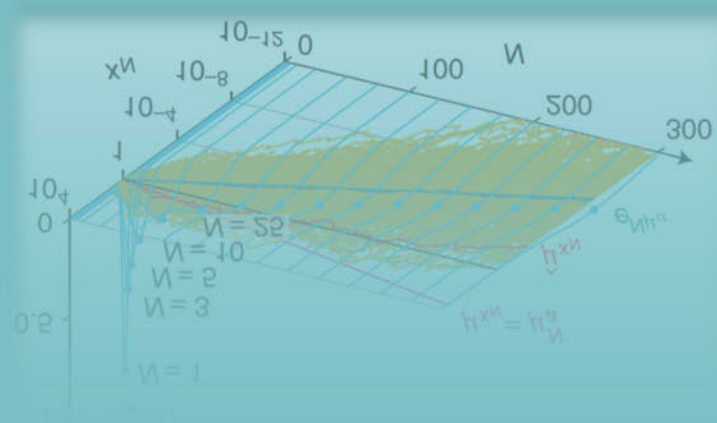
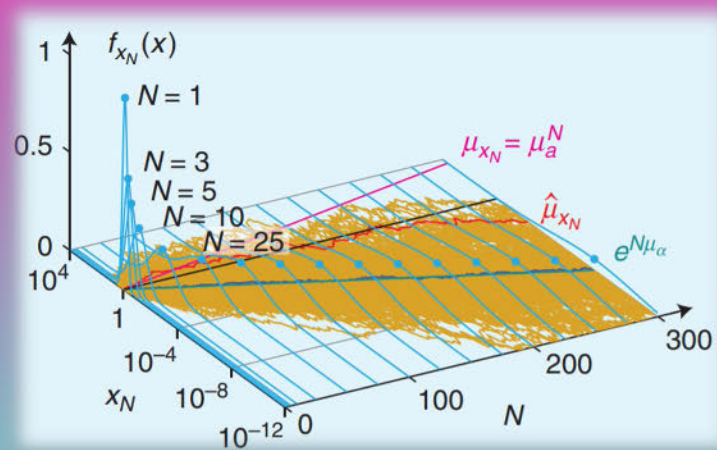


PUBLICATIONS CONTENT DIGEST



CSS Publications Activities

Vice-President

ANDREW ALLEYNE *University of Illinois at Urbana-Champaign*
<http://ieeecss.org/publications>

Journal Editors

IEEE Transactions on Automatic Control

ALESSANDRO ASTOLFI *Imperial College London and University of Rome "Tor Vergata"*
<http://ieeecss.org/publication/transactions-automatic-control>

IEEE Transactions on Control Systems Technology

ANDREA SERRANI *Ohio State University*
<http://ieeecss.org/publication/transactions-control-systems-technology>

IEEE Transactions on Control of Network Systems

JEFF SHAMMA *King Abdullah University of Science and Technology*
ANNA SCAGLIONE Deputy Editor-in-Chief *Arizona State University*
<http://ieeecss.org/publication/transactions-control-network-systems>

IEEE Control Systems Letters

MARIA ELENA VALCHER *University of Padua*
<http://ieeecss.org/publication/control-systems-letters>

IEEE Control Systems Magazine

RODOLPHE SEPULCHRE *University of Cambridge*
<http://ieeecss.org/publication/ieee-control-systems-magazine>

Electronics Editor

E-letter on Systems, Control and Signal Processing

AHMAD TAHA *University of Texas at San Antonio*
<http://ieeecss.org/publication/e-letter>

***Submission and editorial instructions can be found on each publication's homepage**

For subscription to the monthly E-Letter, please send an empty email to
eletter-css-join@lists.it.utsa.edu

IEEE TRANSACTIONS ON AUTOMATIC CONTROL

A PUBLICATION OF THE IEEE CONTROL SYSTEMS SOCIETY



APRIL 2021

VOLUME 66

NUMBER 4

IETAA9

(ISSN 0018-9286)

