



WiserBAN – COST IC1004 Training School on “Wireless Body Area Networks”

June 4 - 6, 2012, Bologna, Italy

Università di Bologna

Giorgio Prodi Lecture Hall, Piazza San Giovanni in Monte 2

<http://www.complexosgm.unibo.it/ComplessoSGM/AulaProdi/default+english.htm>

This international Training School is jointly organized by the FP7 project Wiserban (www.wiserban.eu) and the Working Group on Body Communications of the COST Action IC1004 (www.ic1004.org).

The school will give an inter-disciplinary view of the technology trends in the field of Wireless Body Area Networks (WBANs) and their potential in supporting healthcare applications. Ten lectures will be given on aspects related to application requirements, radio components for WBANs, WBAN radio channel characterization and antenna design issues, PHY and MAC communication protocols for WBANs, and application use cases. Two lectures will be given by industry representatives (SORIN and Vitaever), two from international research centres (CEA-Leti, France, and NICT, Japan), the remaining from University researchers (EPFL, TUB, UNIBO). A demo of WBAN, currently developed within the WiserBAN project, will be shown on the third day.

Upon request, PhD students might be subject to evaluation in order to achieve a certificate to be used for getting credits at own University.

Steering Committee:

Chiara Buratti (WiserBAN)

Raffaele D’Errico (WiserBAN / COST IC1004)

Dionysios Manassis (WiserBAN)

Vincent Peiris (WiserBAN)

Roberto Verdone (COST IC1004)

Kamya Y. Yazdandoost (COST IC1004)

Registration Fee: 250 EUR

(Incl. coffee breaks, one dinner, CDs with lecture slides, possibly lunches depending on number of attendees)

Registration deadline: by May 21st via email at secretary@ic1004.org

Registration form: on IC1004 website: www.ic1004.org

Administrative organization: CNIT

Local organization: RadioNetworks, University of Bologna. Contact: g.bertozzi@unibo.it

School schedule and lectures’ details – see the rest of this document

Schedule

Day One – June 4

- 9.00 Welcome
- 9.30 – 11.00 *“WBAN Requirements and Implementation in Active Implantable Medical Device Systems”*
- 11.00 Coffee break
- 11.30 – 13.00 *“MEMS Based Radio Components in WBANs: Part 1 – Resonators and Oscillators”*
- 13.00 Lunch
- 14.30 – 16.00 *“MEMS Based Radio Components in WBANs: Part 2- MEMS Based Circuits”*
- 16.00 Coffee break
- 16.30 – 18.00 *“Advanced Packaging Technologies for Heterogeneous Components Integration”*

Day Two – June 5

- 9.00 – 10.30 *“BAN Antennas “*
- 10.30 Coffee break
- 11.00 – 12.30 *“BAN Channel”*
- 12.30 Lunch
- 14.00 – 15.30 *“Short Range Communication Schemes for BANs”*
- 15.30 Coffee break
- 16.00 – 17.30 *“MAC Layer: Standard Solutions, WiserBAN Solution”*

Day Three – June 6

- 9.00 – 10.30 *“Toward Energy-Neutral Body Area Networks”*
- 10.30 Coffee break
- 11.00 – 12.30 *“BAN Applications for Elderly People”*
- 10.30 – 13.00 *“WBAN Demo”*
- 13.00 Closure

Lectures' Details

“WBAN requirements and implementation in active implantable medical device systems”

Dr. Renzo Dal Molin (SORIN, France)

Abstract: This lecture will be provided by the end users (or some of them) of the WiserBAN project. The aim is to provide details about the WiserBAN use cases, their requirements, characteristics, and novelty.

“MEMS-based Radio Components in WBANs: Part 1 – Resonators and Oscillators”

Prof Christian Enz (EPFL and CSEM, Switzerland)

Abstract: This lecture will be about understanding the potential of using high-Q MEMS resonators in a radio transceiver, highlighting the main features of high-Q MEMS resonators like BAW resonators and filters and Silicon Resonators. The implications on the design of oscillators, which are key components for radios, will also be discussed.

“MEMS-based Radio Components in WBANs: Part 2 – MEMS-based circuits”

Prof Christian Enz (EPFL and CSEM, Switzerland)

Abstract: This lecture will provide an overview of different possible transceiver architectures that take advantage of the MEMS high-Q and circumvent their drawbacks, such as their poor frequency tenability, overview of critical radio MEMS-based circuits, and future perspectives for MEMS-based radio and WBAN.

