

## RESUME

### Israel A. Wagner

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### ACADEMIC DEGREES

- **1987:** B.Sc. degree in Computer Engineering, Cum Laude (Technion, Haifa).
- **1990:** M.Sc. degree in Computer Science, Cum Laude (Hebrew University, Jerusalem).
- **1999:** Ph.D., Computer Science (Technion, Haifa).  
PhD Thesis: “Ant-Robotics: Search, Exploration and Covering in Multi-A(ge)nt Systems”  
Advisors: Professor Alfred M. Bruckstein, Professor Michael Lindenbaum.

### ACADEMIC APPOINTMENTS

- **1996 - :** Adjunct Lecturer, Computer Science Dept., Technion, Haifa.
- **2002 - :** Adjunct Senior Lecturer, Computer Science Dept., Technion, Haifa.

### PROFESSIONAL EXPERIENCE

- **11/1990-:** Research Staff Member in IBM Haifa Research Lab, MATAM, Haifa 31905 - Development and leading of software and hardware

projects:

1. **CMOS Cell Compiler**-Automatic generation of CMOS layout from netlist.
  2. **Circuit Design and Optimization**- Adder, ALU components, Mixed analog-digital circuits.
  3. **Analog Circuits** - Design and analysis of high-speed data-conversion systems (ADC), phase-locked loops (PLL), random number generator (RNG) and other analog and mixed-signal circuits.
- **10/1987 - 10/1990**: General Microwave Israel, Jerusalem -
    1. Research and development of microwave components
    2. Development of CAD methods for microwave design
  - **Summer 1984**: Tadiran (site 66) - Software for antenna test-equipment

## RESEARCH INTERESTS

- **VLSI** - Design, analysis and optimization of digital and analog systems.
- **Ant Robotics** - Analysis and synthesis of ant-inspired algorithms in robotics and network search.

## PUBLIC PROFESSIONAL ACTIVITIES

### Invited Editor

- *Annals of Mathematics and Artificial Intelligence*, **From Ants to A(ge)nts: Special Issue on Ant Robotics**  
Vol. 31, No. 1/4, 2001. URL: <http://www.wkap.nl/issuetoc.htm/1012-2443+31+1/4+2001>

### Served as referee

- **IEEE** Transactions on Robotics and Automation
- **IEEE** Transactions on Semiconductor Manufacturing
- **IEEE** Transactions on Computer-Aided Design

- **IEEE** Transactions on Evolutionary Computing
- **IEEE** Transactions on VLSI
- **SIAM** Journal on Computing
- **IEEE** DFT - International Workshop on Defect and Fault Tolerance in VLSI Systems
- **IEEE** International Conference on Robotics and Automation
- **FGCS** - Future Generation Computer Systems Journal
- **AMAI** - Annals of Mathematics and Artificial Intelligence
- **JAIR** - Journal of Artificial Intelligence Research
- **GECCO** - Genetic and Evolutionary Computation Conference
- **ISF** - The Israel Science Foundation

### Book Review

- in **Bulletin of Mathematical Biology** Vol. 62, No. 4, July 2000, pp. 796-798, on: **Information Processing in Social Insects**, by C. Detrain, J. L. Deneubourg and Jacques M. Pasteels (Editors), Birkhauser, 1999.

### MEMBERSHIP IN PROFESSIONAL SOCIETIES

- **MAA** - Mathematical Association of America

### HONORS

- **1984,1985**: The Technion president's award.
- **1986**: The Merlin award for best student in Computer Engineering.

## GRADUATE STUDENTS

- **2001** - Vladimir Yanovski, M.Sc. Thesis, Title: **Simple Agents for Complex Tasks**, Joint Supervisor with Prof. A. M. Bruckstein. (completed).
- **2002** - Noam Gordon, M.Sc. Thesis, Title (preliminary): **Shape Formation in Ant-Robotics**, Joint Supervisor with Prof. A. M. Bruckstein.
- **2002** - Roman Barsky, M.Sc. Thesis, Title: **Parametric Yield Prediction via Sensitivity Analysis of Critical Area**.

