

# Grégory Mermoud

## CONTACT INFORMATION

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Ch. des Vendanges  
3968 Veyras  
Switzerland

*Voice:* +41 (0)78 801 5226  
*E-mail:* gregory.mermoud@epfl.ch  
*WWW:* <http://people.epfl.ch/gregory.mermoud>

## OBJECTIVE

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To work on developing innovative and original modeling approaches in order to support research in engineering, and to apply these techniques to concrete case studies in an interdisciplinary environment fostering close collaboration between specialists of various disciplines such as computer science, swarm intelligence, and microengineering.

## EDUCATION

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### **Ph.D. in Computer Science** **September, 2007 - September, 2011 (expected)**

*Program:* Computer, Communication and Information Sciences (EDIC), École Polytechnique Fédérale de Lausanne (EPFL), Switzerland

*Topic:* Understanding, modeling and engineering self-assembling systems at all scales, ranging from MEMS-based microrobots to centimeter-sized mobile robots

*Advisors:* Prof. Alcherio Martinoli, head of the Laboratory of Distributed Intelligent Systems and Algorithms (DISAL-ENAC) and Prof. Juergen Brugger, head of the Laboratory of Microsystems and Nanoengineering (LMIS1-STI).

### **M.Sc. in Computer Science** **October, 2001 - April, 2006**

School of Computer and Communication Sciences (I&C), École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland

*Thesis:* Multi-Level Modeling of Adaptive, Self-Assembling Chemical Systems. Development of multi-level models of self-assembling supramolecular systems, successfully validated against experimental data.

*Advisors:* Prof. Alcherio Martinoli (DISAL-ENAC) and Prof. Kay Severin, head of the Laboratory of Supramolecular Chemistry (LCS-SB)

### **Maturité scientifique** **August, 1996 - June, 2001**

Equivalent to high school diploma, Lycée-Collège des Creusets, Sion, Switzerland

Award for the best final result in Philosophy

## ACADEMIC EXPERIENCE

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### **Research Assistant** **September, 2006 - September, 2007**

- Research project carried out under the joint supervision of Prof. Alcherio Martinoli and Prof. Juergen Brugger. Development of a modeling framework for microfluidics in order to achieve micrometer-sized droplet motion and inkjetting of complex polymeric inks.

### **Semester Projects** **October, 2004 - June, 2005**

- Semester project at the Logic Systems Laboratory (LSL-EPFL), under the supervision of Prof. Eduardo Sanchez. Development of a dynamically-reconfigurable FPGA platform for evolving fuzzy systems. Work presented in a conference paper (IWANN'05). Final grade 6/6.
- Semester project at the Programming Methods Laboratory (LAMP-EPFL), under the supervision of Prof. Martin Odersky. Development of a back-end for the Scaletta compiler that automatically generates a proof that the program is well-formed. Final grade 5.5/6.

### **Main Class Projects** **October, 2004 - June, 2005**

- Ant Colony Optimization for Quadratic Assignment Problem (swarm intelligence, machine learning), *Swarm Intelligence (master)*, Prof. Alcherio Martinoli
- Minimizing the Amount of Shared Memory for an Election Protocol (distributed algorithms), *Problem Solving in Computer Science (doctoral school)*, Prof. Thomas Henzinger
- An Interface Algebra for the Relational Nets (formal design) *Problem Solving in Computer Science (doctoral school)*, Prof. Thomas Henzinger
- Partitioning CiteSeer's Citation Graph Graph (web programming, graph theory), *Problem Solving in Computer Science (doctoral school)*, Prof. Thomas Henzinger
- Behaviour-Based Robotics Position finding in presence of obstacles: in real world (autonomous robotics), *Bio-Inspired Adaptive Machines (master)*, Prof. Dario Floreano
- Complete compiler for the misc functional language, a subset of Scala, including many optimizations, *Advanced Compiler Construction (master)*, Dr. Erik Stenman

## Teaching

### Lectures

- Introduction to Embedded and Real-Time Systems (4 lectures in C programming, computer architecture, and simulation of embedded systems), B.Sc. level course, summer semester 2009

### Teaching Assistantship

- Introduction to Embedded and Real-Time Systems (head assistant), Prof. Alcherio Martinoli, summer semester 2009
- Java Programming (head assistant), Dr. Christelle Vangenot, summer semester 2008
- Swarm Intelligence, Prof. Alcherio Martinoli, winter semester 2007
- Compiler Construction, Prof. Martin Odersky, winter semesters 2004/2005
- C++ Programming, Dr. Jamila Sam, winter semester 2005
- Operating Systems, Prof. André Schiper, summer semester 2004

