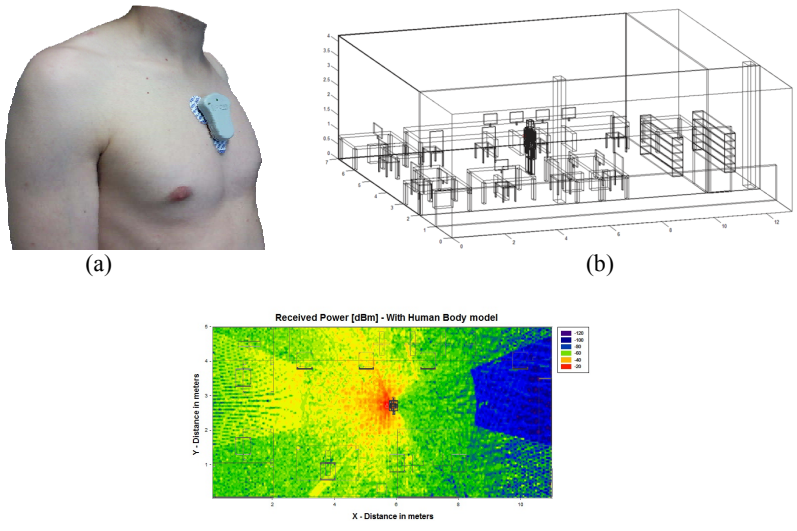
Analysis of AECG Monitoring Wireless Channel Performance in Indoor Environments.

Santiago Led[(1)], Leire Azpilicueta[(1)], Erik Aguirre[(1)], Miguel Martínez de Espronceda[(1)], Luis Serrano[(1)] and Francisco Falcone[(1)]
(1) Electrical and Electronic Engineering Dept., Universidad Pública de Navarra, Spain, http://csm.unavarra.es

Monitoring health constants by means of wireless systems is becoming a widely adopted tool in order to increase cost efficiency of health services as well as to enhance the quality of living of patients. These systems, usually based on a set of sensors coupled to a transceiver, must be capable of periodically record the signal, provide a certain capacity to temporarily store the signal, be ergonomic and exhibit low power consumption. These requirements lead to the use of low transmit power devices (i.e., IEEE 802.15 based devices) and conformable antennas, with moderate radiation gain and efficiency. Moreover, such devices have to operate in contact with the patient and usually within an indoor environment, leading to highly variable losses as a function of sensor location. In this work, the analysis of the performance of an Automated Electrocardiogram (AECG) device implemented within the Universidad Publica de Navarra in a complex indoor environment is presented. The AECG monitor, which employs a Bluetooth transceiver, is tested under several physical locations and the wireless channel behavior has been estimated with the use of in-house implemented 3D Ray Launching code. A complex indoor environment as well as a simplified human body model, with dispersive material consideration (following a Cole-Cole model) has been implemented in order to consider the combined effect in the operation of the AECG monitor. The results show the variability of the received power levels as a function of patient location in the indoor scenario as well as of the device location within the patient body. The combined AECG monitor-patient-scenario analysis is a useful tool for adequate device design as well as indoor radioplanning coverage estimation.



(a) (b) (c)

Figure 1: a) Implemented AECG monitor, b) Implemented indoor simulation scenario and human body model employed, c) Estimation of received power level for one of the considered locations within the scenario.