CSCI–4190 Introduction to Robotic Algorithms, Spring 2002
Assignment 3: out March 22, due April 5

SONAR mapping

In this assignment, you will implement and compare the two SONAR mapping methods we discussed in class (for sparse SONAR scans): using certainty grids and using Dempster-Shafer theory.

I will provide some real (and possibly some simulated) SONAR data; these data will consist of sonar scans (i.e. range measurements from each sensor on a SONAR ring) from a number of positions.

Your program should do the following:

- Read the problem description files. These will include information on the robot (such as the sonar ring radius, cell size, SONAR cone width, etc.) as well as which mapping method should be used.
- Print to the screen which mapping method is being used.
- Display the empty "empty" map.
- Your program should then accept the following commands:
  - General commands:
    - `'q'` will quit the program
  - SONAR processing commands
    - `'n'` will process the next SONAR reading
    - `'s'` will process the next SONAR scan (or the remaining readings in the current scan if one or more readings have already been processed)
    - `'t'` will process the next ten SONAR scans, including the current scan
    - `'a'` will process all remaining SONAR readings
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    - `'e'` will display the "empty" map
    - `'f'` will display the "full" map
    - `'c'` will display a "combined" map
    - `'d'` will dump the current map to a file

  If there are no more SONAR scans when a processing command is given (or during its execution), the program should print a message to that effect. (The program should not exit so that the user can dump the map
- After processing SONAR readings (via any such command), the map should be updated, and the robot should be drawn at the configuration of the last SONAR reading that was processed.

Support code

I will provide support code to read the problem description files and to dump the map to a file. The graphics module we have been using for the previous assignments will be extended to display images so you can display the map on the screen. (Hopefully, I will also implement some zooming feature as well.)

Written portion

You will turn in a written report for this assignment with a comparison of the two mapping methods and other aspects of SONAR mapping. See the web page for the specifics of what you should include.