Raphael

Construction and Building Automation

From Concepts to Implementation



This book is intended to be used as a textbook in undergraduate civil engineering and construction courses to introduce cutting edge mechanical, electrical, and computer science topics that are needed for civil and construction engineers to collaborate in inter-disciplinary automation projects. Part I introduces the basics of hardware and software technologies that are needed for implementing automation in buildings and construction. The content begins with the fundamental concepts and uses practical examples to bring out the benefits of automation through case studies that are easy to understand. No other book uniformly treats the subject of automation within the context of buildings and construction activities. While the technology needed for these two application domains are similar, the unifying principles are not well recognized. This book will bring out the fundamental principles that could form the basis of application to these two domains. For example, it will become clear that sensors, actuators, and controllers, along with smart control strategies could be used for automating tasks within buildings and on construction sites. Part II of the book will introduce key advances in the areas of machine learning and artificial intelligence that are significant for the intelligent control of buildings and construction equipment. Control algorithms and techniques for data analytics are explained in a form that is appropriate for non-computer science students. Each chapter contains several hands-on exercises meant to apply the principles that are covered. These include numerical problems as well as design and analysis examples. This new textbook: • Introduces hardware and software needed for automating engineering tasks • Presents examples of applications in the control of building systems • Illustrates of the use of automation for improving construction processes • Provides a lucid introduction to advanced computing concepts, machine learning, artificial intelligence, and control algorithms to construction and engineering students. It is sure to be essential reading for a growing number of courses in smart construction, building automation, robotics, intelligent buildings, and construction 4.0. Supplementary material including answers to exercises in the book will be provided on the author's website: https://bennyraphael.com/book2022/

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