CS255B Project 1

1. **Sensor Interpretation: Global Compass**
   The purpose of this project is to overcome the most serious problem with mobile robot motion: staying oriented with respect to the environment. You are expected to implement an algorithm whose input is the laser readings, and whose output is a global direction. The global coordinate system should be the robot’s initial pose.

   You should strive for simplicity in design and implementation. The compass should work well under standard indoor conditions: straight walls mostly on rectilinear patterns, not too many moving objects, etc. But, it should also be robust to perturbations: some moving objects (e.g., people), obstacles with slanted surfaces, etc.

   Your algorithm should be efficient, that is, should run at least at 10 Hz on the robot.

   You must write a demo program to test the performance of your algorithm. The demo should move the robot forward 10 m, turn around 180 degrees, and then go back 10 m. The performance will be judged by how well the robot returns to its original place.

   Any graphics that show the angular position of the robot relative to environmental features will be given extra credit.

2. **Goal Seeking with Obstacle Avoidance**
   Implement a go-to-goal behavior that will successfully get the robot to a goal 15 meters directly in front of the robot, while avoiding obstacles that may occur between the robot and the goal. The behavior by preference should use trajectory rollout. A key to this behavior is to have a simple, fast condition on the endpoint of the trajectory.

   Some conditions:
   a) Robot position is from dead-reckoning and your global compass.
   b) The robot will be expected to get around obstacles placed between the robot and the goal.
   c) Expect convex obstacles, or concave obstacles that can be fully seen by the LRF.