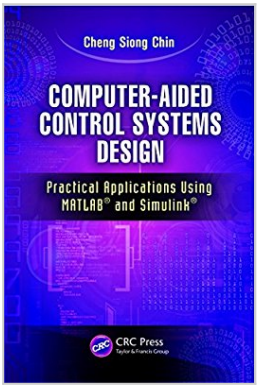

Computer-Aided Control Systems Design: Practical Applications Using MATLAB® and Simulink®

By Cheng Siong Chin

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Computer-Aided Control Systems Design: Practical Applications Using MATLAB® and Simulink® supplies a solid foundation in applied control to help you bridge the gap between control theory and its real-world applications. Working from basic principles, the book delves into control systems design through the practical examples of the ALSTOM gasifier system in power stations and underwater robotic vehicles in the marine industry. It also shows how powerful software such as MATLAB® and Simulink® can aid in control systems design.

Make Control Engineering Come Alive with Computer-Aided Software

Emphasizing key aspects of the design process, the book covers the dynamic modeling, control structure design, controller design, implementation, and testing of control systems. It begins with the essential ideas of applied control engineering and a hands-on introduction to MATLAB and Simulink. It then discusses the analysis, model order reduction, and controller design for a power plant and the modeling, simulation, and control of a remotely operated vehicle (ROV) for pipeline tracking. The author explains how to obtain the ROV model and verify it by using computational fluid dynamic software before designing and implementing the control system. In addition, the book details the nonlinear subsystem modeling and linearization of the ROV at vertical plane equilibrium points. Throughout, the author delineates areas for further study. Appendices provide additional information on various simulation models and their results.

Learn How to Perform Simulations on Real Industry Systems

A step-by-step guide to computer-aided applied control design, this book supplies the knowledge to help you deal with control problems in industry. It is a valuable reference for anyone who wants a better understanding of the theory and practice of basic control systems design, analysis, and implementation.

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Editorial Review

Review

"This text provides a foundation in applied control to help bridge the gap between control theory and its real-world applications. Working from basic principles, the bookdelves into control systems design through the practical examples of the ALSTOM gasifier system in power stations and underwater robotic vehicles in the marine industry. It also shows how software such as MATLAB and Simulink can aid in control systems design. Emphasizing key aspects of the design process, the book covers thedynamic modeling, control structure design, controller design, implementation, and testing of control systems. The book begins with the essential ideas of applied control engineering and an introduction to MATLAB and Simulink. The book then discusses the analysis, model order reduction, and controller design for a power plant and the modeling, simulation, and control of a remotely operated vehicle (ROV) for pipeline tracking. The book then explains how to obtain the ROV model and verify the model by using computational fluid dynamics software before designing and implementing the control system. In addition, it details the nonlinear subsystem modeling and linearization of the ROV at vertical plane equilibrium points. This book will be of interest to individuals who want a better understanding of the theory and practice of basic control systems design, analysis, and implementation."
?*IEEE Control Systems Magazine*, June 2014

"The unique feature of this book is its practical application of remotely operated vehicles and the ALSTOM gasifier, which gives insight into the mathematical procedures of MATLAB and Simulink as powerful simulation tools. ... This excellent book can be used as reference text for undergraduate or postgraduate students. ... it bridges the gap between academic theory and industrial applications. The examples are concise and yet easy to understand."
?Dr. Ivan CK Tam, Newcastle University, Singapore

"This book shows good practical examples on the coding used for control systems design, analysis, and implementations using MATLAB and Simulink."
?Rongxin Cui, Northwestern Polytechnical University, China

"This book, by providing examples in important applications for simulation-based experimentation and simulation-based experience in applied control engineering, is a valuable addition to the literature. It reflects where our knowledge is firm enough to provide mathematical description of systems as well as design, simulation, analysis and implementation of control systems. Areas where the knowledge is yet shallow are targeted for future studies. This book provides a fertile delineation of areas needing attention. It is written for those who may be already familiar with or newly exposed to the concepts associated with applied control engineering. It will be most useful for researchers, engineers, faculty, and students."
?From the Foreword by Dr. Tuncer Ören, University of Ottawa, Canada

About the Author

Dr. Cheng Siong Chin is a professional mechanical engineer with specialization in marine vehicle control systems design as well as the computer-aided engineering modeling and simulation of mechatronic systems. He worked in industry for seven years. In 2010, Dr. Chin joined Newcastle University for its BEng with honors programs in marine engineering as its first lecturer under the Singapore Institute of Technology

(SIT). Dr. Chin is a member of the IET since 2001, a senior member of the IEEE since 2009, an elected executive member of the IET Control and Automation Network, and was the elected Honorary Auditor in the Singapore Branch of the IET in 2011. He is registered as a Chartered Engineer with the UK Engineering Council and as a European Engineer (EUR ING). Dr. Chin is a member of the editorial advisory board of *The Mediterranean Journal of Measurement and Control* and the *Journal of Marine Science: Research and Development*. He has published 21 international journals, 10 conference publications, and three book chapters. Dr. Chin also has three U.S. patents and two trade secrets. He is certified in Six Sigma Green Belt and Design for Six Sigma (DFSS).

For more information, see Dr. Chin's profile at Newcastle University.

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