Digital Control Systems Design Identification And Implementation 1st Edition

Direct Digital Control Systems: Application · Commissioning offers an insightful examination of the critical role of the DDC system in the commissioning process. Included is solid coverage of microprocessor-based control systems combined with the protocols and procedures needed to effectively integrate DDC system validation into systems commissioning. This field handbook is an everyday reference on Direct Digital

Control for commissioning personnel. Whether designer, contractor, air balancer, technician, vendor, commissioning agent, owner, operator or student, increasing one's knowledge of DDC control systems will directly improve project performance.

The extraordinary development of digital computers (microprocessors, microcontrollers) and their extensive use in control systems in all fields of applications has brought about important changes in the design of control systems. Their performance and their low cost make them suitable for use in control systems of various kinds which demand far better capabilities and performances than those provided by analog controllers. However, in order really to take advantage of the capabilities of

microprocessors, it is not enough to reproduce the behavior of analog (PID) controllers. One needs to implement specific and high-performance model based control techniques developed for computer-controlled systems (techniques that have been extensively tested in practice). In this context identification of a plant dynamic model from data is a fundamental step in the design of the control system. The book takes into account the fact that the association of books with software and on-line material is radically changing the teaching methods of the control discipline. Despite its interactive character, computer-aided control design software requires the understanding of a number of concepts in order to be used efficiently. The use of software for illustrating the

various concepts and algorithms helps understanding and rapidly gives a feeling of the various phenomena. Introduction; Review of continuous control; Introductory digital control; Discrete systems analysis; Sampled-data systems; Discrete equivalents; Design using transform techniques; Design using state-space methods; Multivariable and optimal control; Quantization effects; Sample rate selection; System identification; Nonlinear control; Design of a disk drive servo: a case study; Appendix A: Exemples; Appendix B: Tables; Appendix C; A few results from matrix analysis; Appendix D: Summary of facts from the theory of probability and stochastic processes; Appendix E: Matlab functions; Appendix F; Differences between Matlab v5 and v4;

References; Index.

This textbook introduces senior undergraduate and beginning graduate students of mechanical engineering to the field of digital control with an emphasis on applications. Both transform-based and state-variable approaches are included, with a brief introduction to system identification. The material requires some understanding of the Laplace transform and assumes that the reader has studied linear feedback control systems. Adopting an accessible, “tutorial” format, the text presents a clear and concise treatment of Linear Difference Equations, Discrete Simulation of Continuous Systems, Sampled Data Systems, Design using Laplace and Z Transforms, Introduction to Continuous State

Space, Digital Control Design using State Space Methods (including state estimators), and System Identification using Least Squares.

Direct Digital Control Systems

Industrial Digital Control Systems

Digital Control Systems

System Analysis and Control: Classical Approaches-II

Adaptive Control

Applied Control Theory for Embedded Systems

Since the publication of the first edition in 1992, the HVAC industry has gone through enormous changes. As simple digital systems have given way to more complex systems, demand for information on how these systems operate, how they are best applied and

how they communicate with other building control systems has grown rapidly. Direct Digital Control for Building Systems, Second Edition is thoroughly updated and expanded to include coverage of the architecture of modern digital control systems, distributed intelligence networked systems, communication protocols, the technologies and issues concerning interoperability, the latest application strategies, and defensive techniques for designing and specifying control systems. Numerous illustrations throughout help keep the subject highly accessible, and hardware, software, and systems applications are described in the most universal terms possible. This thoroughly revised second edition also

contains a full section on BACnet® standard and Echelon's LonWorks® technology; their meaning, applications, and future implications. An up-to-date appendix is provided. Insights on emerging technologies in intelligent control systems and what the future holds for this dynamic field is covered throughout.

For both undergraduate and graduate courses in Control System Design. Using a "how to do it" approach with a strong emphasis on real-world design, this text provides comprehensive, single-source coverage of the full spectrum of control system design. Each of the text's 8 parts covers an area in control--ranging from signals and systems

(Bode Diagrams, Root Locus, etc.), to SISO control (including PID and Fundamental Design Trade-Offs) and MIMO systems (including Constraints, MPC, Decoupling, etc.).

Design and analysis methods for plants, controllers and control systems; Program packages and programming languages for design purposes; Computer assisted planning; CAD in research, development and instruction; Applications; Lata papers; Survey papers; Round table discussions.

