

**Universiti Teknologi MARA**

**A New Intelligent In-Series DC Motor Controller**

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*To my beloved parent:*

*Zaleha and Ahmad*

*Thanks for your supports and prayer.*

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## ABSTRACT

This thesis presents a new in-series controller for a permanent magnet (PM) DC motor speed control. Instead of using a feedback loop speed sensor to monitor the DC motor speed, the back-EMF voltage in the DC motor is employed as a means of determining the speed of the DC motor. The advantage of this technique is the elimination of the speed sensor feedback loop, which may imply simplistic DC motor system, lower cost and smaller controller design.

To evaluate the performance of the new controller scheme, three controller algorithms were developed and applied in real-time. These controllers are the PID controller, which is widely accepted and used; fuzzy based proportional-derivative (FPD) and fuzzy based proportional-integral (FPI) controllers. The performances of these controllers were evaluated based on the control system theory, which includes transient response analysis and tracking capabilities.

The results obtained in this thesis show that the proposed technique for indirectly measuring the DC motor speed via its back-EMF was successful and all of the three controllers have work with comparable performances.