Springer Tracts in Advanced Robotics 119

Rafael Valencia
Juan Andrade-Cetto

Mapping, Planning and Exploration with Pose SLAM

★star   Springer

Springer

1st edition

1st ed. 2018, XII, 114 p. 40 illus., 38 illus. in color.

Printed book

Hardcover

Printed book

Hardcover
ISBN 978-3-319-60602-6
£ 109,99 | CHF 141,50 | 119,99 € | 131,99 € (A) | 128,39 € (D)

Available

Discount group

Science (SC)

Product category

Monograph

Series

Springer Tracts in Advanced Robotics

Other renditions

Softcover
ISBN 978-3-319-60604-0
Softcover
ISBN 978-3-319-86897-4

Engineering : Robotics and Automation

Valencia, Rafael, Andrade-Cetto, Juan

Mapping, Planning and Exploration with Pose SLAM

- Deals with the mapping, path planning, and autonomous exploration problems, adopting the so-called Pose SLAM as the basic state estimation machinery
- Proposes a novel approach allowing a mobile robot to plan a path and to select the appropriate actions to autonomously construct the map, while maximizing coverage and minimizing localization and map uncertainties
- The presented method has been extensively tested both in simulation and in experiments with a real outdoor robot

This monograph introduces a unifying framework for mapping, planning and exploration with mobile robots considering uncertainty, linking such problems with a common SLAM approach, adopting Pose SLAM as the basic state estimation machinery. Pose SLAM is the variant of SLAM where only the robot trajectory is estimated and where landmarks are used to produce relative motion measurements between robot poses. With regards to extending the original Pose SLAM formulation, this monograph covers the study of such measurements when they are obtained with stereo cameras, develops the appropriate noise propagation models for such case, extends the Pose SLAM formulation to SE(3), introduces information-theoretic loop closure tests, and presents a technique to compute traversability maps from the 3D volumetric maps obtained with Pose SLAM. A relevant topic covered in this monograph is the introduction of a novel path planning approach that exploits the modeled uncertainties in Pose SLAM to search for the path in the pose graph that allows the robot to navigate to a given goal with the least probability of becoming lost. Another relevant topic is the introduction of an autonomous exploration method that selects the appropriate actions to drive the robot so as to maximize coverage, while minimizing localization and map uncertainties.

Order online at springer.com/booksellers

Springer Nature Customer Service Center GmbH
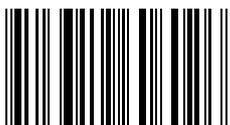Customer Service
Tiergartenstrasse 15-17
69121 Heidelberg
Germany
T: +49 (0)6221 345-4301
row-booksellers@springernature.com

ISBN 978-3-319-60602-6 / BIC: TJFM1 / SPRINGER NATURE: SCT19020

Part of **SPRINGER NATURE**