

## **Practical Data Communications For Instrumentation**

*Learn how to develop your own applications to monitor or control instrumentation hardware. Whether you need to acquire data from a device or automate its functions, this practical book shows you how to use Python's rapid development capabilities to build interfaces that include everything from software to wiring. You get step-by-step instructions, clear examples, and hands-on tips for interfacing a PC to a variety of devices. Use the book's hardware survey to identify the interface type for your particular device, and then follow detailed examples to develop an interface with Python and C. Organized by interface type, data processing activities, and user interface implementations, this book is for anyone who works with instrumentation, robotics, data acquisition, or process control.*

*Understand how to define the scope of an application and determine the algorithms necessary, and why it's important Learn how to use industry-standard interfaces such as RS-232, RS-485, and GPIB Create low-level extension modules in C to interface Python with a variety of hardware and test instruments Explore the console, curses, TkInter, and wxPython for graphical and text-based user interfaces Use open source software tools and libraries to reduce costs and avoid implementing functionality from scratch*

*Practical Machinery Safety aims to provide you with the knowledge to tackle machinery safety control problems at a practical level whilst achieving compliance with national and international standards. The book highlights the major international standards that are used to support compliance with EU regulations and uses these standards as a basis for the design procedures. It looks at the risk assessment processes used to identify hazards and to quantify the risks inherent in a machine. It introduces the concepts of safety categories as defined by standard EN954-1 (Safety of Machinery) and illustrates the principles of failsafe design, fault tolerance and self-testing. It also provides an introduction to machinery protection devices such as guards, enclosures with interlocks and guard-monitoring relays, locking systems, safety mats, photo-electric and electro-sensitive principles and the application of light curtains, a study of Safety Control System techniques, and introduces the principles of safety-certified PLCs. Plan and implement safety systems that deliver a safe working environment and compliance with national and international standards Apply simple risk assessments and hazard design methods to your own projects Identify hazards that occur with machinery and know how to deal with them*

*Designed to increase understanding on a practical and theoretical*

*basis, this invaluable resource provides engineers, plant operators, electricians and technicians with a thorough grounding in the principles and practicalities behind power system protection. Coverage of the fundamental knowledge needed to specify, use and maintain power protection systems is included, helping readers to increase plant efficiency, performance and safety. Consideration is also given to the practical techniques and engineering challenges encountered on a day-to-day basis, making this an essential resource for all.*

*Advances such as 3-G mobile communications networks demonstrate the increasing capability of high-quality data transmission over wireless media. Adapting wireless functionality into instrument and sensor systems endows them with unmatched flexibility, robustness, and intelligence. *Wireless Sensors and Instruments: Networks, Design, and Applications* explains the principles, state-of-the-art technologies, and modern applications of this burgeoning field. From underlying concepts to practical applications, this book outlines all the necessary information to plan, design, and implement wireless instrumentation and sensor networks effectively and efficiently. The author covers the basics of instruments, measurement, sensor technology, communication systems, and networks along with the theory, methods, and components involved in digital and wireless instruments. Placing these technologies in context, the book also examines the principles, components, and techniques of modern communication systems followed by network standards, protocols, topologies, and security. Building on these discussions, the book uses examples to illustrate the practical aspects of constructing sensors and instruments. Finally, the author devotes the closing chapter to applications in a broad array of fields, including commercial, human health, and consumer products applications. Filled with up-to-date information and thorough coverage of fundamentals, *Wireless Sensors and Instruments: Networks, Design, and Applications* supplies critical, hands-on tools for efficiently, effectively, and immediately implementing advanced wireless systems.*

*Practical Data Acquisition for Instrumentation and Control Systems*

*Practical SCADA for Industry*

*For Business and Industry*

*An Introduction*

*DNP3, 60870.5 and Related Systems*

Instrumentation and control, and electrical power engineering are increasingly reliant on radio-based communication technology. This is a comprehensive book covering the essentials of telemetry and radio communications. It explains the principles of telemetry and radio communications, describes their application and equips you with the skills to analyse, specify and debug telemetry and radio communications systems. Key issues addressed in this book are: \* how to design and install radio (wireless) links \* apply latest satellite technologies to your telemetry system \* how to design and install microwave links \*

troubleshoot telemetry communications problems \* tips, tricks and traps with radio links · A guide to the design, installation and utilization of radio applications in instrumentation and control, and electrical power engineering · Explains the principles of telemetry and radio communications, describes their application and equips you with the skills to analyse, specify and debug telemetry and radio communications systems · Addresses topical areas such as designing and installing wireless communications links, the application of satellite technologies in telemetry, microwave links, etc.

