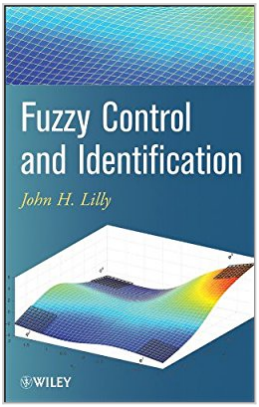

Fuzzy Control and Identification

By John H. Lilly

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This book gives an introduction to basic fuzzy logic and Mamdani and Takagi-Sugeno fuzzy systems. The text shows how these can be used to control complex nonlinear engineering systems, while also also suggesting several approaches to modeling of complex engineering systems with unknown models.

Finally, fuzzy modeling and control methods are combined in the book, to create adaptive fuzzy controllers, ending with an example of an obstacle-avoidance controller for an autonomous vehicle using *modus ponendo tollens* logic.

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Editorial Review

Review

“This is a very useful and attractive material on fuzzy sets in control engineering-accessible to large categories of readers … The book is equally recommended to students (who want to become familiar with the fuzzy logic approach), educators (who are looking for a reliable course and / or application support) and practitioners (who are interested in enlarging their professional horizon).” (*Zentralblatt MATH*, 2012)

From the Back Cover
A comprehensive introduction to fuzzy control and identification, covering both Mamdani and Takagi-Sugeno fuzzy systems

A fuzzy control system is a control system based on fuzzy logic, which is a mathematical system that makes decisions using human reasoning processes. This book presents an introductory-level exposure to two of the principal uses for fuzzy logic—identification and control. Drawn from the author's lectures presented in a graduate-level course over the past decade, this volume serves as a holistically suitable single text for a fuzzy control course, compiling the information often found in several different books on the subject into one.

Starting with explanations of fuzzy logic, fuzzy control, and adaptive fuzzy control, the book introduces the concept of expert knowledge, which is the basis for much of fuzzy control. From there, the author covers:

- Basic concepts of fuzzy sets such as membership functions, universe of discourse, linguistic variables, linguistic values, support, a-cut, and convexity
- Both Mamdani and Takagi-Sugeno fuzzy systems, showing how an effective controller can be designed for many complex nonlinear systems without mathematical models or knowledge of control theory while also suggesting several approaches to modeling of complex engineering systems with unknown models
- How PID controllers can be made fuzzy and why this is useful
- Position-form and incremental-form fuzzy controllers
- How nonlinear systems can be modeled as fuzzy systems in several forms
- How fuzzy tracking control and model reference control can be realized for nonlinear systems using parallel distributed techniques
- The estimation of nonlinear systems using the batch least squares, recursive least squares, and gradient methods
- The creation of direct and indirect adaptive fuzzy controllers

Also included are many examples, exercises, and computer program listings, all class-tested. *Fuzzy Control and Identification* is intended for seniors and first-year graduate students, and is suitable for any engineering department. No knowledge specific to any particular branch of engineering is required, and no knowledge of electrical, chemical, or mechanical systems is necessary to read and understand the material.

About the Author
John H. Lilly, PhD, is a professor in the Speed School of Engineering at the University of Louisville. His research interests are nonlinear and adaptive control, fuzzy identification and control, positive/negative fuzzy

systems, pneumatic muscle actuators, and robotics. In addition to his twenty-eight years of teaching experience, Dr. Lilly has written more than fifty refereed journal and conference articles, book chapters, invited scholarly lectures, and seminars.

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People live in this new time of lifestyle always try and and must have the spare time or they will get wide range of stress from both everyday life and work. So , when we ask do people have free time, we will say absolutely yes. People is human not only a robot. Then we consult again, what kind of activity have you got when the spare time coming to a person of course your answer will probably unlimited right. Then ever try this one, reading textbooks. It can be your alternative throughout spending your spare time, often the book you have read will be Fuzzy Control and Identification.

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