REGULAR PAPERS

Optimal Multivehicle Motion Planning Using Bernstein Approximants	1453
..... <i>V. Cichella, I. Kaminer, C. Walton, N. Hovakimyan, and A. M. Pascoal</i>	
LQG Control and Sensing Co-Design	1468
..... <i>V. Tzoumas, L. Carlone, G. J. Pappas, and A. Jadbabaie</i>	
A Novel Framework for Backstepping-Based Control of Discrete-Time Strict-Feedback Nonlinear Systems With Multiplicative Noises	1484
..... <i>M. Wang, Z. Wang, H. Dong, and Q.-L. Han</i>	
Multiagent Fully Decentralized Value Function Learning With Linear Convergence Rates	1497
..... <i>L. Cassano, K. Yuan, and A. H. Sayed</i>	
Asymptotic Stability of Piecewise Affine Systems With Filippov Solutions via Discontinuous Piecewise Lyapunov Functions	1513
..... <i>R. Iervolino, S. Trenn, and F. Vasca</i>	
Social Optima in Robust Mean Field LQG Control: From Finite to Infinite Horizon	1529
..... <i>B.-C. Wang, J. Huang, and J.-F. Zhang</i>	
\mathcal{F} -Passive Systems and Control Application	1545
..... <i>J. D. Stefanovski</i>	
Solving Nonlinear Filtering Problems in Real Time by Legendre Galerkin Spectral Method	1559
..... <i>W. Dong, X. Luo, and S. S.-T. Yau</i>	
PI Regulation of a Reaction–Diffusion Equation With Delayed Boundary Control	1573
..... <i>H. Lhachemi, C. Prieur, and E. Trélat</i>	
Distortion-Based Lightweight Security for Cyber-Physical Systems	1588
..... <i>G. K. Agarwal, M. Karmoose, S. Diggavi, C. Fragouli, and P. Tabuada</i>	
Extensions of the Dynamic Programming Framework: Battery Scheduling, Demand Charges, and Renewable Integration	1602
..... <i>M. Jones and M. M. Peet</i>	
An Algorithm to Compute the Inverse Image of a Point With Respect to a Nondeterministic Max-Plus Linear System	1618
..... <i>R. M. F. Cândido, L. Hardouin, M. Lhommeau, and R. S. Mendes</i>	
On Approximate Opacity of Cyber-Physical Systems	1630
..... <i>X. Yin, M. Zamani, and S. Liu</i>	
On Adversary Robust Consensus Protocols Through Joint-Agent Interactions	1646
..... <i>D. Angeli and S. Manfredi</i>	
Persistence of Delayed Complex Balanced Chemical Reaction Networks	1658
..... <i>X. Zhang and C. Gao</i>	
Adaptive Event-Triggered Consensus of Multiagent Systems on Directed Graphs	1670
..... <i>X. Li, Z. Sun, Y. Tang, and H. R. Karimi</i>	
Deterministic and Randomized Actuator Scheduling With Guaranteed Performance Bounds	1686
..... <i>M. Siami, A. Olshevsky, and A. Jadbabaie</i>	
Data-Driven Model Predictive Control With Stability and Robustness Guarantees	1702
..... <i>J. Berberich, J. Köhler, M. A. Müller, and F. Allgöwer</i>	

TECHNICAL NOTES

A General Framework for Switched and Variable Gain Higher Order Sliding Mode Control	1718
..... <i>G. P. Incremona, M. Rubagotti, M. Tanelli, and A. Ferrara</i>	

(Contents Continued on Back Cover)