## Teaching Experience

- Courses
  - **2000** : **Algorithmic Aspects in VLSI Design** (CS 236604), CS Dept., Technion.  
(URL: <http://www.cs.technion.ac.il/~wagner/pub/aav.html>)
  - **1999** : A seminar on **MultiRobotics** (CS 236805), CS Dept., Technion.  
(URL: <http://www.cs.technion.ac.il/~wagner/pub/mrseminar.html>)
  - **1996-98** : **Introduction to Logic Design**, CS Dept., Technion.
  - **1988-90**: **Assembler, Pascal, and Data Structures** at the CS Department of the Hebrew University and the Jerusalem College of Technology, Jerusalem , Israel.
  - **1986-88**: **Complex Variables**, the Technion, Haifa
- Undergraduate projects instruction
  - **Implementing MAC Algorithm using Mobile Robot and Video Camera**, (with Micha Lindenbaum), students: Yehuda Gan-El, David Yaron, Moran Shochat.  
URL: [http://www.cs.technion.ac.il/Labs/IsI/projects\\_done/mac/index.html](http://www.cs.technion.ac.il/Labs/IsI/projects_done/mac/index.html)
  - **Ant-Like Robot for Trace-Oriented Covering**, (with Elon Rimon), students: Yoav Gabrieli, Hod Katan and Guy Rogel.  
URL: <http://www.cs.technion.ac.il/~wagner/pub/caw.html>

- **Hamiltonian(t) Simulation**, students: Sharon Salmon and Amir Schneider.  
URL: <http://www.cs.technion.ac.il/~wagner/AS/index.htm>
- **Patrolling Ants for Network (PAN)**, (with Freddy Bruckstein), students: Mark Matusевич and Vladimir Yanovski.  
URL: <http://www.technion.ac.il/~markmat/PAN/index.html>
- **Spatial-Openness Online Calculator, based on a JAVA/VRML applet**, (with Dafna Gewirtzman), students: Ido Zelman and Yifat Zinger.  
URL: [http://www.cs.technion.ac.il/~wagner/pub/so\\_prog/SpatialOpenness.html](http://www.cs.technion.ac.il/~wagner/pub/so_prog/SpatialOpenness.html)
- **Animated CMOS Circuit Simulator**, students: Leonid Kleyman and Evgeny Skarbovsky.  
URL: [http://www.cs.technion.ac.il/~wagner/pub/ckt\\_anim/index.html](http://www.cs.technion.ac.il/~wagner/pub/ckt_anim/index.html)

## Publications

### Book and Journals

1. J.A. Feldman, I.A. Wagner, S. Wimer,  
**An Efficient Algorithm for Some MultiRow Layout Problems**, *IEEE Transactions on CAD*, Vol. 12, No. 8, pp. 1178-1185, August 1993.
2. I.A. Wagner, I. Koren,  
**An Interactive VLSI CAD Tool for Yield Estimation**, *IEEE Transactions on Semiconductor Manufacturing*, Vol. 8, special issue on Defect, Fault and Yield Modeling, pp. 130-138, May 1995.
3. I. A. Wagner and A. M. Bruckstein,  
**Cooperative Cleaners - a Study in Ant-Robotics**, in: A. Paulraj, V. Roychowdhury, C. D. Schaper - ed., *Communications, Computation, Control, and Signal Processing: A Tribute to Thomas Kailath*, Kluwer Academic Publishers, The Netherlands, pp. 289-308, 1997.
4. I. A. Wagner and A. M. Bruckstein,  
**Row Straightening via Local Interactions**, *Circuits, Systems, and Signal Processing* Vol. 16, No.3, p 287-305, 1997.

