An Implantable Microstrip Antenna: Near Field and SAR Distribution

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Wireless technology has been increasingly researched for medical applications. The benefits of this application, such as in medical telemetry, for example, can be use to monitor patients vitals, i.e., blood glucose, blood levels, body temperature, cardiac signals, etc. over a distance via radio-frequency (see Figure 1). This technology will not only bring complete mobility and comfort to the patient but also a higher level of patient care. It illustrates promising potential due to the design of its main component, the implantable antenna. Wireless technology has been greatly comprehended in the telecommunication systems but their application in inhuman medical systems (implantable devices) brings up some distinctive challenges. Some of the issues involved in-body systems are heating of the surrounding tissue and the power consumption it takes to operate the implantable device. The antenna used for the implantable device should be able to radiate outside the body and yet the power associated with the device must comply with the radiation requirements. Increased power levels might cause heating of the tissue and consequently permanent tissue damage.

In this study, we consider a microstrip antenna designed for the 402-405 MHz Medical Implant Communications Service band (MICS). The antenna is embedded in the forearm and simulations are carried out. Results regarding the antenna return loss, gain, near and far fields will be presented for a variety of antenna locations. The data regarding near field and specific absorption rate (SAR) distribution will be assessed. The purpose of this study is to design of an optimum implantable device to be used in the wireless data telemetry.

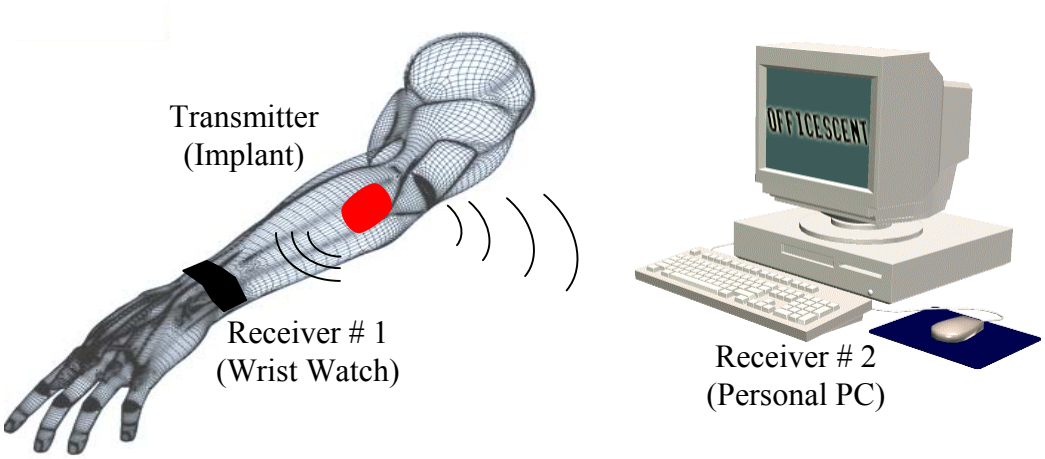

Figure 1. Wireless Data Telemetry System