Fault-Tolerant Control for Systems With Unmatched Actuator Faults and Disturbances	1725
..... <i>K. Zhang, B. Jiang, X. Yan, Z. Mao, and M. M. Polycarpou</i>	
Optimal Output Consensus for Nonlinear Multiagent Systems With Both Static and Dynamic Uncertainties	1733
..... <i>Y. Tang and X. Wang</i>	
Classification for Dynamical Systems: Model-Based and Data-Driven Approaches	1741
..... <i>G. Battistelli and P. Tesi</i>	
Model Reference DSMC With a Relative Degree Two Switching Variable	1749
..... <i>P. Latosiński and A. Bartoszewicz</i>	
Bounded Synchronization of Heterogeneous Complex Dynamical Networks: A Unified Approach	1756
..... <i>S. Zhu, J. Zhou, X. Yu, and J.-an Lu</i>	
Moving-Horizon Estimation for Linear Dynamic Networks With Binary Encoding Schemes	1763
..... <i>Q. Liu and Z. Wang</i>	
Extension of State Space and Lyapunov Matrices	1771
..... <i>A. N. Aliseyko</i>	
Optimal Infinite Horizon Decentralized Networked Controllers With Unreliable Communication	1778
..... <i>Y. Ouyang, S. M. Asghari, and A. Nayyar</i>	
Variational Adaptive Kalman Filter With Gaussian-Inverse-Wishart Mixture Distribution	1786
..... <i>Y. Huang, Y. Zhang, P. Shi, and J. Chambers</i>	
Worst-Case Guarantees for Remote Estimation of an Uncertain Source	1794
..... <i>M. Gagrani, Y. Ouyang, M. Rasouli, and A. Nayyar</i>	
Optimism-Based Adaptive Regulation of Linear-Quadratic Systems	1802
..... <i>M. K. S. Faradonbeh, A. Tewari, and G. Michailidis</i>	
Adaptive Rational Orthogonal Basis Functions for Identification of Continuous-Time Systems	1809
..... <i>W. Mi and W. X. Zheng</i>	
A Probabilistic Framework for Moving-Horizon Estimation: Stability and Privacy Guarantees	1817
..... <i>V. Krishnan and S. Martínez</i>	
Algebraic Necessary and Sufficient Conditions for Testing Stability of 2-D Linear Systems	1825
..... <i>R. Mohsenipour and P. Agathoklis</i>	
Distributed Nash Equilibrium Seeking With Limited Cost Function Knowledge via a Consensus-Based Gradient-Free Method	1832
..... <i>Y. Pang and G. Hu</i>	
Online Stochastic Optimization With Time-Varying Distributions	1840
..... <i>X. Cao, J. Zhang, and H. V. Poor</i>	
Global Practical Tracking Via Adaptive Output Feedback for Uncertain Nonlinear Systems Without Polynomial Constraint	1848
..... <i>Y. Wang and Y. Liu</i>	
Policy Evaluation in Continuous MDPs With Efficient Kernelized Gradient Temporal Difference	1856
..... <i>A. Koppel, G. Warnell, E. Stump, P. Stone, and A. Ribeiro</i>	
A Second-Order Proximal Algorithm for Consensus Optimization	1864
..... <i>X. Wu, Z. Qu, and J. Lu</i>	
Analytic Expressions in Stochastic Max-Plus-Linear Algebra and their Application in Model Predictive Control	1872
..... <i>T. J. J. vanden Boom and B. De Schutter</i>	
Robust Stability of Barrier-Based Model Predictive Control	1879
..... <i>P. Petsagkourakis, W. P. Heath, J. Carrasco, and C. Theodoropoulos</i>	
Mean-Square Consentability of Multiagent Systems With Nonidential Channel Fading	1887
..... <i>J. Xu, Z. Zhang, and W. Wang</i>	
Optimal Multiplexing of Discrete-Time Constrained Control Systems on Matrix Lie Groups	1895
..... <i>C. Maheshwari, S. Srikant, and D. Chatterjee</i>	
Tracking Performance Limitations of Networked Control Systems With Repeated Zeros and Poles	1902
..... <i>C.-Y. Chen, F. Liu, L. Wu, H. Yan, W. Gui, and H. E. Stanley</i>	
Distributed Integer Balancing Under Weight Constraints in the Presence of Transmission Delays	1910
..... <i>A. I. Rikos and C. N. Hadjicostis</i>	
Discrete-Time Distributed Observers Over Jointly Connected Switching Networks and an Application	1918
..... <i>T. Liu and J. Huang</i>	
Adaptive Leader-Follower Synchronization Over Heterogeneous and Uncertain Networks of Linear Systems Without Distributed Observer	1925
..... <i>I. A. Azzollini, W. Yu, S. Yuan, and S. Baldi</i>	
Linear Weakly Hard Real-Time Control Systems: Time- and Event-Triggered Stabilization	1932
..... <i>S. Linsensmayer, M. Hertneck, and F. Allgöwer</i>	

IEEE TRANSACTIONS ON CONTROL OF NETWORK SYSTEMS

A PUBLICATION OF THE IEEE CONTROL SYSTEMS SOCIETY



COSPONSORED BY
IEEE CIRCUITS AND SYSTEMS SOCIETY
IEEE COMMUNICATIONS SOCIETY
IEEE COMPUTER SOCIETY
IEEE ROBOTICS AND AUTOMATION SOCIETY



MARCH 2021

VOLUME 8

NUMBER 1

ITCNAY

(ISSN 2325-5870)

PAPERS

Optimal Allocation of False Data Injection Attacks for Networked Control Systems With Two Communication Channels	<i>L. Guo, H. Yu, and F. Hao</i>	2
Exploiting Timing Information in Event-Triggered Stabilization of Linear Systems With Disturbances	<i>M. J. Khojasteh, M. Hedayatpour, J. Cortés, and M. Franceschetti</i>	15
Distributed Networked Real-Time Learning	<i>A. García, L. Wang, J. Huang, and L. Hong</i>	28
Dissipativity Tools for Convergence to Nash Equilibria in Population Games	<i>M. Arcak and N. C. Martins</i>	39
Distributed Discrete-Time Algorithms for Convex Optimization With General Local Constraints on Weight-Unbalanced Digraph	<i>H. Liu, W. X. Zheng, and W. Yu</i>	51
Imitation Dynamics in Population Games on Community Networks	<i>G. Como, F. Fagnani, and L. Zino</i>	65
Extended Structural Balance and Disagreement Behaviors for Switching Networks With Antagonistic Interactions	<i>D. Meng, Y. Wu, and M. Du</i>	77
Fixed-Time-Synchronized Consensus Control of Multiagent Systems	<i>D. Li, S. S. Ge, and T. H. Lee</i>	89
Mean-Field Transmission Power Control in Dense Networks	<i>Y. Wu, J. Wu, M. Huang, and L. Shi</i>	99
Distributed Impulsive Control for Signed Networks of Coupled Harmonic Oscillators With Sampled Positions	<i>Q. Song, G. Wen, D. Meng, Z.-W. Liu, and F. Liu</i>	111
Analysis and Distributed Control of Periodic Epidemic Processes	<i>S. Gracy, P. E. Paré, H. Sandberg, and K. H. Johansson</i>	123
Resilient State Estimation for Complex Dynamic Networks With System Model Perturbation	<i>P. Duan, G. Lv, Z. Duan, and Y. Lv</i>	135
Output Synchronization of Heterogeneous Networked Linear MIMO Systems: γ -Stabilization and H_∞ Control	<i>L. Zhu, Z. Chen, X. Chen, and D. J. Hill</i>	147
Observer-Based Event-Triggered Approach for Stochastic Networked Control Systems Under Denial of Service Attacks	<i>N. Zhao, P. Shi, W. Xing, and J. Chambers</i>	158
A Blended Active Detection Strategy for False Data Injection Attacks in Cyber-Physical Systems	<i>M. Ghaderi, K. Gheitsi, and W. Lucia</i>	168
Distributed Algorithm Design for Resource Allocation Problems of High-Order Multiagent Systems	<i>Z. Deng</i>	177

