SylvainCalinon

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Learning Algorithms and Systems Laboratory (LASA),
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Born January 12, 1980, Yverdon, Switzerland.
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Domains of expertise

- Robot programming by demonstration
- Machine learning
- Human-robot interaction
- Learning by imitation
- Artificial intelligence

Curriculum

March 2008	Visiting research fellow at the *CNRS-AIST Joint Japanese-French Robotics Laboratory (JRL). National Institute of Advanced Industrial Science and Technology (AIST)*, Tsukuba, Japan (1 month).
2007–now	Postdoctoral fellow at the *Learning Algorithms and Systems Laboratory (LASA). Ecole Polytechnique Fédérale de Lausanne (EPFL)*, Switzerland.
2003–2007	PhD in robot programming by demonstration obtained at the LASA Laboratory. EPFL, Switzerland.
2001–2003	MSc in Microengineering, specialization in robotics. EPFL, Switzerland.
1998–2001	BSc in Microengineering. EPFL, Switzerland.

PhD thesis

Title	*Continuous Extraction of Task Constraints in a Robot Programming by Demonstration Framework*
Supervisor	Prof. Aude Billard
Committee	Prof. Hannes Bleuler, EPFL, president of the jury.
	Prof. Hervé Bourlard, IDIAP Research Institute, examiner.
	Dr Yiannis Demiris, Imperial College London (ICL), UK, examiner.
	Prof. Stefan Schaal, University of Southern California (USC), USA, examiner.
Place and date	LASA Laboratory, EPFL, Switzerland. Oral exam: May 1st, 2007. Public presentation: July 6th, 2007.

MSc thesis

Title	*PDA Interface for Humanoid Robots using Speech and Vision Processing*
Supervisor	Prof. Aude Billard
Committee	Prof. Jean-Daniel Nicoud, DIDEL S.A., EPFL, examiner.

Places and date

Autonomous Systems Lab (ASL), EPFL, Lausanne.
University of Southern California (USC), USA *(1 month)*.
Advanced Telecommunication Research Institute (ATR), Kyoto, Japan *(1 month)*.
Oral exam: March 1st, 2003.

List of publications

Book chapters

Billard, A., Calinon, S., Dillmann, R. and Schaal, S. (2008), *"Robot Programming by Demonstration"*. Siciliano, B. and Khatib, O. (eds.). Handbook of Robotics. Springer.

Calinon, S. and Billard, A. (2007) *"Learning of Gestures by Imitation in a Humanoid Robot"*. Dautenhahn, K. and Nehaniv, C.L. (eds.). Imitation and Social Learning in Robots, Humans and Animals: Behavioural, Social and Communicative Dimensions. Cambridge University Press.

International journals

Hersch, M., Guenter, F., Calinon, S. and Billard, A. (2008) *"Dynamical System Modulation for Robot Learning via Kinesthetic Demonstrations"*. IEEE Transactions on Robotics *(In press)*.

Calinon, S. and Billard, A. (2007) *"What is the Teacher's Role in Robot Programming by Demonstration? - Toward Benchmarks for Improved Learning"*. Interaction Studies, Special Issue on Psychological Benchmarks in Human-Robot Interaction, 8:3.

Calinon, S., Guenter, F. and Billard, A. (2007) *"On Learning, Representing and Generalizing a Task in a Humanoid Robot"*. IEEE Transactions on Systems, Man and Cybernetics, Part B, Special issue on robot learning by observation, demonstration and imitation, 37:2.

Guenter, F., Hersch, M., Calinon, S. and Billard, A. (2007) *"Reinforcement Learning for Imitating Constrained Reaching Movements"*. Advanced Robotics, Special Issue on Imitative Robots, 21:13.

Billard, A., Calinon, S. and Guenter, F. (2006) *"Discriminative and Adaptive Imitation in Uni-Manual and Bi-Manual Tasks"*. Robotics and Autonomous Systems, 54:5.

Billard, A., Epars, Y., Calinon, S., Cheng, G. and Schaal, S. (2004) *"Discovering Optimal Imitation Strategies"*. Robotics and Autonomous Systems, Special Issue: Robot Learning from Demonstration, 47:2-3.

International conference papers

Calinon, S. and Billard, A. (2008) *"A Probabilistic Programming by Demonstration Framework Handling Skill Constraints in Joint Space and Task Space"*. In Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Nice, France *(In press)*.

Calinon, S. and Billard, A. (2008) *"A Framework Integrating Statistical and Social Cues to Teach a Humanoid Robot New Skills"*. In Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), Workshop on Social Interaction with Intelligent Indoor Robots, Pasadena, CA, USA.

Calinon, S. and Billard, A. (2007) *"Active Teaching in Robot Programming by Demonstration"*. In Proceedings of the IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN), Jeju, Korea.

Calinon, S. and Billard, A. (2007) *"Incremental Learning of Gestures by Imitation in a Humanoid Robot"*. In Proceedings of the ACM/IEEE International Conference on Human-Robot Interaction (HRI), Arlington, Virginia, USA.

Calinon, S. and Billard, A. (2006) *"Teaching a Humanoid Robot to Recognize and Reproduce Social Cues"*. In Proceedings of the IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN), Hertfordshire, UK.