SCADA (Supervisory Control and Data Acquisition) systems are at the heart of the modern industrial enterprise ranging from mining plants, water and electrical utility installations to oil and gas plants. In a market that is crowded with high-level monographs and reference guides, more practical information for professional engineers is required. This book covers the essentials of SCADA communication systems focussing on DNP3, the IEC 60870.5 standard and other new developments in this area. It commences with a brief review of the fundamentals of SCADA systems' hardware, software and the communications systems (such as RS-232, RS-485, Ethernet and TCP/IP) that connect the SCADA Modules together. A solid review is then done on the DNP3 and IEC 60870.5 protocols where its features, message structure, practical benefits and applications are discussed. This book provides you with the knowledge to design your next SCADA system more effectively with a focus on using the latest communications technologies available. \* Covers the essentials of SCADA communication systems and other new developments in this area \* Covers a wide range of specialist networking topics and other topics ideal for practicing engineers and technicians looking to further and develop their knowledge of the subject \* Extremely timely subject as the industry has made a strong movement towards standard protocols in modern SCADA communications systems

Highway Addressable Remote Transducer (HART) was developed in the mid to late 1980s by Rosemount, as a digital replacement for 4-20 mA technology for transmitting a process variable for analog instruments. Today, it is the world's most often used protocol for process automation. In this book, the author, James Powell, uses his 18 years of HART technical support and product development knowledge to produce a practical guide on how to use HART. This book is written for people who work with HART, and it will truly assist in making projects successful. The purpose of this guide is to look at the protocol from a practical point of view and show how to use it properly. What Automation Professionals Think About This Book: "A logical, useful guide! This book serves to provide the reader with a realistic and factual resource that can fully prepare Engineers for any HART / HART-IP / HART Wireless inquiry that may arise. It provides useful descriptions and tips on good design, integration and troubleshooting. It is refreshing that this document serves not as another infoglut, but rather a useful guide to assist you in real-life applications." Kyle Roos Technical Trainer, Sales & Marketing team lead, IDX Industrial Data Xchange, South Africa. "Following on from his equally informative book on Profibus, Catching the Profibus Fieldbus, James has succeeded in writing a concise introduction to the Hart protocol that I would thoroughly recommend to anyone with an interest in this widely used industrial automation protocol." Peter Thomas C.Eng Eur.Ing MInstMC, Control Specialists Ltd., UK

Preface; Radio Technology; Line of Sight Microwave Systems; Satellite Systems; Reliability and Availability; Infrastructure Requirements for Master Sites and RTUs; Integrating Telemetry Systems into Existing Radio Systems; Miscellaneous Telemetry Systems; Practical System Examples; Future Trends in Technology; Appendix A: Glossary of Terms; Appendix B: Path Loss Calculation Formula; Appendix C: Data Sheets; Appendix D: Local Services, Regulations and Standards.

Networks, Design, and Applications

Applied Data Communications and Networks

Curriculum Handbook with General Information Concerning ... for the United States Air Force Academy

Automated Data Acquisition and Control Systems

Design, Installation and Troubleshooting

The usage of data communications and computer networks are ever increasing. It is one of the few technological areas which brings benefits to most of the countries and the peoples of the world. Without it many industries could not exist. It is the objective of this book to discuss data communications in a readable form that students and professionals all over the world can understand. As much as possible the text uses diagrams to illustrate key points. Most currently available data communications books take their view point from either a computer scientists top-down approach or from an electronic engineers bottom-up approach. This book takes a practical approach and supports it with a theoretical background to create a textbook which can be used by electronic engineers, computer engineers, computer scientists and industry professionals. It discusses most of the current and future key data communications technologies, including: • Data Communications Standards and Models; • Local Area Networks (Ethernet, Token Ring and FDDI); • Transmission Control Protocol/Internet Protocol (TCP/IP); • High-level Data Link Control (HDLC); • X.25 Packet-switching; • Asynchronous Communications (RS-232) and Modems; • Pulse Coded Modulation (PCM); • Integrated Digital Services Network (ISDN); • Asynchronous Transfer Mode (ATM); • Error Control; • X-Windows. The chapters are ordered in a possible structure for the presentation of the material and have not been sectioned into data communications areas.

