Antenna Based Passive Uhf Rfid Sensor Tags

In this chapter, an introduction to RFID systems has been presented. The major components of a RFID system were defined and the role of each one was discussed. Then, the characteristics of a RFID system were described using electric field integral equations, the Friis transmission equation and effective apertures. The electric field integral equations showed how the backscattered fields were directly related to the load at the port of the RFID antenna. The Friis transmission line equation was

used to clearly show what determines the max read range of a passive RFID tag. The discussion on antenna apertures revealed how in the best possible situation only half of the incident power from the reader can be used by the passive IC. The rest of the power is scattered into the region around the tag. Next, a design methodology for producing compact space-filling antennas was presented. This section was immediately followed by two examples showing this design process. The result of this chapter is an understanding of the fundamental and important concepts of RFID systems and a structured design process for producing compact, useful space-filling antennas for many different applications.

Sensor technologies are a rapidly growing area of interest in science and product design, embracing developments in electronics, photonics, mechanics, chemistry, and biology. Their presence is widespread in everyday life, where they are used to sense sound, movement, and optical or magnetic signals. The demand for portable and lightweight sensors is relentless in several industries, from consumer electronics to biomedical engineering to the military. Smart Sensors for Industrial Applications brings together the latest research in smart sensors technology and exposes the reader to myriad applications that this technology has enabled. Organized into five parts, the book explores:

Photonics and optoelectronics sensors, including developments in optical fibers, Brillouin detection, and Doppler effect analysis. Chapters also look at key applications such as oxygen detection, directional discrimination, and optical sensing. Infrared and thermal sensors, such as Bragg gratings, thin films, and microbolometers. Contributors also cover temperature measurements in industrial conditions, including sensing inside explosions. Magnetic and inductive sensors, including magnetometers, inductive coupling, and ferro-fluidics. The book also discusses magnetic field and inductive current measurements in various industrial conditions, such as on airplanes. Sound and ultrasound sensors,

including underwater acoustic modem, vibrational spectroscopy, and photoacoustics. Piezoresistive, wireless, and electrical sensors, with applications in health monitoring, agrofood, and other industries. Featuring contributions by experts from around the world, this book offers a comprehensive review of the groundbreaking technologies and the latest applications and trends in the field of smart sensors. Backscattering and RF Sensing for Future Wireless Communication Discover what lies ahead in wireless communication networks with this insightful and forward-thinking book written by experts in the field Backscattering and RF Sensing for Future Wireless Communication delivers a concise and insightful

picture of emerging and future trends in increasing the efficiency and performance of wireless communication networks. The book shows how the immense challenge of frequency saturation could be met via the deployment of intelligent planar electromagnetic structures. It provides an in-depth coverage of the fundamental physics behind these structures and assesses the enhancement of the performance of a communication network in challenging environments, like densely populated urban centers. The distinguished editors have included resources from a variety of leading voices in the field who discuss topics such as the engineering of metasurfaces at a large scale, the electromagnetic

analysis of planar metasurfaces, and low-cost and reliable backscatter communication. All of the included works focus on the facilitation of the development of intelligent systems designed to enhance communication network performance. Readers will also benefit from the inclusion of: A thorough introduction to the evolution of wireless communication networks over the last thirty years, including the imminent saturation of the frequency spectrum An exploration of state-of-the-art techniques that next-generation wireless networks will likely incorporate, including software-controlled frameworks involving artificial intelligence An examination of the scattering of electromagnetic

waves by metasurfaces, including how wave propagation differs from traditional bulk materials A treatment of the evolution of artificial intelligence in wireless communications Perfect for researchers in wireless communications, electromagnetics, and urban planning, Backscattering and RF Sensing for Future Wireless Communication will also earn a place in the libraries of government policy makers, technologists, and telecom industry stakeholders who wish to get a head start on understanding the technologies that will enable tomorrow's wireless communications.

The Radio frequency identification (RFID) technology essentially consists of the reader, tag and host

computer.Since the passive RFID tag does not have its own power source, therefore, the continuous sending signal by the RFID reader's antenna through the air acting as activate the tag to send the information to the reader.This Research Presents small low cost passive UHF -RFID tag prototype has been designed and applied for metallic object it can also be used in tracing and tracking object it can be used in logistics and supply chain.The tag can modified into non-metallic application such that tag can be attached to the clothes of humans for tacking and it also can be used in identification of animals, While the tag antenna presented in this project are designed to be as simple as possible with low cost.

Research Trends and Challenges
RFID Systems
Antenna Design Solutions for RFID Tags Based on Metamaterial-Inspired Resonators and Other Resonant Structures
Design Methods and Solutions
UHF RFID in Practice
Smart Sensors for Industrial Applications

This book contains papers presented at the International Conference on Cognitive based Information Processing and Applications (CIPA) held during August 21, 2021, online conference (since COVID 19), which is divided into a 2-volume

book. The papers in the first volume represent the various technological advancements in network information processing, graphics and image processing, medical care, machine learning, smart cities. It caters to postgraduate students, researchers, and practitioners specializing and working in the area of cognitive-inspired computing and information processing.

