AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING

رسالة

The Use Of Personal Computer In Controlling Internal Combustion Engines

By
Eng. Maged Mahmoud Ibrahim
B.Sc. 1988

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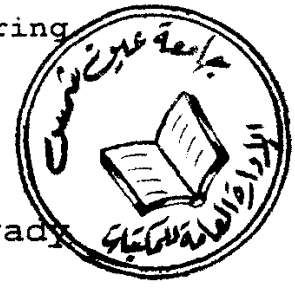
A Thesis
Submitted In Partial Fulfillment For The
Requirements Of The Degree Of Master
In Mechanical Engineering



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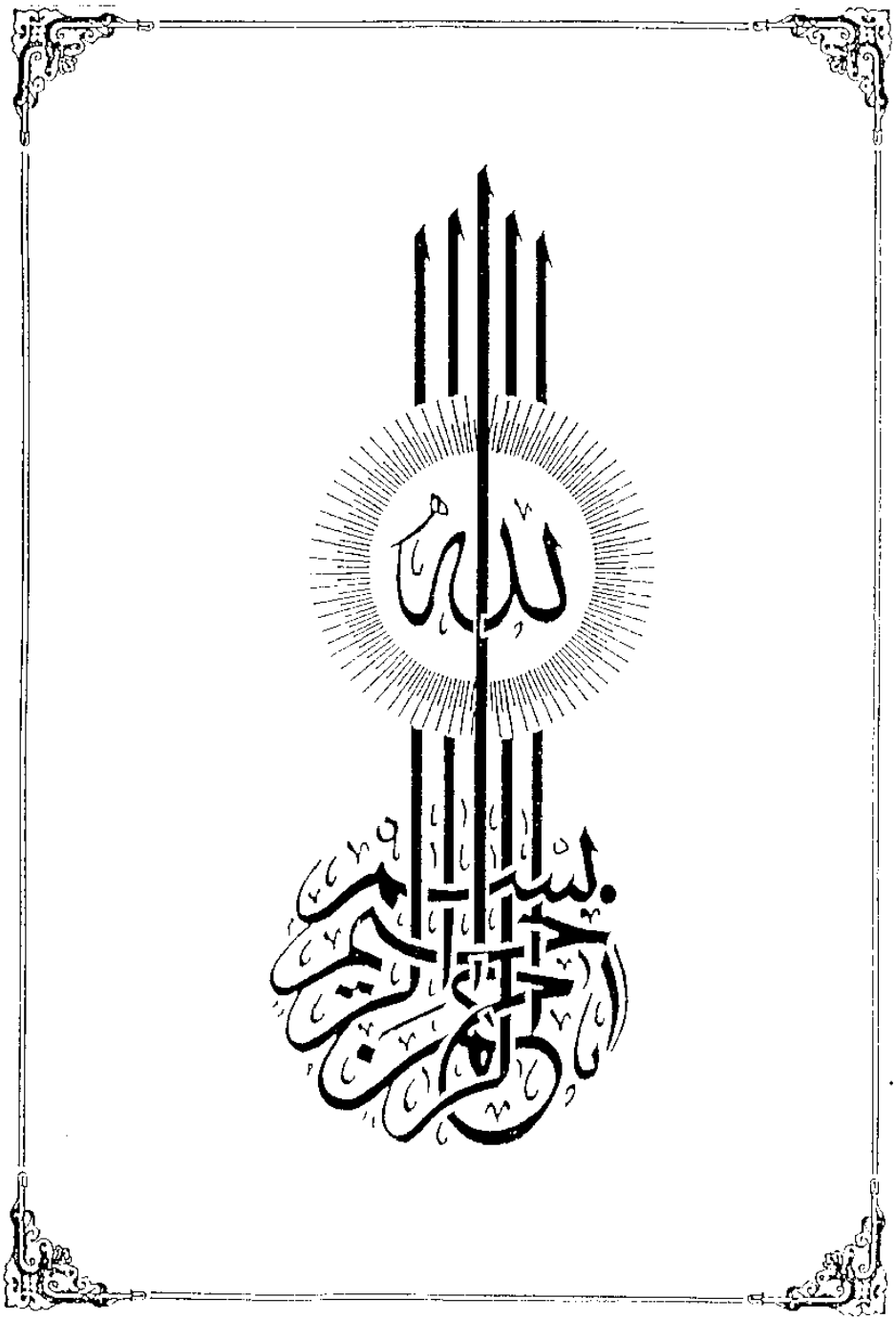

