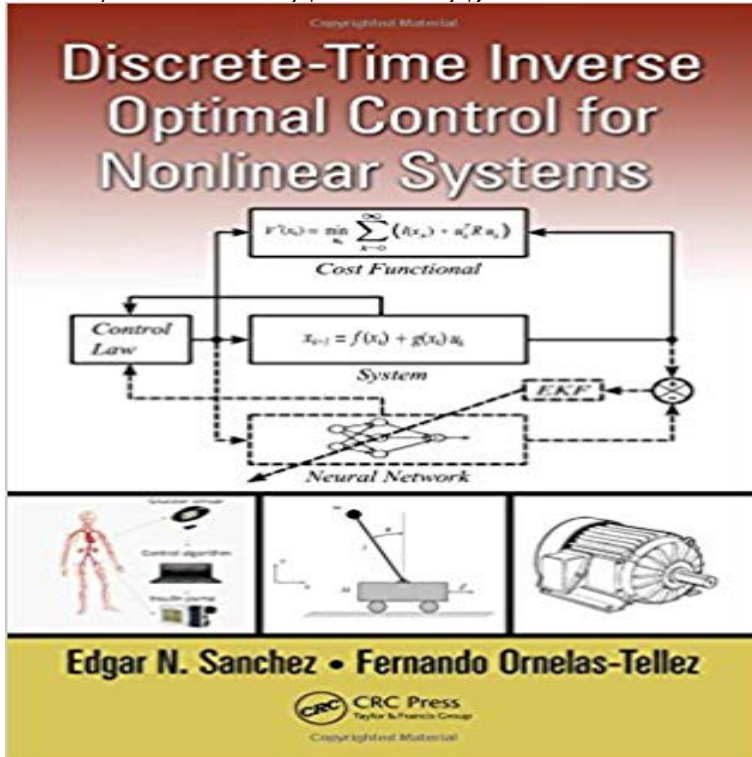


Discrete-Time Inverse Optimal Control for Nonlinear Systems (System of Systems Engineering)



Discrete-Time Inverse Optimal Control for Nonlinear Systems proposes a novel inverse optimal control scheme for stabilization and trajectory tracking of discrete-time nonlinear systems. This avoids the need to solve the associated Hamilton-Jacobi-Bellman equation and minimizes a cost functional, resulting in a more efficient controller. Design More Efficient Controllers for Stabilization and Trajectory Tracking of Discrete-Time Nonlinear Systems The book presents two approaches for controller synthesis: the first based on passivity theory and the second on a control Lyapunov function (CLF). The synthesized discrete-time optimal controller can be directly implemented in real-time systems. The book also proposes the use of recurrent neural networks to model discrete-time nonlinear systems. Combined with the inverse optimal control approach, such models constitute a powerful tool to deal with uncertainties such as unmodeled dynamics and disturbances. Learn from Simulations and an In-Depth Case Study The authors include a variety of simulations to illustrate the effectiveness of the synthesized controllers for stabilization and trajectory tracking of discrete-time nonlinear systems. An in-depth case study applies the control schemes to glycemic control in patients with type 1 diabetes mellitus, to calculate the adequate insulin delivery rate required to prevent hyperglycemia and hypoglycemia levels. The discrete-time optimal and robust control techniques proposed can be used in a range of industrial applications, from aerospace and energy to biomedical and electromechanical systems. Highlighting optimal and efficient control algorithms, this is a valuable resource for researchers, engineers, and students working in nonlinear system control.

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