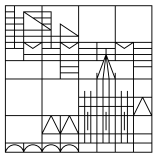
Task Sheet 6

Universität Konstanz



Creating a sensor model for the TurtleBot 4

Deadline 10:00am June 7, 2023
Review on June 11 & 12, 2023

Lecture: *Advanced Autonomous Robotics*, Summer Term 2024

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Tutor: Jonas Kuckling & Paolo Leopardi

In this exercise sheet, you will learn how to create a sensor model.

Task 6.1 Preparing a node to collect sensor data (*prepare at home*)

Using the simulation environment from the SLAM exercise, write a node that subscribes to the topic `/ir_intensity` and collects the data published by this topic. You can save this data in whatever format you prefer. Also develop a script that plots these measurements in the form of a histogram. Furthermore, have your script plot the probabilities as predicted by beam-based sensor model. Try to find parameters that match the histogram you recorded in the simulation. Upload your code, a sample of 500 measurements of the IR sensor, and the corresponding histogram.

Task 6.2 Creating a sensor model (*practical tutorial*)

In the practical session, connect to your TurtleBot and collect the proximity readings. Place the robot at a fixed distance of an obstacle, e.g., the wall and record the topic `/ir_intensity` with your node. Fit the parameters for the beam-based sensor model, as discussed in the lecture to compute the probability that any (independent) sensor reading corresponds to an obstacle. Move the TurtleBot to a different distance from the obstacle and measure again. What do you observe? Does your sensor model still fit? Move the TurtleBot away from any obstacle and test again. What is the model predicting now? Put the TurtleBot in front of a window or walk past it. What do you observe now?