claudio castellini, ph.d.

researcher
german aerospace center

birth date and place july 19th 1972, genova, italy
citizenship italian
marital status single
interests/hobbies photography, swimming, books, cinema, music; blood donor

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research interests

main

prosthetics; rehabilitation robotics; brain-computer interfaces; machine learning / statistical learning theory; speech recognition

secondary

human and robotic stiffness; impedence control in robotics; formal methods and modal / temporal logics; boolean satisfiability

positions

- ***2009-now*** researcher (wissenschaftlicher mitarbeiter) at the german aerospace 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 smaill
- ***2003-2004*** research scientist at *cnr* (italian research council), rome, italy. supervisors: enrico giunchiglia, amedeo cesta
- ***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 engineerings, grade 110/110, university of genova, italy

research projects

current

- *ninapro* development of novel control methods for mechanical hands, based upon surface electromyography (co-investigator)
  www.idiap.ch/project/ninapro

- *the humanoid arm-hand system* development and clinical transfer of devices and methods for advanced control of artificial hands (co-investigator)
  www.robotic.dlr.de

past

- *contact* learning and development of contextual action (co-investigator)
  eris.liralab.it/contact
- *neurobotics* development of state-of-the-art hybrid bionic systems via the fusion with cutting-edge cognitive science paradigms (co-investigator)
- *mfotl (mechanising first-order temporal logics)* application of artificial intelligence techniques to certified safety of large, distributed service systems (principal investigator)
- *tsat++ (satisfiability modulo theory)* formal verification of properties of infinite-state systems via satisfiability of ground first-order formulae (principal investigator)
- *eureka (symbolic model checking c programs)* formal verification of properties of c programs. (co-investigator)
- *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)
- *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.
- *calculemus* 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*
- *2008-2010 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*, *journal of physiology paris*, *journal of neuroengineering and rehabilitation*, several ieee transactions, *international journal of robotics research*, *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
- *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

- *2011 transferring machine learning and robotics to the clinics.* given at cit-ec, bielefeld university, germany
- *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):

- *2011-2012* machine learning 1 – technische universität münchen, germany (spring and winter semester)
- *2008* computational learning methods – university of genova, faculty of engineerings
- *2003-2005* databases – university of genova (as *cultore della materia*), faculty of education sciences
- *2003* artificial intelligence – university of genova, faculty of engineerings
- *2001-2002* basic informatics – university of genova, faculty of engineerings
- *2000* reasoning agents – university of edinburgh, school of informatics
- *1994-1995* digital electronics – university of genova, faculty of engineerings

supervisions

- *2012* barbara hilsenbeck, bachelor thesis: single-finger force prediction using surface electromyography, dlr
- *2012* david sierra gonzález, master thesis: online hand configuration prediction using ultrasound images, dlr
- *2011* roberto perretta, master thesis: stroke rehabilitation using surface electromyography, dlr
- *2011* emanuel zarka, master thesis: using ultrasound images to reconstruct the position of the hand, dlr
- *2010* uwe jaschke, internship: clinical requirements for a dexterous hand prosthesis; development of a simple although biologically plausible graphical model of the hand, dlr
- *2007* maria giovanna scognamiglio, laurea in electronic engineerings: 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, master thesis: realisation of a rehabilitation system for hand-disabled patients based upon machine learning, dlr
- *2004* massimo idini, laurea in electronic engineerings: implementation of an automated reasoning system for satisfiability modulo theories, university of genova
- *2000* manuel contreras-maya, master thesis: 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

languages

- native italian, fluent english (c2), good german and spanish (b2/c2), basic portuguese and french (a1/b2)

work experiences

- *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

in peer-reviewed journals

1. Castellini, C., Badino, L., Metta, G., Sandini, G., Tavella, M., Grimaldi, M. and Fadiga, L. "The use of phonetic motor invariants can improve automatic phoneme discrimination," PLoS ONE (6:9), 2011, e24055.
2. Castellini, C., Tommasi, T., Noceti, N., Odone, F. and Caputo, B. "Using object affordances to improve object recognition," IEEE Transactions on Autonomous Mental Development (3:3), 2011, pp. 207-215.
3. Orabona, F., Castellini, C., Caputo, B., Jie, L. and Sandini, G. "On-line independent Support Vector Machines," Pattern Recognition (43:4), 2010, pp. 1402-1412.
4. Castellini, C., Fiorilla, A. E. and Sandini, G. "Multi-subject / Daily-Life Activity EMG-based control of mechanical hands," Journal of Neuroengineering and Rehabilitation (6:41), 2009.
5. Castellini, C., Gruppioni, E., Davalli, A. and Sandini, G. "Fine detection of grasp force and posture by amputees via surface electromyography," Journal of Physiology (Paris) (103:3-5), 2009, pp. 255-262.
6. Castellini, C. and van der Smagt, P. "Surface EMG in advanced hand prosthetics," Biological Cybernetics (100:1), 2009, pp. 35-47.
7. Castellini, C. "Gaze tracking in semi-autonomous grasping," Journal of Eye Movement Research (2:4), 2009, pp. 1-7.
8. Castellini, C., Orabona, F., Metta, G. and Sandini, G. "Internal models of reaching and grasping," Advanced Robotics (21:13), 2007, pp. 1545-1564.
9. Castellini, C. "Automated reasoning in quantified modal and temporal logics," AI Communications (19:2), 2006, pp. 183-185.
10. Armando, A., Castellini, C., Giunchiglia, E. and Maratea, M. "The SAT-based approach to separation logic," Journal of Automated Reasoning (35:1), 2005, pp. 237-263.
11. Castellini, C., Giunchiglia, E. and Tacchella, A. "SAT-based planning in complex domains: concurrency, constraints and nondeterminism," Artificial Intelligence (147:1-2), 2003, pp. 85-117.
12. Castellini, C. and Smaill, A. "A systematic presentation of quantified modal logics," Logic Journal of the IGPL (10:6), 2002, pp. 571-599.
13. Armando, A., Castellini, C., Giunchiglia, E., Giunchiglia, F. and Tacchella, A. "SAT-based decision procedures for automated reasoning: a unifying perspective", in Hutter, D. and Stephan, W., ed.,'Mechanizing Mathematical Reasoning', Springer Berlin / Heidelberg, 2005, pp. 46-58.