Written by leading researchers, this book collects a number of articles considering the problems of finite-precision computing in digital controllers and filters. Topics range from analysis of fragility and finite-

precision effects to the design of low-complexity digital controllers.

An Engineering Approach

HVAC Control Systems

Identification and Control of Mechanical Systems

Using your Computer to Develop and Diagnose Feedback Controllers

Microcontroller Based Applied Digital Control

System Identification and Control Design

The control of vibrating systems is a significant issue in the design of aircraft, spacecraft, bridges and high-rise buildings. This 2001 book discusses the control of vibrating systems, integrating structural dynamics, vibration analysis, modern

control and system identification. Integrating these subjects is an important feature in that engineers will need only one book, rather than several texts or courses, to solve vibration control problems. The book begins with a review of basic mathematics needed to understand subsequent material. Chapters then cover more recent and valuable developments in aerospace control and identification theory, including virtual passive control, observer and state-space identification, and data-based controller synthesis. Many practical issues and applications are addressed, with examples showing how various methods are applied to real systems. Some methods show the close integration of system identification and control theory from the state-space perspective, rather than from the

traditional input-output model perspective of adaptive control. This text will be useful for advanced undergraduate and beginning graduate students in aerospace, mechanical and civil engineering, as well as for practising engineers.
Symbols are essential to the documentation and communication of engineering ideas. This book presents the symbols and identifiers used for instrumentation and process control. It contains sample P&IDs and other drawings and examples of how to use symbols in different control schemes. ISAs symbol standards form the basis of the book. Readers will learn how to use symbols to convey details and operating relationships in the most efficient way. Chapters are organized by document type, following the typical work sequence of

control systems engineering and design work. In addition to instrument and loop symbols, the book covers piping, electrical, logic, and process flow symbols and diagrams. This is the biggest, most comprehensive, and most prestigious compilation of articles on control systems imaginable. Every aspect of control is expertly covered, from the mathematical foundations to applications in robot and manipulator control. Never before has such a massive amount of authoritative, detailed, accurate, and well-organized information been available in a single volume. Absolutely everyone working in any aspect of systems and controls must have this book! Cloud Control Systems: Analysis, Design and Estimation introduces readers to the basic definitions and various new

developments in the growing field of cloud control systems (CCS). The book begins with an overview of cloud control systems (CCS) fundamentals, which will help beginners to better understand the depth and scope of the field. It then discusses current techniques and developments in CCS, including event-triggered cloud control, predictive cloud control, fault-tolerant and diagnosis cloud control, cloud estimation methods, and secure control/estimation under cyberattacks. This book benefits all researchers including professors, postgraduate students and engineers who are interested in modern control theory, robust control, multi-agents control. Offers insights into the innovative application of cloud computing principles to control and automation

systems Provides an overview of cloud control systems (CCS) fundamentals and introduces current techniques and developments in CCS Investigates distributed denial of service attacks, false data injection attacks, resilient design under cyberattacks, and safety assurance under stealthy cyberattacks
Proceedings of the IFAC Symposium, Zürich, Switzerland, 29-31 August 1979
True Digital Control
Proceedings of the IFAC/IFIP Symposium, Guadalajara, Mexico, 17-19 January 1983
Control System Design Guide
Digital Control System Analysis & Design
Real Time Digital Control Applications

Includes: Digital signals and systems. Digital controllers for process control applications. Design of digital controllers. Control of time delay systems. State-space concepts. System identification. Introduction to discrete optimal control. Multivariable control. Adaptive control. Computer aided design for industrial control systems. Reliability and redundancy in microprocessor controllers. Software and hardware aspects of industrial controller

implementations. Application of distributed digital control algorithms to power stations. An expert system for process control.

This Encyclopedia of Control Systems, Robotics, and Automation is a component of the global Encyclopedia of Life Support Systems EOLSS, which is an integrated compendium of twenty one Encyclopedias. This 22-volume set contains 240 chapters, each of size 5000-30000 words, with perspectives,

applications and extensive illustrations. It is the only publication of its kind carrying state-of-the-art knowledge in the fields of Control Systems, Robotics, and Automation and is aimed, by virtue of the several applications, at the following five major target audiences: University and College Students, Educators, Professional Practitioners, Research Personnel and Policy Analysts, Managers, and Decision Makers and NGOs.

