INTERFACING ELECTRONIC FOR MEASUREMENT, SIGNAL PROCESSING AND WIRELESS COMMUNICATION

Edited by

Sheroz Khan, International Islamic University Malaysia

AHM Zahirul Alam, International Islamic University Malaysia

Anis Nurashikin Nordin, International Islamic University Malaysia

IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

INTERFACING ELECTRONIC FOR MEASUREMENT, SIGNAL PROCESSING AND WIRELESS COMMUNICATION

Edited by

Sheroz Khan, International Islamic University Malaysia

AHM Zahirul Alam, International Islamic University Malaysia

Anis Nurashikin Nordin, International Islamic University Malaysia

IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

Sheroz Khan, AHM Zahirul Alam & Anis Nurashikin Nordin: Interfacing Electronic for Measurement, Signal Processing and Wireless Communication.

ISBN: 978-967-418-171-0

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed By:
IIUM PRINTING SDN.BHD.
No. 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
Selangor Darul Ehsan
Tel: +603-6188 1542 / 44 / 45 Fax: +603-6188 1543
EMAIL: iiumprinting@yahoo.com

CONTENTS

Chapter 2

WIRELESS TRANSFER OF LOW-POWER TO IMPLANTED BIOMEDICAL DEVICES: INTRODUCTION AND 2-D COIL PARAMETERS

IMRAN M. KHAN, SHEROZ KHAN, OTHMAN O. KHALIFA

Recent advances in intelligent sensors, micro- and nano-scale electronics and low-power wireless communication have opened up the door for implantable biomedical sensors and devices that can be used continuous patient monitoring. The design of such for implanted sensors and devices is difficult due to several constraints on their operation. One of the primary challenges faced to supply power to the implanted sensors. Identified as a key open-issue, resolution of this problem is critical as it also impacts the complexity of an implanted device. Inductive coupling is by far the most preferred means of transferring energy to low power implanted devices. However, there are still many challenges associated with wireless energy transfer in this case, including the design and optimization of inductive coils, stable and efficient power rectification and design and use of modulators that transfer data back to the reader at low Bit Error Rate (BER). This chapter focuses on the topic of inductive coil design and gives individual treatment to 2-dimensional coil parameters that are relevant in regard to the issue of wireless transfer of power.

2.1. INTRODUCTION

The easiest and most convenient method of dealing with medical requirement of ailments requiring continuous patient monitoring is to provide patients with small portable devices. Some of these devices requires sensing of *in vivo* parameters such as body temperature, blood-sugar level and nerve action potential strength are to be implanted within the body. Furthermore, there is a recent trend in implanted devices to attempt building System-On-Chip (SoC) devices that provide all the functions of sensing and even responding in emergency situations that would otherwise need medical attention in an hospital. In such a device sensors threshold and output operate in a synchronized manner forming a complete coordinated system that is implanted within the body. The battery supply of an external portable device does not seem to be of serious concern; however supplying such an implantable device with required power will not only be costly but it will also be an inconvenient if surgical procedures are done merely to replace their batteries.