



Lyapunov-Based Control of Robotic Systems (Automation and Control Engineering)

Aman Behal, Warren Dixon, Darren M. Dawson, Bin Xian

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Lyapunov-Based Control of Robotic Systems describes nonlinear control design solutions for problems that arise from robots required to interact with and manipulate their environments. Since most practical scenarios require the design of nonlinear controllers to work around uncertainty and measurement-related issues, the authors use Lyapunov's direct method as an effective tool to design and analyze controllers for robotic systems.

After describing the evolution of real-time control design systems and the associated operating environments and hardware platforms, the book presents a host of standard control design tools for robotic systems using a common Lyapunov-based framework. It then discusses several problems in visual servoing control, including the design of homography-based visual servo control methods and the classic structure from motion problem. The book also deals with the issues of path planning and control for manipulator arms and wheeled mobile robots. With a focus on the emerging research area of human machine interaction, the final chapter illustrates the design of control schemes based on passivity such that the machine is a net energy sink.

Including much of the authors' own research work in controls and robotics, this book facilitates an understanding of the application of Lyapunov-based control design techniques to up-and-coming problems in robotics.

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