ISMICT 2011
Montreux
March 27-30, 2011

Conference Program

(Monday, Tuesday, Wednesday)

Monday: 28 March

8:30	Opening and Welcome	
8:45	Keynote Speaker **Prof. Dr. Ohno-Machado** University of San Diego Chief Division of Biomedical Informatics	**Medical Informatics and BAN for Future Personalized Medicine** Personalized medicine will require the integration of data from several sources. While much has been discussed about the role of genomics in personalizing the care of patients (e.g., pharmacogenomics), little has been discussed about the role of monitoring individuals and the environments they are exposed to. Body area networks can provide a rich source of data that can be analyzed by different types of algorithms and integrated with electronic health records and research data. In this presentation, I will discuss which aspects of personalized medicine are currently most challenging, how they are currently being addressed, and how the engineering/computer science and biomedical communities can work together towards the goal of truly personalizing healthcare.
9:30	Keynote Speaker **Prof. Dr. Kondoh, MD** Professor, Shimane University Hospital	**Server based computing as an infrastructure of hospital-wide EPR and the regional healthcare information system** We renewed the PACS and EPR system on January 2008 and we introduced a server based computing (SBC) system as an infrastructure of the total integrated PACS and EPR. The total integrated PACS operates all DICOM images, non-DICOM images, images from ophthalmology department and department of laboratory, the reports with key images and scanned documents with e-signature. We made a real paper-less hospital information system. SBC has many advantages for security and cost-effectiveness, but it was the first time that it was used for a large-scale hospital-wide information system. We also started to use SBC as an infrastructure of inter-hospital system from July 2010. On this paper we would report the advantages and problems of SBC as an infrastructure of paperless EPR and inter-hospital EPR sharing system and the planning the regional healthcare information system. SBC was introduced as an infrastructure of EPR and PACS for better security and cost effectiveness. SBC was also useful to make the inter-hospital system economically. We planned the regional healthcare information system on the SBC infrastructure.

10:15	**Coffee Break**	
10:30	**Panel Discussion** **Chair: Dr. Huan-Bang Li** Senior Researcher, NICT, Japan and Visiting Professor, the University of Electro-Communications, Japan	**Body Area Network for Medical Treatment and Healthcare– Technologies and Challenges** Body area network (BAN) appears as an effective and efficient technology to assist medical treatment and healthcare in the sense of reducing working load and expense. BAN is defined as a small scale network that provides short-range wireless connections among devices distributed in, on, and in the peripheral proximity around human body with consideration for human body safety. However, engineers may encounter many challenges when designing a BAN including channel behavior, PHY structure, MAC control, etc. Different organizations worldwide set up projects to provide their unique solutions related to BAN. In this panel session, we invite some key figures who are leading BAN related projects to discuss technologies and challenges for BAN from different viewpoints.
	Panelist1 : Ilangko Balasingham Professor, The Interventional Center, Oslo University Hospital, Norway & Institute of Clinical Medicine University of Oslo, Norway and Department of Electronics and Telecommunications Norwegian University of Science and Technology (NTNU), Norway	**UWB Technology for Medical Applications** The ultra-wideband (UWB) technology promises several interesting characteristics such as ultra-short pulses, low duty cycle, fine time resolutions, very large bandwidth, extremely low power spectral density, excellent propagation, low interference generation and good interference rejection, coexistence with conventional systems, almost undetectable, combined communications, localization and sensing, and multi-path resistance (useful in hostile environment). Furthermore the technology can be used for improved wireless health technology, for both improved network communication and improved and possibly novel medical applications. Three major research directions are pursued in the MELODY project, which is a large scale Norwegian ICT project with a funding approximately € 1 million pr. year for up to 7 years, namely short range sensing and imaging, improved sensitivity for short range localization and tracking objects, and distributed signal and communications for dynamic autonomous networks for both in-vivo and ex-vivo medical applications. This presentation will provide status on some of the ongoing research work and results from the MELODY project and some of the other emerging medial applications specifically in therapy.

