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## Lidia A. R. Yamamoto

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### *Current employment:*

- April 2010 – April 2011: Post-doctoral researcher, Data Mining and Theoretical Bioinformatics Team (FDBT), Image Sciences, Computer Sciences and Remote Sensing Laboratory (LSIIT), University of Strasbourg, France. [https://lsiit-cnrs.unistra.fr/fdbt-en/index.php/Main\\_Page](https://lsiit-cnrs.unistra.fr/fdbt-en/index.php/Main_Page)
  - Advisors: Prof. Pierre Collet (head of FDBT) and Prof. Wolfgang Banzhaf (Memorial University of Newfoundland, Canada)
  - Research: Parallel algorithms for the evolution of artificial chemistries by genetic programming on top of GPGPU graphics cards. Cellular automata and reaction-diffusion processes on a GPU. Evolution of reaction-diffusion patterns expressed by a spatial artificial chemistry on a GPU.
  - Teaching: Scientific English (Spring 2010).

### *Previous employment:*

- December 2004 - April 2010: Post-doctoral researcher, Computer Networks Group, Computer Science Department, University of Basel, Switzerland. <http://cn.cs.unibas.ch/>
  - Advisor: Prof. Christian Tschudin
  - Research: Genetic programming for the automatic evolution of programs based on chemical computing. Fault-tolerant distributed computation and optimization based on Artificial Chemistries, Artificial Embryology, and reaction-diffusion processes.
  - Teaching: Bio-inspired computing, autonomic computer systems, computational biology, computer networks, programming languages. Supervision of Master and PhD students.
  - Other activities: Fund raising, recruitment, project administration.

### *Education:*

- January 2005- : *Habilitation*, in progress. Topic: genetic programming for chemical computing.
- February 2003: Doctoral degree in Computer Science, "Adaptive Group Communication over Active Networks", University of Liège, Belgium. Advisor: Prof. Guy Leduc
- May 1995: Master in Communication Systems and Networks, "Group Communication Interface" (in Spanish), Technical University of Madrid (Universidad Politecnica de Madrid), Spain.
- July 1991: Bachelor in Computer Science (5-year study programme), State University of Campinas (Universidade Estadual de Campinas), Brazil.

### *Recent Research:*

- Artificial chemistries:
  - Application of artificial chemistry, artificial cell and embryological models to the design of software with self-\* properties for autonomic computing and communication systems.

- Resilience to failures: Application of the concept of autocatalysis to self-replicating chemical programs, in order to render them robust to instruction loss (co-advisor of a PhD student).
- Design of an energy conservation framework for algorithmic chemistries, with application to the regulation of resource consumption during computations.
- Automatic evolution of programs based on chemical computing:
  - Genetic Programming with a programming language based on the chemical metaphor, designed for the implementation of communication protocols.
  - Design and implementation of mechanisms for the regulation of the production and execution of lines of code in chemical computing, inspired by genetic regulatory networks in cells.
  - Study of properties leading to evolvable languages for chemical computing.

### **Teaching:**

- Scientific English course at the Computer Science Department, University of Strasbourg, France: Co-lecturer for approximated half of the course (10 hours)
- Co-lecturer and exercise assistant for courses at the University of Basel:
  - *Autonomic Computer Systems* (MS level, Prof. Christian Tschudin), Fall 2006 to 2009: Co-lecturer for 1/3 of the course (20 hours per semester), with focus on bio-inspired computing.
  - *Computational Biology* (BS level, Prof. Gaston Gonnet, ETH Zurich), Fall 2005 to 2006: Exercise assistant (30 hours per semester).
  - *Computer Networks and Security* (Spring 2005-2008): lectures on multimedia systems.
  - *10 Programming Languages Seminar* (Summer 2006): organization of lectures/seminars.
- Co-supervisor of PhD thesis on autocatalytic software for self-healing systems, in progress. PhD student: Mr. Thomas Meyer, University of Basel.
- Co-supervisor of MS theses: Applying Artificial Chemistries to Ants Routing (University of Basel, February 2009); Active Networks (University of Liège, 2000).
- Committee member, PhD thesis defense, multimedia networking, March 2009. PhD student: Mr. Juan José Ramos-Muñoz, University of Granada, Spain.

