



claudio castellini, ph.d.

researcher
dlr, germany

birth july 19th 1972, genova, italy

citizenship italian

marital status single

interests photography, books, cinema, music; blood donor

research interests

main

- machine learning and statistical learning theory
- kernel methods applied to prosthetics and speech recognition
- quantified modal and temporal logics, theory and application

secondary

formal methods for infinite-state systems; boolean satisfiability; constraint satisfaction; combinatorial optimisation; planning; genetic algorithms.

positions

- 2009-now researcher (wissenschaftlicher mitarbeiter) at *dlr* (the german aerospace research center), germany. supervisor: patrick van der smagt
- 2005-2009 postdoctoral researcher at *lira-lab* (advanced integrated robotics laboratory), university of genova, italy. supervisor: giulio sandini
- 1999-2005 ph.d. student in artificial intelligence, school of informatics, university of edinburgh, uk. supervisor: alan small
- 2003-2004 research scientist at *cnr* (italian research council), rome, italy. supervisors: enrico giunchiglia, amedeo cesa
- 2001-2004 research scientist at *ailab* (artificial intelligence laboratory), university of genova, italy. supervisors: enrico giunchiglia, alessandro armando

education

- 2005 ph.d. in artificial intelligence, school of informatics, university of edinburgh, uk
- 1999 professional qualification exam (esame di stato per ingegneri)
- 1998 laurea in electronic/biomedical engineering, grade 110/110, university of genova, italy

research projects

current

- *the humanoid arm-hand system* development of a clinically-oriented device for advanced control of a hand model
<http://www.robotic.dlr.de>
- *contact learning and development of contextual action* (co-investigator)
<http://eris.liralab.it/contact>

past

- *neurobotics* development of state-of-the-art hybrid bionic systems via the fusion with cutting-edge cognitive science paradigms (co-investigator)
<http://www.neurobotics.org>
- *mfotl (mechanising first-order temporal logics)* application of artificial intelligence techniques to certified safety of large, distributed service systems (principal)

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investigator)

<http://dream.inf.ed.ac.uk/projects/mfotl>

- *tsat++ (satisfiability modulo theory)* formal verification of properties of infinite-state systems via satisfiability of ground first-order formulae (principal investigator)
<http://people.lira.dist.unige.it/drwho/Tsat>
- *eureka (symbolic model checking c programs)* formal verification of properties of c programs. (co-investigator)
<http://www.ai.dist.unige.it/eureka>
- *prin* a project co-funded by the italian ministry of university, dealing with deduction-based software model checking (co-investigator)
- *avispa (automated validation of internet security protocols and applications)* concerned with the validation of industrial-strength safety-critical protocols and applications (co-investigator)
<http://www.avispa-project.org>
- *robocare* a multi-agent system which generates user services for human assistance.
- *c-plan* development of a sat-based conformant planner.
- *interlink* a platform for aiding the exchange of ph.d. students among european scientific institutions.
- *calcuemus* integration of computer algebra systems and deductive techniques.

international visits

- 2008 *neurolab*, faculty of medicine, university of ferrara, italy. investigation of audio-motor data for an advanced automatic speech recognition system. supervisor: luciano fadiga
- 2007 *dlr* (german aerospace research center), oberpfaffenhofen, germany. investigation and practical implementation of a control system for a mechanical hand using surface forearm electromyography. supervisor: patrick van der smagt
- 2001 stanford university, palo alto, california. investigation of the temporal reasoning techniques employed in the STeP system. supervisors: zohar manna and henny sipma

awards and grants

- 2009 diploma of merit for the project proposal *non invasive adaptive hand prosthetics (ninapro)*. awarded by siri – italian society of automation and robotics
- 2007 one-year research project *machine learning for intelligent prosthetics*. awarded by the ca.ri.ge. foundation (bank of genova and the ligurian riviera)
- 2005 best italian ph.d. thesis of the year in artificial intelligence. awarded by the artificial intelligence italian association
- 2001 two-yearly studentship in *robocare*. awarded by cnr (italian research council)

academic duties

- 2009 member of the program committee of *icar2009, international conference on advanced robotics*
- from 2008 on member of the editorial board of the *open artificial intelligence journal*
- from 2008 on member of the *ieee ras technical committee on robot learning*
- reviewer for several of conferences and journals, among which *advanced robotics*, the *journal of physiology paris*, *icra* and *iros*

