

# **LABORATORY VIII**

## **BAE 5413**

### **SPRING 2007**

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**TITLE:** Microcontroller motor control

**OBJECTIVE:** To gain experience in using a microcontroller to control a DC motor.

**REFERENCES:** Texas Instruments eZ430-F2013 kit and documentation.

#### **PROCEDURE:**

Test power supply regulation circuit:

Figure 1 includes a circuit to provide power at 3.3 V to the eZ430 target module (Power supply / Voltage regulation). Construct this circuit without the microcontroller and use a load resistor in place of the microcontroller. Produce a plot of voltage supplied to the load vs. current for the load. Determine if the circuit is adequate for the microcontroller.

Test PWM circuit:

Figure 1 also includes a circuit to allow the microcontroller to drive a 12V, 14 A DC motor. In the configuration shown, the motor will draw considerably less than the 14 A. rated current. Construct the circuit and use a function generator set to produce a signal similar to the microcontroller to provide the input signal. Validate that the circuit will function properly with the microcontroller. What current level does the motor draw in this configuration at 100% ON? What current level is drawn by the transistor circuit from the function generator. Are the current and voltage levels suitable for interfacing to the microcontroller?

Test the microcontroller program:

Compile and test the program shown in the example below. Remove the target microcontroller and solder wires to the ground, power and P1.2 pins. Connect the target microcontroller to your regulated power supply circuit and use an oscilloscope to observe the output signal from P1.2. Verify that the signal is as expected. Finally, connect P1.2 to the input of your motor drive circuit and validate that it drives the motor properly. Make any modifications necessary to improve the design.

Report your results:

Record notes at each stage above and provide those notes as documentation of your work. Recommend circuitry that would allow the addition of an up and down button that would speed up or slow down the motor. Modify the program to use this circuitry.

Figure 1. Motor Drive Circuit Diagram



