendering them not fully automated. In this thesis, available monitoring techniques, focusing on automated electronic systems, are first introduced. Then, a novel automated hand hygiene monitoring system, capable of capturing hygiene moments with more than 90% precision, is proposed. The proposed system was first tested in a lab environment with private rooms setup, the system was also tested in semi-private rooms setup and then implemented in the Hematology and Oncology Department at the Health Sciences Center of Eastern Health for a pilot study. The study showed a high correlation between the compliance rates calculated by the proposed system compared to the compliance rates found by direct observers.

Atmospheric Monitoring with Arduino Aug 22 2022 Makers around the globe are building low-cost devices to monitor the environment, and with this hands-on guide, so can you. Through succinct tutorials, illustrations, and clear step-by-step instructions, you'll learn how to create gadgets for examining the quality of our atmosphere, using Arduino and several inexpensive sensors. Detect harmful gases, dust particles such as smoke and smog, and upper atmospheric haze—substances and conditions that are often invisible to your senses. You'll also discover how to use the scientific method to help you learn even more from your atmospheric tests. Get up to speed on Arduino with a quick electronics primer Build a tropospheric gas sensor to detect carbon monoxide, LPG, butane, methane, benzene, and many other gases Create an LED Photometer to measure how much of the sun's blue, green, and red light waves are penetrating the atmosphere Build an LED sensitivity detector—and discover which light wavelengths each LED in your Photometer is receptive to Learn how measuring light wavelengths lets you determine

the amount of water vapor, ozone, and other substances in the atmosphere Upload your data to Cosm and share it with others via the Internet "The future will rely on citizen scientists collecting and analyzing their own data. The easy and fun gadgets in this book show everyone from Arduino beginners to experienced Makers how best to do that."

--Chris Anderson, Editor in Chief of Wired magazine, author of Makers: The New Industrial Revolution (Crown Business)

Nanosensors for Smart Manufacturing Aug 30 2020 *Nanosensors for Smart Manufacturing provides information on the fundamental design concepts and emerging applications of nanosensors in smart manufacturing processes. In smart production, if the products and machines are integrated, embedded, or equipped with sensors, the system can immediately collect the current operating parameters, predict the product quality, and then feed back the optimal parameters to machines in the production line. In this regard, smart sensors and their wireless networks are important components of smart manufacturing. Nanomaterials-based sensors (nanosensors) offer several advantages over their microscale counterparts, including lower power consumption, fast response time, high sensitivity, lower concentration of analytes, and smaller interaction distance between sensors and products. With the support of artificial intelligence (AI) tools such as fuzzy logic, genetic algorithms, neural networks, and ambient intelligence, sensor systems have become smarter. This is an important reference source for materials scientists and engineers who want to learn more about how nanoscale sensors can enhance smart manufacturing techniques and processes. Outlines the smart nanosensor classes used in manufacturing applications Shows how nanosensors are being used to make more efficient manufacturing systems Assesses the major obstacles to designing nanosensor-based manufacturing systems at an industrial scale*

Wireless Sensor Networks Apr 06 2021 *Infrastructure for Homeland Security Environments Wireless Sensor Networks helps readers discover the emerging field of low-cost standards-based sensors that promise a high order of spatial and temporal resolution and accuracy in an ever-increasing universe of applications. It shares the latest advances in science and engineering paving the way towards a large plethora of new applications in such areas as infrastructure protection and security, healthcare, energy, food safety, RFID, ZigBee, and processing. Unlike*

*other books on wireless sensor networks that focus on limited topics in the field, this book is a broad introduction that covers all the major technology, standards, and application topics. It contains everything readers need to know to enter this burgeoning field, including current applications and promising research and development; communication and networking protocols; middleware architecture for wireless sensor networks; and security and management. The straightforward and engaging writing style of this book makes even complex concepts and processes easy to follow and understand. In addition, it offers several features that help readers grasp the material and then apply their knowledge in designing their own wireless sensor network systems: * Examples illustrate how concepts are applied to the development and application of * wireless sensor networks * Detailed case studies set forth all the steps of design and implementation needed to solve real-world problems * Chapter conclusions that serve as an excellent review by stressing the chapter's key concepts * References in each chapter guide readers to in-depth discussions of individual topics This book is ideal for networking designers and engineers who want to fully exploit this new technology and for government employees who are concerned about homeland security. With its examples, it is appropriate for use as a coursebook for upper-level undergraduates and graduate students.*

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