Distance-Weighted Kalman Fusion for Precise Docking Problems

Abstract:
This paper proposes a way to solve a highly precise docking problem for a flexible delivery in production environments. The docking problem is seen as one of the fundamental problems to enable more flexible automation using mobile robots. A non-holonomic differential-driven robot with two conveyor belts is used to deliver boxes with goods to two docking slots on an assembly belt and unload them precisely. In order to localize the robot in front of the docking slots, a safety LIDAR and two "minimal invasive" reflecting markers are used that are completely light invariant, thus reaching industrial robustness. This measurement is fused with odometry using a Kalman filter and a distance weighted way to compute the reliability of the data streams.