	Panelist 2: Eryk Dutkiewicz Professor, Wireless Communications and Networking Lab., Macquarie University Australia	**Challenges of Interference Mitigation in Medical Body Area Networks** The growing cost of healthcare and the aging population in developed countries have introduced great challenges for governments, healthcare providers and healthcare industry. There is great interest in using emerging wireless technologies to support remote patient monitoring in an unobtrusive, reliable and cost effective manner thereby providing personalized sustainable services to patients. Medical Body Area Networks (MBANs) is one such emerging technology that has the potential to significantly improve health care delivery, diagnostic monitoring, disease-tracking and related medical procedures. A crucial aspect of MBANs is their ability to provide highly reliable communications for medical devices, especially those implanted in the human body. Effective radio interference mitigation is crucial to achieving highly reliable and low power operation for implant communications. Interference can be caused by legacy systems that operate in the same frequency bands or by other MBANs operating at the same frequency and in the same location. In some countries, such as Australia, MBANs do not have a protected frequency spectrum and need to operate as secondary spectrum users. This is a very challenging environment for their reliable operation. The other source of interference for MBANs will come from other overlapping MBANs. Both interference caused by legacy systems and inter-MBAN interference make interference mitigation an important research issue. Radio interference issues must be therefore well understood and interference mitigation algorithms and techniques must be effectively supported by emerging protocols.
	Panelist 3: Kiyoshi Hamaguchi Group Leader of Medical ICT Group, National Institute of Information and Communications Technology (NICT), Japan	**Body Area Network: Introduction of Research on a New Generation Tele-health System in NICT** By the arrival of aged society in our countries, an information and communications technology (ICT) is expected to contribute medical and healthcare fields, e.g., a medical radio equipment senses our vital information - blood pressure, SpO2, body temperature, cardiac beats, body motion etc. -, and send the data to a doctor to get medical treatment. In our medical ICT group of NICT, the possibility and the profit of wireless ICT in the medical and healthcare fields, especially a wireless body area network (BAN) system, are being examined. Recent activities of medical ICT research, BAN applications at home, and NICT's Ubiquitous Home Project are briefly introduced in my talk.

	Panelist 4: Kamran Sayrafian Program Manager, Information Technology Laboratory, NIST, USA and Adjunct Professor, University of Maryland	**Visualizing RF Propagation in Body Area Networks Using a 3D Immersive Platform** Body area networks which consist of RF-enabled wearable and implantable sensory nodes are poised to be a promising interdisciplinary technology with novel uses in pervasive health information technology. For any communication system, clear understanding of the propagation media is a key step toward a successful transceiver design. Such information is typically gathered by conducting physical experiments, measuring and processing the corresponding data to obtain channel characteristics. Due to the nature of the body area networks, doing extensive physical measurements might be difficult or in some cases not even possible. Here, we present a 3D virtual reality platform that can provide an effective alternative to complement physical experimentation. Several examples are provided to show the intriguing capabilities of the system to study and observe propagation characteristics from implants, creeping waves around the human body and possible effect of metallic implants on body surface propagation.
12:15	**Lunch**	
13:30	**Session 1** **Chair: Dr. Saad Mezzour** Chair ETSI eHealth, Medtronic, The Netherlands	**MAC and Security**
	Jérôme Rousselot CSEM SA, Switzerland	**When Ultra Low Power meets High Performance: The WiseMAC High Availability Protocol** *(INVITED)*
	Yuta Fujiura, Ryuji Kohno Yokohama National University, Japan	**MAC Protocol for Medical BAN** *(INVITED)*
	Mickael Maman, Laurent Ouvry	**BATMAC: an Adaptive TDMA Mac for Body Area Networks Performed with a Space-Time Dependent Channel**
	Saied Hosseini-Khayat	**A Lightweight Security Protocol for Ultra-Low Power VLSI Implementation for Wireless Implantable Medical Devices**
	Yasmin Hovakeemian, Kshirasagar Naik, Amiya Nayak	**A Survey on Dependability in Body Area Networks**
13:30	**Session 3** **Chair: Dr. Alan Wong** Toumaz Ltd., England	**Modeling, Miniaturization, EMI and Physical Parameters**
	Dragan Manic, Daniel Severac	**Cost-effective and Miniaturized System-on-Chip Based Solutions for Portable Medical & BAN Applications**
	Siavash Saremi-Yarahmadi, Kristel Fobelets, Chris Toumazou	**Coupled RF Inductive Sensors for Monitoring the Conductivity of Electrolyte Solutions**
	Sergey Loyka, Vladimir Mordachev	**Electromagnetic Interference and Safety in Wireless Networks: a Statistical Approach**