The emergence of passive ultra-high frequency (UHF) radio-frequency identification (RFID) systems has led to the annual production of RFID tags in the billions. Two graphite-based solutions developed at

the Limerick Pulp and Paper Research Centre (LPPRC) were identified as possible candidates to achieve a more environmentally conscious tag with less complex manufacturing methods compared to what is currently available on the market. These materials are almost entirely composed of carbon and can be formed onto a biodegradable paper substrate using relatively simple methods. The materials ' intrinsic properties are characterized and a simulation profile is created to aid in the design of an optimized tag antenna. Conductivities of 600 S/m and 39,000 S/m are measured for the

two graphite-ink and exfoliated-graphite based papers, respectively. Anechoic chamber read range measurements are performed using a commercial RFID reader. Maximum theoretical read ranges for prototype tags built using graphite-ink and exfoliated-graphite based papers are found to be 2.26 m and 6.83 m, respectively. Comparison of graphite-based tag prototypes and a commercial tag suggests that they are suitable for applications where the benefits of manufacturability and bio-degradability outweigh the disadvantage of a large antenna footprint. Six total designs with varying

read ranges, complexities, sizes, and materials are found.

This book describes innovative design solutions for radio-frequency identification (RFID) tags and antennas. Focusing mainly on passive ultra-high-frequency (UHF)-RFID tag antennas, it examines novel approaches based on the use of metamaterial-inspired resonators and other resonant structures as radiating elements. It also offers an exhaustive analysis of the radiation properties of several metamaterial-inspired resonators such as the split ring resonator (SRR) and related structures. Further,

it discusses in detail an innovative technology for the RFID tagging of optical discs, which has demonstrated a significant improvement over the state of the art and resulted in a patent. By covering the entire research cycle of theory, design/simulation and fabrication/evaluation of RFID tags and antennas, while also reporting on cutting-edge technologies, the book provides graduate students, researchers and practitioners alike with a comprehensive and timely overview of RFID systems, and a closer look at several radiating structures.

Structural Health Monitoring and Integrity Management is a collection of the papers presented at the 2nd International Conference of Structural Health Monitoring and Integrity Management (ICSHMIM2014, Nanjing, China, 24-26 September 2014), and addresses the most recent developments in the field of Structural Health Monitoring (SHM) and integrity ma
A Measurement Method
Fundamentals and Applications
International Conference on Cognitive based Information Processing and Applications (CIPA

2021)
APPEIC 2014
Low-Cost, Passive UHF RFID Tag Antenna-Based Sensors for Pervasive Sensing Applications
Radio Frequency Identification Antennas

This book presents the combined proceedings of the 12th KIPS International Conference on Ubiquitous Information Technologies and Applications (CUTE 2017) and the 9th International Conference on Computer Science and its Applications (CSA2017), both held in Taichung, Taiwan, December 18 - 20, 2017. The

aim of these two meetings was to promote discussion and interaction among academics, researchers and professionals in the field of ubiquitous computing technologies. These proceedings reflect the state of the art in the development of computational methods, involving theory, algorithms, numerical simulation, error and uncertainty analysis and novel applications of new processing techniques in engineering, science, and other disciplines related to ubiquitous computing. James J. (Jong Hyuk) Park received Ph.D. degrees in Graduate School of Information

Security from Korea University, Korea and Graduate School of Human Sciences from Waseda University, Japan. From December, 2002 to July, 2007, Dr. Park had been a research scientist of R&D Institute, Hanwha S&C Co., Ltd., Korea. From September, 2007 to August, 2009, He had been a professor at the Department of Computer Science and Engineering, Kyungnam University, Korea. He is now a professor at the Department of Computer Science and Engineering and Department of Interdisciplinary Bio IT Materials, Seoul National University of Science and

Technology (SeoulTech), Korea. Dr. Park has published about 200 research papers in international journals and conferences. He has been serving as chair, program committee, or organizing committee chair for many international conferences and workshops. He is a steering chair of international conferences – MUE, FutureTech, CSA, CUTE, UCAWSN, World IT Congress-Jeju. He is editor-in-chief of Human-centric Computing and Information Sciences (HCIS) by Springer, The Journal of Information Processing Systems (JIPS) by KIPS, and Journal of Convergence (JoC) by KIPS

CSWRG. He is Associate Editor / Editor of 14 international journals including JoS, JNCA, SCN, CJ, and so on. In addition, he has been serving as a Guest Editor for international journals by some publishers: Springer, Elsevier, John Wiley, Oxford Univ. press, Emerald, Inderscience, MDPI. He got the best paper awards from ISA-08 and ITCS-11 conferences and the outstanding leadership awards from IEEE HPCC-09, ICA3PP-10, IEE ISPA-11, PDCAT-11, IEEE AINA-15. Furthermore, he got the outstanding research awards from the SeoulTech, 2014. His research interests include