(Contents Continued on Page 1)



On the Solution of the Optimal Power Flow for Three-Phase Radial Distribution Networks With Energy Storage	<i>E. Stai, C. Wang, and J.-Y. Le Boudec</i>	187
The Impact of Complex and Informed Adversarial Behavior in Graphical Coordination Games	<i>K. Paarporn, B. Canty, P. N. Brown, M. Alizadeh, and J. R. Marden</i>	200
Optimal Target Control of Complex Networks With Selectable Inputs	<i>L. Gao, G. Zhao, G. Li, F. Guo, and F. Zeng</i>	212
Controller and Triggering Mechanism Co-design for Control Over Time-Slotted Networks	<i>S. Linsenmayer, B. W. Carabelli, S. Wildhagen, K. Rothermel, and F. Allgöwer</i>	222
Synthetic Biology-Inspired Robust-Perfect-Adaptation-Achieving Control Systems: Model Reduction and Stability Analysis.....	<i>A. M. Zand and M. S. Tavazoei</i>	233
Dynamic Resilient Network Games With Applications to Multiagent Consensus.....	<i>Y. Nugraha, A. Cetinkaya, T. Hayakawa, H. Ishii, and Q. Zhu</i>	246
Feedback Stabilization of Uncertain Networked Control Systems Over Delayed and Fading Channels	<i>C. Tan, H. Zhang, W. S. Wong, and Z. Zhang</i>	260
Distributed Zero-Order Algorithms for Nonconvex Multiagent Optimization.....	<i>Y. Tang, J. Zhang, and N. Li</i>	269
Resilient Primal–Dual Optimization Algorithms for Distributed Resource Allocation	<i>B. Turan, C. A. Uribe, H.-T. Wai, and M. Alizadeh</i>	282
Randomized Constraints Consensus for Distributed Robust Mixed-Integer Programming	<i>M. Chamanbaz, G. Notarstefano, F. Sasso, and R. Bouffanais</i>	295
Distributed Automatic Load Frequency Control With Optimality in Power Systems	<i>X. Chen, C. Zhao, and N. Li</i>	307
Uniqueness of Power Flow Solutions Using Monotonicity and Network Topology	<i>S. W. Park, R. Y. Zhang, J. Lavaei, and R. Baldick</i>	319
Distributed Optimization Under Unbalanced Digraphs With Node Errors: Robustness of Surplus-Based Dual Averaging Algorithm.....	<i>C.-X. Shi and G.-H. Yang</i>	331
Fast Online Reinforcement Learning Control Using State-Space Dimensionality Reduction	<i>T. Sadamoto, A. Chakraborty, and J.-ichi Imura</i>	342
Workspace Partitioning and Topology Discovery Algorithms for Heterogeneous Multiagent Networks	<i>E. Bakolas</i>	354
Global Distributed Attitude Tracking Control of Multiple Rigid Bodies via Quaternion-Based Hybrid Feedback	<i>Y. Huang and Z. Meng</i>	367
Admissibility of Uncertain Injections in Quadratic Algebraic Systems... ..	<i>C. Wang, E. Stai, and J.-Y. Le Boudec</i>	379
Nonasymptotic Connectivity of Random Graphs and Their Unions	<i>B. Bjorkman, M. Hale, T. D. Lamkin, B. Robinson, and C. Thompson</i>	391
Set Invariance and Optimal Set Stabilization of Boolean Control Networks: A Graphical Approach	<i>S. Gao, C. Xiang, and T. H. Lee</i>	400
Projection-Free Distributed Optimization With Nonconvex Local Objective Functions and Resource Allocation Constraint.....	<i>D. Li, N. Li, and F. Lewis</i>	413
Fault-Resilient Continuum Deformation Coordination.....	<i>H. Rastgoftar</i>	423
Learning-Based Attacks in Cyber-Physical Systems	<i>M. J. Khojasteh, A. Khina, M. Franceschetti, and T. Javidi</i>	437
Leader–Follower Formation Control With Prescribed Performance Guarantees	<i>F. Chen and D. V. Dimarogonas</i>	450
On the Flow Problem in Water Distribution Networks: Uniqueness and Solvers	<i>M. K. Singh and V. Kekatos</i>	462
An Unknown Input Multiobserver Approach for Estimation and Control Under Adversarial Attacks	<i>T. Yang, C. Murguia, M. Kuijper, and D. Nešić</i>	475
Safety-Critical Control Synthesis for Network Systems With Control Barrier Functions and Assume-Guarantee Contracts.....	<i>Y. Chen, J. Anderson, K. Kalsi, A. D. Ames, and S. H. Low</i>	487
Generic Detectability and Isolability of Topology Failures in Networked Linear Systems	<i>Y. Zhang, Y. Xia, J. Zhang, and J. Shang</i>	500
Stability Conditions for Coupled Autonomous Vehicles Formations.....	<i>P. E. Baldivieso and J. J. P. Veerman</i>	513