This is a practical approach to control techniques. The author covers background material on analog controllers, digital controllers, and filters. Commonly used controllers are presented. Extended use of PSpice (a popular circuit simulation program) is used in problem solving. The book is also documented with 50 computer programs that circuit designers can use. Explains integration of control systems with a personal computer Compares numerous**

control algorithms in digital and analog form Details the use of SPICE in problem solving**Presents modeling concepts for linear and nonlinear systems**Examines commonly used controllers**

Digital Control Systems Analysis and Design is appropriate for a one semester/two-quarter senior-level course in digital or discrete-time controls. It is also a suitable reference for practicing engineers. This best-selling text places

emphasis on the practical aspects of designing and implementing digital control systems. This program presents a better teaching and learning experience--for you and your students. Provide MATLAB programs to students: Short MATLAB programs have been included in many of the examples, which allow students to experiment and learn more skills. Motivate students with running applications that are featured throughout the book: Simple physical

systems are introduced in one chapter and then used again later to illuminate more advanced material. Reinforce core concepts with examples and problems: Numerous problems and worked examples help students grasp the text's concepts. Keep your course current: A new chapter on system identification (Chapter 11) is included in this edition
Control System Documentation
Analog and Digital Control System Design

Control System Design
Implementation with C and Python
Design, Identification and Implementation
New Identification and Design Methods

Real Time Digital Control Applications is a compilation of papers presented at the Symposium on Real-Time Digital Control Applications, sponsored by the International Federation of Automatic Control (IFAC) and the International Federation for Information Processing

(IFIP), held in Guadalajara, Mexico. The event is organized to provide developing countries with the opportunity to gain insights -- from the sharing of ideas and experiences of experts from around the world to the rapid growth and development of applications of real-time digital control systems, which is considered as the basis of industrial revolution. The book presents and discusses the various scientific, industrial, and technical applications of real-time digital control systems. Applications in power generation,

water, metal processing, cement, food, and manufacturing industries are shown. The text also covers applications in robotics, biomedicine, monitoring and failure detection, fuel optimization and heat control, adaptive process control, modeling, and computer software. Industrial engineers, scientists, economists, computer scientists, robotics experts, planners, and technicians will find this book invaluable.

Digital controllers are part of nearly all modern personal, industrial, and

transportation systems. Every senior or graduate student of electrical, chemical or mechanical engineering should therefore be familiar with the basic theory of digital controllers. This new text covers the fundamental principles and applications of digital control engineering, with emphasis on engineering design. Fadali and Visioli cover analysis and design of digitally controlled systems and describe applications of digital controls in a wide range of fields. With worked examples and Matlab applications in

every chapter and many end-of-chapter assignments, this text provides both theory and practice for those coming to digital control engineering for the first time, whether as a student or practicing engineer. Extensive Use of computational tools: Matlab sections at end of each chapter show how to implement concepts from the chapter Frees the student from the drudgery of mundane calculations and allows him to consider more subtle aspects of control system analysis and design An engineering approach to digital controls:

emphasis throughout the book is on design of control systems. Mathematics is used to help explain concepts, but throughout the text discussion is tied to design and implementation. For example coverage of analog controls in chapter 5 is not simply a review, but is used to show how analog control systems map to digital control systems Review of Background Material: contains review material to aid understanding of digital control analysis and design. Examples include discussion of discrete-time systems in time domain and

frequency domain (reviewed from linear systems course) and root locus design in s-domain and z-domain (reviewed from feedback control course) Inclusion of Advanced Topics In addition to the basic topics required for a one semester senior/graduate class, the text includes some advanced material to make it suitable for an introductory graduate level class or for two quarters at the senior/graduate level. Examples of optional topics are state-space methods, which may receive brief coverage in a one semester course,

and nonlinear discrete-time systems Minimal Mathematics Prerequisites The mathematics background required for understanding most of the book is based on what can be reasonably expected from the average electrical, chemical or mechanical engineering senior. This background includes three semesters of calculus, differential equations and basic linear algebra. Some texts on digital control require more

