Control System Engineering Lecture Notes | b588603067baaf0c87d4af8b5d4af47


This book employs the powerful and popular adaptive backstepping control technology to design controllers for dynamic uncertain systems with non-smooth nonlinearities. Various cases involving systems with time-varying parameters, multi-inputs and multi-outputs, backlash, dead-zone, hysteresis and saturation are considered in detail and analysis. For multi-inputs and multi-outputs systems, both centralized and decentralized control strategies are addressed. This book not only presents recent research results on theoretical success and practical development such as the present of system stability and the improvement of system tracking and transient performance, but also gives self-contained coverage of fundamentals on the backstepping approach with simple illustrations. Detail descriptions of methodologies for the construction of adaptive laws, feedback control laws and associated Lyapunov functions is systematically provided in each chapter. Approaches used for the analysis of system stability and tracking and transient performances are elaborated. Two case studies are presented to show how the presented theories are applied.

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This book is a tribute to 40 years of contributions by Professor Mo Jamshidi who is a well known and respected scholar, researcher, and educator. Mo Jamshidi has spent his professional career formalizing and extending the field of large-scale complex systems (LSCS) engineering resulting in educating numerous graduates specifically, ethnically diverse. The book will cover on control and automation, robotics, game-theoretic control, and control of hybrid systems. Also, this book covers the design of software tools, machine learning, and application of neural networks, fuzzy logic, and genetic algorithms, and discusses the design of large-scale complex systems with direct support from one of the greatest modern Chinese scientists, Xuesen Qian. In a letter to Shengzhao Long from Russia, Xuesen Qian wrote: “You have created a very important modern science and technology in China”.

The book is particularly suited for readers who are interested in learning intelligent system and control and artificial intelligence. The book can benefit researchers, engineers, and graduate students. The contents of this book will be useful for beginners, researchers, and professionals interested in the area of communication, signal processing, and artificially intelligent systems. This book is a tribute to 40 years of contributions by Professor Mo Jamshidi who is a well known and respected scholar, researcher, and educator.
This book is devoted to analysis and design on delta operator systems. When sampling is fast, a dynamical system will become difficult to control, which can be seen in wide real world applications. Delta operator approach is very effective in deal with fast sampling systems. Moreover, it is easy to observe and analyze the control effect with different sampling periods in delta operator systems. The framework of this book has been carefully constructed for delta operator systems to handle sliding mode control, time delays, filter design, finite frequency and networked control. These problems indeed are especially important and significant in automation and control systems design. Through the clear framework of the book, readers can easily go through the learning process on delta operator systems via a precise and comfortable learning sequence. Following this enjoyable trail, readers will come out knowing how to use delta operator approach to deal with control problems under fast sampling case. This book should be a good reference for academies, post-graduates scientists and engineers working in the field of control science and control engineering.