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Chapter · January 2018

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In book: Recent Advances in Nonlinear Dynamics and Synchronization, pp.113-149



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Abstract

This chapter provides an in-depth overview of the state of the art on traffic light control and optimization. Several classical control systems, methods, concepts, tools, and strategies are described, and their related pros and cons are discussed. Four different types of control strategies are considered, pretimed, actuated, adaptive, and self-organized, and it is demonstrated that some strategies can be appropriate for local control, area...

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Dynamical properties and chaos synchronization of improved Colpitts oscillators

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Dynamics of a Quasiperiodically Forced Rayleigh Oscillator

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A Computer Control System for Traffic Networks

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A Density-Dependent NaSch Model for Traffic Flow Controlled by a Traffic Light

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Dynamic traffic signal control using a nonlinear coupled oscillators approach

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A Distributed Approach for Coordination of Traffic Signal Agents

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Traffic-responsive signalling control through a modular/switching model represented via DTPN

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On adopting a Petri net-based switching modelling system to represent and control urban areas

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On using Petri nets for representing and controlling signalized urban areas: New model and results

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Reinforcement learning-based multi-agent system for network traffic signal control

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Deterministic and stochastic Petri Net for urban traffic systems

Conference Paper · Mar 2010

 M.A. Badamchizadeh  M. Joroughi

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Modular representation of urban traffic systems based on hybrid Petri nets

Full-text available · Conference Paper · Feb 2001


 A. Di Febbraro  D. Giglio  N. Sacco

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From Kuramoto to Crawford: Exploring the onset of synchronization in populations of coupled oscillators

Article · Sep 2000 · Physica D Nonlinear Phenomena


 Steven H. Strogatz

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A real-time traffic signal control system: Architecture, algorithms, and analysis

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 Pitu Mirchandani  Larry Head

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Applications of the urban traffic control strategy TUC

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 Vaya Dinopoulou  Christina Diakaki  Markos Papageorgiou

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An urban traffic network model via coloured timed Petri nets

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Decentralised control of material or traffic flows in networks using phase-synchronisation

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 Stefan Lämmer  Hiroshi Kori  Karsten Peters  Dirk Helbing

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Modelling a signal controlled traffic stream using cellular automata

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Defining a Traffic Modeling Language Using Cellular Discrete-Event Abstractions.

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A Cell-Based Traffic Control Formulation: Strategies and Benefits of Dynamic Timing Plans

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 Hong K. Lo

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Performance Analysis of Traffic Control Systems Based upon Stochastic Timed Petri Net Models.

Article · Dec 2000 · International Journal of Software Engineering and Knowledge Engineering

 Jiacun Wang  Yi Deng  Chun Jin

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Adaptive Signal Control System with On-line Performance Measure for Single Intersection

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Self Organization and a Dynamical Transition in Traffic Flow Models

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 Ofer Biham  A. Alan Middleton  Dov Levine

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Optimizing traffic lights in a cellular automaton for city traffic

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 Elmar Brockfeld  Robert Barlovic  Andreas Schadschneider  Michael Schreckenberg

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 John D. C. Little  Mark D. Kelson  Nathan H. Gartner

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 M. Dotoli  M.P. Fanti  G. Iacobellis

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Implementation of the OPAC adaptive control strategy in a traffic signal network

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Microscopic simulation of traffic flow at signalized intersection based on cellular automata

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