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## Editorial

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**Biographical notes:** Y. Chen obtained his BEng (Hons I) and PhD in Electrical and Electronic Engineering from Nanyang Technological University, Singapore, in 2002 and 2006 respectively. He is presently with the School of Engineering, University of Greenwich, UK as a Senior Lecturer. He is also with the School of Computer, Electronic and Information, Guangxi University, China as an Adjunct Associate Professor. His current research interests involve wireless and pervasive communications for healthcare, space-time channel characterisation, wireless communication theory and wireless network localisation.

Mohammad Ghavami is a Professor of Electronic Engineering and the Director of the UWB Communications Group at King's College London, University of London. He is the leading author of the book *Ultra Wideband Signals and Systems in Communication Engineering* and has published over 100 technical papers in major international journals and conferences on areas related to UWB systems, digital communications, adaptive filters and beam-space-time signal processing. From 1998 to 2000, he was a JSPS Postdoc Fellow at Yokohama National University, Japan. From 2000 to 2002, he was a Researcher at the Sony Computer Science Laboratories, Inc. in Tokyo, Japan. He won two invention awards from Sony Ltd.

Reza Dilmaghani received his PhD from King's College London in June 2006. Since May 2006, he has been a Lecturer with the Ultra wideband Communications Group. He holds BSc and MSc degrees with great distinction. Reza was a Visiting Researcher at the Japanese Government Lab, National Institute of Information and Communications Technology (NICT), Japan during 2004 where he was researching on UWB channel modelling and channel estimation techniques for UWB systems. His interests include signal processing for communications, (medical) image processing, and wavelet theory. He has also published several technical papers in recognised conferences and journals. Reza was awarded the esteemed European Information Society Technologies (IST) prize sponsored by the European Commission in 2005 which is the most prestigious technology prize for innovative products all over Europe.

Ian James Craddock is a Professor in the CCR, University of Bristol, Bristol, U.K. His research interests include antenna design, electromagnetics, biomedical imaging and radar, funded by organisations such as EPSRC, QinetiQ, DSTL and Nortel. He leads Bristol's Breast Cancer Imaging Project, this project winning the IET's Innovation in Electronics prize in 2006. He has published over 100 papers in refereed journals and proceedings. He has led a workpackage on ground-penetrating radar in an EU Network of Excellence and has a related active research interest in antennas and propagation for instrumentation within the human body. He has delivered numerous invited papers to conferences in Europe, USA and Asia and chaired sessions at leading international conferences.

Yang Hao obtained his PhD from the University of Bristol, Bristol, UK in 1998. From 1998 to 2000, he was a Postdoctoral Research Fellow at the School of Electrical and Electronic Engineering, University of Birmingham, Birmingham, UK. In May 2000, he joined the Antenna Engineering Group, Queen Mary College, University of London, London, UK, first as a Lecturer and was promoted to Reader in 2005 and Professor in 2007. He is active in a number of areas including computational electromagnetics, microwave metamaterials, antennas and propagation for body centric wireless networks, millimeter/submillimeter active antennas and photonic integrated antennas.

Yi Huang obtained his BSc in Physics (Wuhan), MSc in Microwave Engineering (Nanjing) and DPhil in Communications and Electromagnetics from the University of Oxford. He has been conducting research in the areas of applied electromagnetics, communications, radar, radio propagation and positioning and antennas over the past 20 years. His experience includes three years spent with NRIET (China) as a Radar Engineer and various periods with the Universities of Birmingham, Oxford, and Essex as a member of research staff. He worked as a Research Fellow at British Telecom Labs. He has published over 200 refereed international journal and conference papers, and is the principal author of *Antennas: from Theory to Practice*.

William Scanlon obtained his BEng and his PhD in Electronics from the University of Ulster, UK in 1994 and 1997, respectively. He was appointed as a Lecturer at Ulster in 1998, then Senior Lecturer and Full Professor at Queen's University of Belfast (UK) in 2002 and 2008, respectively. He currently leads the Radio Communications Research Group at Queen's and he holds a part-time Chair in Short Range Radio at the University of Twente in the Netherlands. He also has ten years of industrial experience with Nortel Networks, Siemens UK and GEC-Osram. His current research interests include wireless networking, antennas and propagation and body centric communications. He has published over 160 papers in leading journals and in international conferences. He served as a Keynote Speaker for the *European Workshop on Conformal Antennas* (2007) and co-chaired the *2009 Loughborough Antennas and Propagation Conference* and he has acted as an Invited Speaker at numerous other international conferences.

