



# Philippe Bidaud

*Professor at Paris 6 University and Scientific Director at ONERA*

## Short biography

Bidaud Philippe was born in 1959 in Saumur (Pays de Loire) in France. He received a master of science in mechanical engineering from the University of Poitiers in 1980. In 1981, he got a DEA degree in solid mechanics from the University of Poitiers. He realized a PhD in Robotics under the supervision of Professor Jean-Claude Guinot, PhD sustained in December 1984. After his Ph.D., he was recruited as a researcher at the CNRS in the Department of Engineering Sciences. He began his career as a researcher at the Laboratory of Mechanics and Robotics at the Pierre and Marie Curie University in Paris. He subsequently directed several research groups at Robotics Laboratory of Paris. Meanwhile, he made several long stays in foreign universities including those of Stanford, MIT and Rutgers University. In 1994, he obtained a habilitation for research supervision for his work in the field of design and control of complex robotic systems. In 1998, he was hired as a professor at the University Pierre and Marie Curie. He became deputy director of the Robotics Laboratory of Paris in 1999 and then director in 2002 before creating the Institute of Intelligent Systems and Robotics which he provided leadership until 2013. From 1998 to 2012, Philippe Bidaud was entrusted with several teaching responsibilities including the co-direction of the master in Engineering Sciences and then the management of the speciality of Master in Advanced Systems and Robotics. He was also active in the field of technology transfer since assured the vice-direction and the direction of a transfer of technology from 1998 to 2009. Today Philippe Bidaud Scientific Director for Science of information at ONERA (the body of French aerospace research and aéronautique) where he coordinates the research programs of four research departments. He is also in charge of the management of the national network of robotics research in France (GdR Robotique). Philippe Bidaud has developed an important collaborative research across many national projects (industrial, MESR, ANR, FUI) and European (Eureka, FP6, FP7). Since the beginning of his research career, Philippe Bidaud develops research works in the field of modeling and control of robotic systems, particularly for , locomotion and dexterous manipulation. For several years now, this research focuses specifically on all-terrain robot, humanoid robotics, personal robotics and interactive robotics and more recently in space robotics. All of his work is the subject of more than 200 publications in journals and international conferences and a dozen of patents.

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## Education

- 1979 **Bachelor of Science in Mechanical Eng.**, *University*, of Poitiers, .  
1981 **Master of Science in Mechanical Eng.**, *University*, of Poitiers, .

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## PhD Thesis

- Title *Préhenseur Articulé à Mouvements Fins - Articulated Gripper for Fine Manipulation*  
Supervisor Jean-Claude Guinot  
Description Mechanical Design of dextrous grippers for manipulation of objects in insertion tasks. Adaptation of the compliance center with respect to the grasp configuration. Internal force control and hybrid force control for compliant motions

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## Habilitation in Research Supervision

- Title *Méthodes et Outils pour la Conception/Programmation de Systèmes Robotiques Complexes - Methods and Tools for Design / Control Robotic of Complex Systems*  
Description Mechanical Design of dextrous grippers for manipulation of objects in insertion tasks. Adaptation of the remote compliance center with respect to the grasp configuration. Internal force control and hybrid force control for compliant motions

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## Professional occupations

- 1981–1984 **CNRS PhD Student**, *Solid Mechanics Lab.*, Poitiers.  
University of Poitiers  
*CNRS : National Center for Scientific Sciences*  
1984–1987 **CNRS Scientist**, *Mechanics and Robotics Lab.*, Paris.  
University Paris 6  
1987–1996 **CNRS Researcher**, *Paris Robotics Lab.*, Paris.  
University Paris 6  
1996–1997 **Visiting Scientist**, *Massachussets Institute of Technology*, Mech. Eng. Depart.  
1998–today **Full Professor**, *Ing. Faculty*, University Pierre and Marie Curie.  
2002–2006 **Director of the Paris Robotics Laboratory**, *CNRS*, University Pierre and Marie Curie.  
2006–2012 **Founder and Director**, *Institute for Intelligent Systems and Robotics*, CNRS, University Pierre and Marie Curie.  
Since 2012 **Scientific Director for ICT**, *ONERA French Aerospace Research Center*.