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Statement

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

The work included in this thesis was carried out by the author in the Department of Mechanical Power Engineering, Ain Shams University, from November 1989 to November 1996.

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

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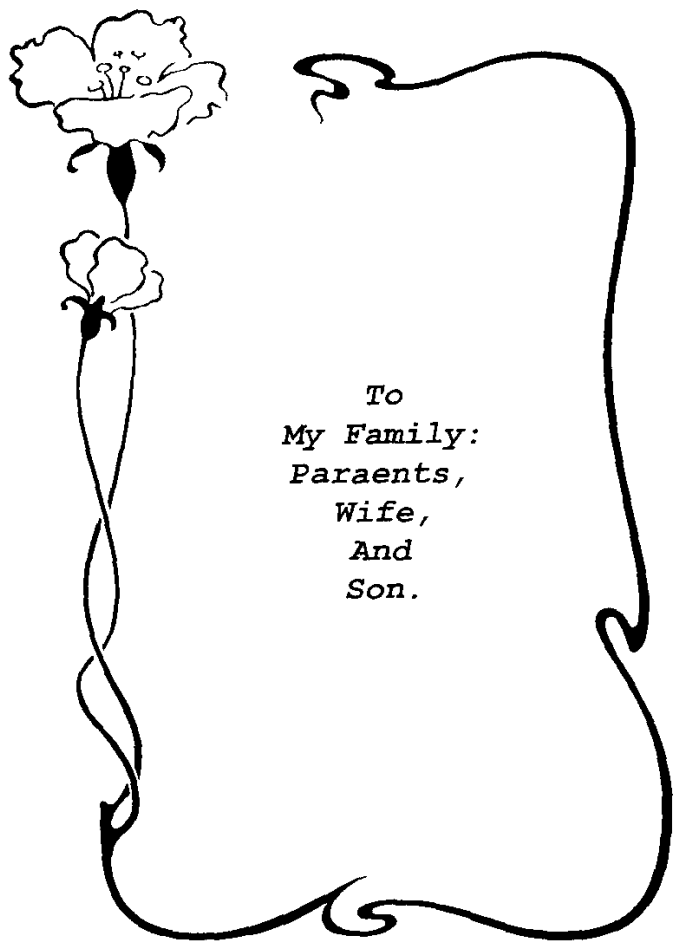

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Abstract

A micro-computer based control system is designed and manufactured to control the speed of a single-cylinder four-stroke spark ignition engine. A test rig has been prepared to achieve the above requirement.

The test rig is composed of an engine generator set, electrical loading facilities, recording and control elements and a micro-computer. The fuel and air feeding systems have been modified to suit the new control system. A computer software is specially devised to record engine speed, compares it with a reference preset value then decides the correct amount of fuel and air to attain the specified engine speed with the lowest allowable error.

Electronic circuits were designed to handle the computer signals and send it to the fuel and air stepper motors to adjust fuel and air mass flow rates. The effect of using a Proportional , Integral and dervative, PID, controller was studied experimentally to obtain the best parameters for fast response and good engine stability.

Experimental results show that the engine control system can maintain the speed with a maximum droop of 1.5% for most engine operating conditions. Increasing the controller gain may result in engine instability.

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The controller derivative action is necessary for damping the overshoot when engine is suddenly loaded or unloaded with great percent.

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