This book provides the reader with an understanding of the hazards involved in using electrical equipment in Potentially Explosive Atmospheres. It is based on the newly adopted international IEC79 Series of Standards that are now harmonizing and replacing older national Standards. Explosion-proof installations can be expensive to design, install and operate. The strategies and techniques described in this book can significantly reduce costs whilst maintaining plant safety. The book explains the associated terminology and its correct use - from Area Classification through to the selection of explosion-protected electrical apparatus, describing how protection is achieved and maintained in line with these international requirements. The IEC standards require that engineering staff and their management are trained effectively and safely in Hazardous Areas, and this book is designed to help fulfill that need. A basic understanding of instrumentation and electrical theory would be of benefit to the reader, but no previous knowledge of hazardous area installation is required. \* An engineer's guide to the hazards and best practice for using electrical equipment in Potentially Explosive Atmospheres. \* Fully in line with the newly adopted international standards, the IEC79 series. \* Clear explanations of terminology and background information make this the most accessible book on this subject. \* Covers all aspects of the data acquisition system from design and specification to programming, installation and configuration \* Gives

both the novice and experienced user a solid understanding of interfacing the PC and standalone instruments to real-world signals from the laboratory to the industrial plant \* Provides a thorough grasp of PC data acquisition systems and the ability to design, specify, install and configure and program data acquisition systems quickly and effectively This book focuses on data acquisition and control using the PC and standalone instruments. The PC has made a dramatic impact in the ease with which the technician, scientist and engineer today can set up their own test and measurement system at a remarkably low cost. And this book aims to show you how easy it is with plenty of carefully researched information. The popular IEEE 488 interface is also covered. All aspects of the data acquisition system are included from design and specification to programming, installation and configuration. This book gives both the novice and experienced user a solid grasp of the principles and practical implementation of interfacing the PC and standalone instruments to real-world signals from the laboratory to the industrial plant. Once you have read the book, you will have a thorough grasp of PC data acquisition systems and will be able to design, specify, install and configure and program data acquisition systems quickly and effectively. \* Covers all aspects of the data acquisition system from design and specification to programming, installation and configuration \* Gives both the novice and experienced user a solid understanding of interfacing the PC and standalone instruments to real-world signals from the laboratory to the industrial plant \* Provides a thorough grasp of PC data acquisition systems and the ability to design, specify, install and configure and program data acquisition systems quickly and effectively

New technologies are revolutionising the way manufacturing and supply chain management are implemented. These changes are delivering manufacturing firms the competitive advantage of a highly flexible and responsive supply chain and manufacturing system to ensure that they meet the high expectations of their customers, who, in today's economy, demand absolutely the best service, price, delivery time and product quality. To make e-manufacturing and supply chain technologies effective, integration is needed between various, often disparate systems. To understand why this is such an issue, one needs to understand what the different systems or system components do, their objectives, their specific focus areas and how they interact with other systems. It is also required to understand how these systems evolved to their current state, as the concepts used during the early development of systems and technology tend to remain in place throughout the life-cycle of the systems/technology. This book explores various standards, concepts and techniques used over the years to model systems and hierarchies in order to understand where they fit into the organization and supply chain. It looks at the specific system components and the ways in which they can be designed and graphically depicted for easy understanding by both information technology (IT) and non-IT personnel. Without a good implementation philosophy, very few systems add any real benefit to an organization,

and for this reason the ways in which systems are implemented and installation projects managed are also explored and recommendations are made as to possible methods that have proven successful in the past. The human factor and how that impacts on system success are also addressed, as is the motivation for system investment and subsequent benefit measurement processes. Finally, the vendor/user supply/demand within the e-manufacturing domain is explored and a method is put forward that enables the reduction of vendor bias during the vendor selection process. The objective of this book is to provide the reader with a good understanding regarding the four critical factors (business/physical processes, systems supporting the processes, company personnel and company/personal performance measures) that influence the success of any e-manufacturing implementation, and the synchronization required between these factors.