in peer-reviewed conferences

1. Castellini, C. and Passig, G. "Ultrasound image features of the wrist are linearly related to finger positions'"Proceedings of IROS - International Conference on Intelligent Robots and Systems', to appear, 2011.
2. Castellini, C. and van der Smagt, P. "Preliminary evidence of dynamic muscular synergies in human grasping'"Proceedings of ICAR - International Conference on Advanced Robotics', 2011, pp. 28-33.
3. Höppner, H., Lakatos, D., Urbanek, H., Castellini, C. and van der Smagt, P. "The Grasp Perturbator: calibrating human grasp stiffness during a graded force task'"Proceedings of ICRA - International Conference on Robotics and Automation', 2011, pp. 3312-3316.
4. Lampariello, R., Castellini, C., Hirzinger, G., Nguyen-Tuong, D. and Peters, J. "Optimal collision-free robot catching in real-time'"Proceedings of ICRA - International Conference on Robotics and Automation', 2011, pp. 3719-3726.

5. Vogel, J., Castellini, C. and van der Smagt, P. "EMG-based teleoperation and manipulation with the DLR LWR-III'"Proceedings of IROS - International Conference on Intelligent Robots and Systems', to appear, 2011.
6. Noceti, N., Caputo, B., Castellini, C., Baldassarre, L., Barla, A., Rosasco, L., Odone, F. and Sandini, G. "Towards a theoretical framework for learning multi-modal patterns for embodied agents", in Foggia, P., Sansone, C. and Vento, M., ed.,'Image Analysis and Processing - ICIAP', 2009, pp. 239-248.
7. Orabona, F., Castellini, C., Caputo, B., Fiorilla, E. and Sandini, G. "Model adaptation with least-squares SVM for hand prosthetics'"Proceedings of ICRA - International Conference on Robotics and Automation', 2009, pp. 2897-2903.
8. van der Smagt, P., Castellini, C. and Urbanek, H. "Human arm impedance and EMG in 3D'"Proceedings of SKILLS - International Conference on Multimodal Interfaces for Skills Transfer', 2009.
9. Castellini, C., van der Smagt, P., Sandini, G. and Hirzinger, G. "Surface EMG for force control of mechanical hands'"Proceedings of ICRA - International Conference on Robotics and Automation', 2008, pp. 725-730.
10. Orabona, F., Castellini, C., Caputo, B., Jie, L. and Sandini, G. "Indoor place recognition using Online Independent Support Vector Machines'"Proceedings of BMVC - British Machine Vision Conference', BMVA - British Machine Vision Association, 2007, pp. 1090-1099.
11. Castellini, C. and Sandini, G. "Gaze tracking for robotic control in intelligent teleoperation and prosthetics'"Proceedings of COGAIN - Communication via Gaze Interaction', 2006, pp. 73-77.
12. Armando, A., Castellini, C., Giunchiglia, E., Idini, M. and Maratea, M. "TSAT++: an open platform for Satisfiability Modulo Theories"(3)'Proceedings of PDPAR - Pragmatics of Decision Procedures in Automated Reasoning', 2005, pp. 25-36.
13. Armando, A., Castellini, C., Giunchiglia, E. and Maratea, M. "A SAT-based decision procedure for the Boolean combination of difference constraints'"Proceedings of SAT - International Conference on Theory and Applications of Satisfiability Testing', Springer-Verlag, 2005, pp. 16-29.
14. Castellini, C. and Smaill, A. "Proof planning for first-order temporal logic'"Proceedings of CADE - International Conference on Automated Deduction', Springer-Verlag, 2005, pp. 235-249.
15. Armando, A., Castellini, C. and Mantovani, J. "Software model checking using linear constraints'"Proceedings of ICFEM - Intenational Conference on Formal Engineering Methods', Springer-Verlag, 2004, pp. 209-223.
16. Castellini, C. and Smaill, A. "Proof planning for feature interactions: a preliminary report'"Proceedings of LPAR - Logic for Programming Artificial Intelligence and Reasoning', Springer-Verlag, 2002, pp. 102-114.
17. Castellini, C., Giunchiglia, E. and Tacchella, A. "Improvements to SAT-based conformant planning'"Proceedings of ECP - European Conference on Planning', 2001, pp. 241-252.
18. Armando, A., Castellini, C. and Giunchiglia, E. "SAT-based decision procedures for temporal reasoning'"Proceedings of ECP - European Conference on Planning', Springer-Verlag, 2000, pp. 97-108.
19. Castellini, C. and Smaill, A. "A modular, tactic-based approach to first-order temporal theorem proving'"Proceedings of ICTL - International Conference on Temporal Logic', 2000.