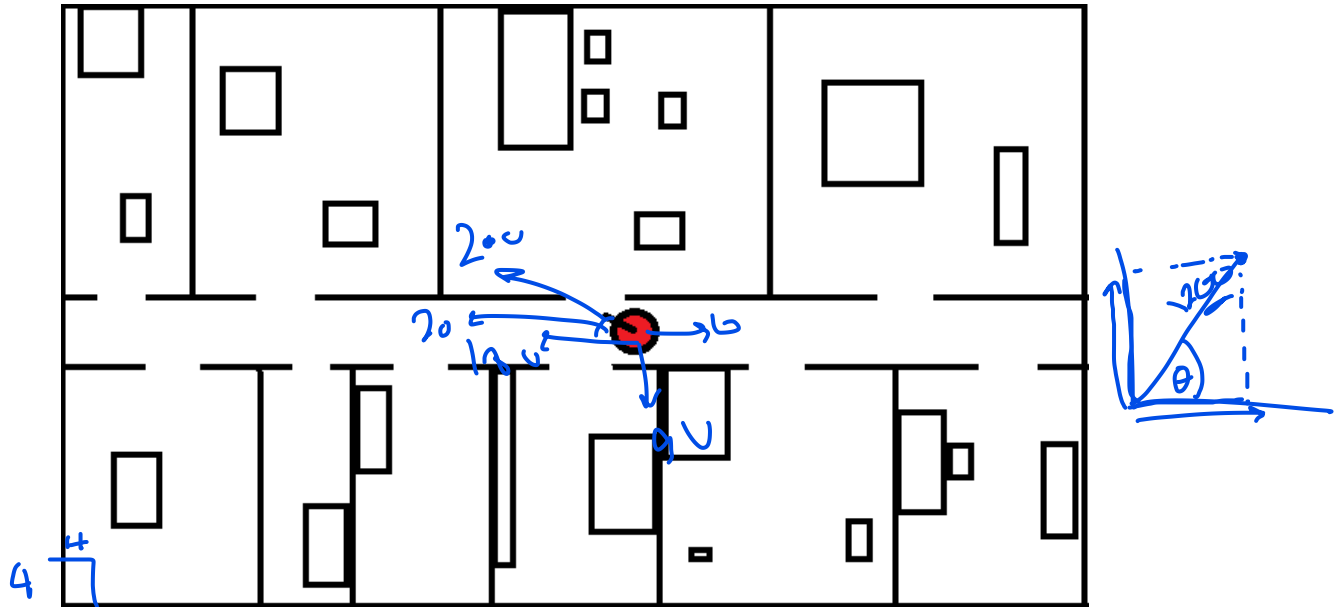


Cognitive Robotics

Assignment 4

4.1) Given is a 2D grid-map and a robot pose (x, y, θ) :



You find the map in the directory. Assume that every pixel has a size of 4cm x 4cm.

Generate laser-range measurements for an opening angle of 250° (125° left and right of the heading direction), every 2° by ray casting.

Use a maximum measurement range of 12m. $\rightarrow 1200 \text{ cm}$

10 points

4.2) Implement the endpoint model for laser-range measurements.

Test your model by computing the likelihood of the generated laser scan for a 3D-grid of poses (x, y, θ) .

For each 2D-cell of the x,y-grid of the map above, visualize the highest likelihood of all orientations θ as gray value.

10 points

- This is a programming assignment, so you are not required to compute anything manually.
- This has nothing to do with ROS, you are required to implement the algorithm yourself in Python (recommended).
- An occupancy grid map (OGM) with resolution 680x400 is provided, where black pixels represent occupied cells and white pixels are empty cells.
- You should perform ray casting (starting from a provided (x, y, θ) in the map) and visualize the rays on the map (similar to the line drawing algorithm, you studied in the computer graphics course).
- Check the document (uploaded to "Assignments" folder) for specific requirements. You are required to submit your code and a PDF document containing your results and visualizations.