Name _____

Lab Section _____

Temperature Controlled Fan using a PWM Signal

Lab 7

Introduction: In this lab you will design and document a simple cooling fan controller. This project combines the hardware developed in the instrumentation lab and code written in the Analog to Digital (ADC) to Pulse Width Modulation (PWM) lab.

Lab Requirements:

1. Demonstration of a cooling fan control system that is capable of increasing the speed of a fan using a Pulse Width Modulation (PWM) signal. The fan must remain spinning at all times.

Idle Duty Cycle _____

Temperature Above Idle (90°F Target) **_____**

Temperature at 100% Duty Cycle (130°F Target) **_____**

Demo Check (JK) **_____**

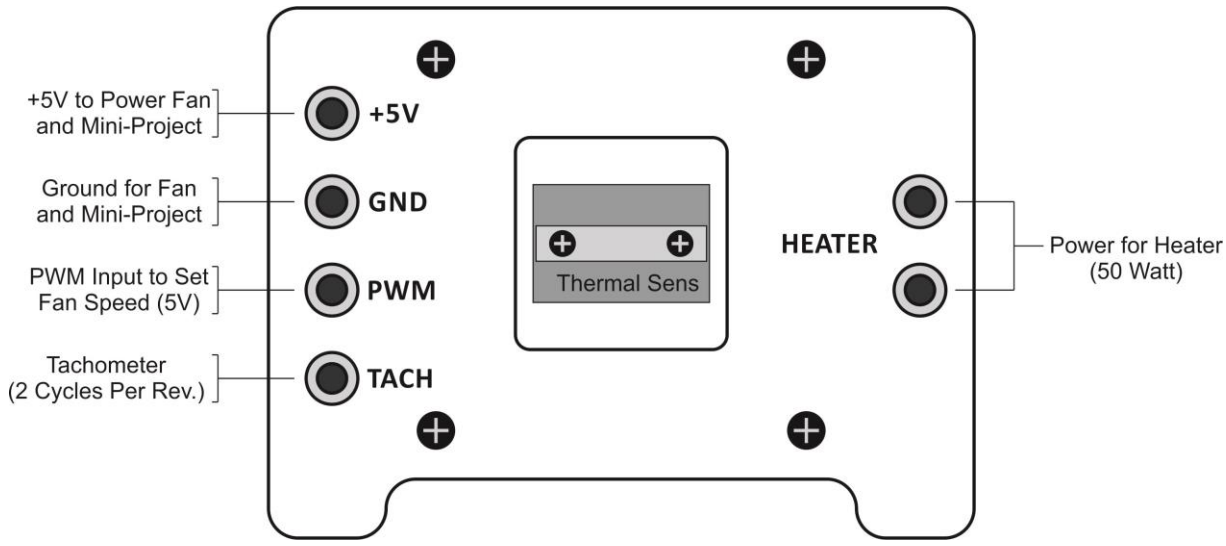
2. Submission of a schematic diagram of your hardware drawn in Mentor Graphics Design Capture software.

3. Submission of cleanly formatted source code for your fan controller.

Controlling the Fan:

The speed of the 4-wire fan used for this lab can be directly controlled using a PWM signal and does not require any additional power electronics. A single 5V supply should be used to power your microcontroller and instrumentation circuitry as well as the fan. A second power supply will connect to the heater in order to change the temperature measured by your thermistor. To ensure that the fan spins up at power on, you can provide a burst period where you run the fan at full speed for a few seconds. After the burst period, your fan should slow down to an idle speed (always remain spinning). When

selecting a duty cycle for the idle speed make sure that it is high enough to keep the fan spinning. After testing the idle speed apply a current to the heater and slowly increase the temperature of your thermistor. Once the temperature increases above 90°F the fan should start to increase in speed and the fan should reach full speed at 130°F (PWM = 100% duty cycle). The actual RPM of the fan can be monitored through the open-collector "TACH" port on the test fixture where the speed is represented a 2 ticks per rotation.



Extra Credit:

Monitor the actual fan speed using the open-collector tachometer "TACH" output signal with your microcontroller and control the speed of the fan using a closed loop feedback system.