### **Relevant Training Course Attended:**

- Summer School "*Blueprint for an Artificial Cell*", Venice, Italy, May 2008. Organized by the European Center for Living Technology (ECLT), and the European PACE project (Programmable Artificial Cell Evolution).
  - Theme: protocell research (artificial cell construction from the bottom up).
  - Sample lectures: building artificial cells (by John McCaskill, Steen Rasmussen, Pier Luigi Luisi, Gunter von Kiedrowski, Normal Packard, John Richard Walker), simulation models including Dissipative Particle Dynamics (Rudolf Fuchslin, Doron Lancet), complex systems (Kristian Lindgren), wet experiments and chemical robots (Martin Hanczyk, Rolf Pfeifer).

### **Research Visits:**

- August 2010: one week visit to the Non Standard Computation group, University of York, UK. Hosted by Prof. Jon Timmis and funded by the PerAda initiative ([www.perada.eu](http://www.perada.eu)). Goal: to exchange ideas in unconventional computation, covering artificial chemistries, artificial immune systems, emergent computation, artificial embryology, and artificial biochemical networks.
- January to March 2008: visit to the research group of Prof. Wolfgang Banzhaf, Department of Computer Science, Memorial University of Newfoundland, St. John's, NL, Canada, to work on the evolution of programs in artificial chemistries.
- November to December 2000: visit to the Network and Distributed Systems research group of Prof. David Hutchison, Computing Department, Lancaster University, UK, to work on Active Networks and code mobility.

### ***Fund Raising:***

- Two EU Integrated Projects, both on autonomic communication: approx. 5 MEUR each, 4 years.
- One Swiss National Science Foundation (SNF) Project: one PhD student.
- One European Coordination Action on autonomic communication: 30K EUR travel funding.

### ***Other Academic Activities:***

- Co-organizer of: PerAda Workshop on Novel Applications of Bio-Inspired Computing to Pervasive Adaptation (part of the ICARIS conference on Artificial Immune Systems), 2010; CEC 2009 Special Session "Online Distributed Evolutionary Computation" (later merged with other sessions), BIONETICS 2006 (conference on bio-inspired systems, vice-chair, <http://www.bionetics.org>), IWAN 2005 (conference on active networks, panel chair), WACEN 2005 (workshop on autonomic communication for evolvable networks, under ISADS 2005).
- Peer reviewer for journal publications: IEEE Transactions on Evolutionary Computation, ACM Transactions on Autonomous and Adaptive Systems, Ad Hoc Networks Journal special issue on bio-inspired computing (Elsevier Science), IEEE JSAC (Journal on Selected Areas in Communications), Special issue on Bio-Inspired Networking.
- Peer reviewer (Technical Programme Committee member) for conferences: IEEE CEC 2009-2010, EvoStar EuroGP 2010-2011 and EvoCoMNet 2007-2010, BIONETICS 2007-2010, WAC 2004-2005 (workshop on autonomic communication), among others.
- Expert evaluator for research projects funded by the European Union: Future and Emerging Technologies (2003, 2007, 2008), Embedded Systems (2005).

### ***Specific Technical and Scientific Skills:***

- Theory and concepts: chemical reaction kinetics (mass action, enzyme and Hill kinetics, ODEs, PDEs), reaction-diffusion patterns, Chemical Organization Theory, Membrane Computing (P Systems), notions of theoretical biology (evolutionary dynamics, hypercycle, origin of life), protocells (metabolism, self-assembly of vesicles and micelles, genes, composites).
- Software: Scilab, Matlab, Maple, Copasi, Breve (artificial life simulator, [www.spiderland.org](http://www.spiderland.org)).
- Programming languages: Java, C++, C, Perl, Python, Prolog, Lisp, Bash.
- Operating systems: Unix, Linux, MacOS X, Windows.

