MTRE 6100, Homework #5
(Due Monday, October/1/2021)

Problem1: Rewrite your solution for homework1 by OOP.

1) Create at least one class of the Robot to represent the localization process of Bayes filter. Please name your class as robotBase.
2)

Problem2: A new robot (robot2) will be deployed for the same scenario. When under a given control $u_t = 1$, the robot2 should move to the next grid (for example, from P0 to P1). However, the motors bring noises, and it may result at:

- With **60%** moves to the next grid (P1),
- With **20%** stay in the same grid (P0),
- With **20%** moves to the grid after the next grid (P2).
- With **0%** moves to the yellow grid that is after P3.

The robot2 equips a different sensor:

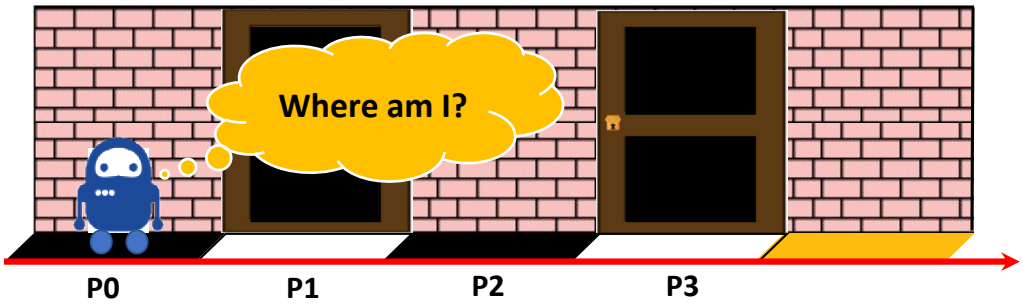
- When face to the wall, the sensor with **60%** depicts the wall detected, **40%** outputs the door detected,
- When face to the door, the sensor with **85%** depicts the door detected, **15%** outputs the wall detected.

Try to figure out how to localize the robot2. Your code of robot2:
1). Must be inherited from the class of robotBase, which you create in problem 1.

Delivery:
1. Output of two problem.
2. A report to explain how to design the classes. Explain the inheritance of two classes, you can refer to the figure of page 13 of our class slides "MTRE6100 Week6 Basic concepts of OOP (Object oriented programming)". To present which attributes and methods are inherited from base class (robotBase), which attributes and methods are new in the class of robot2.
3. Your codes.

Appendix: the copy of Homework1:

Please review the robot location problem on page 38~ page 51 of the lecture slides: "MTRE 6100: Introduction of Robot programming – Continue".



Problem:

When under a given control $u_t = 1$, the robot should move to the next grid (for example, from P0 to P1). However, the motors bring noises, and it may result at:

- With **70%** moves to the next grid (P1),
- With **20%** stay in the same grid (P0),
- With **10%** moves to the grid after the next grid (P2).
- With **0%** moves to the yellow grid that is after P3.

All other situations keep the same as the description of the lecture slides. Try to figure out how to localize the robot. Please show your solution in detail.

Hints: following the solution from lecture slides, at every step to estimate the belief (probability) for the robot at each gird (P0~P3). It needs several steps until the winner (one grid with a firmer belief than others) comes out.