Body-Centric Antennas for Wireless Cardiac Monitoring

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Continuous monitoring of the cardiac signals is vital to diagnose and treat the cardiac related problems. Traditional monitoring systems are extremely uncomfortable and adversely affect the quality of lives of patients. Cardiac care based on an *out-patient* setup through the wireless cellular or internet network is the key to improve the current cardiac monitoring systems. Monitoring the cardiac data of the patient from the cardiologist office and designing a system with wireless electrodes not only provides better conditions for patients but also reduces the medical costs. An important component of a wireless cardiac monitoring system is the body-centric antennas mounted on the patient's body. These antennas are indented to provide the communication between the sensors and an external data storage unit. However, there are several challenges in the design of such antennas. The antennas have to be small enough to be mounted on the body and have sufficient gain to transmit data to the required distance. In addition, the mutual coupling between the antennas should be minimized to ensure a reliable data transmission.

In this study, our goal is investigating the mutual coupling between antennas mounted on a human torso (see figure 1.). To do so, a small size microstrip patch antenna operating at ISM (Industrial Scientific Medical) band (2.40-2.48) is designed using particle swarm optimization in combination with finite element boundary integral solver. The human torso is approximated by a three layer skin-fat-muscle model. The results regarding the individual antenna return loss as well as the mutual coupling between the antennas will be presented.

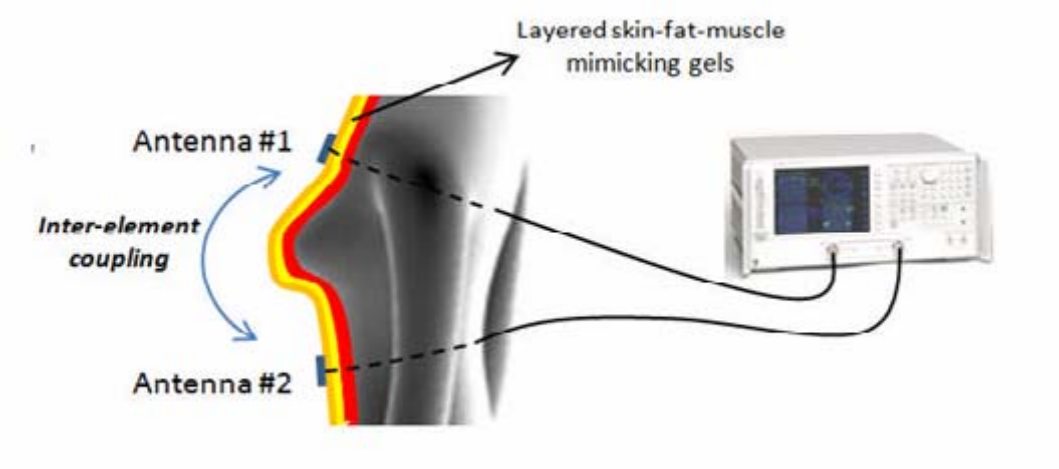

Figure 1. Female torso coated with skin-fat-muscle mimicking gels for in vitro testing of the body-centric antennas.