### ***Past Employments:***

- 2002-2004: Researcher at Hitachi Europe SAS, Sophia Antipolis Laboratory, France.
  - Applied research on network monitoring, self-management, and autoconfiguration in mobile ad hoc networks.
- 1998-2002: Researcher and PhD Student at Montefiore Institute, Research Unit in Networking, University of Liège, Belgium.
- 1996-1998: Technical researcher at KPN Research, Leidschendam, The Netherlands.
  - Applied research on computer networks and multimedia.
- 1996: Internship, ENST Bretagne, Rennes, France: teleteaching and network quality of service.
- 1993-1996: Researcher at Telefónica I+D, Madrid, Spain.
  - Applied research and development on distributed multimedia conferencing.
- 1992: Exchange student, Ingeciber S.A., Madrid, Spain: software for civil engineering.
- 1991: Internship, Promon Electronics, Campinas, Brazil: data communication software.
- 1988-1992: Research internship, A\_HAND Laboratory, Computer Science Department, University of Campinas, Brazil: distributed systems, operating systems.

### **Languages:**

- English, French, Spanish: fluent
- German: intermediate level (B2)
- Dutch, Japanese: elementary
- Portuguese: mother tongue

### **Publications:**

(electronic pre-prints available at <http://cn.cs.unibas.ch/people/ly/>)

- Doctoral dissertation:
  - Lidia A. Rodrigues Yamamoto, *"Adaptive Group Communication over Active Networks"*, Doctoral thesis, Collection of Publications from the Applied Sciences Faculty of the University of Liège (Belgium), n. 224, February 2003, 166 pages.
- Journals and magazines:
  - Daniele Miorandi, Lidia Yamamoto, Francesco De Pellegrini: *"A Survey of Evolutionary and Embryogenic Approaches to Autonomic Networking"*, Computer Networks, Special Issue on New Networking Paradigms, volume 54, number 6, 2010.
  - Thomas Meyer, Daniel Schreckling, Christian Tschudin, Lidia Yamamoto: *"Robustness to Code and Data Deletion in Autocatalytic Quines"*, Transactions on Computational Systems Biology X, LNBI 5410, 2008.
  - Juan J. Ramos-Muñoz, Lidia Yamamoto and Christian Tschudin: *"Serial Experiments Online"*, ACM SIGCOMM Computer Communication Review 38(2):31-42, April 2008.
  - Daniele Miorandi, Lidia Yamamoto and Paolo Dini: *"Service Evolution in Bio-Inspired Communication Systems"*, International Conference on Self-Organization and Autonomous Systems in Computing and Communications (SOAS 2006), September 2006. In: International Transactions on Systems Science and Applications Journal (ITSSA), vol. 2, n. 1, pp. 51-60.
  - Christian Tschudin and Lidia Yamamoto: *"Self-Evolving Network Software"*, Praxis der Informationsverarbeitung und Kommunikation (PIK Magazine) 28 (2005) 4, K. G. Saur Verlag, Munich, Germany, December 2005, pp. 206-210.
  - L. Yamamoto and G. Leduc, *"Autonomous Reflectors over Active Networks: Towards Seamless Group Communication"*, The Interdisciplinary Journal of Artificial Intelligence & the Simulation of Behaviour (AISBJ), Special issue on Agent Technology, vol. 1, nb. 1, Dec. 2001, pp. 125-146.
  - Lidia Yamamoto, Guy Leduc, *"Resource Trading Agents for Adaptive Active Network Applications"*. Network and Information Systems (NIS) Journal, Volume 3, 2000. Also appeared as a book chapter in *"Mobile Agents for Telecommunication Applications"*, by Eric Horlait (editor), Hermes Penton Science, UK, July 2002.
  - B. Jerman-Blazic, L. Yamamoto, P. Drabik, A. Hallan, *"Distributed Group collaborative work through the 'Symmetric TV' Model"*. Computer Communications, Special Issue on Advanced Communications Technologies and Services (ACTS), Volume 22, Number 18, pages 1644-1651, December 1999.
- Full papers at international conferences and workshops with peer-reviewing and proceedings:
  - David Lowe, Amir Mujkanovic, Daniele Miorandi, Lidia Yamamoto, *"Fault Tolerance of Embryonic Algorithms in Mobile Networks"*, Proc. 9<sup>th</sup> International Conference on Evolvable Systems - From Biology to Hardware, York, UK, September 2010.
  - Lidia Yamamoto, Daniele Miorandi, *"Evaluating the Robustness of Activator-Inhibitor Models for Cluster Head Computation"*, Proc. 7<sup>th</sup> International Conference on Swarm