IoT, Human-centric Ubiquitous Computing, Information Security, Digital Forensics, Vehicular Cloud Computing, Multimedia Computing, etc. He is a member of the IEEE, IEEE Computer Society, KIPS, and KMMS. Vincenzo Loia (BS '85, MS '87, PhD '89) is Full Professor of Computer Science. His research interests include Intelligent Agents, Ambient intelligence, Computational Intelligence. Currently he is Founder & Editor-in-chief of "Ambient Intelligence and Humanized Computing", and Co-Editor-in-Chief of "Softcomputing", Springer-Verlag. He is Chair of

the Task Forces “Intelligent Agents” and “Ambient Intelligence” IEEE CIS ETTC. He has been Chair the Emergent Technical Committe "Emergent Technology", IEEE CIS Society and Vice-Chair of Intelligent Systems Applications Technical Committee. He has been author of more than 200 scientific works, Editor/co-editor of 4 Books, 64 journal papers, 25 book chapters, and 100 conference papers. He is Senior member of the IEEE, Associate Editor of IEEE Transactions on Industrial Informatics, and Associate Editor of IEEE Transactions on Systems, Man, and

Cybernetics: Systems. Many times reviewers for national and international projects, Dr. Loia is active in the research domain of agents, ambient intelligence, computational intelligence, smartgrids, distributed platform for enrich added value. Gangman Yi in Computer Sciences at Texas A&M University, USA in 2007, and doctorate in Computer Sciences at Texas A&M University, USA in 2011. In May 2011, he joined System S/W group in Samsung Electronics, Suwon, Korea. He joined the Department of Computer Science & Engineering, Gangneung-Wonju National

University, Korea, since March 2012. Dr. Yi has been researched in an interdisciplinary field of researches. His research focuses especially on the development of computational methods to improve understanding of biological systems and its big data. Dr. Yi actively serves as a managing editor and reviewer for international journals, and chair of international conferences and workshops. Yunsick Sung received his B.S. degree in division of electrical and computer engineering from Pusan National University, Busan, Korea, in 2004, his M.S. degree in computer engineering from

Dongguk University, Seoul, Korea, in 2006, and his Ph.D. degree in game engineering from Dongguk University, Seoul, Korea, in 2012. He was employed as a member of the researcher at Samsung Electronics between 2006 and 2009. He was the plural professor at Shinheung College in 2009 and at Dongguk University in 2010. His main research interests are many topics in brain-computer Interface, programming by demonstration, ubiquitous computing and reinforcement learning. His Journal Service Experiences is Associate Editor at Human-centric

Computing and Information Sciences, Springer (2015- Current).

In the future, large-scale sensor deployment would enable many areas such as infrastructure condition monitoring and supply chain management. However, many of today's wireless sensor technologies are still too expensive to meet this need. Radio Frequency IDentification (RFID) offers good potential for the development of pervasive sensors: RFID tags have a proven track record of large-scale, highly integrated deployment for object identification in the retail

and consumer goods industry. Furthermore, the last decade has seen much progress in making RFID a reliable, standardized wireless communication medium with the ability to mass produce low-cost RFID tags. My thesis introduces the concept of RFID Tag Antenna-Based Sensing (RFID TABS). In this approach, a change in the sensed parameter of interest induces a controlled change in the geometry or boundary conditions of an RFID tag's antenna. The resultant change in the tag's response signal can then be detected by an RFID reader. My approach builds upon current

developments in RFID technology. For instance, the manufacturing techniques for the mass production of low-cost RFID tags can be used for pervasive tag-sensor development. My thesis examines TABS in a two-pronged approach: First, I demonstrate how three fundamental tag and reader signal properties can be used for sensing and propose three classes of TABS: -- Amplitude Modifying (AM) TABS use RFID reader transmitted power and tag response power for sensing. I illustrate proof of concept using a displacement sensor. I demonstrate that both these power

metrics can be used to reliably measure structural displacement to a precision of 2.5 mm using commercial RFID tags. -- Frequency Modifying (FM) TABS relate changes in the sensed parameter to a shift in the tag's optimal operating frequency - the carrier frequency for which the tag is best tuned to respond to the reader. I demonstrate proof of concept using a temperature threshold sensor - the crossing of a design temperature threshold results in a shift in the sensor's optimal operating frequency. I demonstrate that the sensor works reliably over a

3 m read range and in different environmental conditions. -- Phase Modifying (PM) TABS use tag backscatter phase for sensing. I provide a brief summary of the factors influencing RF phase and outline the design for a PM TABS fluid level sensor that uses RFID tag response phase to detect the presence or absence of fluid in a beverage glass. I highlight the challenges in the practical implementation of this approach by demonstrating the sensitivity of RFID tag phase to three extraneous factors. Second, I introduce the concept of Non-Electric Memory to record short

timescale threshold crossovers in the sensed parameter that may occur when the tag-sensor is unpowered. When information about, rather than the exact time of, the threshold occurrence is sufficient, non-electric memory provides a solution. I demonstrate how non-electric memory can be integrated into sensor design at minimal added cost. In the proof of concept of a temperature threshold sensor, I design a thermally actuated shape memory polymer switch to permanently change the electrical properties of an RFID tag when the temperature threshold is

crossed. I demonstrate that the design works reliably over a read range of 3 m and is independent of the material on which the sensor is deployed. In summary, this thesis demonstrates how an RFID tag can be adapted for low cost, pervasive sensing. Sensor prototypes illustrate proof of concept in three application areas. Extensions to two other applications are also discussed.

