



Three Phase Motor Controller

An ELE480 Capstone Design Project with BCA

Company

Bay Computer Associates, Inc. (BCA) is a full-service software and electronics contract design firm. Our permanent staff of over 23 engineers has been designing products for our customers for 24 years. While we have no products of our own, we have significant design experience from websites to electron beam microscopes. It is our hope that a relationship with students will allow us to move closer to having some products of our own.

We are located in Cranston, RI. We anticipate many face to face meetings but we suspect due to the distance to campus that we may allow VPN access to our facilities for some of the required activities as long as a non-disclosure is signed.

Introduction

BCA has invested a significant amount of design time into a three phase AC motor controller. This device currently is operating quite well for relatively low motor currents. In fact, we have installed this on a power assisted bicycle with reasonable results.

The electronics currently has a flaw in the design that, at high motor currents, noise causes the output driver chip to disable itself resulting in reduced current output. In addition, we would love to see the output current capabilities increased so that this controller might be used for a significantly sized vehicle.

The problem with the software is that it is not "friendly" enough to allow us to sell this as an "off the shelf" product. The user cannot easily configure the device to operate with the user's motor.

Tasks to be completed

Hardware

- Evaluation of present hardware
- Design a solution to the "noise" problem described above
- Increase the output drive capability
- Redesign the circuit board

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software development & electronics design





- Test the above.

Software

- Firmware changes to the motor drive
- PC software to configure the system from a user point of view.

Minimum System Specifications

- An updated electronics system that provides twice the current drive of the present system. (testing will likely be done on power assisted bike motor).
- A software system that allows easy modification of parameters for use with other motors.

Stretch goals

NOTE that we consider this design to require significant skill to make good progress. It is likely that the above system will be challenging by itself. If the above can be achieved, a vehicle system using three or four coordinated motor controllers would be exciting to see.

Engineering Skills required

Schematic capture
Digital Design
Analog design
Embedded systems programming ("C" language)
Windows programming

Preferred Team Composition

1 **CPE** major and 2 **ELE** majors

Technical Contact

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