AD-A277 427

DOCUMENTATION PAGE

Approved for public release; distribution unlimited.

Form Approved OMB No. 0704-0188

Average [illegible] per response, including the time for reviewing [illegible] Send comments regarding this burden estimate or any other aspect of this [illegible] Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503

ATE	3. REPORT TYPE AND DATES COVERED FINAL 30 Sep 92 TO 29 Sep 93
4. TITLE AND SUBTITLE FROM ANIMALS TO ANIMATS: SECOND INTERNATIONAL CONFERENCE ON THE SIMULATION OF ADAPTIVE BEHAVIOR	5. FUNDING NUMBERS F49620-92-J-0530 61102F 2313 CS
6. AUTHOR(S) Dr Herbert L. Roitblat	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) University of Hawaii at Monoa Dept of Psychology 2430 Campus Road Honolulu, Hawaii 96822 USA	8. PERFORMING ORGANIZATION REPORT NUMBER AFOSR-TR- 94 0071
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) AFOSR/NL 110 Duncan Avenue, Suite B115 Bolling AFB DC 20332-0001 Dr John F. Tangney	10. SPONSORING/MONITORING AGENCY REPORT NUMBER 405 327 9p 94-09150
11. SUPPLEMENTARY NOTES	
12a. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited Approved for public release; distribution unlimited.	12b. DISTRIBUTION CODE DTIC ELECTE MAR 24 1994 S B D

13. ABSTRACT (Maximum 200 words)

This project provided partial support for an international conference on the simulation of adaptive behavior. The conference was held in Honolulu, HI on December 7-11, 1992. It was attended by more than 100 scientists from the US, Europe, and Asia. The main topic of the conference was how to use theories of animal behavior as a guide in the construction of robots and other autonomous agents. Contributors discussed how to develop behavior-based artificial intelligence, perception and motor control, action selection and the structuring of behavioral sequences, cognitive maps and internal world models, learning, evolution and adaptation, and collective behavior.

14. SUBJECT TERMS			15. NUMBER OF PAGES
			16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT (U)	18. SECURITY CLASSIFICATION OF THIS PAGE (U)	19. SECURITY CLASSIFICATION OF ABSTRACT (U)	20. LIMITATION OF ABSTRACT (UL)

NSN 7540-01-280-5500

Standard Form 298 (Rev 2-89)
Prescribed by ANSI Std Z39-18
298-102

94 3 23 017

Approved for public release;
distribution unlimited.

AFOSR-TR- 94 0071

Final Report

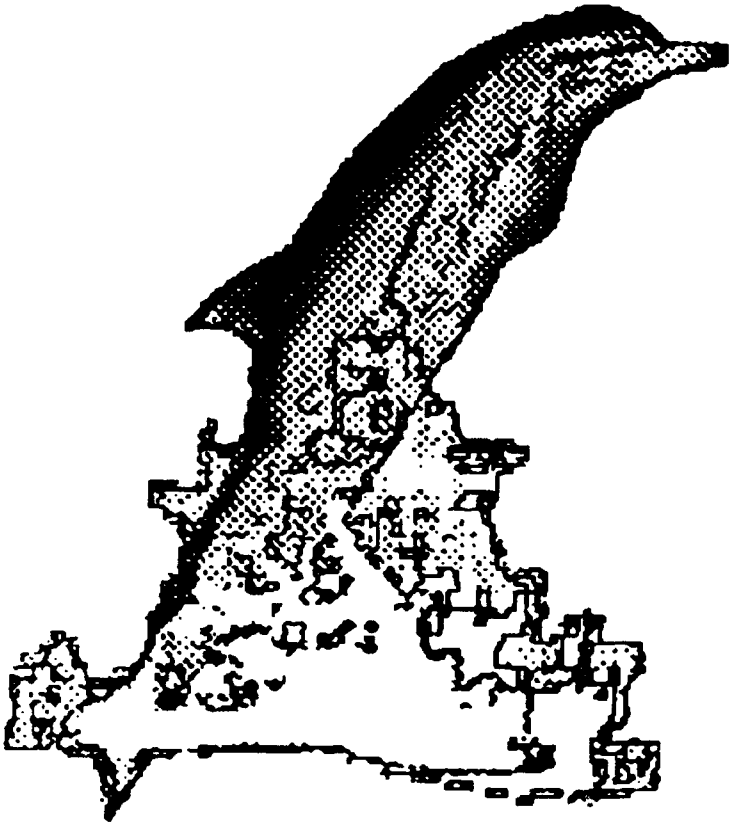
F49620-92-J-0530

From Animals to Animats (SAB92):

Simulation of Adaptive Behavior

This project provided partial support for an international conference on the simulation of adaptive behavior. The conference was held in Honolulu, HI on December 7-11, 1992. It was attended by more than 100 scientists from the US, Europe, and Asia. The main topic of the conference was how to use theories of animal behavior as a guide in the construction of robots and other autonomous agents. Contributors discussed how to develop behavior-based artificial intelligence, perception and motor control, action selection and the structuring of behavioral sequences, cognitive maps and internal world models, learning, evolution and adaptation, and collective behavior.

