ALLEGATO B

UNIVERSITÀ DEGLI STUDI DI MILANO
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Cristiano Alessandro
CURRICULUM VITAE

INFORMAZIONI PERSONALI (NON INSERIRE INDIRIZZO PRIVATO E TELEFONO FISSO O CELLULARE)

COGNOME	ALESSANDRO
NOME	CRISTIANO
DATA DI NASCITA	22/01/1984

INSERIRE IL PROPRIO CURRICULUM

ATTIVITA' DI RICERCA

La mia attività di ricerca consiste nello studio della coordinazione muscolare in relazione alla biomeccanica, e dei circuiti neurali coinvolti nel processo di generazione dei movimenti utilizzando approcci sia computazionali che sperimentali. Tali ricerche trovano applicazione in ambito di riabilitazione e scienza dello sport.

ISTRUZIONE E FORMAZIONE

Feb. 2009/Sett. 2013 — **University of Zurich. Artificial Intelligence Lab**
PhD (defense: 20/09/2013)
- Tesi: "Computational implications of the muscle synergy hypothesis"
- Supervisore: Prof. Rolf Pfeifer
- Referee esterno: Prof. Etienne Burdet

Marzo 2012/Luglio 2012 — **Italian Institute of Technology (IIT), Genoa, Italy**
"Robotics, Brain and Cognitive Science" department (RBCS)
- Studente di dottorato in visita

Ottobre 2005/Aprile 2008 — **Politecnico di Milano**
Laurea magistrale in ingegneria informatica (2 anni)
- Punteggio finale: 110/110 e lode
- Indirizzo: AI, apprendimento automatico, robotica, sistemi di controllo
- Tesi: "A tool for evaluating architectures for autonomous robots"
- Supervisore: Prof. Andrea Bonarini

Sett. 2006/Gennaio 2007 — **Chalmers Institute of Technology, Gothenburg, Sweden**
- Studente in scambio (programma Erasmus)

Ottobre 2002/Luglio 2005	**Università degli Studi di Catania** **Laurea triennale (3 anni)** - Punteggio finale: 110/110 e lode - Tesi: "Navigation Control Algorithms based on spiking networks" - Supervisori: Dr. Mattia Frasca, Dr. Luca Patanè, Prof. Paolo Arena
Sett. 1997/Luglio 2002	**Liceo Scientifico S.Giovanni Bosco, Catania** **Diploma di maturità scientifica** - Punteggio finale: 100/100

Seminari

Sett. 2014	"Summer School on Neurorehabilitation" – Baiona, Spain.
Aprile 2014	"Training Event on Stroke Rehabilitation" – Venice, Italy.
Aprile 2014	"International Workshop on Muscle Synergies" – Venice, Italy.
Giugno 2011	"Machine Learning Summer School" – Biopolis, Singapore.
Luglio 2011	"Summer School on Impedance" – Frauenchiemsee, Germany.
Luglio 2009	"Robot Learning Summer School" – Lisbon, Portugal.
Luglio 2009	"Multimodal and Cognitive System Summer School" – Zurich, Switzerland.
Marzo 2007	"From Kalman to Particle Filters" – Paris, France.

ESPERIENZA LAVORATIVA

Ricerca

Gennaio 2016/oggi	**Postdoc** Northwestern University, Chicago, USA - Argomenti: Neuroscienze motorie, neurofisiologia, biomeccanica - Supervisore: Prof. Matthew Tresch
Gennaio 2014/Giugno 2015	**Postdoc** ETH Zurich, Sensory-Motor Systems Lab - Argomenti: Neuroscienze computazionali, neuroscienze motorie, biomeccanica, analisi di seganli fisiologici (EMG, pressione arteriosa, battito cardiaco) - Supervisore: Prof. Robert Riener
Febbraio 2009/Sett. 2013	**Assistente alla ricerca** University of Zurich. Artificial Intelligence Lab. - Argomenti: : Neuroscienze computazionali, neuroscienze motorie, robotica - Supervisore: Prof. Rolf Pfeifer
Sett./Dicembre 2008	**Assistente alla ricerca** Politecnico di Milano, Department of Electronics and Computer Science - Argomenti: Analisi statistica di segnali fisiologici - Supervisore: Prof. Andrea Bonarini
Collaboratori	Matthew Tresch (Northwestern University), Andrea d'Avella (University of Messina), Robert Riener (ETH Zurich), Lee Miller (Northwestern University), Chethan Pandarinath (Emory University), Juan Pablo Carabajal (ETH Zurich), Filipe Barroso (Spanish National Research Council), Ioannis Delis (University of Leeds), Bastien Berret (University of Paris-Sud), Stefano Panzeri (Italian Institute of Technology)