- Discover how to implement the flexible and responsive supply chain and manufacturing execution systems required for competitive and customer-focused manufacturing
- Build a working knowledge of the latest plant automation, manufacturing execution systems (MES) and supply chain management (SCM) design techniques
- Gain a fuller understanding of the four critical factors (business and physical processes, systems supporting the processes, company personnel, performance measurement) that influence the success of any e-manufacturing implementation, and how to evaluate and optimize all four factors

Practical Machinery Safety

Practical E-Manufacturing and Supply Chain Management

Practical Embedded Controllers

Security and Resilience in Intelligent Data-Centric Systems and Communication Networks

Design and Troubleshooting with the Motorola 68HC11

\* Ideal for those with some background in communications but without previous knowledge of fiber optics \* Provides a comprehensive treatment of the fundamentals of fiber optic systems and their individual components \* Places emphasis on practical techniques of component installation and system design

Fiber Optics is a technology that uses glass (or plastic) threads (fibers) to transmit data. A fiber optic cable consists of a bundle of glass threads, each of which is capable of transmitting messages modulated onto light waves. Fiber optics have several advantages over traditional metal communications lines. While there are plenty of theoretical texts on fiber optics, high-level engineering texts and installation guides, there are few comprehensive applied texts for practicing engineers. This book covers design issues, installation and troubleshooting in the right depth for engineers working in industry. Readers will use this knowledge to develop the required techniques for design, installation and maintenance of their own fiber optic systems.

This is a book for engineers that covers the hardware and software aspects of high-reliability safety systems, safety instrumentation and shutdown systems as well as risk assessment techniques and the wider spectrum of industrial safety. Rather than another book on the discipline of safety engineering, this is a thoroughly practical guide to the procedures and technology of safety in control and plant engineering. This highly practical book focuses on efficiently implementing and assessing hazard studies, designing and applying international safety practices and techniques, and ensuring

high reliability in the safety and emergency shutdown of systems in your plant. This book will provide the reader with the most up-to-date standards for and information on each stage of the safety life cycle from the initial evaluation of hazards through to the detailed engineering and maintenance of safety instrumented systems. It will help them develop the ability to plan hazard and risk assessment studies, then design and implement and operate the safety systems and maintain and evaluate them to ensure high reliability. Finally it will give the reader the knowledge to help prevent the massive devastation and destruction that can be caused by today's highly technical computer controlled industrial environments. \* Helps readers develop the ability to plan hazard and risk assessment studies, then design, implement and operate the safety systems and maintain and evaluate them to ensure high reliability \* Gives the reader the knowledge to help prevent the massive devastation that can be caused by today's highly technical computer controlled industrial environments \* Rather than another book on the discipline of safety engineering, this is a thoroughly practical guide to the procedures and technology of safety in control and plant engineering

This book provides you with the knowledge to analyse, specify and debug SCADA systems in the instrumentation and control environment.

The technology and structure of telecommunications networks has changed dramatically over the past few years. These developments have changed the equipment you purchase, the services you use, the providers you can choose, and the methods available for transporting data. Practical Telecommunications and Wireless Communications for Engineers and Technicians will be of particular benefit to those who want to take full advantage of the latest and most effective telecommunications technology and services. This book provides a grounding in the fundamentals of modern telecommunications systems in use in industrial, engineering and business settings. From networking for control systems to the use of Wireless LANs for enhanced on-site communications systems. This is a cutting-edge book on the fundamentals of telecommunications for anyone looking for a complete understanding of the essentials of the terms, jargon and technologies used. It has been designed for those who require a basic grounding in telecommunications for industrial, engineering and business applications. · Gain an understanding of the fundamentals of modern industrial, engineering and business telecommunications systems, from networking for industrial control to the use of Wireless LANs for enhanced on-site communications systems · Learn to take full advantage of the latest and most effective telecommunications technology and services · Provides a thorough grounding in the terms, jargon and technologies involved in data communications

Practical Machinery Vibration Analysis and Predictive Maintenance

Practical Batch Process Management

Practical Data Communications for Instrumentation and Control

Practical Hazops, Trips and Alarms

Practical Industrial Data Communications

**A professional engineer's guide to communications technology applications in electricity transmission and distribution.**

**Overview of Data Communications; Basic Data Communication Principles; Physical Serial Communication Standards; Error Detection; Cabling Basics; Electrical Noise and Interference; Modems and Multiplexers; Introduction to Protocols; Open Systems Interconnection Model; Industrial Protocols; HART Protocol; Open Industrial Fieldbus and DeviceNet Systems; Local Area Networks; Appendix A: Numbering Systems; Appendix B: Cyclic Redundancy Check (CRC) Program Listing;**

