

2023 Ninth Indian Control Conference (ICC 2023)

**Visakhapatnam, India
18-20 December 2023**



**IEEE Catalog Number: CFP23T96-POD
ISBN: 979-8-3503-9526-6**

**Copyright © 2023 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

| | |
|-------------------------|-------------------|
| IEEE Catalog Number: | CFP23T96-POD |
| ISBN (Print-On-Demand): | 979-8-3503-9526-6 |
| ISBN (Online): | 979-8-3503-9525-9 |

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE OF CONTENTS

| | |
|--|----|
| Reinforcement Learning for Signal Temporal Logic Using Funnel-Based Approach | 1 |
| <i>Naman Saxena, Gorantla Sandeep, Pushpak Jagtap</i> | |
| Deterministic Construction of Binary and Bipolar Measurement Matrices for Compressed Sensing Using BCH Codes | 7 |
| <i>Shashank Ranjan, M. Vidyasagar</i> | |
| Learning to Stabilize: Comparative Analysis of Reinforcement Learning and Traditional Methods for Swirling Pendulum Control | 10 |
| <i>Dwip Dalal, Shubhankar Riswadkar, Harish J Palanthandalam-Madapusi</i> | |
| Safe Q-Learning Approaches for Human-In-Loop Reinforcement Learning | 16 |
| <i>Swathi Veerabathraswamy, Nirav Bhatt</i> | |
| Physics Informed Neural Networks for Baculovirus-Insect Cell System | 22 |
| <i>Vishnu Swarooji Masampally, Surbhi Sharma, Lopamudra Giri, Kishalay Mitra</i> | |
| Prediction and Prognosis of Incipient Off-Spec Events in Diacetone Alcohol Production Process Using Hierarchical Process Monitoring | 28 |
| <i>Parag Patil, Midhun T. Augustine, Mani Bhushan, Sharad Bhartiya, Rajendra M. Sonar</i> | |
| Minimum-Norm Sparse Perturbations for Opacity in Linear Systems | 34 |
| <i>Varkey M. John, Vaibhav Katewa</i> | |
| Discretization of Multiple Time Delay System Using Linear Interpolation | 46 |
| <i>Pooja Sharma, Satyanarayana Neeli</i> | |
| Stabilizing Switched Systems Under Restricted Min-Switching Signals | 51 |
| <i>Darsana Udayakumar, Atreyee Kundu</i> | |
| Kullback-Leibler Divergence Based Sensor Placement Design for Kalman Filtering of Linear Dynamical Systems | 57 |
| <i>Garima Patel, Mani Bhushan</i> | |
| Improved Model Predictive Control for Regulation of Boost Converter Under Parametric and Input Voltage Variation | 63 |
| <i>Khushboo Shah, Neeli Satyanarayana</i> | |
| Accelerating the Iteratively Preconditioned Gradient-Descent Algorithm Using Momentum | 68 |
| <i>Tianchen Liu, Kushal Chakrabarti, Nikhil Chopra</i> | |
| An Assessment of Groebner Basis Methods for a Simplified Biomolecular Folding Model | 74 |
| <i>Vinod Kumar, Shaunak Sen</i> | |
| Study on Various Encryption/Decryption Algorithms for Secure Communication Using Chaotic Based Hashed Key | 79 |
| <i>K. Meera, N. Selvagesan</i> | |
| Frequency Selective Control of an Ensemble Using RF Pulses Designed Via the TOPS Algorithm in NMR Spectroscopy | 85 |
| <i>Justin Jacob, Navin Khaneja</i> | |