IEEE

CONTROL SYSTEMS LETTERS

A PUBLICATION OF THE IEEE CONTROL SYSTEMS SOCIETY



APRIL 2021

VOLUME 5

NUMBER 2

ICSLBO

(ISSN 2475-1456)

PAPERS

Decentralized Event-Triggered Frequency Control With Guaranteed \mathcal{L}_∞ -Gain for Multi-Area Power Systems	<i>L. Yang, T. Liu, and D. J. Hill</i>	373
High-Confidence Attack Detection via Wasserstein-Metric Computations	<i>D. Li and S. Martínez</i>	379
Computing Safe Sets of Linear Sampled-Data Systems	<i>F. Gruber and M. Althoff</i>	385
A Class of High Order Tuners for Adaptive Systems	<i>J. E. Gaudio, A. M. Annaswamy, M. A. Bolender, E. Lavretsky, and T. E. Gibson</i>	391
Self-Configuring Robot Path Planning With Obstacle Avoidance via Deep Reinforcement Learning	<i>B. Sangiovanni, G. P. Incremona, M. Piastra, and A. Ferrara</i>	397
Stabilizing Formation Systems With Nonholonomic Agents	<i>T. L. Dearing, X. Chen, and M. M. Nicotra</i>	403
Fault Isolation in MIMO Systems Based on Active Decoupling	<i>H. Niemann, J. Stoustrup, and N. K. Poulsen</i>	409
Nesterov Acceleration for Equality-Constrained Convex Optimization via Continuously Differentiable Penalty Functions	<i>P. Srivastava and J. Cortés</i>	415
Incremental Inference of Collective Graphical Models	<i>R. Singh, I. Haasler, Q. Zhang, J. Karlsson, and Y. Chen</i>	421
Stochastic Safety for Markov Chains	<i>M. L. Bujorianu, R. Wisniewski, and E. Boulougouris</i>	427
Online Residential Demand Response via Contextual Multi-Armed Bandits	<i>X. Chen, Y. Nie, and N. Li</i>	433
A Time-Freezing Approach for Numerical Optimal Control of Nonsmooth Differential Equations With State Jumps	<i>A. Nurkanović, T. Sartor, S. Albrecht, and M. Diehl</i>	439
Exponential Convergence Rates of Nonlinear Mechanical Systems: The 1-DoF Case With Configuration-Dependent Inertia	<i>D. Calzolari, C. Della Santina, and A. Albu-Schäffer</i>	445
Distance-Based Formation Control With Bounded Disturbances	<i>D. Van Vu, M. H. Trinh, P. D. Nguyen, and H.-S. Ahn</i>	451
A Novel Online Active Fault Diagnosis Method Based on Invariant Sets	<i>S. Yang, F. Xu, X. Wang, and B. Liang</i>	457

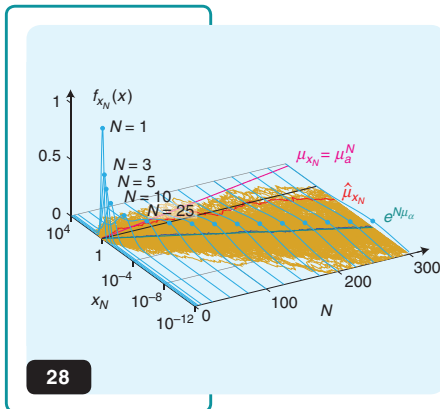
(Contents Continued on Page ii)