references

- *patrick van der smagt*, researcher at german aerospace research center. research group supervisor. email smagt@dlr.de
- *giulio sandini*, full professor at university of genova and research director at italian institute of technology. supervisor from 2005 to 2009. email giulio.sandini@iit.it
- *giorgio metta*, assistant professor at university of genova and senior researcher at italian institute of technology. supervisor from 2005 to 2009. email giorgio.metta@iit.it
- *alan smaill*, lecturer at university of edinburgh, ph.d. supervisor from 1999 to 2005. email a.smaill@ed.ac.uk

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- *alessandro armando*, associate professor at university of genova, supervisor in 2003 and 2004. email alessandro.armando@unige.it
- *enrico giunchiglia*, full professor at university of genova, supervisor in 2001. email enrico.giunchiglia@unige.it

invited talks/papers

- *2008-2009 non-invasive adaptive prosthetics*. given at epfl, Lausanne, switzerland; tum, munich, germany; dlr, oberpfaffenhofen, germany; universidad complutense de madrid, spain
- *2007-2008 machine learning for hand prosthetics (and more)*. given at university of verona, italy; iit, genova, italy; university of belgrade, serbia; idiap, martigny, switzerland
- *2007 learning when to grasp*. invited paper and talk at *concept learning for embodied agents*, a workshop at icra 2007 (international conference on robotics and automation), rome, italy
- *2005 automated reasoning in quantified modal and temporal logics*. given at the 9th congress of the artificial intelligence italian association, university of milano bicocca, italy, and at the department of informatics, university of milano, italy

teaching activities

academic courses (as a teaching assistant):

- *2008* computational learning methods - university of genova, faculty of engineering
- *2003-2005* databases - university of genova (as *culture della materia*), faculty of education sciences
- *2003* artificial intelligence - university of genova, faculty of engineering
- *2001-2002* basic informatics - university of genova, faculty of engineering
- *2000* reasoning agents - university of edinburgh, school of informatics
- *1994-1995* digital electronics - university of genova, faculty of engineering

supervisions

- *2007* maria giovanna scognamiglio, laurea in electronic engineering: practical realisation of a robot that plays air hockey based upon machine learning techniques, university of genova
- *2007* mattia castelnovi, postdoctoral research: project *machine learning for intelligent prosthetics*, university of genova
- *2007* sebastian maier, diplomarbeit: realisation of a rehabilitation system for hand-disabled patients based upon machine learning, dlr
- *2004* massimo idini, laurea in electronic engineering: implementation of an automated reasoning system for satisfiability modulo theories, university of genova
- *2000* manuel contreras-maya, m.sc.: design and set up of a network of agents based upon a logic of belief and knowledge, university of edinburgh

courses in private companies

- *2004* courses organisation consultant, sogea, genova
- *1997* basic and advanced html, csita, genova
- *1996* local and wide-area networks, sogea, genova

skills & languages

- native italian, fluent written and spoken english, basic written and spoken german, spanish and portuguese
- good knowledge of C, C++ and MATLAB programming languages
- good knowledge of Linux and Windows operating systems
- very good scientific writing skill
- very good oral presentation skill

work experiences

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- 2000 software developer at *sellic*, edinburgh, uk
- 1997-1999 system manager and software engineer at *antares*, genova, italy
- 1996-1997 software engineer at *x-technologies*, genova, italy

publications

(for multi-authored work: **(*)** = primary author, major contribution; **(**)** = secondary contribution; **(***)** = equal contribution; **(****)** = minor contribution)