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## Teaching activities

I started my teaching activities when I was a researcher at CNRS. I have taught since 1996 in the Master Programs in Robotics at the University Paris 6. Subsequently appointed professor at the University Paris 6 I assured several responsibilities, including:

- 2003 Responsible for the implementation of the European "LMD" in the field of Robotics at the University Paris 6  
2004–2005 Co-director of the specialty "Mechanical and Systems Engineering" - Master program of Engineering Science at the University Paris 6

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- 2008 Responsible for the creation of a specialty of Robotics in the Engineering School of the University Paris 6
  - 2004–08 Responsible for the Master program in Mechanics and Robotics
  - 2008–2012 Head of specialty Mechanical Systems Robotics and advanced Master program cohabilitated by University Paris 6 / ENSAMP / ENSC
- Running classes during the academic year 2013-14:
- Introduction to Robotics **Master 1 - Robotics systems modeling and control : kinematics and dynamics**
  - Multi-bodies Dynamics **Master 2 - Dynamic of Mechanical Systems**
  - Fundamental on Robotics **Master 2 - Optimisation and Control of redundant manipulators**

## Research Activities

My research interest is in general design and control of robotic systems and planning their movements for evolution in complex environments. They focus on the methods of synthesis of complex mechanisms, analysis and optimization of their kinematic and dynamic performances, dynamic control of these systems for the control of physical interactions with the environment. They consider more specifically dextrous grippers, articulated locomotion systems, humanoid robotics and orthoses and physical assistance systems. Those works resulted today in 180 publications in International Journals and Conferences. They were the subject of 38 PhD thesis.

## National and International Collective Responsibilities

- 2008–2012 Member of the doctoral school SMAER (ED 391)
- 2006–007 Member of the evaluation committee CNRS BIOSTIC
- 2001–2005 Member of the scientific committee of the CNRS program ROBEA
- 2004 In charge for the ANR of the redaction of the ANR program PSIROB
- 2005–2006 Member of the selection committee for the ANR program ANR/PSIROB
- 2007 Member of the evaluation committee of the program projects ANR/PSIROB
- 2010 Member of the selection committee for the ANR/JC and ANR/Blanc - SIMI2
- In 2009 Member of the committee of experts from the Ministry of Defence for Military robotics
- Since 2007 Member of the scientific committee of the GDR Robotique
- Since 2011 Director of the CNRS Robotics Network in Robotics
- Since 2008 French co-representative (appointed by the Ministry of Research) at the International Advanced Robotics Program (IARP)
- Since 2005 French representative appointed technical committee Robotics and Mechatronics of IFToMM

## Technology Transfert

- Patents Inventor on 10 patents in robotics technologies (grippers, surgical robots, rehabilitation robotics, IHM)

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- 1993–2009 Deputy scientific Director of technology transfert center "Centre de Robotique Intégrée Ile de France"
- Since 2010 Member of the Scientific Committee of the Centre National de Référence en Santé et Autonomie

## Bibliography

Bibliographic references on my research works are available on <http://people.isir.upmc.fr/bidaud>.

Some of the latest are listed below :