- Intelligence (ANTS), Special Session on Morphogenetic Engineering. Brussels, Belgium, September 2010.
- Lidia Yamamoto, Wolfgang Banzhaf, "*Catalytic Search in Dynamic Environments*", Artificial Life XII, Proc. 12<sup>th</sup> International Conference on the Synthesis and Simulation of Living Systems, Odense, Denmark, August 2010, MIT Press, <http://www.alifexii.org/proceedings/>
  - Lidia Yamamoto, "*Evaluation of a Catalytic Search Algorithm*", Proc. 4<sup>th</sup> International Workshop on Nature-Inspired Cooperative Strategies for Optimization (NICSO), Granada, Spain, May 2010.
  - Daniele Miorandi, David Lowe, Lidia Yamamoto, "*Embryonic Models for Self-Healing Distributed Services*", Proc. 4<sup>th</sup> International Conference on Bio-Inspired Models of Network, Information, and Computing Systems (BIONETICS 2009), December 2009.
  - Thomas Meyer, Lidia Yamamoto, Wolfgang Banzhaf, Christian Tschudin: "*Elongation Control in an Algorithmic Chemistry*", Proc. 10<sup>th</sup> European Conference on Artificial Life (ECAL 2009), Budapest, Hungary, September 2009 (poster session).
  - Thomas Meyer, Lidia Yamamoto, Christian Tschudin: "*A Self-Healing Multipath Routing Protocol*", Proc. 3<sup>rd</sup> International Conference on Bio-Inspired Models of Network, Information, and Computing Systems (BIONETICS 2008), November 2008.
  - Daniele Miorandi and Lidia Yamamoto: "*Evolutionary and Embryogenic Approaches to Autonomic Systems*", Workshop on Interdisciplinary Systems Approach in Performance Evaluation and Design of Computer & Communication Systems (Inter-Perf 2008), Athens, Greece, October 2008. (invited paper)
  - Lidia Yamamoto: "*PlasmidPL: A Plasmid-Inspired Language for Genetic Programming*", Proc. 11<sup>th</sup> European Conference on Genetic Programming (EuroGP 2008), Naples, Italy, March 2008. Springer LNCS 4971, pp. 337-349, 2008. (poster session)
  - Lidia Yamamoto, Daniel Schreckling, Thomas Meyer: "*Self-Replicating and Self-Modifying Programs in Fraglets*", Proc. 2<sup>nd</sup> International Conference on Bio-Inspired Models of Network, Information, and Computing Systems (BIONETICS 2007), December 2007.
  - Thomas Meyer, Lidia Yamamoto, Christian Tschudin: "*An Artificial Chemistry for Networking*", Bio-Inspired Computing and Communication, First Workshop on Bio-Inspired Design of Networks (BIOWIRE 2007), Cambridge, UK, April 2-5, 2007. In LNCS vol. 5151, Revised Papers, Lio, P.; Yoneki, E.; Crowcroft, J.; Verma, D.C. (Eds.), 2008, pp. 45-57.
  - Daniele Miorandi, Iacopo Carreras, Eitan Altman, Lidia Yamamoto, Imrich Chlamtac: "*Bio-Inspired Approaches for Autonomic Pervasive Computing Systems*", Bio-Inspired Computing and Communication, First Workshop on Bio-Inspired Design of Networks (BIOWIRE 2007), Cambridge, UK, April 2-5, 2007. In LNCS vol. 5151, Revised Papers, Lio, P.; Yoneki, E.; Crowcroft, J.; Verma, D.C. (Eds.), 2008, pp. 217-228.
  - Lidia Yamamoto: "*Code Regulation in Open Ended Evolution*", Proceedings of the 10<sup>th</sup> European Conference on Genetic Programming (EuroGP 2007), Valencia, Spain, April 2007. Springer LNCS 4445, pp. 271-280, 2007. (poster session)
  - Christian Tschudin and Lidia Yamamoto: "*Harnessing Self-modifying Code for Resilient Software*", Proc. 2<sup>nd</sup> IEEE Workshop on Radical Agent Concepts (WRAC), NASA Goddard Space Flight Center Visitor's Center, Greenbelt, MD, USA, September 2005. In: Innovative Concepts for Autonomic and Agent-Based Systems, Springer LNCS 3825, pp. 197-204, 2006.
  - Lidia Yamamoto, Christian Tschudin: "*Experiments on the Automatic Evolution of Protocols using Genetic Programming*", Proc. 2<sup>nd</sup> IFIP Workshop on Autonomic Communication (WAC 2005), Athens, Greece, October 2005. Springer LNCS 3854, pp. 13-28.
  - Tatsuaki Osafune, Lidia Yamamoto: "*Analysis of an Epidemic Dissemination Protocol for Ad Hoc Networks*", Symposium on Ad-hoc Sensor Networks, International Conference on Wireless Networks, Communications, and Mobile Computing (WirelessCom 2005), Maui, Hawaii, USA, June 2005.

