Problem Statement and Goals
2-D Localizer

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Table 1: Revision History

Date	Developer(s)	Change
17 January 2024	Aliyah Jimoh	Initial Draft

1 Problem Statement

Mobile robots can be used to travel certain terrain or complete difficult tasks that could jeopardize the safety of the operators. Using sensors to let the robot know where it is, make it actively react or change its trajectory can help ensure the safty of the robot itself.

1.1 Problem

With environments that are closed space or indoors, it would be hard to get a GPS signal to locate the robot or see if the task has been completed. Testing the robot's trajectory and and algorithm in the actual site without having any way to truely replicate it can add the risk of the robot malfunctioning or having errors making ehic could make it difficult for retriving. This project aims to develop a 2-D localization simulator capable of showing the robot's trajectory while also keeping track of their coordinates through the sensors' placements in the simulation. This project will also draw inpiration from a library called GTSAM which has set up different examples based on SLAM.

1.2 Inputs and Outputs

1.2.1 Inputs

- Room size
- "April Tag" and sensor coordinates

- Wheel odometry for the robot
- Predicted Trajectory of robot

1.2.2 Outputs

- Estimated location of robot through sensors
- Estimated location through "April Tags"

1.3 Stakeholders

1.4 Environment

[Hardware and software environment —SS]

2 Goals

3 Stretch Goals

4 Challenge Level and Extras

[State your expected challenge level (advanced, general or basic). The challenge can come through the required domain knowledge, the implementation or something else. Usually the greater the novelty of a project the greater its challenge level. You should include your rationale for the selected level. Approval of the level will be part of the discussion with the instructor for approving the project. The challenge level, with the approval (or request) of the instructor, can be modified over the course of the term. —SS]

[Teams may wish to include extras as either potential bonus grades, or to make up for a less advanced challenge level. Potential extras include usability testing, code walkthroughs, user documentation, formal proof, GenderMag personas, Design Thinking, etc. Normally the maximum number of extras will be two. Approval of the extras will be part of the discussion with the instructor for approving the project. The extras, with the approval (or request) of the instructor, can be modified over the course of the term. —SS]