ABSTRACT

Muhammad Basri, *Universal Digital Controller* (supervised by **Rhiza S. Sadjad** and **Zahir Zainuddin**)**.**

This is a design project to build a microcontroller-based universal digital controller. The controller consists of a microcontroller circuit, an Analog to Digital Converter (A/DC), a Digital to Analog Converter (D/AC), a voltage equalizer and a user interface application program. It is designed to be reconfigurable by programming the user interface. It can be configured as a Discrete Proportional-Integral-Differential (PID) controller as well as other type of digital controllers. The digital controller can also be configured to compute either using the 8 bit or 16 bit integer computation.

A 12 Volt, 4,5 Watt DC servo-motor control system has been used as a test case. The motor is set to run at the speed of 2000 RPM, and the universal digital controller is configured as a Digital PID Controller with various constants Kp, Ki and Kd. The best sampling time for this experiment is 8,2 ms, to cover the Analog to Digital (A/D) and Digital to Analog (D/A) Conversion time and the PID computation time, with the total of 1,59 ms.