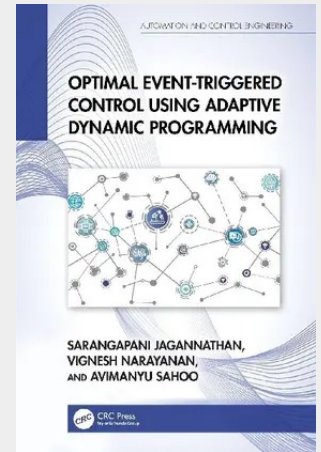


Optimal Event-Triggered Control Using Adaptive Dynamic Programming

Optimal Event-triggered Control using Adaptive Dynamic Programming discusses event triggered controller design which includes optimal control and event sampling design for linear and nonlinear dynamic systems including networked control systems (NCS) when the system dynamics are both known and uncertain. The NCS are a first step to realize cyber-physical systems (CPS) or industry 4.0 vision. The authors apply several powerful modern control techniques to the design of event-triggered controllers and derive event-trigger condition and demonstrate closed-loop stability. Detailed derivations, rigorous stability proofs, computer simulation examples, and downloadable MATLAB® codes are included for each case. The book begins by providing background on linear and nonlinear systems, NCS, networked imperfections, distributed systems, adaptive dynamic programming and optimal control, stability theory, and optimal adaptive event-triggered controller design in continuous-time and discrete-time for linear, nonlinear and distributed systems. It lays the foundation for reinforcement learning-based optimal adaptive controller use for infinite horizons. The text then: - Introduces event triggered control of linear and nonlinear systems, describing the design of adaptive controllers for them - Presents neural network-based optimal adaptive control and game theoretic formulation of linear and nonlinear systems enclosed by a communication network - Addresses the stochastic optimal control of linear and nonlinear NCS by using neuro dynamic programming - Explores optimal adaptive design for nonlinear two-player zero-sum games under communication constraints to solve optimal policy and event trigger condition - Treats an event-sampled distributed linear and nonlinear systems to minimize transmission of state and control signals within the feedback loop via the communication network - Covers several examples along the way and provides applications of event triggered control of robot manipulators, UAV and distributed joint optimal network scheduling and control design for wireless NCS/CPS in order to realize industry 4.0 vision. An ideal textbook for senior undergraduate students, graduate students, university researchers, and practicing engineers, Optimal Event Triggered Control Design using Adaptive Dynamic Programming instills a solid understanding of neural network-based optimal controllers under event-sampling and how to build them so as to attain CPS or Industry 4.0 vision.



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