

CHAPTER 25

INFORMATICS AND COMMUNICATION

Doctoral Theses

01. BIRWAL (Amit)
Design and Development of Compact Antennas for Internet of Things (IoT) based Systems.
Supervisors : Dr. Sanjeev Singh and Prof. Binod K. Kanaujia
Th 25513

Abstract
(Verified)

The main objective of the thesis is to design and develop compact antennas for Internet of Things (IoT) based Systems. There are many antenna designs possible for IoT systems such as wire antenna, whip antenna, chip antenna, printed circuit board (PCB) antenna, external antenna, antenna array etc. One of the key requirements for such antenna is that the design should be compact and light weight and this objective can be met by using planar transmission lines. In this thesis, many microstrip line based external antenna is investigated and their integration with suitable electronic devices is also explored. All the proposed antennas and their optimization are conducted using finite element method (FEM) based commercial software, CST Microwave Studio. Initially a brief overview of planar transmission lines followed by designing planar antennas for few applications such as wireless local area network (WLAN), wearables, mobile communication and Bluetooth is discussed along with miniaturization techniques used in these antennas. The circular polarized (CP) antenna suitable for numerous wireless technologies has found many IoT applications. In view of this, two CP antennas is presented, first a coplanar waveguide (CPW)-fed wide slot antenna with circular polarization and wide impedance bandwidth for GPS applications. Secondly, a planar CPW-fed dual port CP antenna with ultra-wide band (UWB) response is presented for polarization diversity application. Furthermore, to demonstrate multi-input-multi-output (MIMO) technology, two MIMO antenna design is presented to be used for IoT applications as wireless access point (AP). All the antennas are fabricated on FR-4 substrate and measured results are found in close proximity with the simulated results. In another extension, the design of frequency selective surface (FSS) is presented, for applications such as antenna gain enhancement etc. Finally, the final part of the thesis covers an overview of the research investigation summary and conclusions drawn from it.

Contents

1. Introduction: internet of things (IoT) based systems 2. Antenna requirement for IoT based systems 3. Planar antenna design technology 4. Antenna design for different use cases 5. Circular polarized (CP) antenna for IoT application 6. Mimo antenna for IoT application 7. Frequency selective surface for IoT applications 8. Conclusion future scope of work. Bibliography

02. SUNIL KUMAR

Development of New Cryptographic Systems Using Diffusion Models Based on Intertwining Logistic Map, Coupled Map Lattice and Brownian Motion.

Supervisor : Dr. Sanjeev Singh

Th 25512*Abstract
(Verified)*

Due to extensive increase in number of internet users, huge information is generated and shared over the communication network in the form of images, texts, audio, videos. Hence the security become major issue that is needed to tackle. In literature, it is pointout that existing chaos based cryptographic systems lacks in one or other features that are needed to develop an ideal cryptographic system. It maybe due to the inappropriate choice of chaotic dynamical system or control parameters that are used to develop cryptographic system. Chaos based dynamical systems are used in the processes of cryptographic systems like confusion and diffusion, shuffling and key scheming. Each of these processes are affected by inappropriate choice of control parameter or poor selection of chaotic system. Architecture or design of some cryptographic systems also limits the performance of the systems.

Contents

1. Introduction 2. Performance comparison of chaotic systems with the proposed encryption algorithm 3. A secured cryptographic model using intertwining logistic map 4. Coupled map lattice based cryptographic model for image security 5. Cryptographic model based on Brownian motion 6. Conclusion and future scope. Bibliography.