This book explains how UHF tags and readers communicate wirelessly. It gives an understanding of what limits the read range of a tag, how to

increase it (and why that might result in breaking the law), and the practical things that need to be addressed when designing and implementing RFID technology. Avoiding heavy math but giving breadth of coverage with the right amount of detail, it is an ideal introduction to radio communications for engineers who need insight into how tags and readers work. New to this edition: • Examples of near-metal antenna techniques • Discussion of the wakeup challenge for battery-assisted tags, with a BAT architecture example • Latest development of protocols: EPC

Gen 1.2.0 • Update 18000-6 discussion with battery-assisted tags, sensor tags, Manchester tags and wakeup provisions Named a 2012 Notable Computer Book for Computer Systems Organization by Computing Reviews The only book to give an understanding of radio communications, the underlying technology for radio frequency identification (RFID) Praised for its readability and clarity, it balances breadth and depth of coverage New edition includes latest developments in chip technology, antennas and protocols
Radio Frequency IDentification (RFID) stores and

retrieves data using devices called RFID tags: objects attached to or incorporated into a product, animal or person which communicate with an RFID reader or interrogator. This book proposes a linear two-port model for an N-stage modified-Greinacher full wave rectifier, predicting the overall conversion efficiency at low power levels where the diodes are operating near their threshold voltage. Included is an experimental procedure to measure how impedance modulation in the tag affects the signal at the reader, and a useful tool for choosing the most appropriate

impedances.
Design, Fabrication,Experimental Results
Third International Conference on Computing and Wireless Communication Systems, ICCWCS 2019, April 24-25, 2019, Faculty of Sciences, Ibn Tofaïl University -Kénitra- Morocco
Microwave and Radio-Frequency Technologies in Agriculture
Structural Health Monitoring and Integrity Management
Proceedings of the 8th ICIECE 2019
Solutions for Hard-to-tag Objects in UHF RFID

Systems

Provides a collection of works produced by COST Action IC1301 with the goal of achieving significant advances in the field of wireless power transmission This book constitutes together information from COST Action IC1301, a group of academic and industry experts seeking to align research efforts in the field of wireless power transmission (WPT). It begins with a discussion of backscatter as a solution for Internet of Things (IoT) devices and goes on to describe ambient backscattering

sensors that use FM broadcasting for low cost and low power wireless applications. The book also explores localization of passive RFID tags and augmented tags using nonlinearities of RFID chips. It concludes with a review of methods of electromagnetic characterization of textile materials for the development of wearable antennas. Wireless Power Transmission for Sustainable Electronics: COST WiPE - IC1301 covers textile-supported wireless energy transfer, and reviews methods for the electromagnetic

characterization of textile materials for the development of wearable antennas. It also looks at: backscatter RFID sensor systems for remote health monitoring; simultaneous localization (of robots and objects) and mapping (SLAM); autonomous system of wireless power distribution for static and moving nodes of wireless sensor networks; and more. Presents techniques for smart beam-forming for "on demand" wireless power transmission (WPT) Discusses RF and microwave energy harvesting for space applications

Describes miniaturized RFID transponders for object identification and sensing

Wireless Power Transmission for Sustainable Electronics: COST WiPE - IC1301 is an excellent book for both graduate students and industry engineers involved in wireless communications and power transfer, and sustainable materials for those fields.

Grynaeus-Canonia, LaviniaPassive UHF RFID Tag Antenna Design Using Graphite-based Conductive Papers

Today, computer science engineering and

telecommunications are two important areas linked and even inseparable. This is obvious for the user who connects the modem of his computer on his mobile phone or telephone line to access, via the global data network, the information available on the servers. The both domains are evolving rapidly and the development of new architectures of systems dedicated to telecommunications and computing becomes essential. Especially, wireless transmission systems with high data rate. Two parts of these systems should be

developed software and hardware. Another area that is renewable energies becomes more attractive for researchers in order to develop new conversion systems with good performances, and a good optimization of energy. For example, in wireless sensor systems, we try to develop new protocols permitting to have a good autonomy in terms of energy.

Due to progress in the development of communication systems, it is now possible to develop low-cost wearable communication systems. A wearable antenna is meant to be

a part of the clothing or close to the body and used for communication purposes, which include tracking and navigation, mobile computing and public safety. Examples include smartwatches (with integrated Bluetooth antennas), glasses (such as Google Glass with Wi-Fi and GPS antennas), GoPro action cameras (with Wi-Fi and Bluetooth antennas), etc. They are increasingly common in consumer electronics and for healthcare and medical applications. However, the development of compact, efficient wearable antennas is

one of the major challenges in the development of wearable communication and medical systems. Technologies such as printed compact antennas and miniaturization techniques have been developed to create efficient, small wearable antennas which are the main objective of this book. Each chapter covers enough mathematical detail and explanations to enable electrical, electromagnetic and biomedical engineers and students and scientists from all areas to follow and understand the topics

