



# Léonard Jaillet

*Doctor in Robotics and Artificial Intelligence*

## Education

- 2005 **PhD in Robotics and Artificial Intelligence**, *Laboratory for Analysis and Architecture of Systems (LAAS)*, Toulouse.
- 2002 **Master's degree in Imagery, Vision and Robotics**, *National Polytechnic Institute of Grenoble (INPG)*, INRIA Rhône-Alpes, Grenoble.
- 2001 **Master's degree in Automated Production**, *Ecole Normale Supérieure de Cachan*, LURPA Laboratory, Cachan.
- 2001 **Engineer Degree in Mechanics**, *SUPMECA*, Paris.

## Professional Experience

- 2008-2012 **Post-Doc (JAE-Doc Fellowship)**, *Kinematics and Robot Design group, Institut de Robòtica i Informàtica Industrial (IRI), CSIC-UPC*, Barcelona.  
Design of algorithmic tools to plan motions of complex mechanisms. Exploration methods capturing local structure of sub-manifolds appearing in systems with kinematic constraints. Applications such as complex manipulation problems, parallel robots and analyze of conformational changes in molecular loops.
- 2006-2008 **Post-Doc position**, *Robotics and A.I. group, LAAS-CNRS*, Toulouse.  
(16 months) Simulation and study of molecular motions and interactions. Design of hybrid strategies combining stochastic path planners with energetic models. Analysis of constrained accessibility pathways in ligand-protein interactions.
- 2002-2005 **PhD thesis**, *Robotics and A.I. group, LAAS-CNRS*, Toulouse.  
*Méthodes Probabilistes pour la planification réactive de mouvements*. Proposition of a generic framework for motion planning in partially dynamic environments. Construction of sparse cyclic roadmaps. Extension of Rapidly exploring Random Trees for highly constrained environments. Integration of these methods in a general software platform. Advisor: Thierry Siméon.
- 2002 **Master of science project**, *BIPOP team, INRIA Rhône-Alpes*, Grenoble.  
(4 months) Automatic generation of walking motions to control a two-legged robot. Supervised by Pierre-Brice Wieber.
- 2001 **Engineer internship**, *Dassault-Systems*, Aix en Provence.  
(6 months) 3D registration of scanned data. Implementation in the reverse engineering module of CATIA v5 software.

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2000 **Engineer internship**, *Antares project team, CPPM, CNRS/IN2P3*, Marseille.  
(4 months) Evaluation of the physical properties of Optical Module Frames for the ANTARES large area neutrino telescope.

1999 **Engineer internship**, *SNECMA*, Corbeil-Essonnes.  
(3 months) Improving the quality control for Electric Discharge Machining (EDM) machines.

## Stays with Internationally Recognized Scientists

2011 *Berkeley Laboratory for Automation Science and Engineering* with  
(5 weeks) **Pr. Ken Goldberg**. Design of kinodynamic motion planning methods dealing with uncertainties. Outcome: one conference article at ICRA 2011.

2004 *Department of Computer Science, University of Illinois* with  
(2 months) **Pr. Steven M. LaValle**. Improvement of diffusion techniques for sampling-based motion planning in high dimensional spaces. Outcome: Two conference articles, one at IROS 2005, one at ICRA 2005.

2004 *Department of Information and Computing Sciences, Utrecht University* with  
(2 weeks) **Pr. Mark Overmars**. Creating Robust Roadmaps for Motion Planning in Changing Environments. Outcome: one conference article at ICRA 2005.

## Participation to Research Projects

PHRIENDS *Physical Human-Robot Interaction: Dependability and Safety*. Develop key components for the next generation of robots, designed to share the environment and to physically interact with people. Financial entity: European Community  
(2006–2009)

ITAV-ALMA *Motion Algorithms and Macromolecular Interactions: Development of a Novel Predictive Model of Lipase Enantioselectivity*. Develop and validate new, fast and accurate computational methods for the analysis of protein interactions involving conformational changes. Financial entity: Région Midi-Pyrénées.  
(2006–2008)

MOVIE *Motion Planning in Virtual Environments*. Develop motion planning techniques for computing in real time visually-convincing motions of multiple autonomous entities navigating through complex virtual worlds. Financial entity: European Community.  
(2003–2005)

## Languages

French **Native language**

English **Fluent**

Spanish **Fluent**

Russian **Basics**

## Software Engineering

Softwares **CuikSuite**: set of applications to solve position analysis and path planning problems with applications to robotics and molecular biology.

**BioMove3D**: integrated motion planning platform for generic-linkage mechanisms and biomolecular systems.

Programming languages C, C++, Matlab.

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Typesetting TeX, LaTeX, OpenOffice.

Tools gcc, make, autotools, emacs, gdb, cvs, svn, Unix command line tools.

Web HTML, CSS, PHP, Javascript.