papers in peer-reviewed journals

- [2009]** C. Castellini, E. Fiorilla and G. Sandini, *Multi-subject / Daily-Life Activity EMG-based control of mechanical hands*, Journal of Neuroengineering and Rehabilitation, 6:41. **(*)**
- [2009]** F. Orabona, C. Castellini, B. Caputo, L. Jie and G. Sandini, *On-line Independent Support Vector Machines*, Pattern Recognition, 43(4), pp. 1402-1412. **(**)**
- [2009]** C. Castellini, E. Gruppioni, A. Davalli and G. Sandini, *Fine detection of grasp force and posture by amputees via surface electromyography*, Journal of Physiology (Paris), 103(3-5), pp. 255-262. **(*)**
- [2008]** C. Castellini, *Gaze Tracking in Semi-autonomous Grasping*, Journal of Eye Movement Research 2(4):2,1-7.
- [2008]** C. Castellini and P. van der Smagt, *Surface EMG in Advanced Hand Prosthetics*, Biological Cybernetics 100(1), pp. 35-47. **(*)**
- [2007]** C. Castellini, F. Orabona, G. Metta and G. Sandini, *Internal Models of Reaching and Grasping*, Advanced Robotics vol. 21(13), pp. 1545-1564. **(*)**
- [2005]** A. Armando, C. Castellini, E. Giunchiglia and M. Maratea, *The SAT-based Approach to Separation Logic*, Journal of Automated Reasoning vol. 35(1), pp. 237-263. **(*)**
- [2005]** C. Castellini, *Automated Reasoning in Quantified Modal and Temporal Logics*, Intelligenza Artificiale vol. 2(4), pp. 13-20. A short summary also appears in AI Communications vol. 19(2), pp. 183-185, 2006.
- [2003]** C. Castellini, E. Giunchiglia and A. Tacchella, *SAT-based Planning in Complex Domains: Concurrency, Constraints and Nondeterminism*, Artificial Intelligence vol. 147(1-2), pp. 85-117. **(***)**
- [2002]** C. Castellini and A. Smail, *A Systematic Presentation of Quantified Modal Logics*, Logic Journal of the IGPL vol. 10(6), pp. 571-599. **(*)**

book chapters

- [2005]** Armando, C. Castellini, E. Giunchiglia, F. Giunchiglia and A. Tacchella, *SAT-based Decision Procedures for Automated Reasoning: a Unifying Perspective*. Lecture Notes in Computer Science 2605, pp. 46-58. **(****)**

papers in peer-reviewed conferences

- [2009]** N. Noceti, B. Caputo, C. Castellini, L. Baldassarre, A. Barla, L. Rosasco, F. Odone and G. Sandini, *Towards a theoretical framework for learning multi-modal patterns for embodied agents*, proceedings of ICIAP – International Conference on Image Analysis and Processing, Salerno (Italy). **(**)**
- [2009]** F. Orabona, C. Castellini, B. Caputo, E. Fiorilla and G. Sandini, *Model Adaptation with Least-Squares SVM for Hand Prosthetics*, proceedings of ICRA-09 – International Conference on Robotics and Automation, Kobe, Japan. **(**)**
- [2008]** C. Castellini, P. van der Smagt, G. Sandini and G. Hirzinger, *Surface EMG for Force Control of Mechanical Hands*, proceedings of ICRA-08 – International Conference on Robotics and Automation, pp. 725-730. **(*)**
- [2007]** F. Orabona, C. Castellini, B. Caputo, J. Luo and G. Sandini, *Indoor place recognition using Online Independent Support Vector Machines*, BMVC-07 – British Machine Vision Conference, proceedings, pp. 1090-1099. **(***)**
- [2006]** C. Castellini and G. Sandini, *Gaze Tracking for Robotic Control in Intelligent Teleoperation and Prosthetics*, COGAIN-06 – Communication via Gaze Interaction, proceedings, pp. 73-77. **(*)**

- [2005] C. Castellini and A. Smaill, *Proof Planning for First-Order Temporal Logic*, CADE-05 - International Conference on Automated Deduction, Lecture Notes in Computer Science 3632, pp. 235-249. (*)
- [2005] A. Armando, C. Castellini, E. Giunchiglia and M. Maratea, *A SAT-based Decision Procedure for the Boolean Combination of Difference Constraints*, SAT-04 - International Conference on Theory and Applications of Satisfiability Testing, Lecture Notes in Computer Science 3542, pp. 16-29. (*)
- [2005] A. Armando, C. Castellini, E. Giunchiglia, M. Idini and M. Maratea, *TSAT++: an Open Platform for Satisfiability Modulo Theories*, PDPAR-04 - Pragmatics of Decision Procedures in Automated Reasoning, Electronic Notes on Theoretical Computer Science 125(3), pp. 25-36. (*)
- [2004] A. Armando, C. Castellini and J. Mantovani, *Software Model Checking Using Linear Constraints*, ICFEM-04 - International Conference on Formal Engineering Methods, Lecture Notes in Computer Science 3308, pp. 209-223. (***)
- [2002] C. Castellini and A. Smaill, *Proof Planning for Feature Interactions: a Preliminary Report*, LPAR-02 - Logic for Programming, Artificial Intelligence and Reasoning, Lecture Notes in Computer Science 2514, pp. 102-114. (*)
- [2001] C. Castellini, E. Giunchiglia and A. Tacchella, *Improvements to SAT-based Conformant Planning*, ECP-01 - European Conference on Planning, proceedings, pp. 241-252. (***)
- [2000] C. Castellini and A. Smaill, *A Modular, Tactic-based Approach to First-Order Temporal Theorem Proving*, ICTL-00 - International Conference on Temporal Logic, proceedings. (*)
- [2000] A. Armando, C. Castellini and E. Giunchiglia, *SAT-based Decision Procedures for Temporal Reasoning*, ECP-99 - European Conference on Planning, Lecture Notes in Computer Science 1809, pp. 97-108. (***)

