PRINCIPLES OF TRANSDUCER DEVICES AND COMPONENTS

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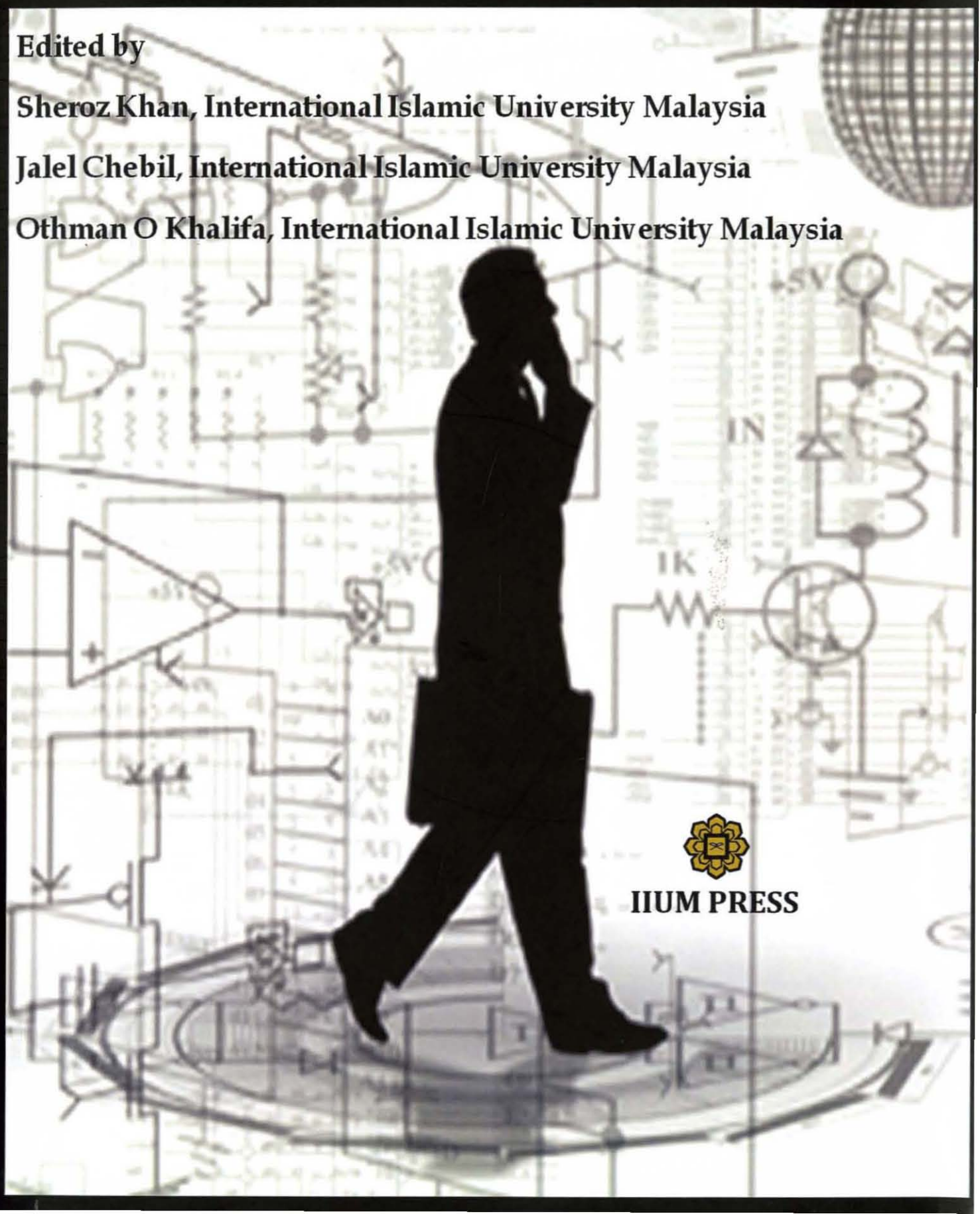

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CONTENTS

Chapter 21

POWER SUPPLY POWER-SUPPLY INTERFERENCE IN SMART SENSORS-TO-MICROCONTROLLER INTERFACE FOR BIOMEDICAL SIGNALS

MOHAMMAD ASHRAFUL, SHEROZ KHAN, MUHAMMAD IBRAHIMY

21.0 INTRODUCTION

The effects of power-supply interference on direct sensor-to-microcontroller interfaces based on measuring the charging and discharging time of an RC circuit that includes the sensor is observed in this assignment. By analysing the RC circuit, it shows that the measurement can be corrupted because of the power-supply trigger noise. To reduce the effects another resistor has been used to get the acceptable measurement of the charging and discharging time. Finally, a new approach also proposed to reduce the effects of power-supply and from this proposed circuit it can be said that the circuit is working properly. A microcontroller during communication with external circuits (or sensors) is making use of the signal conditioning circuits, which are required for signals conversion or translations to squeeze the acquired signal into a desirable range easily acceptable for the microcontroller.The common measurement chain in data-acquisition systems has four basic blocks: sensor, signal conditioner, analog-to-digital converter (ADC), and microcontroller shown in Figure 21.1. This measurement chain can be simplified by using an oscillator circuit as signal conditioner [1-4], since its time-modulated output signal can be directly connected to the microcontroller without using an ADC [5] shown in Figure 21.2. The measurement chain can be further simplified by directly connecting the sensor to the microcontroller [6-8], without using either a signal conditioner or an ADC shown in Figure 21.3. Such an interface circuit generally relies on measuring the charging or discharging time of an RC circuit that includes the sensor (Fig. 21.4).

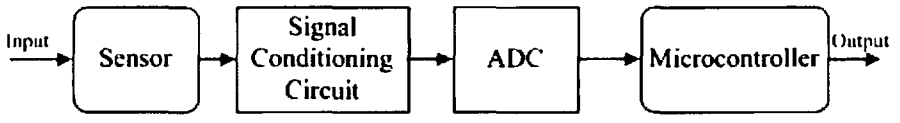

Fig. 21.1: Measurement Chain in Data-Acquisition System