- Saut, J.-P. and Ivaldi, S. and Sahbani, A. and Bidaud, P. (2014). *Grasping objects localized from uncertain point cloud data*. Robotics and Autonomous Systems. Vol 62 Pages 1-15.
- Ibanez, A. and Bidaud, P. and Padois, V. (2014). *Automatic Optimal Biped Walking as a Mixed-Integer Quadratic Program*. Advances in Robot Kinematics. Pages 505-516.
- Maurice, P. and Measson, Y. and Padois, V. and Bidaud, Ph. (2014). *Experimental assessment of the quality of ergonomic indicators for collaborative robotics computed using a digital human model*. Proceedings of the 3rd Digital Human modeling Symposium. Pages -. Tokyo, Japan.
- Ady, R. and Bachtta, W. and Bidaud, P. (2014). *Development and control of a one-wheel telescopic active cane*. IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechatronics (BioRob).
- Ibanez, A. and Bidaud, P. and Padois, V. (2014). *A Distributed Model Predictive Control approach for robust postural stability of a humanoid robot*. In Proceedings of the IEEE International Conference on Robotics and Automation. Pages 2132-2140.
- Cai, D. and Bidaud, P. (2014). *Self-Adjusting Isostatic Exoskeleton for the Elbow*. Proceedings of Romansy 2014 XX CISM-IFTToMM Symposium on Theory and Practice of Robots and Manipulators. Pages 19-26.
- Grand, C. and Jarrault, P. and Ben Amar F. and Bidaud, P. (2014). *Experimental evaluation of obstacle clearance by a hybrid wheel-legged robot*. Proc. 14th International Symposium on Experimental Robotics Springer.
- Granata, C. and Bidaud, P. (2014). *Mapping and understanding the human activity: a multilayer framework based on the ideomotor theory*. Proc. of 17th International Conference on Climbing and Walking Robots and the Support Technologies for Mobile Machines. CLAWAR 2014. Pages to appear.
- Ibanez, A. and Bidaud, P. and Padois, V. (2014). *Emergence of humanoid walking behaviors from mixed-integer model predictive control*. Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems. Pages 1–8.
- Granata, C. and Bidaud, P., and Ady, R., and Salini, J. (2013). *Human activity analysis: a personal robot integrating a framework for robust person detection and tracking and physical based motion analysis*. PALADYN Journal of Behavioral Robotics. Vol 7 Pages 1-19.
- Maurice, P. and Measson, Y. and Padois, V. and Bidaud, P. (2013). *Assessment of physical exposure to musculoskeletal risks in collaborative robotics using dynamic simulation*. CISM International Centre for Mechanical Sciences, Romansy 19 - Robot Design, Dynamics and Control, Springer Vienna, publisher. Vol 544 Pages 325-332.
- Salini, J. and Barthélemy, S. and Bidaud, Ph. and Padois, V. (2013). *Whole-Body Motion Synthesis with LQP-based Controller - Application to iCub*. Cognitive Systems Monographs : Modeling, Simulation and Optimization of Bipedal Walking, Springer Berlin Heidelberg, publisher. Vol 18 Pages 119-210.

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- Ibanez, A. and Bidaud, Ph. and Padois, V. (2013). *Previewed impedance adaptation to coordinate upper-limb trajectory tracking and postural balance in disturbed conditions*. Nature-Inspired Mobile Robotics - Proceedings of the 16th International Conference on Climbing and Walking Robots and the Support Technologies for Mobile Machines, World Scientific, publisher. Pages 519-528.
- Bidaud, Ph. (2013). *Locomotion Dynamique en Robotique*. Cinquième Congrès International Conception et Modélisation des Systèmes Mécaniques. Djerba - Tunisie. invited conference.
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- Li, Y. and Saut, J.-P. and Pettré, J. and Sahbani, A. and Bidaud, P. and Multon, F. (2013). *Fast Grasp Planning by Using Cord Geometry to Find Grasping Points*. IEEE International Conference on Robotics and Automation (ICRA'13). Pages To appear - Best Manipulation Paper Award - Finalist.
- Granata, C. and Bidaud, P., and Ady, R., and Salini, J. (2013). *A personal robot integrating a physically-based human motion tracking and analysis*. in Proc. 16th International Conference on Climbing and Walking Robots and the Support Technologies for Mobile Machines, University of Technology, Sydney, Australia. Pages 68-76.
- Zong, C. and Bidaud, Ph., and Clady, X. (2013). *A mobile 3D vision-based embedded system for robust estimation and analysis of human locomotion*. Proceedings of the Sixteenth International Conference on Climbing and Walking Robots. Vol Sydney Australia Pages 101-108.
- Granata, C. and Bidaud, P., and Ady, R., and Salini, J. (2013). *Human whole body motion characterization from a Kinect*. Proc. of 4rd IEEE IntlConference on Cognitive Infocommunicaitons (CogInfoCom13).
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- Bidaud, Ph. (2013). *Pour faire des robots qui s'adaptent à l'activité humaine et vice-versa*. 2ème Conférence Intercompréhension de l'intraspécifique et l'interspécifique . Pages 1-10. Lorient - Guidel .

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