Calinon, S., Guenter, F. and Billard, A. (2006) *"On Learning the Statistical Representation of a Task and Generalizing it to Various Contexts"*. In Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), Orlando, USA.

Calinon, S., Epiney, J. and Billard, A. (2005) *"A Humanoid Robot Drawing Human Portraits"*. In Proceedings of the IEEE-RAS International Conference on Humanoid Robots (Humanoids), Tsukuba, Japan.

Calinon, S. and Billard, A. (2005) *"Recognition and Reproduction of Gestures using a Probabilistic Framework combining PCA, ICA and HMM"*. In Proceedings of the International Conference on Machine Learning (ICML), Bonn, Germany.

Calinon, S., Guenter, F. and Billard, A. (2005) *"Goal-Directed Imitation in a Humanoid Robot"*. In Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), Barcelona, Spain.

Calinon, S. and Billard, A. (2004) *"Stochastic Gesture Production and Recognition Model for a Humanoid Robot"*. In Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Sendai, Japan.

Calinon, S. and Billard, A. (2003) *"PDA Interface for Humanoid Robots"*. In Proceedings of the IEEE International Conference on Humanoid Robots (Humanoids), Karlsruhe, Germany.

Hersch, M., Guenter, F., Calinon, S. and Billard, A. (2006) *"Learning Dynamical System Modulation for Constrained Reaching Tasks"*. In Proceedings of the IEEE-RAS International Conference on Humanoid Robots (Humanoids), Genova, Italy.

Conference abstracts and posters

Calinon, S. and Billard, A. (2005) *"Learning of Gestures by Imitation in a Humanoid Robot"*. International Symposium on Imitation in Animals and Artifacts (AISB), Hatfield, UK.

Calinon, S. and Billard, A. (2004) *"Gesture Recognition and Reproduction for a Humanoid Robot using Hidden Markov Models*. AMI/PASCAL/IM2/M4 Workshop on Multimodal Interaction and Related Machine Learning Algorithms, Martigny, Switzerland.

Theses

Calinon, S. (2007) *"Continuous Extraction of Task Constraints in a Robot Programming by Demonstration Framework"*. PhD thesis. Learning Algorithms and Systems Laboratory (LASA), Ecole Polytechnique Fédérale de Lausanne (EPFL).

Calinon, S. (2003) *"PDA Interface for Humanoid Robots using Speech and Vision Processing"*. MSc thesis. Autonomous Systems Laboratory (ASL), Ecole Polytechnique Fédérale de Lausanne (EPFL).

Peer-reviewed videos

Calinon, S. and Billard, A. (2007) *"Incremental Learning of Gestures by Imitation in a Humanoid Robot"*. ACM/IEEE International Conference on Human-Robot Interaction (HRI), Arlington, Virginia, USA.

Hersch, M., Guenter, F., Calinon, S. and Billard, A. (2006) *"Learning Dynamical System Modulation for Constrained Reaching Tasks"*. IEEE-RAS International Conference on Humanoid Robots (Humanoids), Genova, Italy.

Calinon, S., Guenter, F. and Billard, A. (2005) *"Goal-Directed Imitation in a Humanoid Robot"*. IEEE International Conference on Robotics and Automation (ICRA), Barcelona, Spain.

Calinon, S. and Billard, A. (2005) *"A Humanoid Robot Drawing Human Portraits"*. IEEE-RAS International Conference on Humanoid Robots (Humanoids), Tsukuba, Japan.

Calinon, S. and Billard, A. (2004) *"Stochastic Gesture Production and Recognition Model for a Humanoid Robot"*. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Sendai, Japan.

Calinon, S. and Billard, A. (2003) *"PDA Interface for Humanoid Robots"*. IEEE-RAS International Conference on Humanoid Robots (Humanoids), Karlsruhe, Germany.

Invited talks and Workshops

2008 *"A Robot Programming by Demonstration Framework Integrating Statistical and Social Cues"*. Workshop on Interactive Robot Learning. Robotics: Science and Systems Conference (RSS), Zurich, Switzerland.

2007 *"Extraction of Task Constraints in a Robot Programming By Demonstration"*. Workshop on Concept Learning for Embodied Agents. International Conference on Robotics and Automation (ICRA), Roma, Italia.

2006 *"Learning and Probabilistic Representation of a Task in a Humanoid Robot"*. Workshop on Collaborative Human-Robot Teamwork. International Conference on Robotics and Automation (ICRA), Orlando, Florida, USA.

Awards

2008 First Prize in the *Grand Challenge on Human-Robot Interaction* at the *International Conference on Robotics and Automation (ICRA'2008)*.

Affiliations to European research projects

ROBOT@CWE European Integrated Project Robot@CWE (Advanced robotic systems in future collaborative working environments) funded by the European Commission under contract FP6-2005-IST-5 (`http://www.robot-at-cwe.eu`). This 3-years project, started in 2006, involves 7 universities and 2 industrial partners, for a budget of 1.75 million €. The main objective of this STREP is to research and demonstrate integrative concepts of advanced robotic systems, to be seen as collaborative agents, in various environments working together with humans. Robot@CWE will design suitable architectures and technologies to achieve this goal.

