



## 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; impedance 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 engineering, 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)
- *mfol* (*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 iee 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 iee 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](mailto: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](mailto:giorgio.metta@iit.it)
- *alan smaill*, lecturer at university of edinburgh, ph.d. supervisor from 1999 to 2005. email [a.smaill@ed.ac.uk](mailto:a.smaill@ed.ac.uk)
- *alessandro armando*, associate professor at university of genova, supervisor in 2003 and 2004. email [alessandro.armando@unige.it](mailto:alessandro.armando@unige.it)
- *enrico giunchiglia*, full professor at university of genova, supervisor in 2001. email [enrico.giunchiglia@unige.it](mailto: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 9<sup>th</sup> 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 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*

- *2012 albert arquer*, master thesis: using emg-estimated stiffness in teleoperation, dlr
- *2012 rashida bohra*, internship: single-finger force prediction using surface electromyography, dlr
- *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 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*, master thesis: 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*, 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*, sozea, genova
- *1997 basic and advanced html*, csita, genova
- *1996 local and wide-area networks*, sozea, 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. & Fadiga, L. (2011), 'The use of phonetic motor invariants can improve automatic phoneme discrimination', *PLoS ONE* 6(9), e24055.
2. Castellini, C.; Tommasi, T.; Noceti, N.; Odone, F. & Caputo, B. (2011), 'Using object affordances to improve object recognition', *IEEE Transactions on Autonomous Mental Development* 3(3), 207-215.
3. Orabona, F.; Castellini, C.; Caputo, B.; Jie, L. & Sandini, G. (2010), 'On-line independent Support Vector Machines', *Pattern Recognition* 43(4), 1402-1412.
4. Castellini, C.; Gruppioni, E.; Davalli, A. & Sandini, G. (2009), 'Fine detection of grasp force and posture by amputees via surface electromyography', *Journal of Physiology (Paris)* 103(3-5), 255-262.
5. Castellini, C.; Fiorilla, A. E. & Sandini, G. (2009), 'Multi-subject / Daily-Life Activity EMG-based control of mechanical hands', *Journal of Neuroengineering and Rehabilitation* 6(41).
6. Castellini, C. & van der Smagt, P. (2009), 'Surface EMG in advanced hand prosthetics', *Biological Cybernetics* 100(1), 35-47.
7. Castellini, C. (2009), 'Gaze tracking in semi-autonomous grasping', *Journal of Eye Movement Research* 2(4), 1-7.
8. Castellini, C.; Orabona, F.; Metta, G. & Sandini, G. (2007), 'Internal models of reaching and grasping', *Advanced Robotics* 21(13), 1545-1564.

### in peer-reviewed conferences

1. Atzori, M., Gijsberts, A., Heynen, S., Mittaz-Hager, A.-G., Deriaz, O., van der Smagt, P., Castellini, C., Caputo, B. & Müller, H., 'Building the NINAPRO Database: A Resource for the Biorobotics Community', *Proceedings of BioRob - IEEE International Conference on Biomedical Robotics and Biomechatronics*, 2012. (to appear.)
2. Castellini, C. & Kõiva, R., 'Using surface electromyography to predict single finger forces', *Proceedings of BioRob - IEEE International Conference on Biomedical Robotics and Biomechatronics*, 2012. (to appear.)
3. Roa, M.A., Kõiva, R. & Castellini, C., 'Experimental Evaluation of Human Grasps Using a Sensorized Object', *Proceedings of BioRob - IEEE International Conference on Biomedical Robotics and Biomechatronics*, 2012. (to appear.)
4. Castellini, C. & Passig, G. (2011), 'Ultrasound image features of the wrist are linearly related to finger positions', in *Proceedings of IROS - International Conference on Intelligent Robots and Systems*, pp. 2108-2114.
5. Castellini, C. & van der Smagt, P. (2011), 'Preliminary evidence of dynamic muscular synergies in human grasping', in *Proceedings of ICAR - International Conference on Advanced Robotics*, pp. 28-33.
6. Höppner, H.; Lakatos, D.; Urbanek, H.; Castellini, C. & van der Smagt, P. (2011), 'The Grasp Perturbator: calibrating human grasp stiffness during a graded force task', in *Proceedings of ICRA - International Conference on Robotics and Automation*, pp. 3312-3316.
7. Lampariello, R.; Castellini, C.; Hirzinger, G.; Nguyen-Tuong, D. & Peters, J. (2011), 'Optimal collision-free robot catching in real-time', in *Proceedings of ICRA - International Conference on Robotics and Automation*, pp. 3719-3726.
8. Vogel, J.; Castellini, C. & van der Smagt, P. (2011), 'EMG-based teleoperation and manipulation with the DLR LWR-III', in *Proceedings of IROS - International Conference on Intelligent Robots and Systems*, pp. 672-678.

9. Noceti, N.; Caputo, B.; Castellini, C.; Baldassarre, L.; Barla, A.; Rosasco, L.; Odone, F. & Sandini, G. (2009), Towards a theoretical framework for learning multi-modal patterns for embodied agents, in Pasquale Foggia; Carlo Sansone & Mario Vento, ed., 'Image Analysis and Processing - ICIAP', pp. 239-248.
10. Orabona, F.; Castellini, C.; Caputo, B.; Fiorilla, E. & Sandini, G. (2009), Model adaptation with least-squares SVM for hand prosthetics, in 'Proceedings of ICRA - International Conference on Robotics and Automation', pp. 2897-2903.
11. van der Smagt, P.; Castellini, C. & Urbanek, H. (2009), Human arm impedance and EMG in 3D, in 'Proceedings of SKILLS - International Conference on Multimodal Interfaces for Skills Transfer'.
12. Castellini, C.; van der Smagt, P.; Sandini, G. & Hirzinger, G. (2008), Surface EMG for force control of mechanical hands, in 'Proceedings of ICRA - International Conference on Robotics and Automation', pp. 725-730.
13. Orabona, F.; Castellini, C.; Caputo, B.; Jie, L. & Sandini, G. (2007), Indoor place recognition using Online Independent Support Vector Machines, in 'Proceedings of BMVC - British Machine Vision Conference', BMVA - British Machine Vision Association, , pp. 1090-1099.
14. Castellini, C. & Sandini, G. (2006), Gaze tracking for robotic control in intelligent teleoperation and prosthetics, in 'Proceedings of COGAIN - Communication via Gaze Interaction', pp. 73-77.