5. A.M. Bruckstein, C.L. Mallows and I.A. Wagner ,  
**Probabilistic Pursuits on the Integer Grid**, *American Mathematical Monthly*, Vol. 104, No. 4, April 1997.
6. I.A. Wagner, M. Lindenbaum, A.M. Bruckstein,  
**Distributed Covering by Ant-Robots Using Evaporating Traces**, *IEEE Transactions on Robotics and Automation*, Vol. 15, No. 5, pp. 918-933, October 1999.
7. I.A. Wagner, M. Lindenbaum, A.M. Bruckstein,  
**Efficiently Searching a Dynamic Graph by a Smell-Oriented Vertex Process**, *Annals of Mathematics and Artificial Intelligence*, Vol. 24, pp. 211-223, 1998.
8. I.A. Wagner, M. Lindenbaum, A.M. Bruckstein,  
**MAC vs. PC - Determinism and Randomness as Complementary Approaches to Robotic Exploration of Continuous Unknown Domains**, *International Journal on Robotics Research*, Vol. 19, No. 1, pp. 12-31, January 2000.
9. I.A. Wagner, M. Lindenbaum, A.M. Bruckstein,  
**ANTS: Agents, Networks, Trees, and Subgraphs**,  
Special issue on Ant Colony Optimization in the *Future Generation Computer Systems* journal, North Holland (Editors: Dorigo, Di Caro and Stützle), Vol. 16, No. 8, pp. 915-926, June 2000.
10. V. Yanovski, I. A. Wagner, A. M. Bruckstein,  
**Vertex Ant Walk - A Robust Method for Efficient Exploration of Faulty Graphs**, *Annals of Mathematics and Artificial Intelligence*, special issue on Ant-Robotics, I. A. Wagner, A. M. Bruckstein - Ed., Vol. 31, No. 1/4, 2001, pp. 99-112.
11. A. Morgenshtein, A. Fish, I. A. Wagner,  
**Gate-Diffusion Input (GDI) - A Power Efficient Method for Digital Combinatorial Circuits**, *IEEE Transactions on VLSI*, Vol. 10, No. 5 , Oct 2002, pp. 566 -581.
12. D. Fisher-Gewirtzman, I. A. Wagner,  
**Spatial openness as a practical metric for evaluating built-up environments**, *Environment and Planning B: Planning and Design* , Vol. 30, No. 1, Jan. 2003, pp. 37 - 49.

13. V. Yanovski, I. A. Wagner, A. M. Bruckstein,  
**A Distributed Ant Algorithm for Efficiently Patrolling a Network**, *Algorithmica*, Vol. 37, No. 3, August, 2003, pp. 165-186.

## Conferences

1. I.A. Wagner, I. Koren,  
**An Interactive Yield Estimator as a VLSI CAD tool**, Proc. *DFT93 - International Workshop on Defect and Fault Tolerance in VLSI Systems*, Venice, pp. 167-174, October 1993.
2. T. Galambos, I.A. Wagner,  
**Timing Analysis and Circuit Verification Using Event Graphs**, Proc. *Computing Week, Bar-Ilan university and the IEEE Computer Society*, November 1994.
3. I.A. Wagner, I. Koren,  
**The Effect of Spot Defects on the Parametric Yield of Long Interconnection Lines**, Proc. *DFT95 - International Workshop on Defect and Fault Tolerance in VLSI Systems*, Lafayette, Louisiana, pp. 46-54, November 1995.
4. I. A. Wagner and A. M. Bruckstein,  
**Cooperative Cleaners - a Study in Ant-Robotics**, Proc. *3rd French-Israeli Symposium on Robotics*, Herzlia, May 1995, and the *1st Online Workshop on Evolutionary Computation*, Nagoya university and the WWW, October 1995,  
(<http://www.bioele.nuee.nagoya-u.ac.jp/wec/>)
5. I.A. Wagner, M. Lindenbaum, A.M. Bruckstein,  
**Ant-Algorithms for Cooperative Search in the Presence of Sensing-Errors**, Proc. *26th Israeli Conference on Mechanical Engineering*, May 21-22, 1996, Haifa, Israel.
6. I.A. Wagner, M. Lindenbaum, A.M. Bruckstein,  
**Smell as a Computational Resource - A Lesson We Can Learn from the Ant**, Proc. *ISTCS'96 - 4th Israeli Symposium on the Theory of Computing and Systems*, Jerusalem, Israel, pp. 219-230, June, 1996.