Accession For	
NTIS GRA&I	☑
DTIC TAB	☐
Unannounced	☐
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	



☆ From Animals to Animats (SAB92) ☆
☆ Simulation of Adaptive Behavior ☆
☆ December 7-11, 1992 ☆

☆☆☆☆☆ Sunday, December 6, 1992

1600-2000 Registration

1800-2000 Cocktail Reception at the Ilikai

Monday-December 7

☆☆☆☆☆ Monday, December 7, Morning 1. 0800-1000

----- THE ANIMAT APPROACH TO ADAPTIVE BEHAVIOR ----

Pattie Maes. "Behavior-Based Artificial Intelligence"

Peter M. Todd and Stewart W. Wilson. "Environment Structure and Adaptive Behavior From the Ground Up"

Geoffrey F. Miller and Peter M. Todd. "Evolutionary Interactions among Mate Choice, Speciation, and Runaway Sexual Selection"

☆☆☆☆☆ Monday, December 7, Morning 2. 1030-1230

----- PERCEPTION & MOTOR CONTROL ------

Michael A. Arbib and Hyun-Bong Lee. "Anuran Visuomotor Coordination for Detour Behavior: From Retina to Motor Schemas"

H. Cruse, U. Mueller-Wilm, and J. Dear. "Artificial Neural Nets for Controlling a 6-Legged Walking System"

Sunil Cherian and Wade O. Troxell. "A Neural Network Based Behavior Hierarchy for Locomotion Control"

☆☆☆☆☆ Monday, December 7, Afternoon. 1630-1900

John C. Gallagher and Randall D. Beer. "A Qualitative Dynamical Analysis of Evolved Locomotion Controllers"

Richard A. Altes. "Neuronal Parameter Maps and Signal Processing"

Herbert L. Roitblat, Patrick W. B. Moore, David A. Helweg, and Paul E. Nachtigall. "Representation and Processing of Acoustic Information in a Biomimetic Neural Network"

William R. Uttal, Gary Bradshaw, Sriram Dayanand, Robb Lovell, Thomas Shepherd, Ramakrishna Kakarala, Kurt Skifsted, and Greg Tupper. "An Integrated Computational Model of a Perceptual-Motor System"

Tuesday-December 8, 1992

☆☆☆☆☆ Tuesday, December 8, Morning 1. 0800-1000

R. Zapata, P. Lepinay, C. Novales, and P. Deplanques. "Reactive Behaviors of Fast Mobile Robots in Unstructured Environments: Sensor-Based Control and Neural Networks"

----- ACTION SELECTION AND BEHAVIORAL SEQUENCES -----

Toby Tyrrell. "The Use of Hierarchies for Action Selection"

Mark Ring. "Two Methods for Hierarchy Learning in Reinforcement Environments"

Tuesday, December 8, Morning 2. 1030-1230

Liane Gabora. "Should I Stay or Should I Go: Coordinating Biological Needs with Continuously-updated Assessments of the Environment"

----- COGNITIVE MAPS AND INTERNAL WORLD MODELS -----

Paul F. M. J. Verschure and Rolf Pfeifer. "Categorization, Representations, and The Dynamics of System-Environment Interaction: A Case Study in Autonomous Systems"

David Kortenkamp and Eric Chown. "A Directional Spreading Activation Network for Mobile Robot Navigation"

☆☆☆☆☆ Tuesday, December 8, Afternoon. 1630-1900

Poster presentations/ Wine and Cheese Reception Sponsored by MIT Press in honor of *The Journal of Adaptive Behavior*

Posters

Leemon C. Baird, III and A. Harry Klopf. "Extensions of the Associative Control Process (ACP) Network: Hierarchies and Provable Optimality"

Andrea Beltratti and Sergio Margarita. "Evolution of Trading Strategies Among Heterogeneous Artificial Economic Agents"

Allen Brookes. "The Adaptive Nature of 3D Perception"

Lawrence Davis, Stewart W. Wilson, and David Orvosh. "Temporary Memory for Examples Can Speed Learning in a Simple Adaptive System"

Dwight Deugo and Franz Oppacher. "An Evolutionary Approach to Cognition"

Dario Floreano. "Emergence of Nest-Based Foraging Strategies in Ecosystems of Neural Networks"

Simon Giszter. "Behavior Networks and Force Fields for Simulating Spinal Reflex Behaviors of the Frog"

Ralph Hartley. "Propulsion and Guidance in a Simulation of the Worm *C. Elegans*"

Tetsuya Higuchi, Tatsuya Niwa, Toshio Tanaka, Hitoshi Iba, Hugo de Garis, and Tatsumi Furuya. "Evolving Hardware with Genetic Learning: A First Step Towards Building a Darwin Machine"

Ian Horswill. "A Simple, Cheap, and Robust Visual Navigation System"

Alexander Linden and Frank Weber. "Implementing Inner Drive Through Competence Reflection"

Luis R. Lopez and Robert E. Smith. "Evolving Artificial Insect Brains for Artificial Compound Eye Robotics"

