Antenna Design and Measurement
for Real Time Urination Detection System using RFID Technology

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Recently, the declining birthrate and the aging population have become serious problems in Japan, as in many developed countries around the world. As the result the work load of the nurses and doctors has become heavier. In order to provide a comfortable healthcare environment for the elderly patients and improve the quality of medical support, it is very important to build a system to alert the medical personnel when diapers of each patient need to be changed.

In this study, a real time urination detection system by RFID technology is suggested. In this system, the tag embedded into each diaper worn by a care-receiver and some reader antennas are set at the bottom of a mattress pad. In the dry diaper, the tag can communicate with the reader. However, in the wet diaper, the tag cannot communicate, because the characteristics of tag antenna are changed by urination. Thus, urination can be detected by whether the tag communicates with the reader or not.

In order to realize this system, antennas play an important role. So, the tag antenna and the reader antenna are designed by numerical calculations. As the calculated results, these antennas are good impedance matching at 950 MHz in the dry diaper. In addition, the tag and the reader antenna were fabricated. Moreover, the communication area on the mattress pad was measured in a real situation. The measured result is shown in Fig. 1. The communication area consists of the dots in Fig. 1. From this result, if some reader antennas are set at the bottom of the mattress pad, the presented system can detect urination.

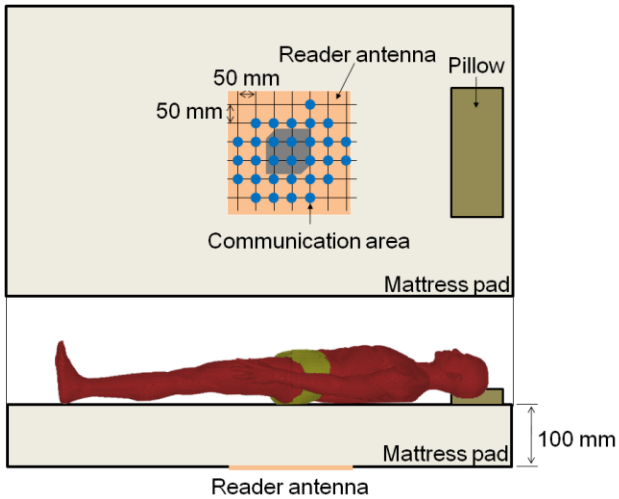

Fig. 1 Communication area and position of reader antenna