Explore a concise and practical introduction to implementation methods and

the theory of digital control systems on microcontrollers Embedded Digital Control: Implementation on ARM Cortex-M Microcontrollers delivers expert instruction in digital control system implementation techniques on the widely used ARM Cortex-M microcontroller. The accomplished authors present the included information in three phases. First, they describe how to implement prototype digital control systems via the Python programming language in order to help the reader better understand theoretical

digital control concepts. Second, the book offers readers direction on using the C programming language to implement digital control systems on actual microcontrollers. This will allow readers to solve real-life problems involving digital control, robotics, and mechatronics. Finally, readers will learn how to merge the theoretical and practical issues discussed in the book by implementing digital control systems in real-life applications. Throughout the book, the application of digital control

systems using the Python programming language ensures the reader can apply the theory contained within. Readers will also benefit from the inclusion of: A thorough introduction to the hardware used in the book, including STM32 Nucleo Development Boards and motor drive expansion boards An exploration of the software used in the book, including MicroPython, Keil uVision, and Mbed Practical discussions of digital control basics, including discrete-time signals, discrete-time systems, linear and time-invariant systems, and constant

coefficient difference equations An examination of how to represent a continuous-time system in digital form, including analog-to-digital conversion and digital-to-analog conversion Perfect for undergraduate students in electrical engineering, Embedded Digital Control: Implementation on ARM Cortex-M Microcontrollers will also earn a place in the libraries of professional engineers and hobbyists working on digital control and robotics systems seeking a one-stop reference for digital control systems on

microcontrollers.
This text's contemporary approach focuses on the concepts of linear control systems, rather than computational mechanics. Straightforward coverage includes an integrated treatment of both classical and modern control system methods. The text emphasizes design with discussions of problem formulation, design criteria, physical constraints, several design methods, and implementation of compensators. Discussions of topics not found in other texts—such as pole

placement, model matching and robust tracking—add to the text's cutting-edge presentation. Students will appreciate the applications and discussions of practical aspects, including the leading problem in developing block diagrams, noise, disturbances, and plant perturbations. State feedback and state estimators are designed using state variable equations and transfer functions, offering a comparison of the two approaches. The incorporation of MATLAB throughout the text helps students to avoid time-

consuming computation and concentrate on control system design and analysis.

Transfer-Function, State-Space, and Algebraic Methods

Algorithms, Analysis and Applications

CONTROL SYSTEMS, ROBOTICS AND AUTOMATION - Volume II

Cloud Control Systems

Digital Control System Analysis and Design

Direct Digital Control for Building HVAC Systems

This work presents traditional methods and current techniques of incorporating the computer into closed-loop

dynamic systems control, combining conventional transfer function design and state variable concepts. Digital Control Designer - an award-winning software program which permits the solution of highly complex problems - is available on the CR

The great advances made in large-scale integration of semiconductors and the resulting cost-effective digital processors and data storage devices determine the present development of automation. The application of digital techniques to process automation started in about 1960, when the first process computer was installed. From about 1970 process computers with cathodic ray tube display have become standard equipment for larger automation systems.

Until about 1980 the annual increase of process computers was about 20 to 30%. The cost of hardware has already then shown a tendency to decrease, whereas the relative cost of user software has tended to increase. Because of the high total cost the first phase of digital process automation is characterized by the centralization of many functions in a single (though sometimes in several) process computer. Application was mainly restricted to medium and large processes. Because of the far-reaching consequences of a breakdown in the central computer parallel standby computers or parallel back-up systems had to be provided. This meant a substantial increase in cost. The tendency to overload the capacity and software problems caused further

difficulties. In 1971 the first microprocessors were marketed which, together with large-scale integrated semiconductor memory units and input/output modules, can be assem bled into cost-effective microcomputers. These microcomputers differ from process computers in fewer but higher integrated modules and in the adaptability of their hardware and software to specialized, less comprehensive tasks.

