AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING

MICROCOMPUTERS-BASED MULTI-MODEL REAL TIME CONTROLLER

BY

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A THESIS

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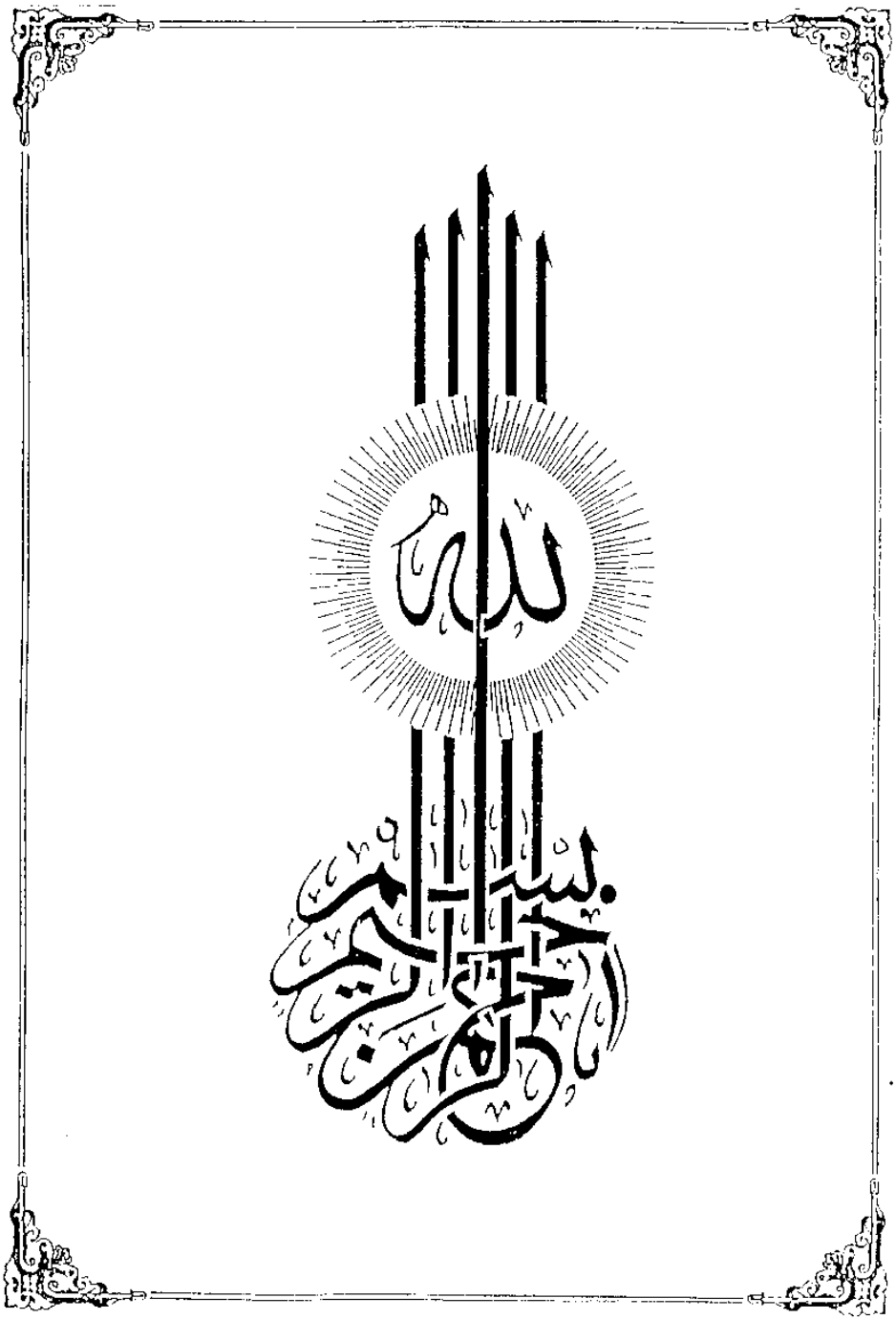

To My Family.

STATEMENT

This dissertation is submitted to Ain Shams University for the degree of Master of science in Electrical Engineering.

The work included in this thesis was carried out by the author in the Electronics and Computer Engineering Department, Faculty of Engineering, Ain Shams University, from september 1987 to december 1990.

No part of this thesis has been submitted for a degree or a qualification at any other University or Institution.

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Abstract: This thesis is concerned with the multi-model control algorithm of industrial processes using the microcomputers.

Multi-model control technique is based on representing the process by a set of linear models which are valid around certain nominal operating points. It lies within two main parts; location and control.

LOCATION is an operation which is able to evaluate the quality of the different models with respect to certain criterion and classify them accordingly.

CONTROL is an operation achieved in two steps:

1- The basic control, of each of the available models, which is calculated separately using certain control criterion.

2- Synthesising the actual control, applied to the process, which can be realized in several ways; either by selecting the basic control of the best model or by combining the different basic controls.

A tracking location criterion is proposed to overcome the problem, encountered by the different available deterministic multi-model techniques, where the used models are of different structure.

A multi-microprocessor network has been developed. It consists of a personal computer connected with three microprocessor cards working in parallel. This network is used to implement and test the multi-model control algorithm.

Simulation results, using the developed network, are included. A real time application is carried out to control the temperature of a pilot thermal process. The results of the simulation and the real time application show the potential of the control algorithm and the efficiency of the proposed hardware configuration and the location criterion.

key words: Multi-model, Multi-microprocessor, optimal control.

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