	Jacopo Olivo, Sandro Carrara, Giovanni De Micheli	**Modeling of Printed Spiral Inductors for Remote Powering of Implantable Biosensors**
	Dmitriy Penkin, Gerard Janssen, Alexander Yarovoy	**Estimation of Maximum Communication Distance Between in-Vivo Miniature Electronic Implants**
15:30	**Coffee Break**	
15:45	**Session 2** **Chair : Prof. Lucila Ohno-Machado** University of California, USA	**Medical BAN and eHealth Applications**
	Saad Mezzour Chair ETSI eHealth, Medtronic, The Netherlands	**ETSI, European Telecommunications Standards Institute, eHealth project** *(INVITED)*
	Ismo Alakärppä Jukka Riekki, Sofia Larsson, Elisa Jaakkola	**Sound Aided Interface of a Pervasive Pain Monitoring System**
	Ville Niemel, Matti Hämäläinen, Jari Iinatti, Attaphongse Taparugs	**P-Rake Receivers in Different Measured WBAN Hospital Channels**
	Chika Sugimoto, Ryuji Kohno	**Operation Scheduling Method by Efficient Anesthesist Assignment Using Genetic Algorithm**
	Jerzy Brzezinski, Stanislaw Czajka, Jacek Kobusinski, Maciej Pierni	**Healthcare Integration Platform**
	Peter Chadwick	**Developments in International Standards and Regulations for Medical Device Communications**

15:45	Session 4 **Chairs: Dr. Matti Hämäläinen** University of Oulu, Finland **Dr. Paul Stadnik** Micro Systems Engineering, Inc., USA	Antenna, Propagation, and Ranging
	Onur Kazanc, Catherine Dehollain, Franco Maloberti	**Impedance-Matched Sensor-Tag Antenna Design Using Genetic Algorithm Optimization**
	Takahiro Aoyagi, Minseok Kim, Jun-Ichi Takada, Kiyoshi Hamaguchi, R	**Numerical Simulations for Dynamic WBAN Propagation Channel During Various Human Movements**
	Kamya Yekeh Yazdandoost, Kiyoshi Hamaguchi	**Very Small UWB Antenna for WBAN Applications**
	Alexander Vasylchenko, John F. Farserotu, Steven Brebels, Walter De Raedt, Guy A. E. Vandenbosch	**Scalable Conformal Array for Multi-Gigabit Body Centric Wireless Communication**
	Koji Enda, Ryuji Kohno	**High Accuracy TOA Positioning Algorithm Using UWB Under NLOS Environment for Medical Network**
	Wen-Bin Yang, Kamran Sayrafian-Pour, John Hagedorn, Judith Terrill	**Impact of an Aortic Valve Implant on Body Surface UWB Propagation: A Preliminary Study**

Tuesday: 29 March

8:45	Keynote Speaker **Dr. Rogier Receveur** Technology Manager Medtronic Bakken Research Center	**Communication strategies for brain interfacing**
9:30	Keynote Speaker **Prof. Dr. Degoulet, MD** Professor of Medical Informatics at Paris Descartes University	**Clinical Information Systems: the thin line between success and failure** Clinical Information Systems have to pass through several steps to become meaningfully used at an institution or regional level. Taking the different points of view of health professionals, deciders or patients, different aspects of the success or failure of a clinical information system will be discussed and the major risk factors considered. Useful experience acquired from 2000 to 2010 at the Pompidou University Hospital in Paris will serve as a guideline to illustrate the permanent challenge of computerizing clinical practice.
10:15	Coffee Break	
10:30	Invited Speaker **Prof. Dr. Christian Enz** CSEM Vice President, Integrated and Wireless Systems	**Ultralow-power MEMS-based Radio for WBAN** The recent advances made in MEMS and particularly in RF MEMS technology are enabling new architectures for the integration of RF transceivers with much reduced power consumption and smaller size. Several fundamental building blocks benefit from the availability of high-Q resonators, namely in the RF front-end, the analog baseband, the frequency synthesizer and the power amplifier in order to lower power consumption, phase noise and die area. In addition, the miniaturization challenge can be addressed by the combination of a system-on-chip (SoC) and system-in-package (SiP) approach to include the few unavoidable off-chip components to form an ultra compact transceiver module. We will present the recent work made at CSEM in the field of ultralow-power transceiver for wireless sensor and body area network applications. It first presents the high-Q resonators, including the BAW resonators used in the RF front-end, the RF oscillator and in the power amplifier together with MEMS used in the low frequency oscillators. We will then look at different possible transceiver architectures that take advantage of the MEMS high-Q and circumvent their drawbacks, such as their poor frequency tunability. We will then focus on some of the main building blocks that can take advantage of high-Q resonators including the RF front-end, the RF oscillator and the power amplifier, highlighting the basic trade-offs. We will then conclude with some future perspectives on MEMS-based radio and WBAN.