True Digital Control: Statistical Modelling andNon–Minimal State Space Designdevelops a true digitalcontrol design philosophy that encompasses data–basedmodel identification, through to control algorithm design,robustness evaluation and implementation. With a heritage from bothclassical and modern control system

synthesis, this book issupported by detailed practical examples based on theauthors' research into environmental, mechatronic and roboticsystems. Treatment of both statistical modelling and control designunder one cover is unusual and highlights the important connectionsbetween these disciplines. Starting from the ubiquitous proportional–integralcontroller, and with essential concepts such as pole assignmentintroduced using straightforward algebra and block diagrams, thisbook addresses the needs of those students, researchers andengineers, who would like to advance their knowledge of controltheory and practice into the state space domain; and academics whoare interested to learn more about non–minimal state variablefeedback

control systems. Such non–minimal state feedback isutilised as a unifying framework for generalised digital controlsystem design. This approach provides a gentle learning curve, fromwhich potentially difficult topics, such as optimal, stochastic andmultivariable control, can be introduced and assimilated in aninteresting and straightforward manner. Key features: Covers both system identification and control systemdesign in a unified manner Includes practical design case studies and simulationexamples Considers recent research into time–variable andstate–dependent parameter modelling and control, essentialelements of adaptive and nonlinear control system design, and thedelta–operator (the discrete–time

equivalent of thedifferential operator) systems Accompanied by a website hosting MATLAB examples True Digital Control: Statistical Modelling andNon–Minimal State Space Design is a comprehensive andpractical guide for students and professionals who wish to furthertheir knowledge in the areas of modern control and systemidentification.

This book focuses on control design with continual references to the practical aspects of implementation. While the concepts of multivariable control are justified, the book emphasizes the need to maintain student interest and motivation over exhaustively rigorous mathematical proof.

PID Control

DIGITAL CONTROL (With CD)

Application · Commissioning
Embedded Digital Control with Microcontrollers
Digital Control of Dynamic Systems
Analysis, Design and Estimation

This work discusses the use of digital computers in the real-time control of dynamic systems using both classical and modern control methods. Two new chapters offer a review of feedback control systems and an overview of digital control systems. MATLAB statements and problems have been more thoroughly and carefully integrated throughout the text to offer students a more complete design picture.

The great advances made in large-scale integration of semiconductors, the resulting cost-effective digital processors and data storage devi ces, and the development of suitable programming techniques are all having increasing influence on the techniques of measurement and con trol and on automation in general. The application of digital techni ques to process automation started in about 1960 when the first process computer was installed. From about 1970 computers have become standard equipment for the automation of industrial processes, connected on-line in open or closed loop. The annual increase of installed process compu ters in the last decade

was about 20- 30 %. The cost of hardware has shown a tendency to decrease, whereas the relative cost of user soft ware has tended to increase. Because of the relatively high total cost, the first phase of digital computer application to process control is characterized by the centralization of many functions in a single (though sometimes in several) process computer. Such centralization does not permit full utilization of the many advantages of digital signal processing and rapid economic pay-off as analog back-up systems or parallel standby computers must often be provided to cover possible breakdowns in the central computer. In 1971 the first microprocessors were

marketed which, together with large-scale integrated semiconductor memory units and input/output mo dules, can be assembled into more cost-effective process microcompu ters.

Adaptive Control (second edition) shows how a desired level of system performance can be maintained automatically and in real time, even when process or disturbance parameters are unknown and variable. It is a coherent exposition of the many aspects of this field, setting out the problems to be addressed and moving on to solutions, their practical significance and their application. Discrete-time aspects of adaptive control are emphasized

to reflect the importance of digital computers in the application of the ideas presented. The second edition is thoroughly revised to throw light on recent developments in theory and applications with new chapters on: multimodel adaptive control with switching, direct and indirect adaptive regulation and adaptive feedforward disturbance compensation. Many algorithms are newly presented in MATLAB® m-file format to facilitate their employment in real systems. Classroom-tested slides for instructors to use in teaching this material are also now provided. All of this supplementary electronic material can be downloaded from fill in URL. The core material is

also up-dated and re-edited to keep its perspective in line with modern ideas and more closely to associate algorithms with their applications giving the reader a solid grounding in: synthesis and analysis of parameter adaptation algorithms, recursive plant model identification in open and closed loop, robust digital control for adaptive control; □ robust parameter adaptation algorithms, practical considerations and applications, including flexible transmission systems, active vibration control and broadband disturbance rejection and a supplementary introduction on hot dip galvanizing and a phosphate drying furnace. Control researchers and applied

mathematicians will find Adaptive Control of significant and enduring interest and its use of example and application will appeal to practitioners working with unknown- and variable-parameter plant. Praise for the first edition: ...well written, interesting and easy to follow, so that it constitutes a valuable addition to the monographies in adaptive control for discrete-time linear systems... suitable (at least in part) for use in graduate courses in adaptive control.

