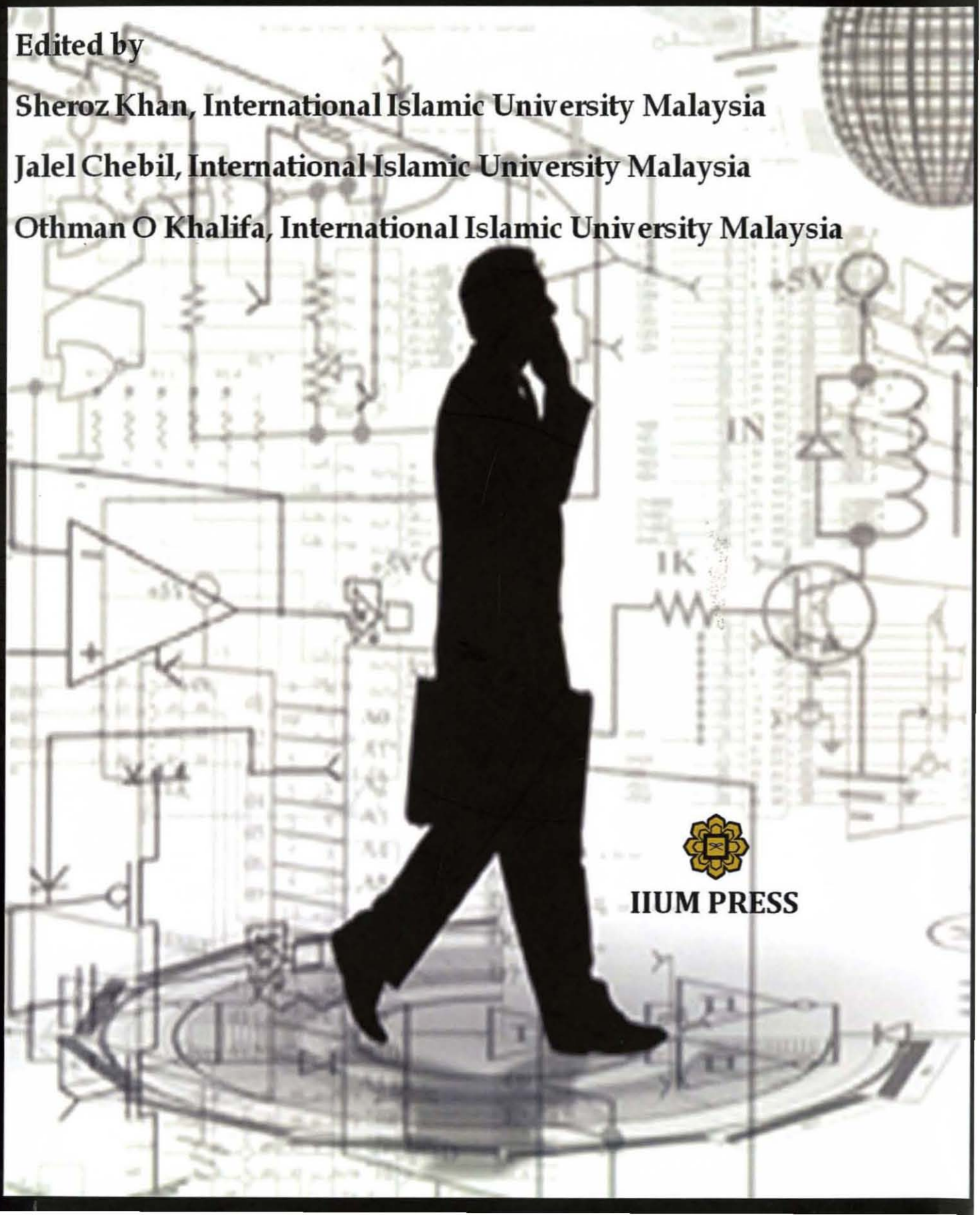
PRINCIPLES OF TRANSDUCER DEVICES AND COMPONENTS

Edited by

Sheroz Khan, International Islamic University Malaysia

Jalel Chebil, International Islamic University Malaysia

Othman O Khalifa, International Islamic University Malaysia



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Selangor Darul Ehsan
Tel: +603-6188 1542 / 44 / 45 Fax: +603-6188 1543
EMAIL: iiumprinting@yahoo.com

CONTENTS

Chapter 24

POWER SUPPLY INTERFERENCE IN SMART SENSOR MICROCONTROLLER INTERFACE

ISMAILA TIJANI, SHEROZ KHAN

24.0 INTRODUCTION

Signal conditioning circuits otherwise referred to as sensor interface play important roles in data acquisition systems especially with microcontroller based systems. They are employed for signals conversion or translations to squeeze the acquired signal into a desirable range easily acceptable for the microcontroller. Many interfaces (signal conditioning circuits) have been proposed in the recent times in this regards, [1-3]; for instance, it is been employed to convert the measurand into a periodic modulated output signal which can be directly process by the microcontroller without needing an extrinsic A/D converter [3]. In [1], relaxation oscillator based conditioning circuit was proposed for proper transmission of sensor output to microcontroller.

Also the outputs of most biomedical sensors (passive or active) are very small voltages, currents, or resistance changes, thus signal conditioning circuits incorporate an amplifier for amplification of the signal for proper detection, [5]. Generally, amplification, level translation, impedance transformation, linearization, and filtering are fundamental signal conditioning functions which may be required and often incorporated in the design of appropriate signal conditioning circuit.

Furthermore, in an attempt to reduce cost and simplify the configuration of a data-acquisitions system, direct interfacing of the sensor to the microcontroller has been proposed [7]. This interface relies on measuring the charging and discharging time of RC/RLC circuit that includes the sensor. However, one of the major problems arising from this is 'trigger noise' due to power supply interference generated as a result of the oscillations from the RC circuit interface [7]. For instance, in compact systems, quasi-digital sensors often share supply rails with digital processors whose internal switching results in a noisy supply voltage.

The need thus arise to analyze the effects of power supply interference on direct sensor-to-microcontroller interfaces. This work is aimed at proposing appropriate technique of modelling and analyzing the effect of power supply interference on the direct interface of sensor-to-microcontroller. A mixed modeling approach is hereby proposed based on the previous work employing relaxation oscillator based sensor response conditioning circuit [1] and simple RC transistorized circuit for charging and discharging operation.