11:15	Invited Speaker **Prof. Dr. Kohno** Division of Physics Yokohama National University and NICT, Japan	**Dependable Wireless for Medicine and Other Reliable Systems**
12:00	Lunch	
13:30	Sessions 5 **Chair : Prof. Shinsuke Hara** Osaka City Univ., Japan	Wireless BAN Technology
	Wayne Burleson Professor, Electrical and Computer Engineering, University of Massachusetts, Amherst, USA	**Physical Layer Security and Privacy with UWB** *(INVITED)*
	Igor Dotlic, Ryuji Kohno	**Preamble Structure and Synchronization for IEEE 802.15.6 Impulse--Radio Ultra--Wideband Physical Layer**
	Haruka Suzuki, Ryuji Kohno	**Performance Analysis of Hybrid ARQ Error-Controlling Scheme for UWB BAN**
	Stephane Mebaley Ekome, Genevieve Baudoin, Jean Schwoerer, Martine Villegas Universite Paris-Est and Orange Labs, France	**Short Integration Time for Inter-Pulse Interference Mitigation in UWB Communications**
	Marco Hernandez, Ryuji Kohno	**UWB on-Off Waveform Coded Modulation for Body Area Networks**
13:30	Session 7 **Chair: Prof. Dr. Enrico Staderini, MD** HEIG-VD, Switzerland	Medical Imaging and Patient Diagnostic System
	Art Astrin Chair IEEE802.15.6 Body Area Networks, USA	**BAN and future patient diagnostic systems** *(INVITED)*
	Gozen Koklu, Sandro Carrara, Yusuf Leblebici	**A Switched Capacitor Fully Differential Correlated Double Sampling Circuit for CMOS Image Sensors**
	Tsu-Wang Shen, Yue-Loong Hsin, Tomor Harnod	**Using Fuzzy C-Means Index Matrix to Depict for the Focal Cortical Dysplasia Region on Brain MRI Images**
	Etienne Lareau, Guillaume Simard, Frederic Lesage, Dang Nguyen	**Near Infrared Spectrometer Combined with Multichannel EEG for Functional Brain Imaging**
	Allen Huang, Bernard Segal	**A literature review of the safety of medical body area network devices in magnetic resonance imaging.**

