

ECED 6640.03 Mobile Robotics

Assignment #4

Due date: In two weeks.

Assignment #4 contains the following problems:

- 1) Derive the pose of a robot given a sensor set that computes the robot's position from two-point landmarks by using triangulation under the following assumptions:
 - a. The distance to each landmark can be directly observed.
 - b. The absolute orientation to each landmark can be directly observed.

- 2) Describe a procedure for determining the pose of a robot in a 2-D world by using only "wall following" and assuming that a perfect map is available and that the absolute orientation of the robot can be determined at anytime.

- 3) Implement a wall-following algorithm using an idealized perfect range sensor.

- 4) Derive the geometric dilution of precision (GDOP) for a robot that computes its position from two-point landmarks using triangulation under the following assumptions:
 - a. The distance to each landmark can be directly observed with an uncertainty that varies linearly with distance.
 - b. The absolute orientation to each landmark can be directly observed.
 - c. The distance to each landmark can be directly observed with an uncertainty independent of distance.

- 5) Implement a potential field path-planning method and compute a 2-D trajectory across a rectangular room with several nonconvex obstacles in it.