presented. New topics and design methods are presented for the first time in the area of wearable antennas, metamaterial antennas and fractal antennas. The book covers wearable antennas, RF measurements techniques and measured results in the vicinity of the human body, setups and design considerations. The wearable antennas and devices presented in this book were analyzed by using HFSS and ADS 3D full-wave electromagnetics software. Explores wearable medical systems and antennas Explains the design and

development of wearable communication systems Explores wearable reconfigurable antennas for communication and medical applications Discusses new types of metamaterial antennas and artificial magnetic conductors (AMC) Reviews textile antennas Dr. Albert Sabban holds a PhD in Electrical Engineering from the University of Colorado at Boulder, USA (1991), and an MBA from the Faculty of Management, Haifa University, Israel (2005). He is currently a Senior Lecturer and researcher at the Department of Electrical and Electronic

Engineering at Kinneret and Ort Braude Engineering Colleges.
20th Tyrrhenian Workshop on Digital Communications
Design and Optimization of Passive UHF RFID Tag Antenna for Mounting on Or Inside Material Layers
COST WiPE - IC1301
Radio Frequency Identification Fundamentals and Applications
Flexible Electronics
RFID-Tag Antenna Design

The book introduces a design of different antennas for

RFID tag and readers. A fractal dipole antenna for passive UHF RFID applications has been proposed. The antenna is simple and has good impedance matching with the chip impedance. A curved dual-band ring dielectric resonator tag antenna has been presented. The radiation characteristics and backscattering from the tag antenna in free space, mounted on cylindrical bottle and mounted on spherical bottle have been considered. The book proposes and studies the parameters of an OFHA for handheld UHF RFID reader. an elliptical dielectric resonator antenna fed by single feed with rectangular ground is proposed for radio frequency identification (RFID) reader operating at center frequency

of 5.8 GHz.The effects of the presence of portable reader device and human hand on the radiation characteristics of the antenna are investigated.An 8x8 NF-focused EDRA phased array for fixed RFID reader applications is investigated. The NF-focused array introduces a focused spot area with diameter of 13.7 cm and SLL of -16 dB so representing a valuable solution in realistic applications."

This volume presents the proceedings of the joint conference of the European Medical and Biological Engineering Conference (EMBEC) and the Nordic-Baltic Conference on Biomedical Engineering and Medical Physics (NBC), held in Tampere, Finland, in June 2017.

The proceedings present all traditional biomedical engineering areas, but also highlight new emerging fields, such as tissue engineering, bioinformatics, biosensing, neurotechnology, additive manufacturing technologies for medicine and biology, and bioimaging, to name a few. Moreover, it emphasizes the role of education, translational research, and commercialization. This book, entitled Radio Frequency Identification Fundamentals and Applications, Bringing Research to Practice, bridges the gap between theory and practice and brings together a variety of research results and practical solutions in the field of RFID. The book is a rich collection of articles written by people from all over the

world: teachers, researchers, engineers, and technical people with strong background in the RFID area. Developed as a source of information on RFID technology, the book addresses a wide audience including designers for RFID systems, researchers, students and anyone who would like to learn about this field. At this point I would like to express my thanks to all scientists who were kind enough to contribute to the success of this project by presenting numerous technical studies and research results. However, we couldn't have published this book without the effort of InTech team. I wish to extend my most sincere gratitude to InTech publishing house for continuing to publish new,

interesting and valuable books for all of us.
This book highlights technology trends and challenges that trace the evolution of antenna design, starting from 3rd generation phones and moving towards the latest release of LTE-A. The authors explore how the simple monopole and whip antenna from the GSM years have evolved towards what we have today, an antenna design that is compact, multi-band in nature and caters to multiple elements on the same patch to provide high throughput connectivity. The scope of the book targets a broad range of subjects, including the microstrip antenna, PIFA antenna, and the monopole antenna to be used for different applications over three different mobile

generations. Beyond that, the authors take a step into the future and look at antenna requirements for 5G communications, which already has the 5G drive in place with prominent scenarios and use-cases emerging. They examine these, and put in place the challenges that lie ahead for antenna design, particularly in mm-Wave design. The book provides a reference for practicing engineers and under/post graduate students working in this field.

Energy Devices and Applications

Radiation Efficiency of Balanced Passive UHF RFID Dipole Tag Antennas

Theory and Applications of Applied Electromagnetics

Design of Space-Filling Antennas for Passive UHF RFID Tags
Passive UHF RFID Tag Antenna Design Using Graphite-based Conductive Papers
Sensing Platform and Object Motion Detection Based on Passive UHF RFID Tags Using a Hidden Markov Model-based Classifier

Radio Frequency Identification (RFID) is a modern wireless data transmission and reception technique for applications including automatic identification, asset tracking and security surveillance. This

book focuses on the advances in RFID tag antenna and ASIC design, novel chipless RFID tag design, security protocol enhancements along with some novel applications of RFID.