**Appendix C: Serial Link Design; Glossary.**

**Introduction to Data Acquisition & Control; Analog and Digital Signals; Signal Conditioning; The Personal Computer for Real Time Work; Plug-in Data Acquisition Boards; Serial Data Communications; Distributed & Standalone Loggers/Controllers; IEEE 488 Standard; Ethernet & LAN Systems; The Universal Serial Bus (USB); Specific Techniques; The PCMCIA Card; Appendix A: Glossary; Appendix B: IBM PC Bus Specifications; Appendix C: Review of the Intel 8255 PPI Chip; Appendix D: Review of the Intel 8254 Timer-Counter Chip; Appendix E: Thermocouple Tables; Appendix F: Numbers Systems; Appendix G: GPIB (IEEE-488) Mnemonics & their Definition; Appendix H: Practical Laboratories & Demonstrations; Appendix I: Command Structure & Programming.**

**SCADA systems are at the heart of the modern industrial enterprise. In a market that is crowded with high-level monographs and reference guides, more practical information for professional engineers is required. This book gives them the knowledge to design their next SCADA system more effectively.**

**A Practical Guide**

**Practical Power System Protection**

**Practical TCP/IP and Ethernet Networking for Industry**

**Practical Hydraulic Systems: Operation and Troubleshooting for Engineers and Technicians**

**Practical Grounding, Bonding, Shielding and Surge Protection**

The book provides technical know-how not covered by most universities and colleges in a subject that is central to the roles of many electrical engineers in industry, focusing on switchgear, power cables, power factor correction, and network studies. \* Learn how to install and maintain electrical power equipment in industrial settings \* Select and specify the right power system at the right price \* Provides the practical essentials for reliable operation of industrial electrical networks - covering switchgear, cabling and power correction factors

Do you have trips and safety interlocks in your plant? Are they good enough or are they perhaps over-designed and much more expensive than necessary? Are you or your company aware of how Hazard Studies should define risk reduction requirements? Are you actually using Hazard Studies at all? The answer is the integrated approach to safety management. New international standards combined with well-proven hazard study methods can improve safety management in your company. Practical Hazops, Trips and Alarms for Engineers and Technicians describes the role of hazard studies in risk management, and then proceeds with basic training in Hazop techniques. A number of practical exercises support the reference information and allow you to test your understanding of the material in the book. This book aims to bridge the discipline gap between hazard studies and the provision of safety-related alarm and trip systems. It provides training in hazard and operability methods (Hazops) and in the principles of safety instrumented systems as defined by international standard IEC 61508. Design an integrated safety management system to increase efficiency and reduce costs Learn how to carry out hazard and operability studies (Hazops) and find out how to convert Hazop outputs into safety requirements specifications Implement safety instrumented systems to the new IEC standards (IEC61508)

**Preface; Introduction to Communications; Networking Fundamentals; Ethernet Networks; Fast and Gigabit Ethernet Systems; Introduction to TCP/IP; Internet Layer Protocols; Host to Host Layer Protocols; Application Layer Protocols; TCP/IP Utilities; LAN System Components; The Internet;**



Internet Access; The Internet for Communications; Security Considerations; Process Automation; Installing and Troubleshooting TCP/IP; Satellites and TCP/IP.

There are many data communications titles covering design, installation, etc, but almost none that specifically focus on industrial networks, which are an essential part of the day-to-day work of industrial control systems engineers, and the main focus of an increasingly large group of network specialists. The focus of this book makes it uniquely relevant to control engineers and network designers working in this area. The industrial application of networking is explored in terms of design, installation and troubleshooting, building the skills required to identify, prevent and fix common industrial data communications problems - both at the design stage and in the maintenance phase. The focus of this book is 'outside the box'. The emphasis goes beyond typical communications issues and theory to provide the necessary toolkit of knowledge to solve industrial communications problems covering RS-232, RS-485, Modbus, Fieldbus, DeviceNet, Ethernet and TCP/IP. The idea of the book is that in reading it you should be able to walk onto your plant, or facility, and troubleshoot and fix communications problems as quickly as possible. This book is the only title that addresses the nuts-and-bolts issues involved in design, installation and troubleshooting that are the day-to-day concern of engineers and network specialists working in industry. \* Provides a unique focus on the industrial application of data networks \* Emphasis goes beyond typical communications issues and theory to provide the necessary toolkit of knowledge to solve industrial communications problems \* Provides the tools to allow engineers in various plants or facilities to troubleshoot and fix communications problems as quickly as possible