7. I.A. Wagner, M. Lindenbaum, A.M. Bruckstein,  
**On-Line Graph Searching by a Smell-Oriented Vertex Process**, Proc. *AAAI-97 Workshop on On-Line Search*, Providence, RI, pp. 122-125, July 1997.
8. I.A. Wagner, M. Lindenbaum, A.M. Bruckstein,  
**Robotic Exploration, Brownian Motion and Electrical Resistance**, *RANDOM'98 - 2nd International workshop on Randomization and Approximation Techniques in Computer Science*, Barcelona, Spain, October 1998, Lecture Notes on CS, 1518, Springer Verlag, pp. 116-130.
9. I.A. Wagner, M. Lindenbaum, A.M. Bruckstein,  
**Efficiently Exploring a Continuous Unknown Domain by an Ant-Inspired Process**, *ANTS'98 - From Ant Colonies to Artificial Ants: 1st International Workshop on Ant Colony Optimization*, Brussels, Belgium, October, 1998.
10. I.A. Wagner, A.M. Bruckstein,  
**Hamiltonian(t) - An Ant-Inspired Heuristic for Recognizing Hamiltonian Graphs**, Proc. *Congress on Evolutionary Computing*, Washington DC, pp. 1465-1469, July 1999.
11. V. M. Yanovski, I. A. Wagner, A. M. Bruckstein,  
**Edge Ant Walk for Patrolling Networks**, Proc. *ANTS'2000 - 2nd International Workshop on Ant Algorithms*, Brussels, Belgium, pp. 152-155, September 2000.
12. D. Goren, E. Shamsaev, I. A. Wagner,  
**A Novel Method for Stochastic Nonlinearity Analysis of a CMOS Pipeline ADC** Proc. *DAC'2001 - 38th Design Automation Conference* June 18-22, 2001, Las Vegas.
13. A. Morgenshtein, A. Fish, I. A. Wagner,  
**Gate-Diffusion Input (GDI) - A Novel Power Efficient Method for Digital Circuits: A Design Methodology**, *ASIC/SOC 2001*, September 12-15 2001, Hyatt Regency, Washington DC, USA.
14. D. Fisher-Gewirtzman, I. A. Wagner,  
**Spatial Openness as a Metric for Comparative Evaluation of Dense built-Up Environments**, First International Workshop on

Architectural and Urban Ambient Environment, February, 6-8, 2002, Nantes, France.

15. D. Goren, M. Zelikson, T. C. Galambos, R. Gordin, B. Livshitz, A. Amir, A. Sherman, I. A. Wagner,  
**An Interconnect-Aware Methodology for Analog and Mixed Signal Design, Based on High Bandwidth (Over 40 GHz) On-chip Transmission Line Approach**, *DATE 2002*, Paris, 4-8 March, 2002.
16. A. Morgenshtein, A. Fish, I. A. Wagner,  
**Gate-Diffusion Input (GDI) - A Technique for Low Power Design of Digital Circuits: Analysis and Characterization**, *ISCAS 2002*, May 26-29, 2002, Scottsdale, Arizona, USA.
17. D. Goren, M. Zelikson, R. Gordin, I. A. Wagner, A. Barger, A. Amir, B. Livshitz, A. Sherman, Y. Tretiakov, R. Groves, J. Park, D. Jordan, S. Strang, R. Singh, C. Dickey, D. Haramé,  
**On-chip Interconnect-Aware Design and Modeling Methodology, Based on High Bandwidth Transmission Line Devices**, *DAC 2003*, Chicago, September 2-6, 2003.
18. N. Gordon, I. A. Wagner and A. M. Bruckstein, **Discrete Bee Dance Algorithms for Pattern Formation on a Grid**, *Web Intelligence 2003 (WI 2003)*, Halifax, Canada, October 13-17, 2003.
19. M. Moreinis, A. Morgenshtein, I. A. Wagner, A. Kolodni, **Logic Gates as Repeaters (LGR) for Timing Optimization of SoC Interconnects**, *IFIP VLSI SoC 2003 - International Conference on Very Large Scale Integration of Systems-on-Chip - Darmstadt, Germany*, December 1-3, 2003.

