This lab assignment consists of two main sections. One section focuses on some sample software while using the demonstration home-made encoder in the lab. The other section pertains to actually building a home-made encoder, simple robot base, and installing motors for testing various systems. The encoder will be your main way to verify that the wheels have turned as many times as your program had intended. Thusly, it becomes quite important as a rough position verification mechanism.

**A)**

1) Find a sample program known as ENC_L.C. This code sets a "count goal" and displays the resulting encoder count, while running a motor at a fixed speed. Study the comments in the code which explain the rules regarding the "encoders.c" (library) program.

2) Your task is to modify this code so that you can run the motor at 3 different speeds: "low", "medium", and "fast", with a new count goal. You should be able to change speeds while running just one version of the program. In other words, simply changing the speed variable, saving the code, and re-loading it…is NOT what we want you to do. (Not enough will be learned from this approach, and we want you to gain skills for future robot programming.)

3) Run the new program at each of the new speeds at least 5 times for each speed. Record the encoder count results each time. Demonstrate your program to a TA, then turn in the code and a plot of the result, along with a table listing at least 15 run results. This should give us an idea as to how accurate your encoder is.

**B)**

1) Build a test platform or use your existing robots to mount your motors, along with a broken-beam sensor and a pulley (with appropriate holes) for making an encoder. (Ultimately, you need an encoder on both wheels!)

2) You probably want to do this in two steps:
   i) Just make a simple encoder on a single motor so that you can quickly finish the testing in "A" above.

   ii) Then a more complete "test bed" with two motors, some gearing, and at least one encoder to be used in the next lab assignment. Note that you have flexibility in your approach.

3) Build a robot that can drive forward a predetermined distance. Show your test robot progress to the TAs and hand in your commented code. It is highly unlikely that this early design will be your final design for the RoboRat. This unit is merely to get you started, quickly, to be able to test sensor and actuator systems. Remember to make notes in your lab notebook. Include dates, sketches, reminders, ideas, technical notes, and try to indicate which partner is doing each part of the work.