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INDUSTRIAL  
ELECTRONICS

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HANDBOOK

Editor-in-Chief  
**J. DAVID IRWIN**



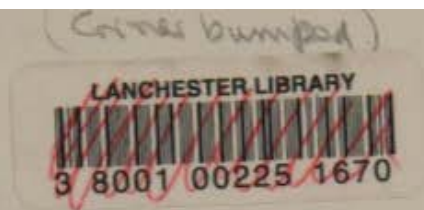
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A CRC Handbook Published in Cooperation with IEEE Press

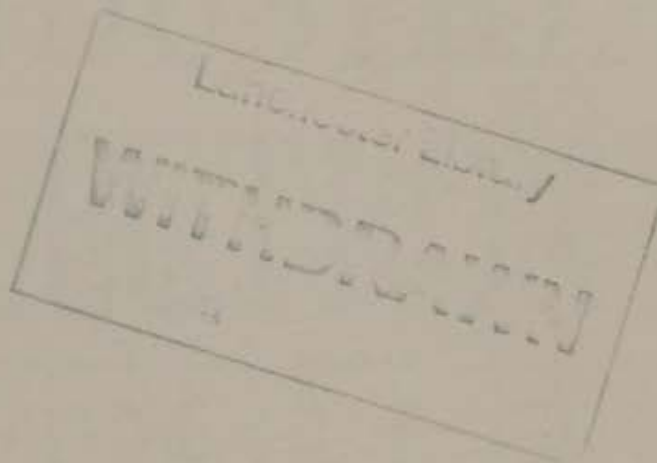
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# INDUSTRIAL ELECTRONICS

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H A N D B O O K

EDITED BY  
J. DAVID STONEN

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Preface

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# INDUSTRIAL ELECTRONICS

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H A N D B O O K

Editor-in-Chief  
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CRC PRESS



IEEE PRESS

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## Introduction

The purpose of *The Industrial Electronics Handbook* is to provide a reference that is both concise and useful for individuals who range from students in engineering to experienced practicing professionals. The Handbook is designed to cover a very wide range of topics that comprise the subject of industrial electronics in a well-organized and highly informative manner. This volume is a careful blend of the traditional topics with the new and innovative technologies that are at the vanguard of the advancements being made in this subject. Special emphasis is placed on the practical application of the technologies discussed. Thus this Handbook is not a theoretical tome, but an enlightening presentation of the usefulness of the variety of technological entities that encompass the field. In an effort to further enhance the value of the book to the reader and foster a clear understanding of the material, the presentation is tutorial in nature, and items, such as examples of the practical use of the technology described, have been deliberately included.

The contributors to this Handbook span the globe (about one-fourth of them are from outside the U.S.) and are some of the leading authorities in their areas of expertise. Approximately one-third of them are from industry and government. The remaining contributors are from academe. All of them were chosen because of their intimate knowledge of their subjects as well as their ability to present them in an easily understandable manner.

## Organization

The book is organized into two parts. Part 1 presents the traditional topics that have long been fundamental core areas of this technology. Part 2 introduces the new emerging and exciting areas that will play a vital and increasingly important role in the future of industrial electronics. The material not only stresses the key concepts, models, parameters, and equations that describe the technology, but in addition special emphasis is placed on the application of this technology to real-world problems. A unique mix of the basic principles and their application has been provided by authors who are eminently qualified and very experienced to address the important aspects of this technology.

Part 1 begins with a tutorial discussion of some of the topics which are basic to industrial electronics and provides the foundation for the development of the remaining sections. The section on Data Acquisition and Measurement Systems addresses the issues surrounding the manner in which data in an industrial process are obtained for analysis and subsequent use in such areas as communication, control, and automation. The remaining sections in Part 1 present the elements and methodologies of Power Electronics, Factory Communications, System Control, and Factory Automation which form the backbone of the industrial processes employed on the factory floor.

Part 2, which is entitled Intelligent Electronics and Emerging Technologies, presents the new modern techniques that are having, and will continue to have, a profound effect on the development and optimization of industrial systems. The fundamental characteristic, which permeates the new industrial electronics technologies, is the implied or specific use of some form of intelligence. These technologies include expert systems, neural networks, fuzzy systems, soft computing, evolutionary systems, computational intelligence, and hybrid systems. The emerging technologies, which exhibit great promise for use in industrial processes, include virtual reality, asynchronous transfer mode technology, micro-electro-mechanical systems, and multisensor fusion and integration.

## Locating Your Topic

Numerous avenues of access to information contained in the Handbook are provided. A complete table of contents is presented at the front of the book. In addition, an individual table of contents precedes each of the ten sections. Finally, each chapter begins with its own table of contents. The reader should look over these tables of contents to become familiar with the structure, organization, and content of the book.

Two alphabetical indexes have been compiled to provide access to information. The first is an index of contributing authors and the second a detailed subject index.

*The Industrial Electronics Handbook* is designed to provide both the young engineer and the experienced professional with answers to questions involving the wide spectrum of industrial electronics technology covered in this book. The topical coverage, as well as the numerous avenues to its access, hopefully will effectively satisfy the reader's needs.

## Acknowledgments

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