| | |
|---|-----|
| Wind Farm Layout Optimization Under Uncertainty Using Bayesian Approach..... | 90 |
| <i>Keerthi N Pujari, Kishalay Mitra</i> | |
| Efficient Home Energy Management Using Load Approximation Models..... | 96 |
| <i>Siddhant Vibhute, Anupama Kowli</i> | |
| Development of Block Iterated Extended Kalman Filter for Recursive Estimation of ARMAX Model Parameters..... | 102 |
| <i>Shrita Singh, Ashutosh K. Singh, Sachin C. Patwardhan</i> | |
| Passive Ranging with a Team of Aircraft Using Angle Only Tracks..... | 108 |
| <i>Sanketh Ailneni, Sudesh K Kashyap, V. P. S Naidu, Amitabh Saraf, N. K. Sinha</i> | |
| A Multi-Harmonic System Identification Method for Internal Circuit Element Monitoring..... | 114 |
| <i>Ankit Vivek Deshpande, Romil Vikram Sonigra, Prasad Enjeti, P. R. Kumar</i> | |
| A Noise Mitigation Approach for Improving Position Estimate in Indoor Vehicle Navigation Using Inertial Measurement Unit..... | 120 |
| <i>Vasumathi R, Subhadeep Kumar, Ramkrishna Pasumarthy, Nirav Bhatt</i> | |
| Terrain Estimation for Off-Road Vehicles Using Gaussian Mixture Model..... | 126 |
| <i>Alok Kumar, Atul Kelkar</i> | |
| Scheduling Networked Control Systems Under Data Losses: A Probabilistic Allocation Approach | 132 |
| <i>Anubhab Dasgupta, Darsana Udayakumar, Atreyee Kundu</i> | |
| Lyapunov-Based Attack Detection and Mitigation with Variable Control Gain..... | 138 |
| <i>Pushkal Purohit, Anoop Jain</i> | |
| Impact of Fading Channel Imposed Correlated Packet Drops on State Estimation in a Networked Control System: An Experimental Study Based on SDRs..... | 144 |
| <i>Ayyappadas Rajagopal, Shaikshavali Chitraganti</i> | |
| Pinning Impulsive Synchronisation of Complex Delayed Dynamical Network with Power Leader | 150 |
| <i>Yashasvi Chauhan, Bharat Bhushan Sharma</i> | |
| State Estimation with Correlated Packet Drops: An Experimental Evaluation with a Mobile Robot | 156 |
| <i>Ayyappadas Rajagopal, Shaikshavali Chitraganti</i> | |
| Dynamic Updates in Stochastic Control for Networked System with Uncertainties..... | 162 |
| <i>Narendra Kumar Dhar, Anuj Nandanwar</i> | |
| Adaptive Identification of SIS Models..... | 168 |
| <i>Chi Ho Leung, William E. Retnaraj, Ashish R. Hota, Philip E. Parè</i> | |
| Approximation of Convex Envelope Using Reinforcement Learning (Extended Abstract)..... | 174 |
| <i>Vivek S. Borkar, Adit Akarsh</i> | |
| The Reinforce Policy Gradient Algorithm Revisited..... | 177 |
| <i>Shalabh Bhatnagar</i> | |
| Convergence of Momentum-Based Distributed Stochastic Approximation with RL Applications | 178 |
| <i>Ankur Naskar, Gagan Thoppe</i> | |
| Adaptive Estimation of Random Vectors with Bandit Feedback: A Mean-Squared Error Viewpoint | 180 |
| <i>Dipayan Sen, Prashanth L. A., Aditya Gopalan</i> | |

| | |
|---|-----|
| Convergence of Momentum-Based Heavy Ball Method with Batch Updating And/or Approximate Gradients | 182 |
| <i>Tadipatri Uday Kiran Reddy, M. Vidyasagar</i> | |
| Attitude Consensus of Multi-Agent Uncertain Rigid Bodies in Presence of Disturbances and Time-Delays..... | 227 |
| <i>Manmohan Sharma</i> | |
| Desired Clustering in Signed Networks | 233 |
| <i>Aashi Shrinete, Twinkle Tripathy, Laxmidhar Behera</i> | |
| Nonlinear Cooperative Strategy for Active Aircraft Defense with Exact-Time Convergence..... | 239 |
| <i>Susan Basnet, Saurabh Kumar, Shashi Ranjan Kumar</i> | |
| Escaping the Double Threat: Modified PPN Law and Evasion Strategy for 2-On-1 Pursuit | 245 |
| <i>Pulkat Paliwal, Dwaipayan Mukherjee, Shashi Ranjan Kumar</i> | |
| Effect of External Biases on Opinion Formation in a Cooperative Network..... | 251 |
| <i>Vishnudatta Thota, Akshay Nagesh Kamthe, Twinkle Tripathy</i> | |
| Average Consensus in Discrete-Time Cyclic Pursuit with Communication Delays..... | 257 |
| <i>Supratim Paul, Souradip De, Soumya Ranjan Sahoo</i> | |
| Safe Motion Planning for Quadruped Robots Using Density Functions | 263 |
| <i>Sriram S. K. S Narayanan, Andrew Zheng, Umesh Vaidya</i> | |
| Redundancy in Planar Robotic Manipulator: A Comparison of Redundancy Configurations for Force Production Tasks | 269 |
| <i>Suyash Patidar, Shail Jadav, Harish J. Palanhandalam-Madapusi</i> | |
| A Non-Iterative Spatio-Temporal Multi-Task Assignments Based Collision-Free Trajectories for Music Playing Robots..... | 275 |
| <i>Shridhar Velhal, Krishna Kishore Vs, Suresh Sundaram</i> | |
| A Reinforcement-Learning Approach to Control Robotic Manipulator Based on Improved DDPG | 281 |
| <i>Saikat Majumder, Soumya Ranjan Sahoo</i> | |
| Modeling of Soft Robotic Grippers for Reinforcement Learning-Based Grasp Planning in Simulation | 287 |
| <i>Nijil George, Vighnesh Vatsal</i> | |
| Collision Cone Control Barrier Functions for Kinematic Obstacle Avoidance in UGVs | 293 |
| <i>Phani Thontepu, Bhavya Giri Goswami, Manan Tayal, Neelaksh Singh, Shyam Sundar P I, Shyam Sundar M G, Suresh Sundaram, Vaibhav Katewa, Shishir Kolathaya</i> | |
| A Generative Adversarial Networks Based Modelling for Efficient Design of Wind Energy Conversion Systems | 299 |
| <i>Keerthi N. Pujari, Srinivas S. Miriyala, Kishalay Mitra</i> | |
| The Dynamic Watermarking Method for the Cybersecurity of the Tennessee Eastman Process Control System | 305 |
| <i>Tzu-Hsiang Lin, P. R. Kumar</i> | |
| Game-Theoretic Approach for the Stochastic Target Guarding Problem | 311 |
| <i>Naveen Kothuri, Sindhuja Mangalwedekar, Bharath Bhikkaji</i> | |