Geotechnical Instrumentation for Monitoring Field Performance

Practical Fiber Optics

Overview of Industrial Process Automation

Practical Electrical Network Automation and Communication Systems

Practical Telecommunications and Wireless Communications

*The first book on the subject written by a practitioner for practitioners. Geotechnical Instrumentation for Monitoring Field Performance Geotechnical Instrumentation for Monitoring Field Performance goes far beyond a mere summary of the technical literature and manufacturers' brochures: it guides reader through the entire geotechnical instrumentation process, showing them when to monitor safety and performance, and how to do it well. This comprehensive guide: \* Describes the critical steps of planning monitoring programs using geotechnical instrumentation, including what benefits can be achieved and how construction specifications should be written \* Describes and evaluates monitoring methods and recommends instruments for monitoring groundwater pressure, deformations, total stress in soil, stress change in rock, temperature, and load and strain in structural members \* Offers detailed practical guidelines on instrument calibrations, installation and maintenance, and on the collection, processing, and interpretation of instrumentation data \* Describes the role of geotechnical instrumentation during the construction and operation phases of civil engineering projects, including braced excavations, embankments on soft ground, embankment dams, excavated and natural slopes,*

*underground excavations, driving piles, and drilled shafts \* Provides guidelines throughout the book on the best practices In the past automation of the power network was a very specialized area but recently due to deregulation and privatization the area has become of a great importance because companies require more information and communication to minimize costs, reduce workforce and minimize errors in order to make a profit. \* Covers engineering requirements and business implications of this cutting-edge and ever-evolving field \* Provides a unique insight into a fast-emerging and growing market that has become and will continue to evolve into one of leading communication technologies \* Written in a practical manner to help readers handle the transformation from the old analog environment to the modern digital communications-based one*

*A SCADA system gathers information, such as where a leak on a pipeline has occurred, transfers the information back to a central site, alerting the home station that the leak has occurred, carrying out necessary analysis and control, such as determining if the leak is critical, and displaying the information in a logical and organized fashion. SCADA systems can be relatively simple, such as one that monitors environmental conditions of a small office building, or incredibly complex, such as a system that monitors all the activity in a nuclear power plant or the activity of a municipal water system. An engineer's introduction to Supervisory Control and Data Acquisition (SCADA) systems and their application in monitoring and controlling equipment and industrial plant Essential reading for data acquisition and control professionals in plant engineering, manufacturing, telecommunications, water and waste control, energy, oil and gas refining and transportation Provides the knowledge to analyse, specify and debug SCADA systems, covering the fundamentals of hardware, software and the communications systems that connect SCADA operator stations*

*This book will help the technician, engineer and user understand the microcontroller-based systems along with the most common problems and their solutions. This book covers design, specification, programming, installation, configuration and of course troubleshooting. · An engineer's guide to the design, applications and troubleshooting of microcontroller-based systems · The introductory chapters on embedded microcontroller architecture and programming are written at the right level with an applications focus for practicing engineers · A highly topical book with a wide readership involved with product design and industrial processes including control systems*

**Practical Electrical Equipment and Installations in Hazardous Areas**

**Real World Instrumentation with Python**

**Wireless Sensors and Instruments**

**Practical Computer Data Communications**

**Best Practice Techniques**

*Several years ago when I began consulting full time, I quickly discovered that despite three advanced academic degrees my practical industrial experience had some significant gaps. It thus was necessary initially to spend considerable (nonbillable) time collecting and organizing a great deal of essential information on the various aspects of modern data communications. The task was made more difficult by the highly interdisciplinary nature of the field, with the required information scattered throughout the vast international literature of telecommunications, computers, electrical engineering, military systems, mathematics, operations research, optimization, speech processing, and the murky world of legal and regulatory policy. Although there were a number of fine books and periodicals in each of these specialized disciplines, I was unable to find a single comprehensive text that covered the entire field at even a modestly attractive technical and mathematical level. After going to the trouble of organizing all this diverse material for my clients and students, it seemed rather natural to put it into book form and thus share it with those professionals working with computer data communications who need a comprehensive coverage of the subject at a level immediately applicable to their work and yet easily accessible for self-study. The project was facilitated by an agreeable publisher and an incredibly understanding and cooperative family, and Practical Computer Data Communications is the result.*

*A practical introductory guide to the principles of process measurement and control. Written for those beginning a career in the instrumentation and control industry or those who need a refresher, the book will serve as a text or to supercede the mathematical treatment of control theory that will continue to be essential for a well-rounded understanding. The book will provide the reader with the ability to recognize problems concealed among a mass of data and provide minimal cost solutions, using available technology.*

