## CONTENTS

<table>
<thead>
<tr>
<th>Preface</th>
<th>ix</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 Introduction</strong></td>
<td>1</td>
</tr>
<tr>
<td>1.1 Distributed Coverage Control of Mobile Sensor and Actuator Networks</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Overview of the Book</td>
<td>4</td>
</tr>
<tr>
<td>1.3 Some Other Remarks</td>
<td>6</td>
</tr>
<tr>
<td><strong>2 Barrier Coverage between Two Landmarks</strong></td>
<td>9</td>
</tr>
<tr>
<td>2.1 Introduction</td>
<td>9</td>
</tr>
<tr>
<td>2.2 Problem of Barrier Coverage between Two Landmarks</td>
<td>10</td>
</tr>
<tr>
<td>2.3 Distributed Self-Deployment Algorithm for Barrier Coverage</td>
<td>12</td>
</tr>
<tr>
<td>2.4 Illustrative Examples</td>
<td>14</td>
</tr>
<tr>
<td><strong>3 Multi-level Barrier Coverage</strong></td>
<td>17</td>
</tr>
<tr>
<td>3.1 Introduction</td>
<td>17</td>
</tr>
<tr>
<td>3.2 Problem of $K$-Barrier Coverage</td>
<td>18</td>
</tr>
<tr>
<td>3.3 Distributed Algorithm for $K$-Barrier Coverage</td>
<td>22</td>
</tr>
</tbody>
</table>
4 Problems of Barrier and Sweep Coverage in Corridor Environments 33
4.1 Introduction 33
4.2 Corridor Coverage Problems 34
  4.2.1 Barrier Coverage 35
  4.2.2 Sweep Coverage 37
4.3 Barrier Coverage in 1D Space 38
4.4 Corridor Barrier Coverage 39
4.5 Corridor Sweep Coverage 42
4.6 Illustrative Examples 43

5 Sweep Coverage along a Line 57
5.1 Introduction 57
5.2 Problem of Sweep Coverage along a Line 60
5.3 Sweep Coverage along a Line 63
5.4 Assumptions and the Main Results 68
5.5 Illustrative Examples 72
  5.5.1 Straight-Line Sweeping Paths 73
  5.5.2 Comparison with the Potential Field Approach 73
  5.5.3 Sweep Coverage along Non-straight Lines 74
  5.5.4 Scalability 75
  5.5.5 Measurement Noises 76
  5.5.6 Sea Exploration 77
5.6 Proofs of the Technical Facts Underlying Theorem 5.1 79

6 Optimal Distributed Blanket Coverage Problem 87
6.1 Introduction 87
6.2 Blanket Coverage Problem Formulation 88
6.3 Randomized Coverage Algorithm 90
6.4 Illustrative Examples 93

7 Distributed Self-Deployment for Forming a Desired Geometric Shape 97
7.1 Introduction 97
7.2 Self-Deployment on a Square Grid 98
CONTENTS

10.4 Illustrative Examples and Computer Simulation Results 168
10.5 Theoretical Analysis of the Algorithm 171

References 181
Index 191