15:45	**Session 6** **Chair: Prof. Volker M. Koch** Bern University of Applied Sciences, Germany	**Telemonitoring, Wireless Healthcare and Homecare**
	Olaf Schleusing, Ph. Renevey, M. Bertschi, St. Dasen, J.-M. Koller	**Monitoring physiological and behavioral signals to detect mood changes of bipolar patients**
	Masoud Roham, Enrique Saldivar, Srinivas Raghavan, Mark Zurcher	**A Mobile Wearable Wireless Fetal Heart Monitoring System**
	Tony Bacchillone, Massimiliano Donati, Sergio Saponara	**A Flexible Home Gateway System for telecare of Patients Affected by Chronic Heart Failure**
	Theodoros Katsaras, Alexios Milsis, Aggelos Vontetsianos	**The Use of the Healthwear-Wearable System in Chronic Patients-Early Hospital Discharge**
	Shiori Suzuki, Takehiro Yokoishi, Hisakazu Hada, Jin Mitsugi	**Bidirectional Medication Support System for Medical Staff and Home Care Patients**
15:45	**Session 8** **Chairs: Allen R Huang** McGill University Health Centre & McGill University, Canada **Dr. Jean Luprano** CSEM SA, Switzerland	**Medical and Diagnostic Systems, Rehabilitation and eHealth**
	Sasiluk Junhom, Wudhichai Assawinchaichote	**A Design of H_infinity Fuzzy Controller for HIV/Aids Infection System with Dual Drug Dosages**
	Kenji Hashiodani, Tatsuya Onoue, Shinichi Takada, Yohei Fukumizu	**Biosignals Separation Method for Medical Diagnostic System**
	Juan Carlos Munz, Roberto Cassibba, Ruben Corrao, Favio Montane	**Identification of Chemical Elements Present in Daily Materials in Orthotics and Prosthetics**
	Enrico Maria Staderini, Stefano Mugnaini	**Personal vibrotactile Stimulator for the Rehabilitation of the Hand in Stroke and Parkinson Patients**
	Beatus Hofrichter MedTech Sector Lead, Deloitte Consulting AG	**Challenges & opportunities of innovation management in the MedTech Industry** *(INVITED)*
19:30	**Dinner speech with** **Dr. van Hoof** Head of Department of the Clinical Chemistry University Hospital Antwerp, Belgium **Banquet Dinner**	

Wednesday: 30 March

8:45	Keynote Speaker **Mr. Adrien Bron** Deputy Secretary General Health Department, Canton of Geneva	**The e-toile experience: from the eHealth vision to a political necessity**
9:30	Keynote Speaker **Mr. Adrian Schmid** Head of the Swiss Coordination Office for eHealth	**The Swiss eHealth Strategy – a model for international cooperation?** Building a Swiss framework for "eHealth" is confronted to many challenges that are similar to building a framework for Europe or worldwide. Switzerland is a federal republic of 26 cantons with 26 ministries of health that set their health laws. Therefore the strategy has to deal with many languages and cultures, many legal frameworks and political organizations, many different understandings. The "Swiss Coordination Office for eHealth", which has a mandate of the federal and cantonal authorities, has established a method to guarantee the coordination on the national level while respecting the needs an autonomy of each canton.
10:15	Coffee Break	
10:30	Nano-Tera Special Session **Chair: Prof. Dr. Giovanni De Micheli** EPFL/LSI	
	Project Leader: Giovanni De Micheli, EPFL/LSI Presented by **Sandro Carrara**, EPFL	**i-Ironic: Implantable/Wearable System for on-line Monitoring of Human Metabolic Conditions**
	Project Leader: Carlotta Guiducci, EPFL/IBI/CLSE Presented by **Carlotta Guiducci**	**IsyPeM: Intelligent Integrated Systems for Personalized Medicine**
	Project Leader: Peter Ryser, EPFL/STI/IMT/LPM2 Presented by: **Kamiar Aminian**, EPFL	**SimOs: Smart Implants for Orthopaedics Surgery**
	Project Leader: Gerhard Tröster, ETHZ/D-ITET/IFE Presented by: **Jean Luprano**, CSEM	**TecInTex: Technology Integration into Textiles: Empowering Health and Security**
	Project Leader: Alex Dommann, CSEM Presented by: **Nicolas Blanc**, CSEM	**Nexray: Network of integrated miniaturized X-ray systems operating in complex environments**

	Project Leader: Martinus Gijs, EPFL/LMS2 Presented by: **Martinus Gijs**	**NutriChip: A technological platform for nutrition analysis to promote healthy food**
	Project Leader: Harry Heinzelmann, CSEM Presented by: **André Meister**, CSEM	**PATLiSci: Probe Array Technology for Life Science Applications**
	Project Leader: Qiuting Huang, ETHZ/Integrated Systems Laboratory (IIS) Presented by: **Qiuting Huang**	**PlaCITus: Platform Circuit Technology Underlying Heterogeneous Nano and Tera Systems**
12:15	**Closing Speech by Chair**	
12:25	**Lunch**	