National Institute of Technology Rourkela

Synopsis Seminar

Seminar Title	: CHIPLESS RFID SENSORS FOR THE APPLICATIONS OF BIOMEDICAL IMPLANTS
Speaker	: Priyabrata Sethy (Rollno : 519ec1012)
Supervisor	: Santanu Kumar Behera
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Abstract	: In the present era, biological implants have the capability to enhance the precision of clinical diagnoses, leading to a growing demand for reliable on-body sensor technologies and the radio telemetry required for data collection. At the very least, an in-body sensor must be paired with a power source and an antenna. In this context, chipless RFID standout as the most versatile system for sensor and in-body implant applications RFID Sensors are a substantial part of today&rsquos sophisticated, multifaceted systems. Recent advances in wireless sensor networks have paved the way for combining sensor and sensing technologies with RFID systems. In addition to automatic object identification, RFID technology can monitor and share information about the surrounding environment by using sensor-enabled tags. An object that simultaneously provides its own condition and identification simplifies the total infrastructure and enhances the quality of information. This dissertation explores the feasibility of utilizing chipless planar microstrip resonators in the physical layer of a chipless RFID sensor system. To minimize the cost of passive tags sensor, it is essential to enhance the coding capacity of resonator-based tags while keeping their overall size compact. Additionally, an inexpensive substrate must be used, ensuring that the control structures do not negatively impact system performance. The primary objective of this research is to design and validate different types of RFID sensor and their potential application in sensing several environment parameters along with the biological parameters for bio-implants. Compact passive RFID sensors are the most cost-effective IoT devices used for several environmental as well as medical applications. Several multibit tags have been designed to verify the range operation based on their physical structure. A physical foot print of 45 × 25 × 1.6 mm3 is designed inspired by the shape of a Wi-Fi symbol and convolutional encoding and Viterbi decoding techniques areused to encode the transmitted data and Viterbi decoding is used to decode the received data. The bit error rate is also calculated to validate its performance. The data coding capacity is analyzed using this technique. A convex octagonal tag is proposed having ISM band of frequency along with a low cost monopole antenna reader having frequency range of 1.9 to 6 GHz. The equivalent circuit model of the tag is proposed to validate the design with the lumped element. The smart material like graphene and Kapton are the used to enhance the sensor characteristics. A 300 MHz of frequency shift is obtained A seven-bit smart material based chipless RFID sensors are utilized to measure the environment parameters like moisture and temperature along with the bio-medical implant applications. A frequency follower tag is also proposed to verify the sensing and ID bit for a secure sensing applications.