

ELEC 3040/3050 Final Project Specification – Fall 2011

Implement an embedded digital controller for dc motor speed, and demonstrate using the Dragonfly module and lab dc motor.

Specifications:

- a. The desired speed must be selected from a 16-key keypad.
- b. The system must demonstrate **nine (9)** different non-zero speeds. You may select any nine non-zero DESIRED speeds, but they should be evenly spaced between the minimum speed at which the motor can be reliably operated and the motor's "full speed", which is defined to be the no-load speed with 9 Vdc applied voltage.
- c. The sampling period for the system must be 10 ms +/- 1 microsecond.
- d. The measured steady-state speed of the motor must be within 5% of the desired speed, whether the motor is under load or not. The test load will be a single turn of string around the motor pulley, with a 15 gram washer weighting the free end. The reference speed for this test will be 50% of motor full speed.
- e. Extra credit (15% more): The system meets requirements (a)-(d), AND the closed-loop step response settling time is one-half the open-loop settling time. Overshoot must be less than 10%. The step change will be from 40% to 50% of motor full speed. This test will be conducted with no shaft loading.

Notes:

- Requirement (a) means the keypad interface must work.
- Requirement (b) can be achieved without motor speed feedback. Nine different speeds are required, but there is no spec on steady-state accuracy. A way must be found to demonstrate that 9 different speeds are achieved.
- Requirement (c) means timer interrupts must work.
- Requirement (d) means feedback is implemented, and speed is adjusted to meet the target value, but good tuning is not essential.
- Option (e) means a well-tuned feedback system has been implemented.