

Preface

With the advent of Radio Frequency Identification (RFID) technology as a contactless identification technique, more attention has been drawn to the application of RFID in a variety of commercial areas such as access management, tracking of goods and animals, toll collection, contactless payment, and so on. This has driven a huge motivation within different research and industrial groups to propose a variety of techniques to realize contactless identification. Chipless RFID is one of the current proposed candidates which can compete with the traditional barcode in terms of cost and ease of fabrication. Recently, many efforts have been made to improve the design of printable and compact chipless RFID tags and the identification techniques. In spite of the many conferences and seminars held on chipless RFID tags and many publications introduced by researchers in literature, there is a need for a reference book which covers both the tag design and detection techniques applicable in practical chipless RFID systems. The goal of this book is to provide the theoretical basis and practical techniques to design and analyze chipless RFID systems. The material presented in this book will help researchers and engineers to understand the design methodology and detection techniques based on rigorous mathematical formulation.

In contrast to conventional RFID tags, the chipless RFID tags do not carry any electronic circuitry in their structure to handle a communications protocol. This makes the chipless RFID tag a fully electromagnetic scatterer and encoder. The advantage of using this technology is the simplicity of the tag manufacturing process. Using conductive ink, a conventional inkjet printer can print the tag pattern directly onto a package or item. On the other hand, the detection technique could be especially challenging in an environment containing noise, clutter, and multiple multi-bit tags. Part of this book has been devoted to the transient scattering analysis which is beneficial both for the design methodology and the detection procedure. Employing transient scattering analysis, an efficient and effective anti-collision algorithm is developed for tag detection in the case with multiple multi-bit tags in the reader range.

Although this book has been prepared as a reference on chipless RFID systems, it can be useful in other electromagnetic-based detection scenarios such as ground penetrating radar (GPR), target identification, resonant-based detection of breast cancer, human identification, biometrics, and chipless sensors.

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Chipless RFID

Design Procedure and Detection Techniques

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