Lorenzo Mucchi obtained his Dr Ing in Telecommunications Engineering from the University of Florence (Italy) in 1998 and his PhD in Telecommunications and Information Society in 2001. Since 2001, he has been with the Department of Electronics and Telecommunications of the University of Florence as a Research Scientist. His main research areas are spread spectrum techniques (UWB, CDMA), cooperative communication systems, cognitive radio, wireless security, diversity techniques and satellite communications. Currently, he has published five book chapters, 12 international journals papers and several conference papers (~54). Since 2004, he has been TPC of about 16 international conferences.

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Ultra wideband (UWB) techniques have attracted much research interest in a variety of medical applications. Novel biomedical electromagnetic imaging techniques have relied on UWB radar concepts to improve the sensitivity and specificity of cancer detection. Tissue-implanted UWB devices communicate biomedical signals from the interior to the exterior of the human body and vice versa. UWB systems may also be deployed for non-contact, non-invasive vital-sign monitoring. Developing and optimising these technologies involves a crystal understanding of the interactions between UWB electromagnetic field and human body. Moreover, UWB technology can be applied in body-centric wireless communications, which refer to human-self and human-to-human networking with the use of wearable and implantable wireless sensors. It encompasses wireless body area network (WBAN), wireless sensor network (WSN), and wireless personal area network (WPAN). Body-centric wireless communications find rich applications in personal health monitoring to achieve distributed diagnosis and home healthcare.

The objective of this special issue is to highlight current and emerging research in applications of UWB systems in biomedicine, which will bring together the latest work in this growing interdisciplinary field. In this special issue, we have collected six papers covering various aspects of the applications of UWB systems in biomedicine by several leading research groups.

The first article titled 'UWB channel modelling for wireless body area networks in a hospital' by Taparugssanagorn et al. describes an experimental study of the UWB WBAN channel in a hospital environment. The measured data are used to develop statistical models for the channel, which can then be used to design efficient and safe communication networks.

The second article titled 'Medical applications adapting ultra wideband – a system study' by Viittala et al. studies two types of UWB systems, i.e., direct sequence UWB (DS-UWB) and UWB frequency modulation (UWB-FM) in order to find the best solution of physical layer for medical WBAN.

The third article titled 'Experiences on bio-medical sensing using ultra wideband communications and radar technology' by Bilich studies and reports some experimental results on the application of UWB technology to perform biomedical sensing and vital-sign monitoring in humans.

The fourth article titled 'Off-body UWB channel characterisation within a hospital ward environment' by Catherwood et al. presents received signal strength measurements and delay statistics for both stationary and mobile users equipped with a wearable UWB radio transmitter within a hospital environment.

The fifth article titled 'An overview of radar based ultra wideband breast cancer detection algorithms' by Teo et al. gives an overview of the existing algorithms for UWB breast cancer detection, which is a safe, accurate and easy-to-use technique that can be performed in the general practitioner clinics to overcome the restriction faced in mammography.

The sixth article titled 'Investigating a double layer Vivaldi antenna design for fixed array field measurement' by Ostadrahimi et al. investigates a modified Vivaldi antenna with improved cross polarisation working in the UWB frequency range (3.1–10.6 GHz) to be used as multiple probes for microwave tomography system.

We believe that these interesting papers will inspire further progress and innovation in the area of UWB systems in biomedicine.

Finally, we would like to thank the Editor-in-Chief of the *International Journal of Ultra Wideband Communications and Systems (IJUWBCS)*, Dr. R.S. Kshetrimayum, for supporting us to prepare this special issue. We would also like to thank the authors for their outstanding work and the anonymous reviewers for their time and effort spent on reviewing the submitted manuscripts.