

1. Record Nr.	UNINA9910778807503321
Autore	Lyons Damian M
Titolo	Cluster computing for robotics and computer vision [[electronic resource] /] / Damian M. Lyons
Pubbl/distr/stampa	Singapore, : World Scientific, c2011
ISBN	1-283-43325-7 9786613433251 981-283-636-5
Descrizione fisica	1 online resource (235 p.)
Disciplina	629.8925
Soggetti	Robotics - Programming Computer vision - Programming
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references (p. 199-206) and index.
Nota di contenuto	Dedication; Preface; Contents; List of Tables; List of Figures; 1. Introduction; 1.1 Robots; 1.2 Cluster Computing; 1.3 Overview of the Book; 2. Clusters and Robots; 2.1 Parallel Computation; 2.1.1 Parallel Architectures; 2.1.2 Multiprocessor; 2.1.3 Multicomputer; 2.2 Clusters; 2.2.1 Terminology; 2.2.2 Cluster Configuration; 2.2.3 Programming the Cluster; 2.2.4 Configuring the Cluster; 2.2.5 Simple Cluster Configuration with OpenMPI; 2.2.6 Connecting the Cluster to the Robot; 2.3 Summary; References; 3. Cluster Programming; 3.1 Approaches to Parallel Programming; 3.2 Programming with MPI 3.2.1 Message-Passing3.2.2 Single Program Multiple Data (SPMD) Model; 3.2.3 Collective Communication; 3.3 Compiling and Running MPI Programs; 3.4 Analyzing Parallel Computation Time; 3.4.1 Speedup and Amdhal'sLaw; 3.4.2 Communication and Calculation; 3.4.3 Communication Models; 3.5 Summary; References; 4. Robot Motion; 4.1 Motion of a Mobile Robot in Two Dimensions; 4.2 Calculation of Location by Dead-Reckoning; 4.2.1 Partitioning: Block Data Decomposition; 4.2.2 Program Design; 4.2.3 Analysis; 4.3 Dead-Reckoning with Intermediate Results; 4.3.1 Partitioning; 4.3.2 Program Design 4.3.3 Analysis4.4 Dead-Reckoning for a Team of Robots; 4.4.1 Partitioning; 4.4.2 Program Design; 4.4.3 Analysis; 4.4.4 Local and

Global Buffers; 4.5 Summary; References; 5. Sensors; 5.1 Transforming Sensor Readings; 5.1.1 Partitioning: Single Robot Location; 5.1.2 Analysis; 5.1.3 Partitioning: Multiple Robot Locations; 5.1.4 Analysis; 5.2 Drawing a Map from Sonar Data; 5.2.1 Finding Straight Lines with the Hough Transform; 5.2.2 Partitioning; 5.2.3 Program Design; 5.2.4 Analysis; 5.2.5 Load Balanced Hough Calculation; 5.2.6 Analysis; 5.3 Aligning Laser Scan Measurements  
5.3.1 Polar Scan Matching; 5.3.2 Partitioning and Analysis; 5.3.3 Program Design; 5.4 Summary; References; 6. Mapping and Localization; 6.1 Constructing a Spatial Occupancy Map; 6.1.1 Probabilistic Sonar Model; 6.1.2 Bayesian Filtering; 6.1.3 Partitioning by Map; 6.1.4 Program Design; 6.1.4.1. Phase 1; 6.1.4.2. Phase 2; 6.1.4.3. Phase 3; 6.1.4.4. Phase 4; 6.1.5 Analysis; 6.1.6 Partitioning by Sensor Readings; 6.1.7 Program Design; 6.1.8 Analysis; 6.2 Monte-Carlo Localization; 6.2.1 Partitioning; 6.2.2 Program Design; 6.2.3 Analysis; 6.2.4 Improving the Serial Fraction; 6.3 Summary; References  
7. Vision and Tracking; 7.1 Following the Road; 7.2 Iconic Image Processing; 7.2.1 Partitioning; 7.2.2 Program Design; 7.2.3 Analysis; 7.2.4 Spatial Pixel Operations; 7.2.5 Partitioning; 7.2.6 Program Design; 7.3 Multiscale Image Processing; 7.3.1 Partitioning; 7.4 Video Tracking; 7.4.1 Spatial Histograms; 7.4.2 Condensation; 7.4.3 Partitioning; 7.4.4 Program Design; 7.5 Summary; References; 8. Learning Landmarks; 8.1 Landmark Spatiograms; 8.2 K-Means Clustering; 8.2.1 Partitioning; 8.2.2 Program Design; 8.2.3 Analysis; 8.3 EM Clustering; 8.3.1 Partitioning; 8.3.2 Program Design; 8.3.3 Analysis  
8.4 Summary

---

## Sommario/riassunto

In this book, we look at how cluster technology can be leveraged to build better robots. Algorithms and approaches in key areas of robotics and computer vision, such as map building, target tracking, action selection and landmark learning, are reviewed and cluster implementations for these are presented. The objective of the book is to give professionals working in the beowulf cluster or robotics and computer vision fields a concrete view of the strong synergy between the areas as well as to spur further fruitful exploitation of this connection. The book is written at a level appropriate for a

---