Combines the theory and the practice of applied digital control This book presents the theory and application of microcontroller based automatic control systems.

Microcontrollers are single-chip computers which can be used to control real-time systems. Low-cost, single chip and easy to program, they have traditionally been programmed using the assembly language of the target processor. Recent developments in this field mean that it is now possible to program these devices using high-level languages such as BASIC, PASCAL, or C. As a result, very complex control algorithms can be developed and implemented on the microcontrollers. Presenting a detailed treatment of how microcontrollers can be programmed and used in digital control applications, this book: * Introduces the basic principles of the theory of

digital control systems. * Provides several working examples of real working mechanical, electrical and fluid systems. * Covers the implementation of control algorithms using microcontrollers. * Examines the advantages and disadvantages of various realization techniques. * Describes the use of MATLAB in the analysis and design of control systems. * Explains the sampling process, z-transforms, and the time response of discrete-time systems in detail. Practising engineers in industry involved with the design and implementation of computer control systems will find Microcontroller Based Applied Digital Control an invaluable resource. In

addition, researchers and students in control engineering and electrical engineering will find this book an excellent research tool.

Digital Controller Implementation and Fragility

Marine Systems Identification, Modeling and Control

Multivariable Control Systems

Digital Control Engineering

Analysis and Design

The Control Handbook

Containing a fundamental treatment of modern trends in digital control systems, this book presents modern digital control techniques so that

the reader may handle digital design and implementation problems.
Market_Desc: " Engineering and postgraduate students in control engineering and electronic engineering." Practicing control systems engineers and researchers in this field." Engineers needing to learn digital control Special Features: " Developed from three existing lecture courses on digital control, systems identification and intermediate process control" Includes numerous examples, problems, solutions and Matlab code." Highlights the advantages of the polynomial approach." Assumes little or no prior knowledge of analogue

control." Offers a very thorough treatment of the z-transform and frequency-domain analysis." Includes a thorough treatment of identification." Attempts the tuning of PID controllers using model-based control techniques." Concludes each chapter with a 2018 problems' section.The distinguishing feature of the Indian edition of this book is the accompanying CD which contains:- A ten minute video introduction to the book, using slides- Set of chapter wise presentation slides for teachers with animation- Set of slides for students, with four slides on one page- Matlab code, in zip format and also as individual files, arranged in a directory

structure- Scilab code in the same format as the Matlab code- Scilab software, using which one can install Scilab- Spoken tutorial on Scilab that explains how to install Scilab About The Book: This book is about the design of digital controllers. An attempt has been made to present digital control from scratch. The book is organized into five parts. The first deals with modeling, the second concerned with the topic of signal processing, the third devoted to identification of plants from measurements, fourth section looks at the transfer function approach to control design and the last section is devoted to state space

techniques for control design. The topics of observers, Kalman filter and combined controller and observer have also been included.

Many embedded engineers and programmers who need to implement basic process or motion control as part of a product design do not have formal training or experience in control system theory. Although some projects require advanced and very sophisticated control systems expertise, the majority of embedded control problems can be solved without resorting to heavy math and complicated control theory. However, existing texts on the subject are highly mathematical and

theoretical and do not offer practical examples for embedded designers. This book is different;it presents mathematical background with sufficient rigor for an engineering text, but it concentrates on providing practical application examples that can be used to design working systems, without needing to fully understand the math and high-level theory operating behind the scenes. The author, an engineer with many years of experience in the application of control system theory to embedded designs, offers a concise presentation of the basics of control theory as it pertains to an embedded environment. Practical, down-to-earth guide

teaches engineers to apply practical control theorems without needing to employ rigorous math Covers the latest concepts in control systems with embedded digital controllers

