

# **2025 IEEE Symposium on Computational Intelligence in Artificial Life and Cooperative Intelligent Systems (ALIFE-CIS 2025)**

**Trondheim, Norway  
17-20 March 2025**



**IEEE Catalog Number: CFP258B1-POD  
ISBN: 979-8-3315-0838-8**

**Copyright © 2025 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:    | CFP258B1-POD      |
| ISBN (Print-On-Demand): | 979-8-3315-0838-8 |
| ISBN (Online):          | 979-8-3315-0837-1 |

**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](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

## Table of Contents

- 1 Automating Damage Recovery in a Legged Robot  
*Geoff Nitschke (University Of Cape Town)\*; Alexandros Pouroullis (University Of Cape Town); David Blore (University Of Cape Town); Michael Scott (University Of Cape Town); Julius Smith ( University Of Cape Town); Sindiso Mkhathshwa (University of Konstanz)*
- 8 Exploring higher-order mutation rates in a game-theoretical setting  
*Bruno Gaperov (University of Ljubljana)\*; Branko Iter (University of Ljubljana)*
- 15 Towards a CRISPR Cas9 Enhanced Genetic Algorithm  
*Camden Black Ingersoll (Northeastern University)\*; Jonathan Mwaura (Roux Institute at Northeastern University )*
- 24 Generational Replacement and Learning for High-Performing and Diverse Populations in Evolvable Robots  
*Ege de Bruin (University of Oslo)\*; Kai Olav Ellefsen (University of Oslo); Kyrre Glette (Oslo University)*
- 31 Evolutionary ecology of words  
*Reiji Suzuki (Nagoya University)\*; Takaya Arita (Graduate School of Information Science, Nogoya University)*
- 38 Towards Understanding Evolved Memory Retaining Circuitry in the Wireworld Cellular Automaton  
*Clifford Bohm (Michigan State University); Arend Hintze (Dalarna University)\**
- 47 Leveraging Heterogeneous Controller Representations for Evolutionary Swarm Robotics  
*Max Foreback (Michigan State University)\*; Clifford Bohm (Michigan State University); Emily Dolson (Michigan State University)*
- 56 Testing the Inference Accuracy of Accelerator-friendly Approximate Phylogeny Tracking  
*Matthew Moreno (University of Michigan)\*; Anika Ranjan (University of Michigan); Emily Dolson (Michigan State University); Luis Zaman (University of Michigan)*
- 65 Shared Encoding and Representation of Tool-Mediated and Direct Touch via Superposition Mechanisms  
*Haruna Kasashima (Hokkaido University)\*; Wataru Noguchi (Hokkaido University);*

*Yasumasa Tamura (Hokkaido University); Masahito Yamamoto (Hokkaido University); Hiroyuki Iizuka (Hokkaido University)*

72 Structural Cellular Hash Chemistry

*Hiroki Sayama (Binghamton University, State University of New York)\**

79 Exploring Open Dimensions in Artificial Immune Systems for High-Dimensional Tasks

*Axel Luiggi-Gørriksen (NTNU)\*; Pauline Haddow (NTNU); Trygve Woldseth (NTNU)*

86 Frequency-based Multi-objective Feature Selection to Enhance the Generalization of Evolutionary Algorithms

*HAMZA RANGWALA (Wilfrid Laurier University)\*; Azam Asilian Bidgoli (Wilfrid Laurier University)*