



# Robot Technology Fundamentals

*By James G. Keramas*

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## **Robot Technology Fundamentals** By James G. Keramas

Designed as a reference tool, this new book, Robot Technology Fundamentals, covers all the practical aspects, disciplines and latest developments in industrial robots. It includes various exercises and case studies for self-review. In addition, the latest robot manufacturers with address, phone and fax numbers are included in the appendix.

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## **Editorial Review**

### **Review**

PREFACE. INTRODUCTION: Objective. Automation and Robot. Brief History. Economic and Social Issues. Present and Future Applications. Summary. Questions. Problems. References. ROBOT CLASSIFICATION: Objectives. Manipulator Arm Geometry. Degrees of Freedom. Power Sources. Types of Motion. Path Control. Summary. Questions. Problems. References. ROBOT END EFFECTORS: Objectives. Types of End Effectors. Mechanical Grippers. Gripper Force Analysis. Other Types of Grippers. Special-purpose Grippers. Gripper Selection and Design. Process Tooling. Compliance. Summary. Questions. Problems. References. ROBOT TECHNOLOGY: Objectives. Fundamentals. General Characteristics. Basic Components. Robot Anatomy. Methods of Path Control. Robot Generations. Robot Selection. Summary. Questions. Problems. References. ROBOT SYSTEM ANALYSIS: Objectives. Robot Operation. Hierarchical Control Structure. Line Tracking. Dynamic Properties of Robots. Modular Robot Components. Summary. Questions. Problems. References. SENSORS: Objectives. Robot Sensors. Sensor Classification. Microswitches. Solid State Switches. Proximity Sensors. Photoelectric Sensors. Rotary Position Sensors. Usage and Selection of Sensors. Signal Processing. Sensor and Control Integration. Summary. Questions. Problems. References. VISION: Objectives. Visual Sensing. Machine Vision. Machine Vision Applications. Other Optical Methods. Summary. Questions. Problems. References. PROGRAMMING: Objectives. Robot Programming. Programming Methods. Programming Languages. Levels of Robot Programming. Space Position Programming. Motion Interpolation. Program Statements. Sample Programs. Summary. Questions. Problems. References. SAFETY: Objectives. Robot Safety. Safety Standards. System Reliability. Human Factor Issues. Safety Sensors and Monitoring. Safeguarding. Training. Safety Guidelines. Definitions. Summary. Questions. Problems. References. CONTROL SYSTEMS: Objectives. Control System Correlation. Control System Requirements. Programmable Logic Controller. PLC Programming Terminals. Proportional Integral Derivative. Computer Numerical Control. Microprocessor Unit. Universal Robot Controller. Interfacing. Workcell Control. Summary. Questions. Problems. References. ARTIFICIAL INTELLIGENCE: Objectives. Intelligent Systems. Elements of Artificial Intelligence. System Architecture. Applications of Advanced Robots. Fuzzy Logic for Robot Arm Control. Advanced Concepts and Procedures. Future Developments. Impact on Employment. Summary. Questions. Problems. References. INDUSTRIAL APPLICATIONS: Objectives. Automation in Manufacturing. Robot Applications. Material-Handling Applications Processing Operations. Assembly Operations. Inspection Operations. Evaluating the Potential of a Robot Application. Future Applications. Challenge for the Future. Summary. Questions. Problems. References. APPENDICES. GLOSSARY. ROBOT MANUFACTURERS. INDEX.

### **About the Author**

Dr. Keramas has 22-years experience as a professor in Engineering Technology coupled with over 20-years or industrial practice as a project leader, director of research, inventor, consultant and entrepreneur. He has taught previously at the University of Massachusetts and Massachusetts Institute of Technology (MIT). The author of many technical journalistic articles and two texts, he is also a review board member for the Journal of Industrial Technology. In addition, he has given numerous presentations worldwide on automated manufacturing, robotics and the utilization of high technology. Dr. Keramas holds 23 patents in the United States (U.S.) and Canada for inventions in the automated manufacturing field and is an expert product liability witness listed in the Harvard Lawyer's Trial book. He is a regular consultant for the Office of Technology Innovations of the U.S. Department of Commerce and the National Institute of Standards and Technology, and has provided consulting services to companies in the U.S. and abroad. Dr. Keramas is an advisory committee member for the Pan European Network, creating joint education and industry alliances

for technology transfer and training, and a member of the Ed/Tech Group of MIT's Lincoln Laboratory, working on curriculum development for the High Tech Workforce of Tomorrow. Dr. Keramas received his Bachelor of Science and Master of Science in Mechanical Engineering from Athens Polytechnic Institute in Athens, Greece, and his Doctorate from the University of Massachusetts, Amherst. His research interest is in Automated Manufacturing, Robotics, Artificial Intelligence, CAD/CAM, and Computer Integrated Manufacturing.

## **Users Review**

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