## Technical Reports

1. J.A. Feldman, I.A. Wagner, S. Wimer,  
**An Efficient Algorithm for Some MultiRow Layout Problems**, *Technical Report 88.321*, March 1992, IBM Haifa Research Lab.
2. I. A. Wagner and A. M. Bruckstein,  
**Row Straightening via Local Interactions**, *Technical report CIS-9406*, *Center for Intelligent Systems*, Technion, Haifa, May 1994.

3. A.M. Bruckstein, C.L. Mallows and I.A. Wagner ,  
**Probabilistic Pursuits on the Integer Grid**, *Technical report CIS-9411, Center for Intelligent Systems*, Technion, Haifa, September 1994, revised: February 1995.
4. I. A. Wagner and A. M. Bruckstein,  
**Cooperative Cleaners - a Study in Ant-Robotics**, *Technical report CIS-9512, Center for Intelligent Systems*, Technion, Haifa, June 1995.
5. I.A. Wagner, M. Lindenbaum, A.M. Bruckstein,  
**Cooperative Covering by Ant-Robots using Evaporating Traces**, *Technical report CIS-9610, Center for Intelligent Systems*, Technion, Haifa, April 1996;
6. J.A. Feldman, O. Gat, I.A. Wagner, S. Wimer,  
**Net Assignment and Image Definition for Optimal CMOS Cell Layout**, *Technical report 88.375, IBM Israel Science and Technology*, MATAM, Haifa, February 1997.
7. I. A. Wagner, M. Lindenbaum, A. M. Bruckstein,  
**MAC vs. PC - Determinism and Randomness as Complementary Approaches to Robotic Exploration of Continuous Unknown Domains**, CIS Technical Report CIS-9814, CS Dept., Technion.
8. I. A. Wagner, M. Lindenbaum, A. M. Bruckstein,  
**ANTS: Agents on Networks, Trees, and Subgraphs**, CIS Technical Report CIS-2000-03, CS Dept., Technion.
9. V. Yanovski, I. A. Wagner, A. M. Bruckstein,  
**Vertex Ant Walk - A Robust Method for Efficient Exploration of Faulty Graphs**, CIS Technical Report CIS-2001-03, CS Dept., Technion.
10. V. Yanovski, I. A. Wagner, A. M. Bruckstein,  
**A Distributed Ant Algorithm for Efficiently Patrolling a Network** , CIS Technical Report CIS-2002-05, CS Dept., Technion.
11. N. Gordon, I. A. Wagner and A. M. Bruckstein,  
**Discrete Bee Dance Algorithms for Pattern Formation on a Grid**, CIS Technical Report CIS-2003-03, CS Dept., Technion.

## Patents

1. T. C. Galambos, R. P. Masleid, I. A. Wagner, **US5894419: System and method for robust clocking schemes for logic circuits.**
2. I. A. Wagner, M. Leibowitz, U. Elazar, **US6577649: Multiplexer for Asynchronous Data**
3. I. A. Wagner, T. C. Galambos, **US6658368: On-chip histogram testing for very high speed analog-to-digital converters**
4. D. Goren, E. Shamsaev, I. A. Wagner, **US6566934: Charge Cancellation Circuit for Switched Capacitor Applications**
5. M. Zelikson, M. Leibowitz, I. A. Wagner, **US6420663: One layer spider interconnect**
6. I.A. Wagner, E. Shamsaev, M. Zelikson, Y. Perelman, **US6744395: A Power-Scalable Asynchronous Architecture for a Wave-Pipelined Analog to Digital Converter**
7. V. Yanovski, A. M. Bruckstein, I. A. Wagner, **A Boundary Filling Method Using Frame Buffer Memory Traces** (pending)
8. E. Shamsaev, I. A. Wagner, **A Fast, Low Power Current Comparator in CMOS with Completion Logic** (pending)
9. A. Morgenshtein, A. Fish, I.A. Wagner, **GDI (Gate-Diffusion Input) circuits for fast, low-power and area-efficient implementations of logical gates.** (pending)
10. O. Katz, D. A. Ramon, I. A. Wagner, **A Differential Approach to Current-Mode Chaos Circuit Enables a Robust Generation of Randomness** (pending)