

Poster Abstract: Biomedical WSN application based on dynamic configuration

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Abstract—The fast technological growth in the physiological sensors, the integrated circuits with weak consumption and the wireless communication allowed a new generation of wireless sensor network (WSN). Biomedical applications based on this WSN provide a huge potential for the remote control and monitoring of patients health. Furthermore, the increasing number of measurable physiological parameters provokes a complexity, variety and enormous number of devices that must be deployed in the body. This framework aims to give a solution for the configuration of Body Sensor Network (BSN) in response of these challenges.

Keywords—WSN, BSN, Network, Configuration

I. INTRODUCTION

Unlike the technology based on the wired communication, the WSN have a less cost [1], denser deployment, free, mobility, and flexibility infrastructure with easy maintenance. These features offer great performances for the biomedical applications. In other hand, the body sensor network presents the main clause of the biomedical structure. For this reason, we look to develop a biomedical wireless sensor network project (BWSN) based on dynamic configuration of BSN. The management of the network and the results obtained are given in this framework.

II. DESCRIPTION

The Telosb [2] motes are used to collect and transmit data from the BSN to the base station. The set of deployed devices

use Zigbee standard for communication which are characterized by low power consumption and low data rate [3]. These features present an impediment against the requirement of the biomedical applications [4]. For this reason, the management of the network can improve the efficiency, reliability and optimize the operation of the application.

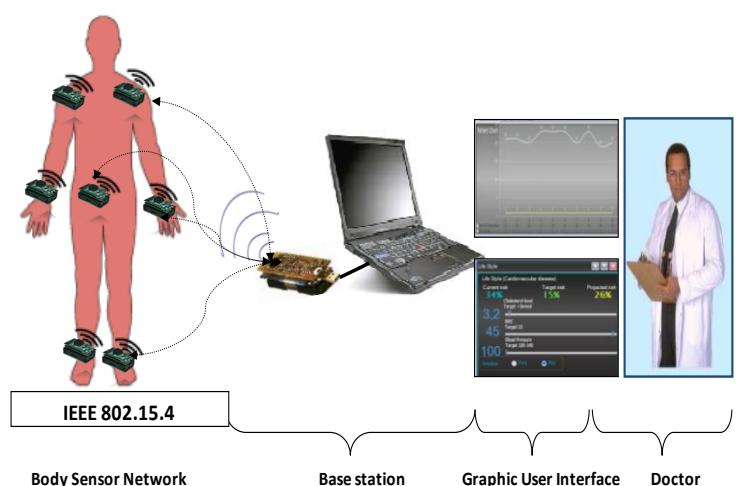


Fig 1. Structure of biomedical application

III. IMPLEMENTATION

In this phase, we used the TinyOS [5] operation system with NesC [6] language. Furthermore, we used NetBeans IDE 6.7 with java language in Spine [7] framework for the design of WSN application based on star topology.

A. Implementation Of Nodes

Each node contains a unique ID. The implementation of this mote must return the data collected from the sensor. This data transmitted to the base station to be transferred to the PC where the doctor can monitor the evolution of the physiological parameters. To do that, we use TinyOS and NesC language. For the sensors related to the node, we utilize the predefined libraries. But, for the specific devices (EKG, Blood presser, etc.) we must custom the libraries and the codes to operate the sensor.

B. Implementation Of Base Station

The set of data collected from the nodes must be aggregated and transferred to the PC. Each data can be transmitted in one or more channels.

C. Management Of BSN

In the hospital, many parameters of many patients can be supervised and controlled. For this reason, it appears very important to manage the network to improve these capabilities:

- Minimize energy consumption
- Minimize data rate
- Scan the network
- Analyze the data
- Make easy diagnosis of network
- Improve reliability
- Dynamic reconfiguration

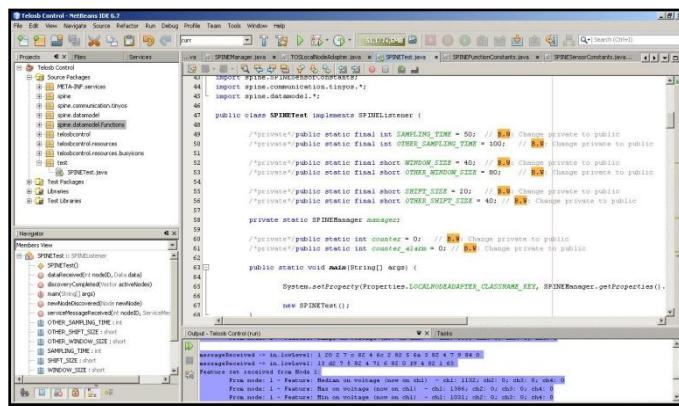


Fig 2. Interface API based on java (NetBeans)

IV. RESULTS

To avoid the constraints of biomedical applications (huge number of patients, complexity of the network, etc.), our work consists of developing a dynamic configuration of the network (add or delete node, detect or replace existing node, etc.).

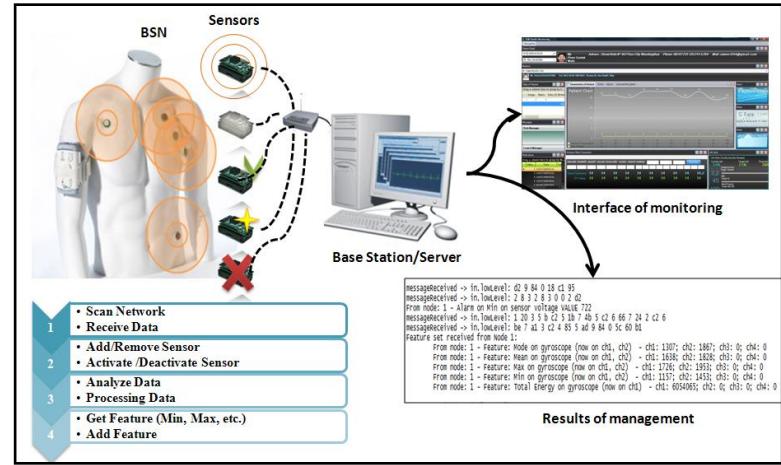


Fig 3. Dynamic configuration

Depending of the patient situation (case of risk or normal situation), the network change configuration to improve the capabilities of application.

V. CONCLUSION

The main objective of this poster is to study the importance of the dynamic configuration in biomedical applications and its effects on the performance of the network.

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REFERENCES

- [1] Yang Xiao, Hui Chen. *Mobile Telemedicine A Computing and Networking Perspective* Taylor & Francis Group, LLC p10, 2008.
- [2] Crossbow website, <http://www.xbow.com/Products/>
- [3] ZigBee Alliance. *ZigBee Specification*, 2005.
- [4] Miaomiao Wang, Jiannong Cao, Miao Liu, Bo Chen, Youlin Xu, Jing Li. *Design and implementation of distributed algorithms for WSN-based structural health monitoring*, 2009.
- [5] <http://www.techno-science.net/>
- [6] Bouillaguet, Mathieu Valero Mathieu. *OS pour réseaux de capteurs TinyOS et Zigbee*, p13
- [7] Official Spine website, <http://spine.tilab.com/>