This book provides an insight into the 'hot' field of Radio Frequency Identification (RFID) Systems In this book, the authors provide an insight into the field of RFID systems with an emphasis on networking aspects and research challenges related to passive

Ultra High Frequency (UHF) RFID systems. The book reviews various algorithms, protocols and design solutions that have been developed within the area, including most recent advances. In addition, authors cover a wide range of recognized problems in RFID industry, striking a balance between theoretical and practical coverage. Limitations of the technology and state-of-the-art solutions are identified and new research

opportunities are addressed. Finally, the book is authored by experts and respected researchers in the field and every chapter is peer reviewed. Key Features: Provides the most comprehensive analysis of networking aspects of RFID systems, including tag identification protocols and reader anti-collision algorithms Covers in detail major research problems of passive UHF systems such as improving reading accuracy, reading range and throughput

Analyzes other "hot topics" including localization of passive RFID tags, energy harvesting, simulator and emulator design, security and privacy Discusses design of tag antennas, tag and reader circuits for passive UHF RFID systems Presents EPCGlobal architecture framework, middleware and protocols Includes an accompanying website with PowerPoint slides and solutions to the problems http://www.site.uottawa.ca/~mbolic/RFIDBook/ This book will be an

invaluable guide for researchers and graduate students in electrical engineering and computer science, and researchers and developers in telecommunication industry.

This book is a collection of the best research papers presented at the 8th International Conference on Innovations in Electronics and Communication Engineering at Guru Nanak Institutions Hyderabad, India. Featuring contributions by researchers,

technocrats and experts, the book covers various areas of communication engineering, like signal processing, VLSI design, embedded systems, wireless communications, and electronics and communications in general, as well as cutting-edge technologies. As such, it is a valuable reference resource for young researchers.

For context-aware systems in indoor work settings, several types of sensors have been applied to capture work

activities. We introduce and present a sensing platform and object motion detection system using a hidden Markov Classifier based on a UHF RFID system. Backscattered signal strength of passive UHF RFID tags as a sensor is used for providing information on the movement and identity of work objects. As the read range of passive UHF RFID broadens up to 12 meters compared to 1-meter range of HF RFID, passive tags have been used for many applications such as tracking

medical devices and objects of daily living. The RF communication link between the reader antenna and tags for indoors exhibits intermittent loss of signal reception due to antenna orientation mismatch and breakpoints within the antenna coverage area. We propose a design of a sensing platform for tracking objects using a UHF RFID system with passive tags that provides continuous signal reception over the coverage area. We first investigated

causes of power loss for passive tags and then designed a sensing platform solution using antenna diversity. The causes of tag's power loss were eliminated with angle and spatial diversity methods that can cover an arbitrary area of interest. We implemented this design in an indoor setting of a trauma resuscitation room and evaluated it by experimental measurement of signal strength at different points and angles in the area of

interest. Our sensing platform supported complete coverage and uninterrupted interrogation of tags as they moved in the area of interest. We conclude that this sensing platform will be suitable for uninterrupted object tracking with UHF RFID technology in generic indoor spaces. In addition to the sensing platform, we design an object motion detection system using passive UHF RFID tags attached on medical objects. To use the signal strength for accurate

detection of object movement we propose a novel hidden Markov model with continuous observations, RSSI preprocessor, frame-based data segmentation, and motion-transition finder. We use the change in backscattered signal strength caused by tag's relocation to reliably detect movement of tagged objects. To maximize the accuracy of movement detection, an HMM-based classifier is designed and trained with dynamic

settings, and different object types. We deployed an RFID system in a hospital trauma bay and evaluated our approach with data recorded in the trauma room during 28 simulated resuscitations performed by trauma teams. Our motion detection system shows 89.5% accuracy in this domain.

EMBEC & NBC 2017

Wearable Systems and Antennas Technologies for 5G, IOT and Medical Systems

Antenna Fundamentals for Legacy Mobile Applications and Beyond
Advanced Radio Frequency Identification Design and Applications
ICCWCS 2019
Advances in Computer Science and Ubiquitous Computing

The first topic in this chapter was an introduction to RFID systems. This was followed immediately with a discussion on metamaterials and LH-propagation. Expressions for the propagation constants, phase velocity and Bloch impedance were derived and discussed. Next, several metamaterial-based antenna designs for passive RFID tags were

presented. The designs offered showed that by incorporating elements found in metamaterials in the design of the antenna on a RFID tag, the antenna could be made to resonate at a much smaller dimension. The result is a compact passive RFID tag with very useful max read range values.

As a first step, the effects of dielectric materials on an antenna's impedance match and radiation pattern are investigated. The detuning effect is quantified based on the theoretical frequency scaling and effective permittivity of a dielectric material of finite thickness. Using simple formulas, the operational range of a tag can be predicted without intensive full-wave simulations of different materials. Next, a spectral domain Green's function is applied to compute the antenna pattern when the tag is mounted on or inside a

layered medium. The optimal placement of the tag is found based on the focusing effect that the material has on the gain pattern of the antenna. For tires, the steel ply in the sidewall of a tire looks like a periodic wire grating. The performance of an antenna placed close to a wire grating is predicted using Floquet theory. The results indicate that steel plies embedded in the tire can be utilized as a reflector to further focus the gain pattern and increase the read range of a tag. Using these design tools and theoretical analysis, several broadband RFID tag antennas are designed for multi-layered materials. A novel stretchable conductive textile (E-fiber) based tag antenna is also developed for placement in elastic materials. Prototype antennas are fabricated and embedded in a tire during the tire manufacturing process. Experimental

results indicate that tags with the new antennas achieve significant improvement compared with commercially available tags.

