PRINCIPLES OF TRANSDUCER DEVICES AND COMPONENTS

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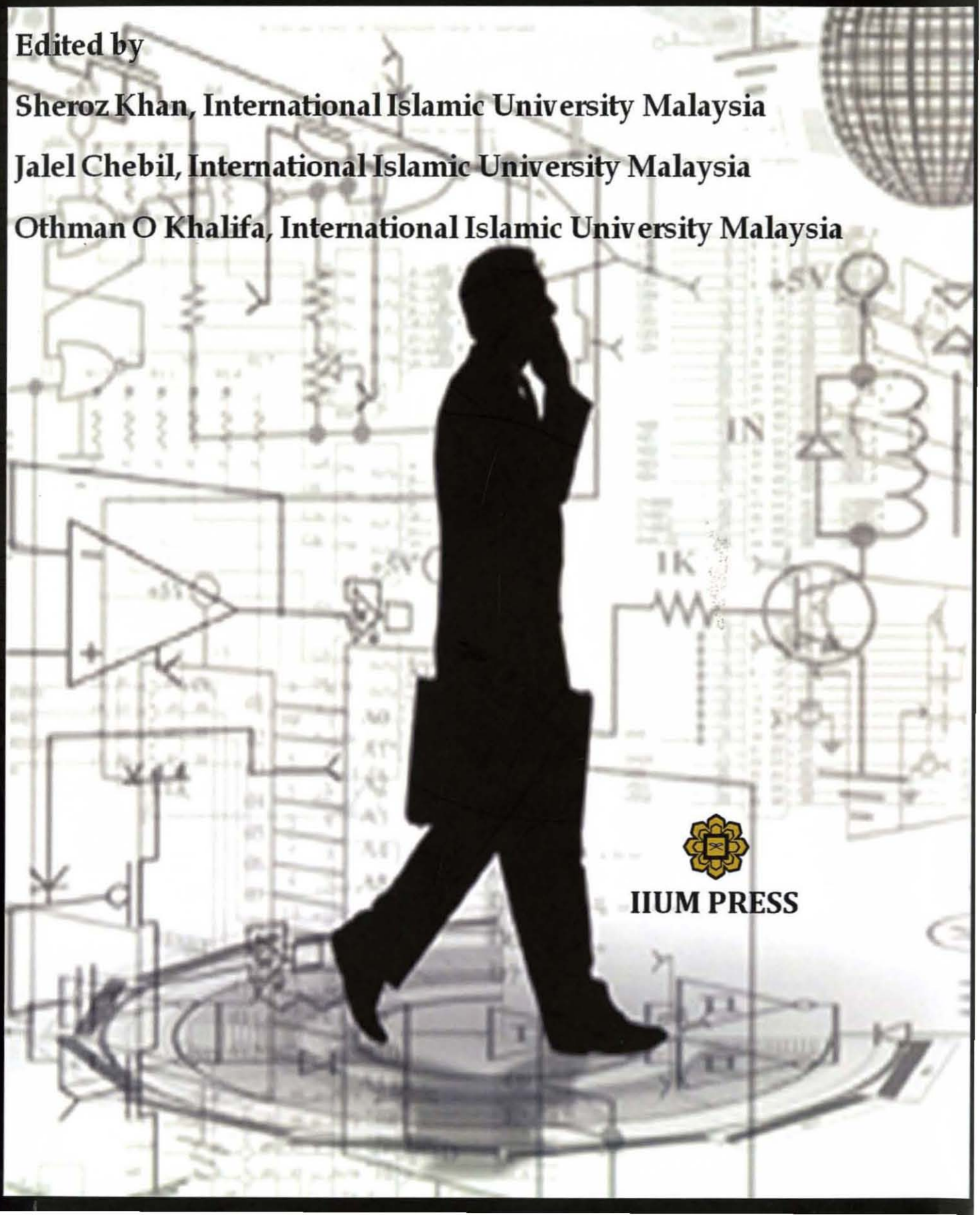

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CONTENTS

Chapter 29

DESIGN AND IMPLEMENTATION OF AN OPTIMAL FUZZY LOGIC CONTROLLER USING EGENTIC ALGORITHM

SALAMI FEMI ABDULAZEEZ, LAWAL WAHAB ADETUNJI, SHEROZ KHAN, AHM ZAHIRUL ALAM,MOMOH JIMOH E. SALAMI, SHIHAB AHMED HAMEED, AISHA HASAN ABDALLA AND MOHD RAFIQUL ISLAM

29.0 INTRODUCTION

Most control systems suffer from problems related to undesirable overshoot, longer settling times and vibrations while going from one state to another state. Works so far reported techniques which are on how to overcome or reduce the effects of these issues for ensuring smoother and finely tuned controlling process. The devised solution is software-based which employs an algorithmic approach for programming a PIC16F877A microcontroller, thus eliminating altogether the parametric dependence issues while adding the benefits of easier modification to suit a given control system for varying operational conditions. The approach is first simulated using MATLAB/and the simulated results are verified by programming the PIC16F877A microcontroller with the algorithm and using it on a temperature control system where a fan is regulated in response to variations in the ambient system temperature. The results justify the effectiveness of the approach implemented in this study and they further prove that the optimized Fuzzy Logic Controller is functioning better than the conventional PID Controller.

29.1 APPLICATIONS

Over the years, control of processes and systems in the industry is customarily done by experts through the conventional PID control techniques. This is as a result of its simplicity, low cost design and robust performance in a wide range of operating conditions. Although the PID controllers have gained widespread usage across technological industries, it must also be pointed out that the unnecessary mathematical rigorosity, preciseness and accuracy involved with the design of the controllers have been a major drawback [1]. This has made it difficult if not impossible for designers, engineers and technology experts to design intelligent complex systems, nonlinear systems higher order and time-delayed linear systems that can satisfactorily behave as expected while operating in the human-machine interface. However, various techniques and modifications to the conventional PID controllers have been employed in order to overcome these