Facultad de Informática
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# ANUNCIO DE CONFERENCIA

# Towards Smart and Energy-Aware Design of Wireless Body Sensor Networks for Personal Health Monitoring

Dra. Nadia Khaled

Robotic Systems Laboratory (LSRO1), Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland.

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## resumen:

Recent advances in microelectronics have gone a long way towards the miniaturization and power efficiency of processing elements, radio transceivers and sensing elements of a large array of physiological phenomena. It has thus become plausible to realize the low cost, low power, miniaturized, yet, smart sensor nodes needed to enable wearable personal health monitoring systems. These sensor nodes should be able to sense various physiological quantities, process and communicate sensor data with on-body or remote base stations. They should also be able to organize in a wireless body-area sensor network (WBSN) to achieve an integrated monitoring capability. The inherent resource-constrained nature of these systems, coupled with the harsh operating conditions and stringent autonomy requirements, pose important design challenges. And, although several sensor platforms have been recently proposed to address some of these challenges, much remains to be done in terms of functionality, power efficiency and miniaturization.
This talk reviews the state-of-the-art of WBSN platforms for personal health monitoring systems, and discusses their main design challenges. In particular, it highlights the unsustainable energy cost incurred by the straightforward wireless streaming of raw sensor data. To achieve the extended autonomy required by ambulatory monitoring, we advocate enabling more embedded intelligence onboard these sensors. To illustrate the effectiveness of this approach, we then focus on electrocardiogram (ECG) monitoring applications. After analyzing the requirements of these applications in terms of wireless communications and local signal processing, we discuss recent advances in efficient mapping of ECG signal processing algorithms on a state-of-the-art sensor node, namely, the SHIMMER node. These algorithms range from simple heart rate estimation to advanced compression and feature extraction. We then show that such advanced embedded intelligence actually translates into a reduction in the node's energy consumption, and accordingly into an extension of its battery lifetime.

## sobre Nadia Khaled:

**Nadia Khaled** received the M.Sc. degree in electrical engineering from ENSEEIHT, Toulouse, France, in 2000, and the Ph. D. in applied sciences from the Katholieke Universiteit Leuven, Belgium, in 2005. From 2000 to 2005, she was with the wireless research group of the Interuniversity Microelectronics Center (IMEC), Leuven, Belgium. From 2005 to 2006, she was a postdoctoral researcher at ETH Zurich, Switzerland. Since 2006, she has been a postdoctoral researcher at EPFL, and has held the position of visiting assistant professor at the University of Carlos III Madrid (UC3M) from 2006 to 2009. As of January 2010, Nadia is leading a joint NESTLE-EPFL project on non-intrusive, intelligent and wearable sensors to help monitoring the health, well-being and nutrition of the elderly.