| | |
|---|-----|
| Controller Design for a Nonlinear Pressurized Water Nuclear Reactor..... | 317 |
| <i>Venkata Satya Sai Ammu, Kumar Pakki Bharani Chandra, Vijaysekhar Chellaboina</i> | |
| An Adaptive Energy Management System for Battery-Supercapacitor Electric Vehicle Based on Frequency Separation..... | 321 |
| <i>Ashruti Upadhyaya, Chitralkha Mahanta</i> | |
| Control of a Torpedo-Shaped AUV with Partial Actuator Failure..... | 327 |
| <i>Tanmay Raju Kale, Krishnadas K M, Milind Fernandes, Soumya Ranjan Sahoo</i> | |
| Privacy Preservation in LQG Teams | 333 |
| <i>Ankur A. Kulkarni, Mukesh Kumar</i> | |
| A Robust Finite-Time Control for Leader-Follower Consensus for Perturbed Double Integrator Agents..... | 339 |
| <i>Krishanu Nath, Tara Swaraj, Manas Kumar Bera, Sudipta Chakraborty</i> | |
| First-Order Dynamic Quantized Consensus of Multi-Agent Systems..... | 345 |
| <i>Arvind Ragghav V, Arun D. Mahindrakar</i> | |
| Control of a Hybrid Electric Vehicle Using Control Vector Parameterization and Reinforcement Learning | 351 |
| <i>Vishnu Swaroopji Masampally, Abhishek Agarwal, Aditya Pareek, Venkataramana Runkana</i> | |
| Decentralized Cooperative Guidance for Time-Constrained Rendezvous with Non-Accelerating Targets | 357 |
| <i>Rasesh Tabiyar, Abhinav Sinha, Shashi Ranjan Kumar</i> | |
| On a Pursuit Evasion Game with Incomplete Information..... | 363 |
| <i>K. S. Mallikarjuna Rao, A. J. Shaiju</i> | |
| Time-Optimal Bezier Curves for Straight-Line and Circular Path Convergence 3D Space..... | 365 |
| <i>Sayantan Pal, Sikha Hota</i> | |
| Game Theory Based Optimal Sensor Placement Design for Fault Detection and Isolation..... | 371 |
| <i>Brijesh Kumar, Mani Bhushan</i> | |
| Optimal Geodesic Curvature Constrained Dubins' Path on Sphere with Free Terminal Orientation | 377 |
| <i>Deepak Prakash Kumar, Swaroop Darbha, Satyanarayana Gupta Manyam, Dzung Tran, David W. Casbeer</i> | |
| Off-Policy Reinforcement Learning for Optimal Control of a Two Wheeled Self Balancing Robot..... | 383 |
| <i>Athira Mullachery, Shaikshavali Chitraganti</i> | |
| Discrete-Time Control of Nonlinear Control-Affine Systems with Uncertain Dynamics..... | 389 |
| <i>Abhijit Dongare, Amit K. Sanyal, Reza Hamrah</i> | |
| An Elementary Proof for the Existence of Limit Cycle in Three Gene Cyclic Regulatory Network | 401 |
| <i>Sidhanta Mohanty, Ananya Mohit, Mudit Aggarwal, Shaunak Sen</i> | |
| Fixed-Time Sliding Mode Control for a Class of Second-Order Perturbed Systems with Applications to Quadrotor and Robot Manipulator | 407 |
| <i>Mohit Kant, Laxmidhar Behera, Nishchal K. Verma</i> | |
| Model Predictive Control for Un-Tripped Rollover Prevention of Heavy Commercial Road Vehicles | 413 |
| <i>Remya Sukumaran, Pavel Vijay Gaurkar, Shravan S. Devadiga, Shankar C. Subramanian</i> | |

| | |
|---|-----|
| Application of Nonlinear Aerodynamic Model for State Estimation of Intentional Target Maneuvers | 419 |
| <i>Affan Abdul Aziz Momin, Prashant G. Bhale, P. N. Dwivedi, Dipak Kumar Giri</i> | |
| A TDF Fractional Order Controller Design for Time Delay Systems Using IMC Approach..... | 425 |
| <i>K Gnaneshwar, Prabin Kumar Padhy</i> | |
| Fractional Order Modeling of a Li-Ion Battery Using Recursive Least Squares Approach Considering the Effect of Aging and Variable Forgetting Factor..... | 431 |
| <i>Nilima Gadkar, Velivela Naga Prudhvi, Arijit Guha</i> | |
| Adaptive Robust Control of Torpedo-Shaped Autonomous Underwater Vehicle for Underwater Payload Delivery | 437 |
| <i>Krishnadas K M, Tanmay Raju Kale, Milind Fernandes, Soumya Ranjan Sahoo</i> | |

Author Index