*The objective of this book is to outline the best practice in designing, installing, commissioning and troubleshooting industrial data communications systems. In any given plant, factory or installation there are a myriad of different industrial communications standards used and the key to successful implementation is the degree to which the entire system integrates and works together. With so many different standards on the market today, the debate is not about what is the best - be it Foundation Fieldbus, Profibus, Devicenet or Industrial Ethernet but rather about selecting the most appropriate technologies and standards for a given application and then ensuring that best practice is followed in designing, installing and commissioning the data communications links to ensure they run fault-free. The industrial data communications systems in your plant underpin your entire operation. It is critical that you apply best practice in designing, installing and fixing any problems that may occur.*

*This book distills all the tips and tricks with the benefit of many years of experience and gives the best proven practices to follow. The main steps in using today's communications technologies involve selecting the correct technology and standards for your plant based on your requirements; doing the design of the overall system; installing the cabling and then commissioning the system. Fiber Optic cabling is generally accepted as the best approach for physical communications but there are obviously areas where you will be forced to use copper wiring and, indeed, wireless communications. This book outlines the critical rules followed in installing the data communications physical transport media and then ensuring that the installation will be trouble-free for years to come. The important point to make is that with today's wide range of protocols available, you only need to know how to select, install and maintain them in the most cost-effective manner for your plant or factory - knowledge of the minute details of the protocols is not necessary. An engineer's guide to communications systems using fiber optic cabling, copper cabling and wireless technology Covers: selection of technology and standards - system design - installation of equipment and cabling - commissioning and maintenance Crammed with practical techniques and know how - written by engineers for engineers*

*Practical Centrifugal Pumps is a comprehensive guide to pump construction, application, operation, maintenance and management issues. Coverage includes pump classifications, types and criteria for selection, as well as practical information on the use of pumps, such as how to read pump curves and cross reference. Throughout the book the focus is on best practice and developing the skills and knowledge required to recognise and solve pump problems in a structured and confident manner. Case studies provide real-world scenarios covering the design, set up, troubleshooting and maintenance of pumps. · A comprehensive guide to pump construction, design, installation, operation, troubleshooting and maintenance. · Develop real-world knowhow and practical skills through seven real-world case studies · Coverage includes pump classifications, types and criteria for selection, as well as practical information on the use of pumps*

*Practical Industrial Safety, Risk Assessment and Shutdown Systems*

*Practical Power Distribution for Industry*

*Practical Radio Engineering and Telemetry for Industry*

*Mechatronics*

*Instrumentation Fundamentals for Process Control*

Historically batch control systems were designed individually to match a specific arrangement of plant equipment. They lacked the ability to convert to new products without having to modify the control systems, and did not lend themselves to integration with manufacturing management systems. Practical Batch Management Systems explains how to utilize the building blocks and arrange the structures of modern batch management systems to produce flexible schemes suitable for automated batch management, with the capability to be reconfigured to use the same plant equipment in different combinations. It introduces current best practice in the automation of batch processes, including the drive for integration with MES (Manufacturing Execution

System) and ERP (Enterprise Resource Planning) products from major IT vendors. References and examples are drawn from DCS / PLC batch control products currently on the market. - Implement modern batch management systems that are flexible and easily reconfigured - Integrate batch management with other manufacturing systems including MES and ERP - Increase productivity through industry best practice

Whatever your hydraulic applications, *Practical Hydraulic Systems: Operation & Troubleshooting For Engineers & Technicians* will help you to increase your knowledge of the fundamentals, improve your maintenance programs and become an excellent troubleshooter of problems in this area. Cutaways of all major components are included in the book to visually demonstrate the components' construction and operation. Developing an understanding of how it works leads to an understanding of how and why it fails. Multimedia views of the equipment are shown, to give as realistic a view of hydraulic systems as possible. The book is highly practical, comprehensive and interactive. It discusses Hydraulic Systems construction, design applications, operations, maintenance, and management issues and provides you with the most up-to-date information and Best Practice in dealing with the subject. \* A focus on maintenance and troubleshooting makes this book essential reading for practising engineers. \* Written to cover the requirements of mechanical / industrial and civil engineering. \* Cutaway diagrams demonstrate the construction and operation of key equipment.

