Assignment (1)

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# Requirement(1):

# A computer screen with white text Description automatically generated

Given the initial pose of the robot I want to take the readings if the lidar with max\_range as passed

Return of this function is the reading vector of dimensionality corresponding to each angle of rotation by the sensor

A black background with white text

Description automatically generated

## Output:

The left images will be the max\_range of the rays without taking inconsideration the obstacles and the right images are the actual readings taken by the sensor from the nearest obstacle :D

A diagram of a house

Description automatically generated

A diagram of a house

Description automatically generated

A diagram of a house

Description automatically generatedA diagram of a house

Description automatically generatedA diagram of a house

Description automatically generatedA diagram of a house

Description automatically generatedA two different types of houses

Description automatically generated with medium confidenceA diagram of a house

Description automatically generated

A diagram of a house

Description automatically generated

A diagram of a house

Description automatically generated

# Requirement(2):

Given certain Sigma and max\_ray measurement we need to get the likelihood map A black screen with white text

Description automatically generated

First we need to compute the likelihood

Note: we can still use Gaussian blur here which is a special case of the distance transform especially we are working with images

A screen shot of a computer

Description automatically generated

Then we will loop over all the poses and get the most probable orientation given the likelihood

A screen shot of a computer program

Description automatically generated

## Output:

A black and white diagram

Description automatically generated

A black and white diagram

Description automatically generated

A black and white diagram

Description automatically generated

A black and white diagram

Description automatically generated

A black and white map of a building

Description automatically generated

A black and white background with white lines

Description automatically generated

A close-up of a qr code

Description automatically generated

# Extra part to be use readings from req(1) to estimate the pose [Not Required]

We generate the likelihood of the map

Then we will take reading of the sensor with that likelihood and estimate the position of the robot in the map [ie keep searching in all the grid at which position can I get these readings 😊😊]

A screenshot of a computer

Description automatically generated

A diagram of a house

Description automatically generated

A screenshot of a computer program

Description automatically generated A diagram of a house

Description automatically generated

Given that reading we get that the most probable position is A black and white graph

Description automatically generated

Regarding the function

I computes the P of pose\_belief to be the postion the robot is in now given its readings and the likehood map A screenshot of a computer program

Description automatically generated

Output:

The left is the visualization of the givien measuremnat and the pose\_befilef it is clear that it is correct belief about the postion

The right the pose is wring s that readings doesn’t match with the surronding obstacles so the left has belief higher proboanlity than the one ta the right

![A map of a building

Description automatically generated]()A map of a building

Description automatically generated