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Exercises

Student Competitions: Mobile Robotics Training

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Bonus: Creating Simulation Maps for Path Navigation

Task: Create a map using the image of your own path navigation track for your robot

Steps:

Open the image of a track `imageForSimMap.jpg` (in generatingSimulationMap -> exercises folder) outside of MATLAB and observe it. This track will be used to perform dead reckoning, line following and obstacle avoidance tasks. Use this image to generate a map that can be used by the robot simulator block in a Simulink model to test the controller's behavior during Normal simulation mode.

1. Open the **Simulation Map Generator App** from the App tab on the MATLAB Desktop.
2. In the App interface, load the image `imageForSimMap.jpg` or your own image of a robot field or path to create the map using the **Load Map Image** button.
3. Specify the size of the map in meters, say [3 1.5] where 3m is the width and 1.5 is height. Click away from or hit enter to enable the next option.
4. Select what type of map to generate from the drop down menu. In this case, select the option 'Both'. Notice that the preview changes to a black and white version of the original image
5. Apply thresholding appropriately to the black and white image to distinguish the line from everything else. Use either the **Automatic** or **Manual threshold mode** to achieve the desired image output.
6. Under **Obstacle Map** section, enter the **Number of Obstacles** to be added on the map.
7. Click **Place Obstacles** to open a window with the original image. Place obstacles by drawing a rectangle over the image over a region of interest. Then, double-click inside the rectangle to record this region as an obstacle. Repeat this for the number of obstacles you had entered earlier. Notice the **Map Preview** updated with a solid rectangle representing an obstacle.
8. Click on the **Export Map** button to save the final map image as a .MAT file with the file name `exampleSimMap.mat`. Notice the success message and the file is in the Current Folder displayed in the MATLAB Desktop.
9. Right-click the MAT file in the Current Folder and select Load. This will load the variable `mapForSim` to the Workspace.
10. Use this variable name appropriately in the simulator blocks in your Simulink model.