## Reviewer

International Journals ○ The International Journal of Robotics Research  
○ IEEE Transactions on Robotics

International Conferences ○ IEEE International Conference on Intelligent Robot and Systems  
○ IEEE International Conference on Robotics and Automation

## Publications

### PhD Thesis

L. Jaillet. *Méthodes probabilistes pour la planification réactive de mouvements*. PhD thesis, Paul Sabatier University, 2005.

### Journal Papers

L. Jaillet and J. M. Porta. Path planning under kinematic constraints by rapidly exploring manifolds. *IEEE Transactions on Robotics*, to appear.

J. M. Porta and L. Jaillet. Exploring the energy landscapes of flexible molecular loops using higher-dimensional continuation. *Journal of Computational Chemistry*, to appear.

J. M. Porta, L. Jaillet, and O. Bohigas. Randomized path planning on manifolds based on higher-dimensional continuation. *The International Journal of Robotics Research*, 31(2):201–215, 2012.

L. Jaillet, F. J. Corcho, J.-J. Pérez, and J. Cortés. A randomized tree construction algorithm to explore energy landscapes. *Journal of Computational Chemistry*, 32(16):3464–3474, 2011.

L. Jaillet, J. Cortés, and T. Siméon. Sampling-based path planning on configuration-space costmaps. *IEEE Transactions on Robotics*, 26(4):635–646, 2010.

L. Jaillet and T. Siméon. Path deformation roadmaps: Compact graphs with useful cycles. *The International Journal of Robotics Research*, 27(11-12):1175–1188, 2008.

J. Cortés, L. Jaillet, and T. Siméon. Disassembly path planning for complex articulated objects. *IEEE Transactions on Robotics*, 24(2):475–481, 2008.

### Conference Articles

L. Jaillet and J. M. Porta. Asymptotically-optimal path planning on manifolds. In *Robotics: Science and Systems*, 2012.

L. Jaillet, J. Hoffman, J. van den berg, P. Abbeel, J. M. Porta, and K. Goldberg. EG-RRT: Environment-guided random trees for kinodynamic motion planning with

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uncertainty and obstacles. *Proc. IEEE/RSJ Int. Conf. on Intelligent Robots and Systems*, pages 2646–2652, 2012.

L. Jaillet and J. M. Porta. Path planning with loop closure constraints using an Atlas-based RRT. *International Symposium on Robotics Research*, 2011.

J. Mainprice, A. Sisbot, L. Jaillet, J. Cortés, R. Alami, and T. Siméon. Planning human-aware motions using a sampling-based costmap planner. *In Proceedings of the IEEE International Conference on Robotics and Automation*, pages 5012 – 5017, 2011.

J. M. Porta and L. Jaillet. Path planning on manifolds using randomized higher-dimensional continuation. *Ninth International Workshop on the Algorithmic Foundations of Robotics*, pages 337–353, 2010.

L. Jaillet, J. Cortés, and T. Siméon. Transition-based rrt for path planning in continuous cost spaces. *Proceedings of the IEEE International Conference on Robots and Systems*, pages 2145–2150, 2008.

L. Jaillet, J. Cortés, and T. Siméon. Transition-based rrt for path planning in continuous cost spaces. *AAAI Workshop on Search Techniques in Artificial Intelligence and Robotics*, 2008.

J. Cortés, L. Jaillet, and T. Siméon. Molecular disassembly with RRT-like algorithms. *Proceedings of the IEEE International Conference on Robotics and Automation*, pages 3301–3306, 2007.

L. Jaillet and T. Siméon. Path deformation roadmaps. *In Seventh International Workshop on the Algorithmic Foundations of Robotics*, 2006.

L. Jaillet, A. Yershova, S. M. LaValle, and T. Siméon. Adaptive tuning of the sampling domain for dynamic-domain RRTs. *In Proceedings of the IEEE International Conference on Robots and Systems*, pages 2851–2856, 2005.

J. van den Berg, D. Neuwenhuysen, L. Jaillet, and M.H. Overmars. Creating robust roadmaps for motion planning in changing environments. *In Proceedings of the IEEE International Conference on Robots and Systems*, pages 1053–1059, 2005.

A. Yershova, L. Jaillet, T. Siméon, and S. M. LaValle. Dynamic-domain RRTs: Efficient exploration by controlling the sampling domain. *In Proceedings of the IEEE International Conference on Robotics and Automation*, pages 3856–3861, 2005.

L. Jaillet and T. Siméon. A PRM-based motion planner for dynamically changing environments. *Proceedings of the IEEE International Conference on Robots and Systems*, 2:1606–1611, 2004.

R. Chatila, R. Alami, T. Siméon, J. Pettre, and L. Jaillet. Safe, reliable and friendly interaction between humans and humanoids. *In 3rd IARP International Workshop on Humanoid and Human Friendly Robotics*, pages 83–87, 2002.