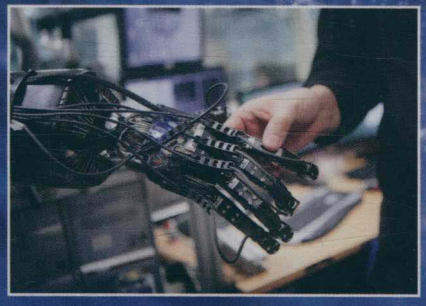
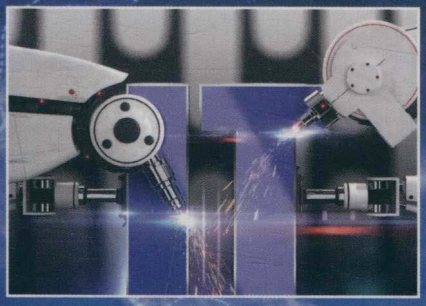
ROBOTS AND ROBOTICS

Principles, Systems, and Industrial Applications

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Robots and Robotics

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Robots and Robotics

Principles, Systems, and Industrial Applications

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To Patricia Ann Miller, wife, mother, and a great teacher . . .

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Preface

This book was written with a number of purposes in mind. While many people want to know more about robots and robotics, most do not have the engineering or technical background in pneumatics, hydraulics, and electronics to understand what a robot is all about internally or conceptually. Further, some people who do have the necessary background do not know where to start in looking at the future of robots in their own trade or profession. Thus *Robots and Robotics: Principles, Systems, and Industrial Applications* is intended as a comprehensive introduction to the topic.

This book is suitable for use in a first course on robotics for students in industrial electronics programs as well as in mechanical, manufacturing, or industrial technology. It is also designed to serve as a source of information on robots and robotics for robot hobbyists, professional machinists, electricians, and electronics technicians. It provides a broad view of the subject without overwhelming the reader with technical detail or jargon.

The text relies on the real world of robots to bring excitement to its pages. Up-to-date examples of industrial robots and practical applications are emphasized throughout the book. Ample illustrations are provided to clarify the discussion and to aid readers in recognizing robot parts and movements. End-of-chapter key terms sections and a comprehensive glossary at the end of the book are included to make words applicable to robots easy to understand and master. Chapter review questions and their answers are also in the book.

Whether beginners or individuals who have worked with machines for some time, readers will gain not only fundamental knowledge but also new insights into the complex field of robotics. Chapter 7 on putting a robot to work will give readers a clear idea of what these machines can and cannot do. While robots have a long way to go before they can do all the things we dream they will do, they are an exciting and dynamic force that *must* be seriously considered by everyone, no matter his or her occupation or interests. The goal of this book is to provide the

necessary information in such a way that it can be used effectively by readers of all skill levels and backgrounds.

The organization of this book is flexible and allows for individual preferences in the order of study. Chapter 1 provides an overview of robotics. It includes a definition of what constitutes a robot and outlines both the positive and negative aspects of robots, as well as their interaction with human labor. Chapter 1 also contains a brief review of component programs, languages, and microprocessors.

Chapter 2 identifies various types of robots. Parts of the robot and robotic motion capabilities are also examined. Chapter 3 covers the mechanical components of robots, such as drive systems, pumps, and motors. Sensor types and sensing capabilities are discussed in Chapter 4.

Chapter 5 covers control methods for robots, including various methods of robot programming. Chapter 6 emphasizes the computer working with the robot. It also presents a better understanding of programming and control of the robot. Vision for the robot as well as object recognition is covered. Chapter 7 examines the topic of robots in industry and the future of robots and robotics. Chapter 8 provides a list of manufacturers and equipment, along with specifications, descriptive information, and illustrations from manufacturers' catalogs. Chapter 9 includes a comprehensive set of principles and practices for troubleshooting electronic controls and electric motors. Chapter 10 discusses robots of yesterday and tomorrow.

In addition to a glossary, six appendices are included to enlarge the book's usefulness. Appendix A provides a conversion chart so that international references to various values can be converted to the U.S. system with as little effort as possible. Appendix B provides a more comprehensive look at the newest robots and their controllers. Appendix C deals with the opportunities for robot repairpersons and robotics engineers. Appendix D illustrates electronics and fluid power schematic symbols. Appendix E is a cross-comparison that shows the reader the vast number of robots available; some of the information goes back to the 1970s when robots burst on the scene the world over. Appendix F provides formulas and conversion factors often needed in the work world that includes robots and their programming, control, and design. The robot operator and/or robot technician should have a scientific-type calculator handy to solve some of the problems that arise in dealing with robots and robotics. Mathematics demands a more important role in the operation and design of robots and their installation and utilization.

Mark R. Miller
Rex Miller

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