“Advanced packaging technologies for heterogeneous components integration”

Dr. Dionysios Manassis (TUB, Germany)

Abstract: The increasing demand for miniaturised electronic systems has sparked the development of system-in-packages where components with heterogeneous functionalities can be integrated in small packages with autonomous system functionality. Active and passive chip components, MEMS devices are assembled on thin copper layer and then are embedded in thin epoxy-resin layers in 18”x24” large panels for the creation of flat and thin SiPs which can be further assembled on PCBs. In this way, the package form factor has been decreased, economies-of-scale can be achieved due to large scale manufacturing capability, and extra PCB space has become free since many components are embedded. The lecture will highlight the advantages of embedding technologies as a vehicle for SiP miniaturisation not only for WBAN applications but for a number of other industrial applications. Advanced assembly packaging technologies will be elaborated and technology roadmaps will be in detail discussed.

“BAN Antennas”

Dr. Kamya Y. Yazdandoost (NICT, Japan), Dr. Raffaele D’Errico (CEA-Leti, France)

Abstract: This lecture will address the topic of antenna design and characterization for BANs. The lecture will explain the main effects of antenna-body interaction, like impedance mismatch, radiation pattern degradation, etc.. An insight on some techniques to reduce the impact of the body on antenna performance will be given, as well as some examples of small antenna design for BANs.

“BAN Channel” -

Dr. Raffaele D’Errico (CEA-Leti, France), Dr. Kamya Y. Yazdandoost (NICT, Japan)

Abstract: This lecture will address the topic of radio channel modeling in BANs. The lecture will focus on the main features of the BAN channels, such as path loss according to the considered link, shadowing and antenna effects on the transmission channel. Some channel models (IEEE 802.15.6, COST, etc.) in the main frequency bands of interest, for example, 2.4 GHz and UWB, will be presented.

“Short Range communication schemes for BANs”

Prof. Davide Dardari (UNIBO, University of Bologna)

Abstract: This lecture will introduce the design criteria and performance characterization of energy efficient short-range communication schemes for BAN applications with reference to existing and under definition standards, such as IEEE802.15.6, IEEE802.15.4/a, and IEEE802.15.4f. In addition, some advanced approaches currently under study (e.g., UWB, passive communications, etc.) and their potential benefits in terms of energy consumption and added functionalities will be illustrated.

“MAC Layer: Standard solutions, WiserBAN solution”

Dr. Chiara Buratti (UNIBO, Italy)

Abstract: The lecture will continue with the overview on the protocol stack, considering the MAC and upper layers. An overview of the solutions made available by the different standards, suitable for WBANs will be provided. Finally, the WiserBAN upper layers protocols will be described, showing some numerical results.

“Toward Energy-Neutral Body Area Networks”

Prof. Luca Benini (UNIBO, Italy)

Abstract: Energy neutrality (sometimes called energy sustainability) is a grand challenge in the field of wireless sensing in general, and body area sensing, in particular, as it would enable a large number of applications where the presence of batteries and/or energy-limited network lifetime are major obstacles. In this talk I will survey recent advances in energy harvesting technologies and related energy management strategies which clearly demonstrate that energy neutrality is now at reach for many application domains. I will conclude with an outlook, focusing on promising technologies which could help addressing the energy neutrality challenge in the context of body-area wireless sensing.

“BAN applications for elderly people”

Dr. Laura Contin (Telecom Italia, Italy)

Abstract: The marked and continuous increase in life expectancy will determine an increase of demand for healthcare and represent a challenge in societies with decreasing resources and smaller workforces. This lecture will discuss the opportunities provided by BAN, and more in general by WSN, to enhance the life quality of elderly people, while keeping the health systems sustainable. Examples of solutions developed by the Department “Research&Prototyping” of Telecom Italia for activity monitoring, remote rehabilitation and ambient assisted living will be presented.

“WBAN Demo”

Dr. Chiara Buratti and Riccardo Cavallari (UNIBO, Italy)

Abstract: A demo will close the school. This demo will be based on the benchmark platform that will be developed in the framework of Task 5.3 of WiserBAN in the next months. This demo will show the communication between four devices, that will emulate the four WiserBAN use cases, and a device outside the body, that will emulate the remote control. A star topology will be formed and devices will generate data to be received by the remote control, connected to a PC. The Texas Instruments platform, implementing one of the PHY and MAC layers defined within the project, will be used.