Continuing advancements in electronics creates the possibility of communicating with more people at greater distances. Such an evolution calls for more efficient techniques and designs in radio communications. Emerging Innovations in Microwave and Antenna Engineering provides innovative insights into theoretical studies on propagation and microwave design of passive and active devices. The content within this publication is separated into three sections: the design of antennas, the design of the antennas for the RFID system, and the design of a new structure of microwave amplifier. Highlighting topics including additive manufacturing

technology, design application, and performance characteristics, it is designed for engineers, electricians, researchers, students, and professionals, and covers topics centered on modern antenna and microwave circuits design and theory.

This book constitutes the proceedings from the 20th Tyrrhenian Workshop on Digital Communications, held September 2009 in Pula, Sardinia, Italy and focused on the "Internet of Things."

Wearable Antennas and Electronics

Design and Optimization of Passive UHF RFID Systems

Multifunctional MIMO Antennas: Fundamentals and Application

Design of Passive UHF RFID Tag Antennas Using

Metamaterial-Based Structures and Techniques
Introduction to Smart eHealth and eCare Technologies
Humanity's ability to produce enough food is mostly due to adoption of new methods and technologies by the agricultural industries as they became available. New information, communication and high speed processing and precision agriculture technologies have the potential to transform the agricultural industry. These technologies incorporate radio-frequency and microwave radiation into their systems. This book presents an overview of how these technologies are being used in agricultural systems. The main

purpose of the book is to provide a glimpse of what is possible and encourage practitioners in the engineering and agricultural industries to explore how radio-frequency and microwave systems might further enhance the agricultural industry. The authors have extensive experience in agricultural and microwave engineering, instrumentation and communication systems.

This book presents a comprehensive approach to antenna designs for various applications, including 5G communication, the internet of things (IoT), and wearable devices. It discusses models, designs, and developments of MIMO antennas, antenna

performance measurement, 5G communication challenges and opportunities, and MIMO antennas for LTE/ISM applications. It covers important topics including mmWave antennas, antenna arrays for MIMO applications, reconfigurable/band-notched MIMO antennas, multiband MIMO antennas, wideband MIMO antennas, and fractal-based compact multiband hybrid antennas. FEATURES Discusses antenna design optimization techniques in detail Covers MIMOI antenna performance measurement, multiband MIMO antennas, and wideband MIMO antennas Discusses modeling, simulation, and specific absorption rate

(SAR) analysis of antennas Provides applications including radio-frequency identification (RFID), wearable antennas, and antennas for IoT Multifunctional MIMO Antennas: Fundamentals and Application is useful for undergraduate and graduate students and academic researchers in areas including electrical engineering, electronics, and communication engineering.

RFID is a technology for wireless identification of objects. More recently, much attention is paid to application areas within biomedical engineering, in which wearable tags for on-body use could provide real-time remote bio-monitoring of humans. New

types of antenna materials and antenna structures are emerging to fulfil the requirements encountered within the new RFID application areas. Tag designs where the tag antenna structure is formed from conductive ink or conductive threads have been proposed as competitive materials to conventional etched copper. The new materials used to form the complex antenna materials are challenging to model accurately. In this book, a novel radiation efficiency measurement method is developed and verified for measurement of passive UHF RFID dipole tag antennas. The measurement method provides a powerful tool for

characterisation of complex antenna material structures losses in practise. The acquired information can be used to optimise tag antenna material structures and to improve tag antenna performance and reliability, which is crucial for widespread use of RFID to become reality.

This book presents a practical and comprehensive guide to game-changing and state-of-the-art wearable antennas and RF electronics and their applications. Written by leading experts, the book details how to weave clothing into functional antennas and sensors to serve as unobtrusive devices for medical monitoring, athletic

performance tracking, body-area network communications, and a host of other applications. You will learn about the latest advances in materials and electronics along with new and unexplored opportunities in functionalizing fabrics for sensing and wireless connectivity; understand materials selection for diverse wearable applications; gain practical insight into the newest class of embroidered e-textiles; and learn how to engineer flexible and wearable sensors. Wearable Antennas and Electronics covers basic approaches for wearable technology and their applications. You will also get an expert preview of promising future

directions and paths for research opportunities. This is a must-have resource for anyone working in the growing industry of wearables and body-area devices, including engineers, researchers, faculty, and graduate students.

