

# Towards a Semantic Gas Source Localization under Uncertainty

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**Abstract.** This work addresses the problem of efficiently and coherently locating a gas source in a domestic environment with a mobile robot, meaning efficiently the coverage of the shortest distance as possible and coherently the consideration of different gas sources explaining the gas presence. The main contribution is the exploitation, for the first time, of semantic relationships between the gases detected and the objects present in the environment to face this challenging issue. Our proposal also takes into account both the uncertainty inherent in the gas classification and object recognition processes. These uncertainties are combined through a probabilistic Bayesian framework to provide a priority-ordered list of (previously observed) objects to check. Moreover the proximity of the different candidates to the current robot location is also considered by a cost function, which output is used for planning the robot inspection path. We have conducted an initial demonstration of the suitability of our gas source localization approach by simulating this task within domestic environments for a variable number of objects, and comparing it with a greedy approach.

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