A General Framework for Bounding Approximate Dynamic Programming Schemes	463
..... <i>Y. Liu, E. K. P. Chong, A. Pezeshki, and Z. Zhang</i>	
Robust Control Design of Underactuated 2×2 PDE-ODE-PDE Systems	469
..... <i>J. Auriol, U. J. F. Aarsnes, F. Di Meglio, and R. Shor</i>	
Synchronization Analysis of Networks of Linear Parabolic Partial Differential Equations	475
..... <i>T. Xia and L. Scardovi</i>	
Sparse Sensing and Optimal Precision: An Integrated Framework for $\mathcal{H}_2/\mathcal{H}_\infty$ Optimal Observer Design ...	481
..... <i>V. M. Deshpande and R. Bhattacharya</i>	
A Semi-Algebraic Optimization Approach to Data-Driven Control of Continuous-Time Nonlinear Systems ..	487
..... <i>T. Dai and M. Sznaier</i>	
Distributed Localization in Wireless Sensor Networks Under Denial-of-Service Attacks	493
..... <i>L. Shi, Q. Liu, J. Shao, and Y. Cheng</i>	
Fully Distributed Nash Equilibrium Seeking Over Time-Varying Communication Networks With Linear Convergence Rate	499
..... <i>M. Bianchi and S. Grammatico</i>	
Hybrid Reinforcement Learning Control for a Micro Quadrotor Flight	505
..... <i>J. Yoo, D. Jang, H. J. Kim, and K. H. Johansson</i>	
Nested Sparse Successive Galerkin Approximation for Nonlinear Optimal Control Problems	511
..... <i>Z. Wang and Y. Li</i>	
Data-Driven Tests for Controllability	517
..... <i>V. K. Mishra, I. Markovsky, and B. Grossmann</i>	
Characterizing Safety: Minimal Control Barrier Functions From Scalar Comparison Systems	523
..... <i>R. Konda, A. D. Ames, and S. Coogan</i>	
Second-Order Sensitivity Methods for Robustly Training Recurrent Neural Network Models	529
..... <i>L. Johnston and V. Patel</i>	
A Necessary and Sufficient Condition for Stability of a Class of Planar Positive Nonlinear Systems	535
..... <i>Y. Zou and C. Qian</i>	
PDE-Based Dynamic Density Estimation for Large-Scale Agent Systems	541
..... <i>T. Zheng, Q. Han, and H. Lin</i>	
Sparse Resource Allocation for Control of Spreading Processes via Convex Optimization	547
..... <i>V. L. J. Somers and I. R. Manchester</i>	
Optimal Control Design for Perturbed Constrained Networked Control Systems	553
..... <i>M. Bahraini, M. Zanon, A. Colombo, and P. Falcone</i>	
Separable Control Lyapunov Functions With Application to Prostheses	559
..... <i>R. Gehlhar and A. D. Ames</i>	
Distance Measures for Strong Observability and Strong Detectability of Systems With Direct Feedthrough	565
..... <i>R. Falkensteiner, R. Seeber, M. Reichhartinger, and M. Horn</i>	
Memory-Augmented System Identification With Finite-Time Convergence	571
..... <i>A. Vahidi-Moghaddam, M. Mazouchi, and H. Modares</i>	
Decentralised Probabilistic Consensus Control for Stochastic Complex Dynamical Networks	577
..... <i>R. Herzallah</i>	
Five-Full-Block Structured Singular Values of Real Matrices Equal Their Upper Bounds	583
..... <i>O. Troeng</i>	
A Derivative-Free Optimization Method With Application to Functions With Exploding and Vanishing Gradients	587
..... <i>S. Al-Abri, T. X. Lin, M. Tao, and F. Zhang</i>	
Traffic Control via Platoons of Intelligent Vehicles for Saving Fuel Consumption in Freeway Systems	593
..... <i>G. Piacentini, P. Goatin, and A. Ferrara</i>	
Distributed Time-Varying Resource Allocation Optimization Based on Finite-Time Consensus Approach ...	599
..... <i>B. Wang, Q. Fei, and Q. Wu</i>	
Model-Free State Estimation Using Low-Rank Canonical Polyadic Decomposition	605
..... <i>A. S. Zamzam, Y. Liu, and A. Bernstein</i>	
Self-Activation Attenuates the Adverse Effects of Scarce Resources on Genetic Switches	611
..... <i>A. Gyorgy</i>	
Distributed Spatial Filtering Over Networked Systems	617
..... <i>S. Izumi, R. Katayama, X. Xin, and T. Yamasaki</i>	
A Generalization of the Classical Kelly Betting Formula to the Case of Temporal Correlation	623
..... <i>J. D. O'Brien, K. Burke, M. E. Burke, and B. R. Barmish</i>	
High-Gain Observer Design for Some Semilinear Reaction-Diffusion Systems: A Transformation-Based Approach	629
..... <i>C. Kitsos, G. Besançon, and C. Prieur</i>	
Universal Adaptive Stabilization-Based Trend Filtering for Impending Battery Voltage Collapse Detection ...	635
..... <i>S. Alawnah, S. Mukhopadhyay, and A. Sagahyoon</i>	
Controller Design via Experimental Exploration With Robustness Guarantees	641
..... <i>T. Holicki, C. W. Scherer, and S. Trimpe</i>	

