Preface

The main objective of this book is to present wearable system and flexible compact antennas for wireless sensor network and energy harvesting applications. The anticipated book is providing deep introduction about wearable body area network, which has been utilized in telemedicine, which will be definitely helpful for the society. There are several 3D full wave EM software such as IE3D, CST, ADS, and HFSS, which are utilized to design flexible wearable antennas. The flexible wearable antennas design in this book was simulated using IE3D and CST software. Jeans are flexible material that is used to make receiver and transmitter of wearable antenna, which play most important technological role for mankind.

In the present decade most of the electronic devices are consuming low power and this power is supplied by means of batteries .However these batteries are rechargeable ones but powering them is a difficult task. Even though power consumption is low only solar cells could power them, no other sources provide a great deal of energy. On the other side energy harvesting will provide the better solution to powering the wearable electronics and wireless sensors. Radio Frequency harvesting technique of energy conversion has assumed great importance during the last few decades because of excellent flexible materials have been developed.

Chapter 1 describes a 'ला' shape antenna for high frequencies is designed which has been simulated under CST Software using Copper material i.e. FR-4. The dielectric constant of this material is 4.3. The return loss of 'ला' shaped antenna is -28 dB at 6.774 Giga-Hertz and -19 dB at 7.7 Giga-Hertz resonant frequencies.

Chapter 2 describes the hammer shaped textile antenna having large bandwidth, which is used in wide band applications. The model of antenna is simulated in CST software. The optimization of anticipated antenna has been studied in this chapter.

Chapter 3 reports a hybrid wearable energy harvesting system. Integration of microwave antenna on thin film amorphous silicon solar cell creates a hybrid system which can harvest both the solar and microwave energies.

In this Chapter 4, dual wideband textile antenna is proposed for WLAN and WiMax application. Textile Antennas are invaluable as a result of their compelling cost and straightforward acknowledgment process.

Chapter 5 proposed triple band novel geometry & enhanced characteristics of flexible antenna. Textile Antenna is exceptionally invaluable due to their successful cost, small profile, low mass and basic acknowledgment process.

Chapter 6 explains the concept of energy harvesting and also its potential function in wireless system. This paper reports a hybrid wearable energy harvesting system. Integration of microwave antenna on thin film amorphous silicon solar cell creates a hybrid system which can harvest both the solar and microwave energies.

Chapter 7 describe multiband zigzag shaped microstrip patch antenna with cross Cut-set patch with defected ground structure has been designed, simulated, and tested for wireless applications.

Chapter 8 describes the concept of multilevel inverter with different conventional topologies with different pulse width modulation techniques and shows the comparison between the total harmonic distortions.

Chapter 9 describes Microstrip rhombus patch antenna, which contain many properties, includes, light weight, low profile, low cost, less volume and easy to install on rigid surface due to these properties it is easy to fabricate.

Chapter 10 describes, Slotted Wearable Antenna which is designed at frequency 2.4 GHz for wireless application and radiolocation. Proposed antenna is used for radiolocation through which detection of objects is possible using a tracking system of radio waves by analyzing the properties of received radio waves.

Chapter 11 describes the single element of wearable antenna is designed and further to enhance the gain of wearable rectenna array is designed. The anticipated antenna array shows the directivity of 8.048 dBi that was used to calculate received power by antenna array. This rectenna array can be used to operate the micro-electronic gadgets and to operate small sensors.

In Chapter 12, different textile materials have been discussed which are flexible in nature and light weight. E textile is one such wearable antenna where the sensors are integrated with the very fabric to be used by humans for various purposes and objectives Usage. of e-textiles in medical facility or at the times of disaster management etc makes it perhaps one of the most important wearable antennas because of the scale of purpose it aims to solve.

In Chapter 13 a relationship is developed between the theoretical inset feed distance and simulated coaxial feed distance of rectangular patch antenna. A ratio also has been developed between the inset feed distance and coaxial feed distance. By knowing one feed distance other feed distance can be easily determined. This relationship can help in simulation process of design a co-axial probe feed rectangular patch antenna.

As this book covers relatively wide areas and numerous contents connected to complex scientific issues, errors and omissions may be unavoidable due to the limited knowledge and competence of the authors, therefore we sincerely appreciate the criticism and comments from the readers. We feel confident it will be highly valued for its documentation of the important field of optimization of sensors and antennas for wearable device and its practical applications.

Vinod Kumar Singh
S. R. Group of Institutions Jhansi, India

Ratnesh Tiwari
Bhilai Institute of Technology, India

Vikas Dubey
Bhilai Institute of Technology, India

Zakir Ali
Bundelkhand University, India

Ashutosh Kumar Singh
Indian Institute of Information Technology Allahabad, India