Emmanuel Mazer, Juan Manuel Ahuactzin, El-Ghazali Talbi, and Pierre Bessiere. "The Ariadne's Clew Algorithm"

Rolf Pfeifer and Paul Verschure. "Designing Efficiently Navigating Non-Goal-Directed Robots"

Feliz Ribeiro, Jean-Paul Barthes, and Eugenio Oliveira. "Dynamic Selection of Action Sequences"

Bruce E. Rosen and James M. Goodwin. "Dynamic Flight Control with Adaptive Coarse Coding"

Juergen Schmidhuber and Reiner Wahnsiedler. "Planning Simple Trajectories Using Neural Subgoal Generators"

Anton Schwartz. "Perceptual Modes: Task-Directed Processing of Sensory Input"

J. E. R. Staddon. "A Note on Rate-Sensitive Habituation"

Josh Tenenberg, Jonas Karlsson, and Steven Whitehead. "Learning via Task Decomposition"

Gerhard Weiss. "Action Selection and Learning in Multi-Agent Environments"

Wednesday-December 9, 1992

☆☆☆☆☆ Wednesday, December 9, Morning 1. 0800-1000

Saburo Tsuji and Shigang Li. "Memorizing and Representing Route Scenes"

Tony J. Prescott and John E. W. Mayhew. "Building Long-Range Cognitive Maps Using Local Landmarks"

Nestor A. Schmajuk and H. T. Blair. "Dynamics of Spatial Navigation: An Adaptive Neural Network"

☆☆☆☆☆ Wednesday, December 9, Morning 2. 1030-1230

----- LEARNING -----

A. Harry Klopf, James S. Morgan, and Scott E. Weaver. "Modeling Nervous System Function with a Hierarchical Network of Control Systems That Learn"

Michael L. Littman. "An Optimization-based Categorization of Reinforcement Learning Environments"

Long-Ji Lin and Tom Mitchell. "Reinforcement Learning with Hidden States"

☆☆☆☆☆ Wednesday, December 9, Afternoon. 1630-1900

Jing Peng and Ronald J. Williams. "Efficient Learning and Planning within the Dyna Framework"

Ulrich Nehmzow, Tim Smithers, and Brendan McGonigle. "Increasing Behavioural Repertoire in a Mobile Robot"

Thomas Ulrich Vogel. "Learning Biped Robot Obstacle Crossing"

Marco Colombetti and Marco Dorigo. "Learning to Control an Autonomous Robot by Distributed Genetic Algorithms"

Thursday-December 10, 1992

☆☆☆☆☆ Thursday, December 10, Morning 1. 0800-1000

----- EVOLUTION -----

Federico Cecconi and Domenico Parisi. "Neural Networks with Motivational Units"

Hitoshi Iba, Hugo de Garis, and Tetsuya Higuchi. "Evolutionary Learning of Predatory Behaviors Based on Structured Classifiers"

Inman Harvey, Philip Husbands, and Dave Cliff. "Issues in Evolutionary Robotics"

☆☆☆☆☆ Thursday, December 10, Morning 2. 1030-1230

Dave Cliff, Philip Husbands, and Inman Harvey. "Evolving Visually Guided Robots"

Craig W. Reynolds. "An Evolved, Vision-Based Behavioral Model of Coordinated Group Motion"

Alexis Drogoul and Jacques Ferber. "From Tom Thumb to the Dockers: Some Experiments with Foraging Robots"

☆☆☆☆☆ Thursday, December 10, Afternoon.

1630-1730 Oliver Selfridge. "From Pandemonium to Robotic Self Organization"

1730-1900 Demos, and special sessions

2100-2400 Cruise on the Navatek I. Buses will leave at 2030 and return at 2400. Heavy pupus, desserts, and drinks.

Friday-December 11, 1992

☆☆☆☆☆ Friday, December 11, Morning 1. 0800-1000

----- COLLECTIVE BEHAVIOR -----

Maja J. Mataric. "Designing Emergent Behaviors: From Local Interactions to Collective Intelligence"

Lynne E. Parker. "Adaptive Action Selection for Cooperative Agent Teams"

Gregory M. Werner and Michael G. Dyer. "Evolution of Herding Behavior in Artificial Animals"

☆☆☆☆☆ Friday, December 11, Morning 2. 1030-1310

C. Ronald Kube and Hong Zhang. "Collective Robotic Intelligence"

Chisato Numaoka and Akikazu Takeuchi. "Collective Choice of Strategic Type"

Holly Yanco and Lynn Andrea Stein. "An Adaptive Communication Protocol for Cooperating Mobile Robots"

Ronald C. Arkin and J. David Hobbs. "Dimensions of Communication and Social Organization in Multi-Agent Robotic Systems"

☆☆☆☆☆ Friday, December 11, Afternoon.

1800 Optional Luau (not included in registration).

Buses will leave for the Bishop Museum at 1500 and return at 2200. Visit the museum and enjoy the planetarium show before dinner. Dinner includes Hawaiian food, drinks, and entertainment.