

## Indiana University – Purdue University Fort Wayne Opus: Research & Creativity at IPFW

Computer and Electrical Engineering Technology &  
Information Systems and Technology Senior Design  
Projects

School of Engineering, Technology and Computer  
Science Design Projects

12-13-2002

### Motor Controller

Kevin Fenn

*Indiana University - Purdue University Fort Wayne*

Jason Reece

*Indiana University - Purdue University Fort Wayne*

Follow this and additional works at: [http://opus.ipfw.edu/etc\\_seniorproj](http://opus.ipfw.edu/etc_seniorproj)

 Part of the [Computer Sciences Commons](#), and the [Engineering Commons](#)

---

#### Opus Citation

Kevin Fenn and Jason Reece (2002). Motor Controller.  
[http://opus.ipfw.edu/etc\\_seniorproj/34](http://opus.ipfw.edu/etc_seniorproj/34)

This Senior Design Project is brought to you for free and open access by the School of Engineering, Technology and Computer Science Design Projects at Opus: Research & Creativity at IPFW. It has been accepted for inclusion in Computer and Electrical Engineering Technology & Information Systems and Technology Senior Design Projects by an authorized administrator of Opus: Research & Creativity at IPFW. For more information, please contact [admin@lib.ipfw.edu](mailto:admin@lib.ipfw.edu).

## **MOTOR CONTROLLER**

### **EET SENIOR DESIGN PHASE II**

by:  
Kevin Fenn  
Jason Reece

December 13, 2002

Prepared for:  
Professor Paul Lin  
Senior Design Phase II, EET491  
Indiana University – Purdue University at Fort Wayne

## **ABSTRACT**

This document describes the construction of a circuit that can be used to vary the speed of a three-phase motor. A three-phase motor controller is needed to adjust the frequency of a three-phase motor using a constant DC voltage. This capability is useful in reducing the high cost of ECM motors, which are used in labs or other circuits in the industry. The circuit that will be presented will be a cost-effective alternative to buying ECM motor. This document is being submitted in accordance with the requirements of EET 491 senior design phase two and will go into details about the timing issues, and the components that will be needed to complete this project.

## **LIST OF ILLUSTRATIONS**

<u>Figure</u>	<u>Page</u>
1. Block Diagram .....	3
2. Actual Timing Wave Form .....	4
3. Calculated Timing Wave Form .....	4
4. Flute View .....	5
5. Fluke190.....	6
6. PIC16F876 .....	7
7. PIC programmer .....	7

## TABLE OF CONTENTS

ABSTRACT .....	ii
PREFACE .....	iii
LIST OF ILLUSTRATIONS .....	iv
1.0 INTRODUCTION.....	1
1.1 PROBLEM TASK.....	1
1.2 BACKGROUND.....	1
1.3 CRITERIA .....	1
1.4 METHODOLOGY.....	1
1.5 PRIMARY PURPOSE .....	2
1.6 OVERVIEW.....	2
2.0 DESCRIPTION OF CIRCUIT COMPONENTS.....	3
2.1 TECHNICAL .....	3
2.2 PIC16F873 .....	6
2.3 MOTOROLA 1N4001 .....	8
2.4 INTERNATIONAL IR RECTIFIER IRF540N .....	8
2.5 FAIRCHILD SEMICONDUCTOR RFD 8905-ND .....	8
2.6 FAIRCHILD SEMICONDUCTOR LM7805 .....	8
2.7 FAIRCHILD SEMICONDUCTOR 2N3055 .....	8
3.0 TESTING .....	9
4.0 COST/MATERIALS.....	10
5.0 FABRICATION .....	11
5.1 ETCHING PROCEDURE.....	11
5.2 TIN PLATING PROCEDURE .....	11
6.0 DISCUSSION .....	13
7.0 CONCLUSION .....	14

## APPENDIX

A REFERENCES / SCHEMATIC / POSTIVE FOOTPRINT .....	16
B PARTSLIST / TIMING WAVEFORM .....	20
C PIC CODE .....	22
D KINGBRIGHT L1413SGDL DATA SHEET .....	27
E MOTORLOA MJE3055T DATA SHEET .....	33
F MOTOROLA 1N4001 DATA SHEET .....	36
G INTERNATIONAL IR RECTIFIER IRF540N DATA SHEET .....	38
H FAIRCHILD SEMICONDUCTOR RF8P05 DATA SHEET .....	46
I FAIRCHILD SEMICONDUCTOR LM7805 DATA SHEET .....	52