Unscented Dual Quaternion Particle Filter for SE(3) Estimation	<i>K. Li, F. Pfaff, and U. D. Hanebeck</i>	647
Incremental Affine Abstraction of Nonlinear Systems	<i>S. M. Hassaan, M. Khajenejad, S. Jensen, Q. Shen, and S. Z. Yong</i>	653
Distributed Fiedler Vector Estimation With Application to Desynchronization of Harmonic Oscillator Networks	<i>D. Deplano, M. Franceschelli, A. Giua, and L. Scardovi</i>	659
Sparse Linear Injection Attack on Multi-Agent Consensus Control Systems	<i>K. F. E. Tsang, M. Huang, K. H. Johansson, and L. Shi</i>	665
Data-Driven Attack Detection for Linear Systems	<i>V. Krishnan and F. Pasqualetti</i>	671
On Stability of Distributed-Averaging Proportional-Integral Frequency Control in Power Systems	<i>J. W. Simpson-Porco</i>	677
Leader-Follower Synchronization and ISS Analysis for a Network of Boundary-Controlled Wave PDEs	<i>L. Aguilar, Y. Orlov, and A. Pisano</i>	683
Modal Consensus of Single Integrators With Minimal “Disagreement Interaction” via Distributed Endogenous Internal Model	<i>A. Monti, C. Possieri, and M. Sassano</i>	689
On a Phase Transition of Regret in Linear Quadratic Control: The Memoryless Case	<i>I. Ziemann and H. Sandberg</i>	695
Optimal Impulsive Control Problems Motivated by Mechanical Systems With Vibrations and Blockable DOFs	<i>E. Goncharova, M. Staritsyn, and F. Lobo Pereira</i>	701
Backward Reachability Using Integral Quadratic Constraints for Uncertain Nonlinear Systems	<i>H. Yin, P. Seiler, and M. Arcak</i>	707
Distributed Stabilization of Two Interdependent Markov Jump Linear Systems With Partial Information	<i>G. Peng, J. Chen, and Q. Zhu</i>	713
Epistemic Uncertainty Quantification in State-Space LPV Model Identification Using Bayesian Neural Networks	<i>Y. Bao, J. Mohammadpour Velni, and M. Shahbakhti</i>	719
A Population-Based Approach to Study the Effects of Growth and Division Rates on the Dynamics of Cell Size Statistics	<i>N. Totis, C. Nieto, A. Küper, C. Vargas-García, A. Singh, and S. Waldherr</i>	725
Control Barrier Function-Based Quadratic Programs Introduce Undesirable Asymptotically Stable Equilibria	<i>M. F. Reis, A. P. Aguiar, and P. Tabuada</i>	731
Leader-Follower Consensus of Unicycles With Communication Range Constraints via Smooth Time-Invariant Feedback	<i>E. Restrepo, A. Loría, I. Sarras, and J. Marzat</i>	737

» FEATURE

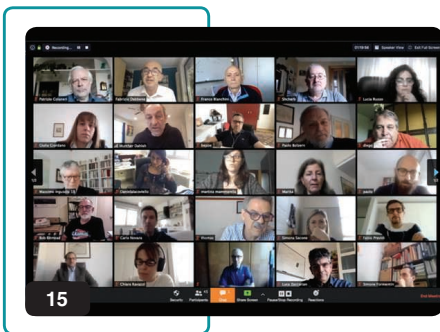


28 Stochasticity in Feedback Loops

Great expectations and guaranteed ruin

ROY S. SMITH and BASSAM BAMIEH

» DEPARTMENTS



4 FROM THE EDITOR
To Know or to Predict?

6 ABOUT THIS ISSUE
Stochastic Feedback

8 PRESIDENT'S MESSAGE
Toward Autonomous Operations:
An Industrialist's Perspective

13 25 YEARS AGO

15 MEMBER ACTIVITIES
Modeling and Control of the COVID-19 Outbreak

17 PUBLICATION ACTIVITIES
New Associate Editors

Cover credit: This image shows the performance of 50 simulated investments with random returns, each having a positive expected rate of return. In spite of an excellent expected profit, the vast majority of investors lose their money.



18

18 TECHNICAL ACTIVITIES

Technical Committee on Automotive Controls
 Technical Committee on Discrete Event Systems

22 PEOPLE IN CONTROL

Florian Dörfler
 Jason R. Marden

45 LECTURE NOTES

Input Shaping: A Tutorial Introduction

52 BOOKSHELF

Book Announcements

56 AWARDS

2020 IEEE Control Systems Society Awards

60 CONFERENCE REPORTS

2021 American Control Conference Preview

62 CONFERENCE CALENDAR



**IEEE PERIODICALS
 MAGAZINES DEPARTMENT**

445 Hoes Lane, Piscataway,
 NJ 08854 USA

Senior Managing Editor
 Geraldine Krolin-Taylor

Senior Art Director
 Janet Dudar

Associate Art Director
 Gail A. Schnitzer

Production Coordinator
 Theresa L. Smith

Advertising Production Manager
 Felicia Spagnoli

Production Director
 Peter M. Tuohy

*Director, Business Development –
 Media & Advertising*
 Mark David

Editorial Services Director
 Kevin Lisankie

*Senior Director
 Publishing Operations*
 Dawn M. Melley

*IEEE prohibits discrimination, harassment,
 and bullying. For more information, visit
[http://www.ieee.org/web/aboutus/whatis/
 policies/p9-26.html](http://www.ieee.org/web/aboutus/whatis/policies/p9-26.html).*

MISSION STATEMENT AND SCOPE: As the official means of communication for the IEEE Control Systems Society, *IEEE Control Systems* publishes interesting, useful, and informative material on all aspects of control system technology for the benefit of control educators, practitioners, and researchers. With this mission statement in mind, *IEEE Control Systems* encourages submissions, both feature articles and columns, on all aspects of control system technology.

