PRINCIPLES OF TRANSDUCER DEVICES AND COMPONENTS

Edited by

Sheroz Khan, International Islamic University Malaysia

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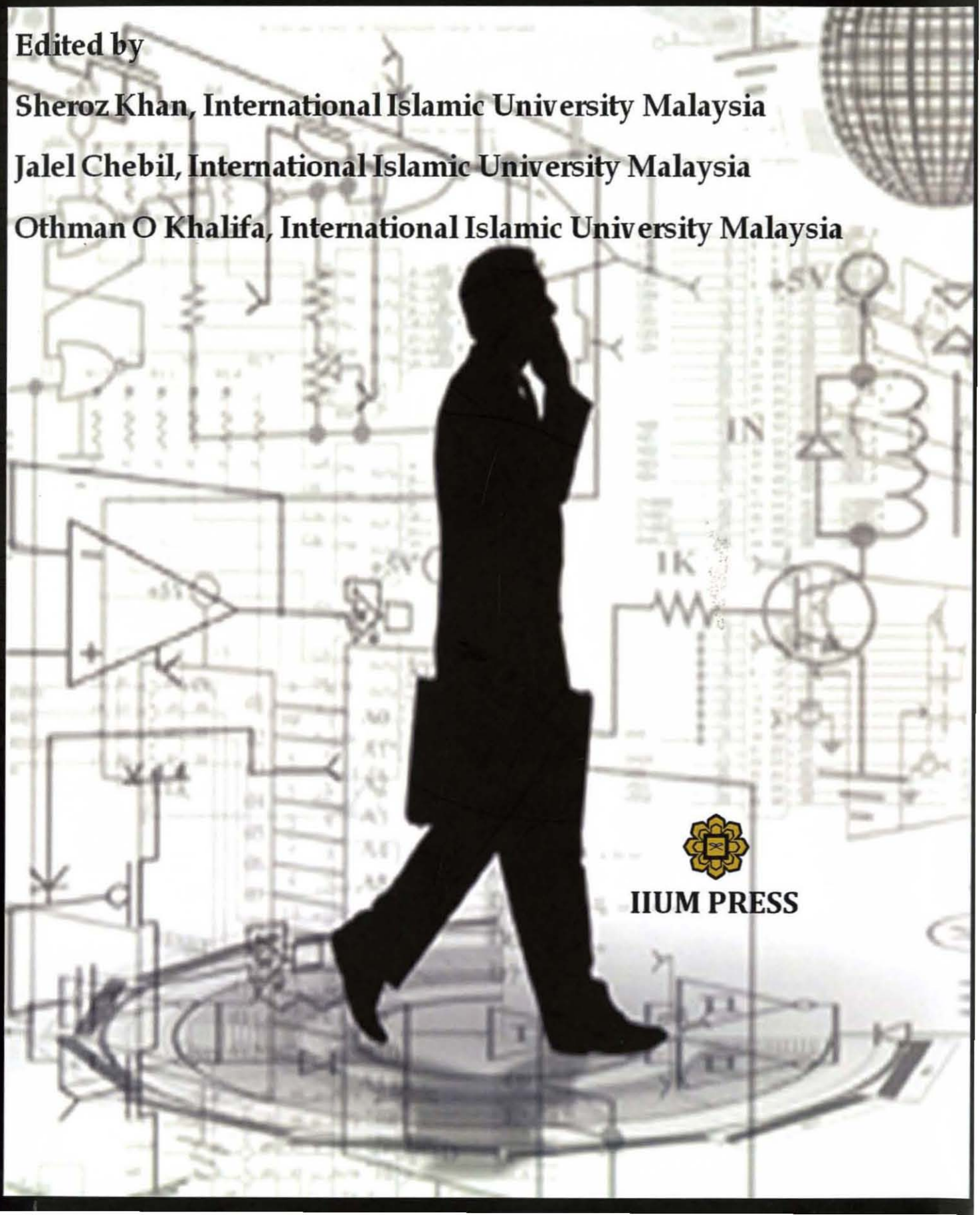

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Chapter 34

FUZZY LOGIC BASED TEMPERATURE CONTROL OF THERMOELECTRIC COOLER FOR SINGLE PHOTON AVALANCHE DIODE APPLICATION

NURUL IZZATI SAMSUDDIN, SALMIAH AHMAD, NURUL FADZLIN HASBULLAH

34.0 INTRODUCTION

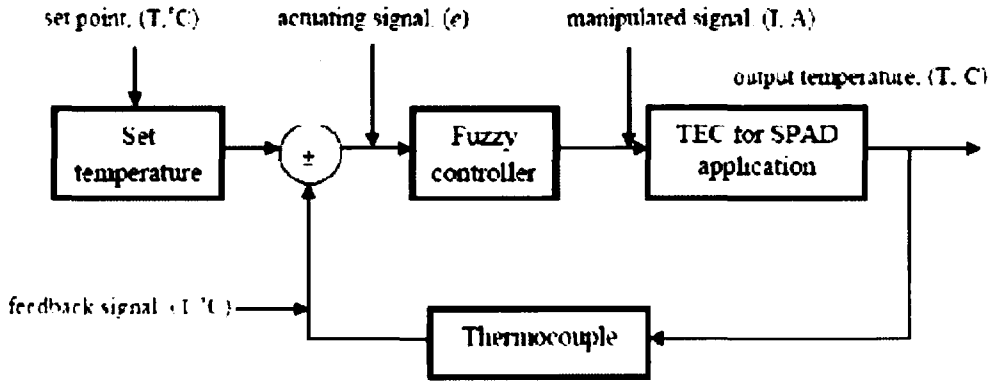

Fig. 34.1: The P-type fuzzy logic temperature control of TEC for SPAD application

Figure 34.1 shows a P-type fuzzy logic temperature control of TEC for SPAD application. The fuzzy logic is chosen as the controller because it provides a solution for nonlinear and complex TEC mathematical model. The P-type fuzzy logic controller is used as a test platform. The fuzzy controller gives more flexibility for the user to design the fuzzy internal dynamic. In fuzzy controller, the user is free to design in the fuzzifier, where it functions to map the input value according to the number, shape and range of the membership function. Also, the user is free to design in the defuzzifier, where it functions to map the fuzzy consequent according to the number, shape and range of the membership function into crisp output current values.

34.1 TEMPERATURE CONTROL AND FUZZY LOGIC SET

The linguistic function of the input is the error in temperature, e in the range of -52.5°C to +52.5°C, because the maximum temperature difference of the TEC is 105°C. The