Wireless Power Transmission for Sustainable Electronics

The Internet of Things

An Introduction for Agriculturalists and Engineers

Design and Applications

Proceedings of the 2nd International Conference of Structural Health Monitoring and Integrity Management (ICSHMIM 2014), Nanjing, China,

24-26 September 2014
CSA-CUTE 17

Radio frequency identification (RFID) is an auto-identification technology realised by radio waves. The ultimate goal of RFID is the item-level tagging of all kinds of products in supply chains. This goal challenges industry and academia in many aspects. Passive UHF RFID systems, when compared with other RFID systems, are believed to possess advantages in achieving that goal. However, UHF RFID systems possess two serious disadvantages: (i) the relatively large antenna size, and (ii) the sensitiveness to

the metallic items on which a tag is mounted. Those two deficiencies make a large number of small size objects and metallic objects hard to tag. In addition, different applications also bring special requirements or limitations in adopting UHF RFID systems, such as in the case of a container seal, the requirement for tags to have a physical security function, and in other cases such as pallet shipping, the requirement for detecting massive numbers of items densely stacked together. Finally, of course, cost is one of the key limitations if one intends to apply his or her design down to item-level

tagging commercially. Hence each of the inherent deficiencies of the system itself and the limitations caused by the application, or a combination of all or some of the deficiencies and limitations make a large number of items hard to tag and impedes the item-level tagging target. The research in this thesis aims, by antenna design and electromagnetic wave analysis, to provide feasible and affordable solutions for some of those hard-to-tag objects in UHF RFID systems, and the thesis can be divided into five parts. In detail, the first part of the thesis gives the motivations, contributions

and structure of this thesis. In addition it also provides a brief introduction to RFID systems and about how they are operated, developed, classified, regulated and standardised. The second part of this thesis presents basic terminologies and design criteria in tag antenna design, transponder IC design and reader design. Factors which limit the operating range of UHF RFID systems are discussed. Following this discussion, a novel method making use of a scattering matrix for evaluating the operating range of a UHF RFID system deployed in an arbitrary environment is proposed. In the third part,

concerning the meander line dipole antenna (MDA), one of the approaches to minimising tag antenna size is analysed in terms of its resonant frequency, size reduction contributors, radiation pattern and efficiency. An analytic formula for calculating the resonant frequency of an MDA on a dielectric substrate as an RFID tag antenna is established. Based on the analysis, a novel tag antenna with a physical security function (an electronic seal) for protecting shipping containers was designed and experimentally verified. The fourth part of this thesis puts emphasis on metallic item

detection. The reason of why common dipole based tag antennas cannot work well in close proximity to metal is given. Previous solutions and their own demerits in solving this problem are summarised. Then, a low profile, simple structure, compact size solution is introduced via the artificial magnetic conductor concept. Furthermore, a general DVD disc contains a very thin metal layer inside for the purpose of reflecting laser. That layer may not bring many troubles in identifying a single DVD by a UHF RFID system, but if thousands of DVDs were stacked, the role the metal component plays

in degrading the detection of each DVD in the stack should be investigated. An approach in detecting a large number of DVDs (up to 2000) densely stacked is thus presented. Conclusions of the work in this thesis are drawn as the last part of the thesis. Besides conclusions the last part also includes some recommendations for future work and the description of the original contributions of this thesis. The potential benefits of item-level tagging in supply chains are enormous. The existence of a large number of hard-to-tag objects is one of the main challenges in achieving item-level tagging. The studies in

this thesis extend the scope of the detectable objects and this extension makes item-level tagging more realisable.

In this book, experts from academia and industry present the latest advances in scientific theory relating to applied electromagnetics and examine current and emerging applications particularly within the fields of electronics, communications, and computer technology. The book is based on presentations delivered at APPEIC 2014, the 1st Applied Electromagnetic International Conference, held in Bandung, Indonesia in December 2014. The conference provided an

ideal platform for researchers and specialists to deliver both theoretically and practically oriented contributions on a wide range of topics relevant to the theme of nurturing applied electromagnetics for human technology. Many novel aspects were addressed, and the contributions selected for this book highlight the relevance of advances in applied electromagnetics to a variety of industrial engineering problems and identify exciting future directions for research.

Both the demographics and lack of resources in the health and well-being industry are increasingly forcing us to find alternative

solutions for individualized health and social care. In an effort to address this issue, smart technologies present enormous potential in solving this challenge. This book strives to enhance communication and collaboration between technology and health and social care sectors. The reader will receive an extensive overview of the possibilities of various technologies in care sectors (including ICT, electronics, automation, and sensor technology) written by experts from various countries. It will prove extremely useful for engineers developing well-being related systems, software, or

other devices that can be used by professionals working with people with specialist needs, well-being and health service providers, educators teaching related courses, and upper level undergraduate students and graduate student studying related topics. The technology focus of the book is widespread and addresses elderly care and hospitals, in addition to solutions for various user groups, devices, and technologies. Beyond serving as a resource for nurses and people working in care sector, the book is also meant to give guidelines for engineers developing person-centered systems

by exploring the integration of these technologies into service systems.

Clinical Aspects of O2-transport and Tissue Oxygenation

Development of Passive UHF RFID Tag Antennas for Challenging Objects and Environments

Backscattering and RF Sensing for Future Wireless Communication

Innovations in Electronics and Communication Engineering

Volume 1

Emerging Innovations in Microwave and Antenna Engineering