- Lidia Yamamoto, Christian Tschudin: "*Genetic Evolution of Protocol Implementations and Configurations*", Proc. IFIP/IEEE International Workshop on Self-Managed Systems & Services (SelfMan'05), May 2005, Nice, France.
  - Christian Tschudin and Lidia Yamamoto, "*A Metabolic Approach to Protocol Resilience*", Proc. 1st. Workshop on Autonomic Communication (WAC 2004), Berlin, Germany, October 2004.
  - Spyros Denazis and Lidia Yamamoto, "*A Unified Framework for the negotiation and Deployment of Network Services*", Proc. 1st. Workshop on Autonomic Communication (WAC 2004), Berlin, Germany, October 2004.
  - Lidia Yamamoto, "*Automated Negotiation for On-demand Inter-domain Performance Monitoring*", Proc. 2nd. International Workshop on Inter-Domain Performance and Simulation (IPS 2004), Budapest, Hungary, March 2004.
  - Lidia Yamamoto, Guy Leduc, "*Autonomous Multicast Reflectors over Active Networks*". Proc. Symposium on Software mobility and adaptive behaviour, AISB'01 Convention, York, UK, March 2001.
  - Lidia Yamamoto, Guy Leduc, "*An Active Layered Multicast Adaptation Protocol*". Proc. 2nd. International Working conference on Active Networks (IWAN 2000), Springer LNCS 1942, pp. 180-194, Tokyo, Japan, October 2000.
  - Lidia Yamamoto, Guy Leduc, "*Adaptive Applications over Active Networks: Case Study on Layered Multicast*". Proc. 1st. IEEE European Conference on Universal Multiservice Networks (ECUMN 2000), Colmar, France, October 2000.
  - Lidia Yamamoto, Guy Leduc, "*An Agent-Inspired Active Network Resource Trading Model Applied to Congestion Control*". Proc. 2nd. International Workshop on Mobile Agents for Telecommunication Applications (MATA 2000), Springer LNCS 1931, pages 151-169, Paris, France, September 2000.
  - Omar Ait-Hellal, Lidia Yamamoto, Guy Leduc, "*Cycle-based TCP-Friendly algorithm*", Proceedings of IEEE GLOBECOM'99, Rio de Janeiro, Brazil, December 1999.
  - P. Drabik, L. Yamamoto, B. Jerman-Blazic, A. Hallan, "*Distributed Group Interaction through the 'Symmetric TV' Concept*", Proceedings of the ITS 12th Biennial Conference, Stockholm, Sweden, June 1998.
  - B. Jerman-Blazic, A. Hallan, L.A.R. Yamamoto. "*Symmetric TV Technology Model: A New Potential Tool for Education - An Experience of the European R&D Co-operation*". IASTED Computers and Advanced Technology in Education (CATE'98). Cancun, Mexico, May 1998.
  - L.A.R. Yamamoto, J.G. Beerends, "*Impact of network performance parameters on the end-to-end perceived speech quality*", EXPERT ATM Traffic Symposium, Mykonos, September 1997.
  - A. Azcorra, T. Miguel, M. Petit, L. Rodrigues, C. Acuña, P. Chas, J. Bastos, V. Lagarto, "*Multicast IP support for distributed conferencing over ATM*", Network+Interop'95, Las Vegas, USA, March 1995.
  - Tomás P. de Miguel, Santiago Pavón, Joaquín Salvachua, Juan Quemada Vives, Pedro Luis Chas Alonso, Javier Fernandez-Amigo, Carlos Acuña, Lidia Rodrigues Yamamoto, Vasco Lagarto, Joao Bastos, "*ISABEL: Experimental Distributed Cooperative Work Application over Broadband Networks*", IWACA'94 - Multimedia: Advanced Teleservices and High-Speed Communication Architectures, Springer LNCS 868, pages 353-362, September 1994.
- Invited talks and tutorials:
- Lidia Yamamoto, "*Self-Organization in Chemical Computing*", Telecommunication Club panel on bio-inspired self-organized networks, Hungarian Scientific Association for Infocommunications, Budapest, Hungary, 14 May 2009.
  - Lidia Yamamoto, "*Considerations on the Evolution of Programs Based on Chemical Computing*", invited lecture, seminar series Advances in Telecommunications, Networking

