Mechanical Assemblies: Their Design, Manufacture, and Role in Product Development

Oxford University Press, 2004. ISBN: 0195157826. US$101.00.

Assembly is the process by which parts become products that do useful things. Therefore it is fundamental to the work of every mechanical engineer. Yet the design of assemblies and the process of assembling them are rarely taught in universities.

In order to to develop a systematic approach to the modeling and design of assemblies, this text addresses the subject on two levels. "Assembly in the Small" develops a systematic theory for the design of assemblies with their functions in mind, starting from the basic principles of mechanical constraint and including methods for representing assemblies mathematically. In addition, important assembly analysis techniques such as predicting variation and generating assembly sequences are covered using a consistent mathematical formulation. "Assembly in the Large" deals with the role of assemblies in product development, including product architecture, design for assembly, and manufacturing strategy as well as design and evaluation of assembly processes and systems.

Principles of Robot Motion: Theory, Algorithms, and Implementations

Howie Choset, Kevin M. Lynch, Seth Hutchinson, George Kantor, Wolfram Burgard, Lydia E. Kavraki, and Sebastian Thrun, MIT Press (MIT Series on Intelligent Robotics and Autonomous Agents), 2005. ISBN 0-262-03327-5. US$60.00.

Robot motion planning has become a major focus of robotics. Research findings can be applied not only to robotics but also to planning routes on circuit boards; directing digital actors in computer graphics, robot-assisted surgery, and medicine; and in novel areas like drug design and protein folding. This text reflects the great advances in the field that have taken place in the last ten years, including sensor-based planning, probabalistic planning, localization and mapping, and motion planning for dynamic and nonholonomic systems. The book aims to make the mathematical underpinnings of robot motion accessible to students of computer science and engineering, relating low-level implementation details to high-level algorithmic concepts. Chapters 2–6 treat geometric motion planning approaches, chapter 7 covers probabilistic methods for geometric planning, chapters 8–9 cover probabilistic methods mainly for localization, and chapters 10–12 cover dynamic mechanical systems. New mathematical concepts are introduced in an intuitive manner on an as-needed basis; the appendix contains further background on topics including graph theory, probability, filtering, and statistics. The seven coauthors each worked on all 12 chapters.