

# **Design and experimental evaluation of predictive engine air-ratio control using relevance vector machine**

By

**Wong Hang Cheong**



**M.Sc. in Electromechanical Engineering**



**澳門大學**

**UNIVERSIDADE DE MACAU**

**UNIVERSITY OF MACAU**

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By

Wong Hang Cheong

M-A8-6542-9

A thesis submitted in partial fulfillment of the  
requirements for the degree of

MSc. in Electromechanical Engineering

Faculty of Science and Technology

University of Macau

2010

Approved by: Wong Pak-kin

Supervisor

Program Authorized  
to Offer Degree

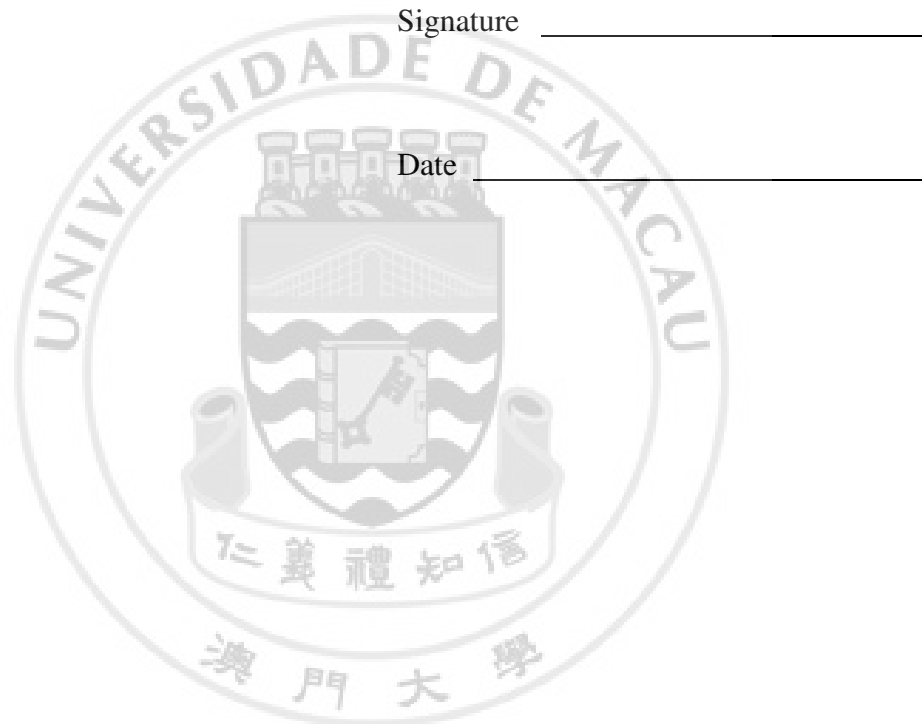
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Address: Av. Padre Tomas Pereira, Macau, China

Telephone: +853 8397 4292

E-mail: hcwong@umac.mo



University of Macau

Abstract

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By Wong Hang Cheong

M-A8-6542-9

Thesis Supervisor: Professor Wong Pak King

Department of Electromechanical Engineering, Faculty of Science and Technology

Air-ratio relates closely to pollution reduction and fuel efficiency improvement among all of the engine control variables. Maintaining the air-ratio to be the stoichiometric value can ensure the maximum efficiency of the three-way catalytic converter so that minimizing the engine emission. The thesis presents a new model predictive control (MPC) algorithm for air-ratio regulation based on relevance vector machine (RMV). The control algorithm has been implemented on a real car to test. Experimental results show that the control performance of the relevance vector machine model predictive controller (RVMMPC) is superior to typical neural network MPC, decremental least-squares support vector machine MPC and conventional proportional-integral (PI) controller in production cars. Therefore, the RVMMPC is a

potential scheme to replace PI controller in the automotive ECU for engine air-ratio control.



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## Acknowledgements

The author wishes to thank Prof. Wong Pak Kin. His wise and intelligent leadership make the completion and success of this thesis. The author also wishes to thank Dr. Vong Chi Man for his invaluable inspiration on introducing the concept of relevance vector machine. The author would like to thank the financial support from the University of Macau Research Grant UL011/09-Y2/EME/WPK02/FST and the Science and Technology Development Fund of Macau, Grant No. 019/2007/A.