FEELIX GROWING — European Integrated Project Feelix Growing (Feel, interact, express: a global approach to development with interdisciplinary grounding) funded by the European Commission under contract FP6-IST-045169 (`http://www.feelix-growing.org`). This 4-years project, started in 2006, involves 6 universities and 2 industrial partners, for a budget of 2.5 million €. The overall goal of this project is the interdisciplinary investigation of socially situated development from an integrated or global perspective, as a key paradigm towards achieving robots that interact with humans in their everyday environments in a rich, flexible, autonomous, and user-centered way.

COGNIRON — European Integrated Project Cogniron ("The Cognitive Companion") funded by the European Commission under contract FP6-IST-002020 (`http://www.cogniron.org`). This 4-years project, started in 2004, involves 8 university partners, for a budget of 8 million €. The overall objectives are to study the perceptual, representational, reasoning and learning capabilities of embodied robots in human centered environments.

Refereeing

2008 Reviewer for *IEEE Transactions on Systems, Man, and Cybernetics - Part A (SMC-A)*, and for the *IEEE International Conference on Intelligent Robots and Systems (IROS'2008)*.

2007 Reviewer for the *IEEE Transactions on Robotics (TRO)*, *IEEE Transactions on Systems, Man, and Cybernetics - Part B (SMC-B)*, *International Journal of Humanoid Robotics (IJHR)*, *International Journal of Robotics Research (IJRR)*, and *Advanced Robotic Systems (ARS)*, and for the *IEEE International Conference on Robotics and Automation (ICRA'2008)*.

2006 Reviewer for the *IEEE International Conference on Robotics and Automation (ICRA'2007)*.

2005 Reviewer for *Neural Networks (NN)* and for *IEEE Transactions on Systems, Man, and Cybernetics - Part C (SMC-C)*.

Languages

French *(native)* English *(fluent)* German *(good knowledge)*

Computer skills

Programming — C/C++, Matlab, Java, Assembler, PHP, OpenGL

Systems — Unix/Linux, Windows

Robot platforms — HOAP-2, HOAP-3 (Fujitsu), Katana (Neuronics), DB (Sarcos), HRP-2 (Kawada Ind., General Robotix), Robota (Didel)

Supervision of graduate students projects

2007 Richard, M. *"Implementation of a learning-by-imitation algorithm on the Katana robot"*. MSc thesis, EPFL.

2005 Magnard, F. *"Object tracking for a camera designed to be worn by children"*. MSc thesis, EPFL.

2004 Brossard, A. *"Control of the humanoid robot HOAP-2"*. MSc thesis, EPFL.

2004 Maurer, A. *"Artificial Neural Network (ANN) - Hidden Markov Model (HMM) Comparison for a gesture recognition application"*. MSc thesis, EPFL.

2003 Kunze, M. *"Person recognition for the humanoid robot Robota"*. MSc thesis, EPFL.

Supervision of undergraduate students projects

2008 Bodenmann, A. *"Hierarchical learning of a movement through Hidden Markov Model"*. Semester project, EPFL.

2008 D'halluin, F. *"Incremental learning of gestures through the support of a human teacher"*. Semester project, EPFL.

2007 Nadeau, C. *"Vocal analysis to teach a humanoid robot manipulation skills"*. Semester project, EPFL.

2007 Pulvin, M. *"Imitation of legs motion by a humanoid robot through the use of motion sensors"*. Semester project, EPFL.

2006 Hitz, A. *"Locomotion control module for the HOAP3 robot"*. Semester project, EPFL.

2005 Epiney, J. *"A Humanoid Robot that can paint"*. Semester project, EPFL.

2005 Schoeneich, P. *"Gaze direction detection using inertial sensors"*. Semester project, EPFL.

2004 Borter, J.-J. *"Motion data representation using motion sensors"*. Semester project, EPFL.

2004 Dubach, C. *"Recognition of trajectories using a stereoscopic vision system"*. Semester project, EPFL.

2004 Hentsch, V. *"Gestures analysis using gyroscopic sensors"*. Semester project, EPFL.

2003 Noth, A. *"Development of an auditory systems running on a Pocket-PC"*. Semester project, EPFL.

2003 Linder, Y. *"Robust visual arms and head tracking running on a Pocket-PC"*. Semester project, EPFL.

2003 Grivaz, C. *"Interactive game of a pair of mini-humanoid robot Robota"*. Semester project, EPFL.

Practical and workshops

2008 Supervision of a half-day workshop on human-robot interfaces for humanoid robots and industrial robots during the COGNIRON Winter School on Human Robot Interaction (CWSHRI), Lausanne, Switzerland, January 21-25.

2004 Supervision of a half-day workshop on human-robot interfaces and vision processing for the RAS/IFRR Summer School on Human-Robot Interaction, Volterra, Italy, July 19-23.

2004 Supervision of a practical on human-robot interfaces and image processing during one semester (robotics class for graduate students in Microengineering), EPFL, Switzerland.

Lausanne, June 6, 2008