### Project Supervision

- Modeling and Distributed Control of a Swarm of Self-Assembling Robots, Ludovic Fardel (M.Sc. in Computer Science, semester project), winter semester 2008
- Distributed Control of a Swarm of Self-Assembling Alice robots, William Chris Evans (M.Sc. in Computer Science, semester project), winter semester 2008
- An Image Processing Software Package for Monitoring Self-Assembly Experiments, Harsha Umesh Babu (M.Sc. in Information Communication Technology, master project), summer semester 2008
- Hybrid Reaction Modeling of the Extended Self-Assembly Problem, Loïc Matthey (M.Sc. in Computer Science, master project), summer semester 2008, awarded the Anaheim Foundation Prize for bringing together life sciences and computer sciences
- Self-Organized Resource Allocation in Sustainable Electricity Multi-Agent Systems, Stefano Penese (M.Sc. in Computer Science, master project), co-supervised, summer semester 2007

## GENERAL EXPERIENCE

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### Swarm Intelligent Systems Group, Lausanne, Switzerland

#### Software development

**July, 2006 – September, 2006**

Development of an automated benchmark platform for checking new releases of Webots, a mobile robotics simulation software, for potential bugs or inaccuracies

### Icare Institute, Sierre, Switzerland

#### Software development

**July, 2005 – September, 2005**

Carried out several projects related to RFID technology under the supervision of Prof. Sciboz, including a complete system for tracking genetic material at worldwide scale, based on 3 different databases (Oracle, MS-SQL and MySQL). Development of drivers for several RFID devices.

### Communal Administration, Veyras, Switzerland

### Summer Internship

Summers 2003/2004

Carried out the financial planning 2004-2009, including financial projections, statistics and analysis, in collaboration with a certified public accountant.

### PUBLICATIONS

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V. Fakhfouri, **G. Mermoud**, J. Y. Kim, A. Martinoli, and J. Brugger, *Drop-On-Demand Inkjet Printing of SU-8 Polymer*, Micro and Nanosystems, vol. 1, no. 1, pp. 63-67, 2009.

**G. Mermoud**, J. Brugger, and A. Martinoli, *Towards Multi-Level Modeling of Self-Assembling Intelligent Micro-Systems*, in 8th International Conference on Autonomous Agents and Multiagent Systems, Budapest, Hungary, 2009.

V. Fakhfouri, N. Cantale, **G. Mermoud**, J.Y. Kim, D. Boiko, E. Charbon, A. Martinoli, and J. Brugger, *Inkjet Printing of SU-8 for Polymer-based MEMS; a Case Study for Microlenses*, 21st IEEE International Conference on Micro Electro Mechanical Systems, Tucson (AZ), 2008, accepted.

**G. Mermoud**, N. Correll, A. Buryak, A. Martinoli, and K. Severin, *Agent-based modeling of self-assembled molecular macrocycles*, Journal of Chemical Information and Modeling, 2009, in preparation.

**G. Mermoud**, V. Fakhfouri, A. Martinoli and J. Brugger, *Micrometric Droplet Motion*, 4th Conference on Foundations of Nanoscience (FNANO07): Self-Assembled Architectures and Devices, Snowbird (UT), 2007.

**G. Mermoud**, A. Upegui, C.-A. Peña, and E. Sanchez. 2005. *A Dynamically-Reconfigurable FPGA Platform for Evolving Fuzzy Systems*, in Proceedings of the 8th International Work-Conference on Artificial Neural Networks (IWANN'2005), LNCS, 3512(572–581).

### INVITED TALKS

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- Modeling Self-Assembly at All Scales, Hydromel Workshop, March 12, 2009, Université Libre de Bruxelles, Brussels, Belgium
- Controlling and Exploiting Self-Assembly of Micro/nanosystems using Microdroplets, May 30, 2007, Integrated System Center, EPFL, Lausanne, Switzerland

### SKILLS

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- Excellent programming skills. Languages: C/C++, Java, Matlab, Python, Perl, VHDL, Shell scripting, LabView
- Strong background in mathematics, physics and chemistry
- Numerical methods and simulations (stochastic and ODE-based models, fluid dynamics)
- Modeling, design, and control of complex, non-linear systems, self-organization, self-assembly
- Machine learning and artificial intelligence (swarm intelligence, neural networks, genetic algorithms, fuzzy logic)
- Compiler design, type systems, formal verification
- Hardware: digital design, FPGAs, embedded systems
- Databases (Oracle, MS-SQL, MySQL, Access)
- Typesetting (Word, L<sup>A</sup>T<sub>E</sub>X)
- Web programming (PHP, XHTML, CSS) and design (Photoshop), CMS (Mambo, Joomla!)

### DIPLOMA AND AWARDS

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- Travel scholarship for AAMAS'09 conference, Budapest, Hungary
- Award for the best final result in Philosophy of Lycée-Collège des Creusets, Sion (2001)
- Musical theory diploma (1999)

### LANGUAGES

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- French (native speaker, very good writing skills)
- English (fluent, level C2)
- German (High School level)

### INTERESTS

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- Classical music and jazz (conductor, arranger and trumpeter in various bands)

- Interest in philosophy, mathematics, physics and literature
- Cycling, volleyball, beach volley, ski
- Graduate Student Member of the IEEE