*Machinery Vibration Analysis and Predictive Maintenance* provides a detailed examination of the detection, location and diagnosis of faults in rotating and reciprocating machinery using vibration analysis. The basics and underlying physics of vibration signals are first examined. The acquisition and processing of signals is then reviewed followed by a discussion of machinery fault diagnosis using vibration analysis. Hereafter the important issue of rectifying faults that have been identified using vibration analysis is covered. The book also covers the other techniques of predictive maintenance such as oil and particle analysis, ultrasound and infrared thermography. The latest approaches and equipment used together with the latest techniques in vibration analysis emerging from current research are also highlighted. Understand the basics of vibration measurement Apply vibration analysis for different machinery faults Diagnose machinery-related problems with vibration analysis techniques

*Security and Resilience in Intelligent Data-Centric Systems and Communication Networks* presents current, state-of-the-art work on novel research in theoretical and practical resilience and security aspects of intelligent data-centric critical systems and networks. The book analyzes concepts and technologies that are successfully used in the implementation of intelligent data-centric critical systems and communication networks, also touching on future developments. In addition, readers will find in-demand information for domain experts and developers who want to understand and realize the aspects (opportunities and challenges) of using emerging technologies for designing and developing more secure and resilient intelligent data-centric critical systems and communication networks. Topics covered include airports, seaports, rail transport systems, plants for the provision of water and energy, and business transactional systems. The book is well suited for researchers and PhD interested in the use of security and resilient computing technologies. Includes tools and techniques to prevent and avoid both accidental and malicious behaviors Explains the state-of-the-

art technological solutions for main issues hindering the development of monitoring and reaction solutions Describes new methods and technologies, advanced prototypes, systems, tools and techniques of future direction

Practical Centrifugal Pumps

HART Communication Protocol

Practical Modern SCADA Protocols

Practical Industrial Data Networks

*Mechatronics has evolved into a way of life in engineering practice, and it pervades virtually every aspect of the modern world. In chapters drawn from the bestselling and now standard engineering reference, The Mechatronics Handbook, this book introduces the vibrant field of mechatronics and its key elements: physical system modeling; sensors and actuators; signals and systems; computers and logic systems; and software and data acquisition. These chapters, written by leading academics and practitioners, were carefully selected and organized to provide an accessible, general outline of the subject ideal for non-specialists. Mechatronics: An Introduction first defines and organizes the key elements of mechatronics, exploring design approach, system interfacing, instrumentation, control systems, and microprocessor-based controllers and microelectronics. It then surveys physical system modeling, introducing MEMS along with modeling and simulation. Coverage then moves to essential elements of sensors and actuators, including characteristics and fundamentals of time and frequency, followed by control systems and subsystems, computer hardware, logic, system interfaces, communication and computer networking, data acquisition, and computer-based instrumentation systems. Clear explanations and nearly 200 illustrations help bring the subject to life. Providing a broad overview of the fundamental aspects of the field, Mechatronics: An Introduction is an ideal primer for those new to the field, a handy review for those already familiar with the technology, and a friendly introduction for anyone who is curious about mechatronics.*

*This book will allow you to gain practical skills and know-how in grounding, bonding, lightning & surge protection. Few topics generate as much controversy and argument as that of grounding and the associated topics of surge protection, shielding and lightning protection of electrical and electronic systems. Poor grounding practice can be the cause of continual and intermittent difficult-to-diagnose problems in a facility. This book looks at these issues from a fresh yet practical perspective and enables you to reduce expensive downtime on your plant and equipment to a minimum by correct application of these principles. Learning outcomes: \* Apply the various methods of grounding electrical systems \* Detail the applicable national Standards \* Describe the purposes of grounding and bonding \* List the types of systems that cannot be grounded \* Describe what systems can be operated ungrounded \* Correctly shield sensitive communications cables from noise and interference \* Apply practical knowledge of surge and transient protection \* Troubleshoot and fix grounding and surge problems \* Design, install and test an effective grounding system for electronic equipment \* Understand lightning and how to minimize its impact on your facility \* Protect sensitive equipment from lightning · An engineer's guide to earthing, shielding, lightning and surge protection designed to deliver reliable equipment and communications systems that comply with international and national codes · Discover how to reduce plant downtime and intermittent faults by implementing best-practice grounding/earthing techniques · Learn the principles of cable shielding in communication networks*

*Man-made or industrial processes, localised or geographically distributed, need be automated in order to ensure they produce quality, consistent, and cost-effective goods or services. Automation systems for these processes broadly consist of instrumentation, control, human interface, and communication subsystems. This book introduces the basics of philosophy, technology, terminology, and practices of modern automation systems with simple illustrations and examples. Provides an introduction to automation Explains the concepts through simple illustrations and examples Describes how to understand technical documents*