SUBMISSION OF MANUSCRIPTS: A feature article typically provides an in-depth treatment of either an application of control technology, a tutorial on some area of control theory, or an innovation in control education.

IEEE Control Systems publishes a variety of columns. "Applications of Control" columns are industrially oriented summaries of innovations in control technology. "Focus on Education" typically describes some aspect of education such as novel control experiments. "Lecture Notes" can be theoretical in nature as long as they have clear tutorial value and intent. See recent issues for examples of these and other types of columns. Authors are encouraged to contact the editor-in-chief about the suitability of potential columns.

A detailed Author's Guide, a sample formatted manuscript, and LATEX template can be found at <http://www.ieeecss.org/publications/csm/submissions>. The specifications in this guide should be followed by all submissions.

All manuscripts should be submitted electronically to the *IEEE Control Systems* website, <https://css.paperplaza.net/conferences/scripts/start.pl>, with inquiries on appropriateness of content emailed to r.sepulchre@eng.cam.ac.uk.

SPECIAL ISSUES: *IEEE Control Systems* encourages proposals for special issues. Proposers are encouraged to contact the editor-in-chief to discuss potential topics.

BOOKS AND CONFERENCES: Submit information about recently published books to the associate editor for book reviews. Submit information about past and future conferences to the corresponding editor for conferences.

ADVERTISING: *IEEE Control Systems* accepts advertising for educational products, books, software, conferences, employment, and control-related technology. For information about advertising, contact Mark David, m.david@ieee.org, +1 732 465 6473.

IEEE CONTROL SYSTEMS—(ISSN 1066-033X) (ISMAD7) is published bimonthly by The Institute of Electrical and Electronics Engineers, Inc. Headquarters: 3 Park Avenue, 17th Floor, New York, NY 10016-5997, U.S.A. +1 212 419 7900. Responsibility for the contents rests upon the authors and not upon the IEEE, the Society, or its members. The is a membership benefit of the IEEE Control Systems Society, and subscriptions are US\$4.00 per member per year (included in Society fee). Replacement copies for members are available for US\$20.00 (one copy only). Nonmembers can purchase individual copies for US\$118. Nonmember subscription prices are available on request. Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limits of the U.S. Copyright law for private use of patrons: 1) those post-1977 articles that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01970, U.S.A.; and 2) pre-1978 articles without fee. For other copying, reprint, or republication permission, write to: Copyrights and Permissions Department, IEEE Service Center, 445 Hoes Lane, Piscataway NJ 08854, U.S.A. Copyright © 2021 by The Institute of Electrical and Electronics Engineers, Inc. All rights reserved. Periodicals postage paid at New York, NY, and at additional mailing offices. Postmaster: Send address changes to *IEEE Control Systems*, IEEE, 445 Hoes Lane, Piscataway, NJ 08854 U.S.A. Canadian GST #125634188 Printed in U.S.A

UPCOMING CONFERENCES



American Control Conference **ACC 2021**

May 26–28, New Orleans, Louisiana, USA

Manuscript Submission Deadline
September 14, 2020 (Passed)

Acceptance/Rejection Notice
January 24, 2021

Final Manuscript Submission Deadline
March 15, 2021 (Passed)

<http://acc2021.a2c2.org/>



Conference on
Control Technology and Applications
CCTA 2021

August 8–11, San Diego, USA

Initial Submissions

~~January 19, 2021 (Passed)~~

Decision Notification and Registration Opens

April 19, 2021

Final Submissions

May 24, 2021

<https://ccta2021.ieeecss.org/>



Conference on Decision and Control **CDC 2021**

December 13–15, Austin, USA

Initial Paper Submissions to L-CSS with CDC Option Due:

~~March 4, 2021 (Passed)~~

Invited Session Proposals Due:

~~March 9, 2021 (Passed)~~

Initial Paper Submissions Due:

~~March 18, 2021 (Passed)~~

Workshop Proposals Due:

May 1, 2021

Decision Notification:

Mid-July, 2021

Final Submissions Due:

September 10, 2021

<https://cdc2021.ieeeccs.org/>



American Control Conference **ACC 2022**

June 8–10, Atlanta, GA, USA

LCSS Option Submission
September 14, 2021

Manuscript Submission
September 28, 2021

Acceptance/Rejection Notice
January 24, 2022

Final Manuscript Submission
March 15, 2022

<https://acc2022.a2c2.org/>