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Robot navigation algorithm to wall following using fuzzy Kalman filter

This paper appears in:

Control and Automation (ICCA), 2011 9th IEEE International Conference on

Date of Conference: 19-21 Dec. 2011**Author(s):** Karambakhsh, A.

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Page(s): 440 - 443**Product Type:** Conference Publications

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ABSTRACT

Robot navigation and obstacle avoidance are from the most important problems in mobile robots, especially in unknown environments. The autonomous navigation of mobile robots has attracted a number of researchers over the years. A wide variety of approaches and algorithms have been proposed to tackle this complex problem. There are many successful localization methods that can determine the robot's position relative to a map using sonar, laser and camera data; however, most localization methods fail under common environmental conditions. In this paper we present a novel method for navigation of autonomous mobile robots in several indoor environments that optimize our old navigation approach, using fuzzy Kalman filter based on extracted lines and fusing data from laser scanner sensors. In this approach, the sonar data and laser measurement are combined using the fuzzy Kalman filter. Finally, the simulation results show that the proposed algorithm offers advantages over previous methods and has improved performance.

INDEX TERMS

• IEEE Terms

Fuzzy systems , Kalman filters , Mobile robots , Robot sensing systems , Sonar navigation

• INSPEC

◦ Controlled Indexing

Kalman filters , collision avoidance , fuzzy set theory , indoor environment , mobile robots , optical scanners , position control , sensor fusion , sonar tracking

◦ Non Controlled Indexing

autonomous mobile robot , camera data , complex problem , data fusion , environmental condition , fuzzy Kalman filter , indoor environment , laser data , laser measurement , line extraction , localization method , obstacle avoidance , robot navigation algorithm , robot position , sonar data , wall following

• Author Keywords

Autonomous Robots Fuzzy System , Kalman Filter , Obstacle Avoidance , Robot Mapping , Robot Navigation

Additional Details

References (9)

On page(s): 440
Conference Location : Santiago
ISSN : 1948-3449
Print ISBN: 978-1-4577-1475-7
INSPEC Accession Number: 12496216
Digital Object Identifier : 10.1109/ICCA.2011.6138043
Date of Current Version : 26 January 2012
Issue Date : 19-21 Dec. 2011

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