The effectiveness of proportional-integral-derivative (PID) controllers for a large class of process systems has ensured their continued and widespread use in industry. Similarly there has been a continued interest from academia in devising new ways of approaching the PID tuning problem. To the industrial engineer and many control academics this work has previously appeared fragmented; but a key determinant of this

literature is the type of process model information used in the PID tuning methods. PID Control presents a set of coordinated contributions illustrating methods, old and new, that cover the range of process model assumptions systematically. After a review of PID technology, these contributions begin with model-free methods, progress through non-parametric model methods (relay experiment and phase-locked-loop procedures), visit fuzzy-logic- and genetic-algorithm-based methods; introduce a novel subspace identification method before closing with an interesting set of parametric model techniques

including a chapter on predictive PID controllers. Highlights of PID Control include: an introduction to PID control technology features and typical industrial implementations; chapter contributions ordered by the increasing quality of the model information used; novel PID control concepts for multivariable processes. PID Control will be useful to industry-based engineers wanting a better understanding of what is involved in the steps to a new generation of PID controller techniques. Academics wishing to have a broader perspective of PID control research and development will find useful pedagogical material and research ideas in

this text.

A Modern Perspective

Statistical Modelling and Non-Minimal State Space Design

Introduction to Applied Digital Controls

Applying Symbols and Identification

Modelling, Analysis and Design

Computer Aided Design of Control Systems

This important new book bridges the gap between works on classical control and process control, and those dealing with HVAC control at a more elementary level, which generally adopt a qualitative and descriptive control. Both

advanced level students and specialist practitioners will welcome the in-depth analytical treatment of the subject presented in this volume. Of particular significance are the current developments in adaptive control, robust control, artificial neural networks and fuzzy logic systems, all of which are given a thorough analytical treatment in the book. First book to provide an analytical treatment of subject Covers all new developments in HVAC control systems Looks at systems both in the UK and abroad Applied Control System Design examines several methods for building up systems models based on real experimental data from typical industrial processes and incorporating

system identification techniques. The text takes a comparative approach to the models derived in this way judging their suitability for use in different systems and under different operational circumstances. A broad spectrum of control methods including various forms of filtering, feedback and feedforward control is applied to the models and the guidelines derived from the closed-loop responses are then composed into a concrete self-tested recipe to serve as a check-list for industrial engineers or control designers. System identification and control design are given equal weight in model derivation and testing to reflect their equality of importance in the

proper design and optimization of high-performance control systems. Readers ' assimilation of the material discussed is assisted by the provision of problems and examples. Most of these exercises use MATLAB ® to make computation and visualization more straightforward. Applied Control System Design will be of interest to academic researchers for its comparison of different systems models and their response to different control methods and will assist graduate students in learning the practical necessities of advanced control system design. The consistent reference to real systems coupled with self-learning tools will assist control

practitioners who wish to keep up to date with the latest control design ideas.

Systems and control theory has experienced significant development in the past few decades. New techniques have emerged which hold enormous potential for industrial applications, and which have therefore also attracted much interest from academic researchers. However, the impact of these developments on the process industries has been limited. The purpose of Multivariable System Identification for Process Control is to bridge the gap between theory and application, and to provide industrial solutions, based on sound scientific theory, to

process identification problems. The book is organized in a reader-friendly way, starting with the simplest methods, and then gradually introducing more complex techniques. Thus, the reader is offered clear physical insight without recourse to large amounts of mathematics. Each method is covered in a single chapter or section, and experimental design is explained before any identification algorithms are discussed. The many simulation examples and industrial case studies demonstrate the power and efficiency of process identification, helping to make the theory more applicable. MatlabTM M-files, designed to help the reader to learn identification in a computing

environment, are included.

Marine Systems Identification, Modeling and Control is a concise, stand-alone resource covering the theory and practice of dynamic systems and control for marine engineering students and professionals. Developed from a distance learning CPD course on marine control taught by the authors, the book presents the essentials of the subject, including system representation and transfer, feedback control and closed loop stability. Simulation code and worked examples are provided for both Scilab and MATLAB, making it suitable for both those without access to expensive software and those using MATLAB in

a professional setting. This title considers the key topics without superfluous detail and is illustrated with marine industry examples. Concise and practical, covering the relevant theory without excessive detail Industry-specific examples and applications for marine engineering students and professionals Clearly presents key topics of the subject, including system representation and transfer, feedback control and closed loop stability, making it ideal for self-study or reference Simulation code and worked examples using Scilab and MATLAB provided on the book's companion website

Automatic Control Systems

Multivariable System Identification For Process Control Using P.I.M.+ Software
Modern Digital Control Systems
Applied Control Systems Design
Volume 2: Stochastic Control, Multivariable Control, Adaptive Control, Applications