other papers

- [2009] C. Castellini, E. Gruppioni, A. E. Fiorilla, P. van der Smagt and G. Sandini, *Non-Invasive Adaptive Hand Prosthetics*, ICRA workshop *Brain Machine Interfaces for Neuroprostheses and Robot Control*, Kobe, Japan.
- [2008] C. Castellini, E. Gruppioni, A. Davalli and G. Sandini, *EMG-driven hand prosthetics: initial results on a patient*, poster at *Recent Advances in Neuro-robotics Symposium*, Freiburg, Germany.
- [2008] C. Castellini, E. Fiorilla and G. Sandini, *Multi-subject/DLA analysis of surface EMG control of mechanical hands*, poster at GNB I, 1st annual meeting of the Gruppo Nazionale Bioingegneria, Italian National Bioengineering Group, Pisa, Italy.
- [2007] A. Pasquali, C. Castellini, V. Gaillard, F. Orabona, G. Metta and A. Cleeremans, *Developmental learning in non-markovian processes: Premises of a new biologically plausible cognitive architecture*, poster at ASSC 2007, 11th annual meeting of the Association for the Scientific Study of Consciousness, Las Vegas (USA).
- [2007] C. Castellini and G. Sandini, *Learning when to grasp*, invited paper at *Concept Learning for Embodied Agents*, a workshop in ICRA, Rome.
- [2006] F. Orabona, C. Castellini and G. Sandini, *Online Independent Support Vector Machines*, poster presented at CCKM06 (Current Challenges in Kernel Methods), Brussels.
- [2003] A. Armando, C. Castellini, E. Giunchiglia and M. Maratea, *Effective Reasoning Techniques for Temporal Reasoning*, presented at the I Robocare Workshop, Rome (Italy).
- [2001] C. Castellini and A. Smaill, *Tactic-based Theorem Proving in First-Order Modal and Temporal Logics*, proceedings of IJCAR Workshop 10, Issues in the Design and Experimental Evaluation of Systems for Modal and Temporal Logics, Siena (Italy). Available as Technical Report DII14/01, University of Siena (Italy).
- [2001] C. Castellini, E. Giunchiglia and A. Tacchella, *C-Plan: a Conformant Planner based on Satisfiability*, proceedings of IJCAI Workshop PRO-2, Planning under Uncertainty and Incomplete Information, Seattle (WA, USA).

technical reports

- [2007]** F. Orabona, C. Castellini, B. Caputo, L. Jie and G. Sandini, *On-line Independent Support Vector Machines for Cognitive Systems*, IDIAP research report IDIAP-RR 07-63.
- [2006]** F. Orabona and C. Castellini, *Trading Accuracy for Size: Online Small SVMs via Linear Independence in the Feature Space*, LIRA-Lab technical report.

theses

- [2005]** *Automated Reasoning for Quantified Modal and Temporal Logics*, Ph.D. thesis, University of Edinburgh (UK). Awarded Best Italian Ph.D. Thesis in Artificial Intelligence by AIIA (Artificial Intelligence Italian Association).
- [1998]** *Sviluppo ed analisi sperimentale di procedure di decisione per l'aritmetica lineare* (Development and experimental analysis of decision procedures for Linear Arithmetic), laurea thesis, University of Genova (Italy).