and Computing, Department of Telecommunications, Budapest Technical University (BUTE), Budapest, Hungary, 12 May 2009.

- Christian Tschudin, Lidia Yamamoto, "*Réseaux Bio-Inspirés*" (*Bio-Inspired Networks*), Summer School "Réseaux Autonomes et Internet du Futur" (Autonomous Networks and Future Internet), Calcatoggio, Corsica, France, June 2007.
- Lidia Yamamoto, Guy Leduc, "*An Active Network Resource Trading Model Applied to Congestion Control*". 2èmes Journées Multimédia, Facultés Universitaires Notre-Dame de la Paix, Namur, Belgium, September 2000.

➤ Seminars, symposia, short papers, position statements:

- Lidia Yamamoto, Thomas Meyer: "*Biochemically-Inspired Emergent Computation*", position statement at the PerAda Workshop on Novel Applications of Bio-Inspired Computing to Pervasive Adaptation, Proceedings of the 9th International Conference on Artificial Immune Systems (ICARIS), Edinburgh, UK, July 2010, LNCS Vol. 6209, pp. 320-322.
- Lidia Yamamoto, "*Epidemic Dissemination in Ad Hoc Networks*", Extended Abstract, Dagstuhl Seminar 04411, Service Management and Self-Organization in IP-based Networks, Schloss Dagstuhl, Germany, October 2004.
- Lidia Yamamoto, Guy Leduc, "*Building Bidirectional Multicast Trees Using Autonomous Reflectors*". Short paper, Third International Working conference on Active Networks (IWAN 2001), Philadelphia, Pennsylvania, USA, September-October 2001.

➤ Patents filled:

- Lidia Yamamoto and Masato Hayashi, "*Method and apparatus for allocating a unique identifier to a network node*", European Patent Office Application Number EP 04292627.9, filed in November 2004.
- Lidia Yamamoto and Masato Hayashi, "*Method and apparatus for disseminating, storing and collecting information in a communication network*". EPO Application Number EP 04291137.0, filed in May 2004.