Progetti

Gennaio 2016/oggi	Neural control of internal joint variables (NIH)
Gennaio/Giugno 2015	NCCR Robotics (SNSF) www.nccr-robotics.ch
Gennaio/Dic. 2014	STAMAS (EU FP7) Smart Technology for Artificial Muscle Applications in Space http://www.stamas.ethz.ch/
Ott. 2012/Sett. 2013	AMARSi (EU FP7) Adaptive Modular Architectures for Rich Motor Skills http://www.amarsi-project.eu/
Ott. 2009/Sett. 2012	RobotDoC (EU FP7 - Marie Curie Fellowship) Robotics for Development of Cognition http://robotdoc.org/
Feb. 2009/Sett. 2011	ECCEROBOT (EU FP7) Embodied Cognition in a Compliant Engineered Robot http://eccerobot.org/

Supervisione di studenti

Gennaio 2018/oggi	Mater thesis, Miss. Hsin-Yun Yeh (Northwestern University) Argomenti: attaività muscolare durante la locomozione, e ruolo dei segnali afferenti articolari
Giugno 2014/Maggio 2015	Master thesis, Mr. Robin Urselli (Politecnico di Milano) “Impact of muscle redundancy and nonlinearities on the muscle synergy hypothesis: a computational investigation”
Marzo/Agosto 2011	Bachelor thesis, Mr. Mathias Weyland (University of Zurich) “Reflex learning in a tendon-driven robot”

Attivita’ didattica

Sett./Dic. 2011	“Designing and Programming Embedded Systems for Robots”. Uni. Zurich.
Feb./Luglio 2010	“Artificial Life”. University of Zurich.
Sett./Dic. 2009 Feb./Lug. 2009	“Introduction to AI”. University of Zurich. “Neural Networks”. University of Zurich.
Marzo/Giugno 2008	“Software Engineering”. Politecnico di Milano.
Sett./Dic. 2007	“Computer Science A”. Politecnico di Milano.
Sett. 2003/Luglio 2004	Tutoring service towards students of first year of engineering university. University of Catania.

Organizzazione di convegni e arrivita’ di revisione

Sett. 2018/oggi	Revisore per Scientific Reports Revisore per Journal of Neurophysiology
Giugno 2013/oggi	Revisore per Frontiers in Computational Neuroscience Revisore per Frontiers in Neurorobotics

Genn./Sett. 2012	Financial chair per la "Post-graduate conference on Robotics and Development of Cognition". Lausanne (Switzerland), 10-12 September 2012.

SOCIETA' PROFESSIONALI

- Society for Neuroscience (SfN)
- Society for Neural Control of Movements (NCM)
- Institute of Electrical and Electronics Engineers (IEEE)

PRESENTAZIONI SU INVITO

Aprile 2018	**Neural control of internal joint variables** Shirley Ryan AbilityLab, Patton Lab. Chicago, USA, April 14th.
Novembre 2017	**Neural control of internal joint variables** John Hopkins University, Shadmehr Lab. Baltimore, USA, November 17th.
Giugno 2014	**Computational analyses of the muscle synergy hypothesis** EPFL, Translational Neural Engineering Laboratory. Lausanne, Switzerland, June 6th.
Marzo 2014	**Computational implications of the muscle synergy hypothesis** Politecnico di Milano, Depart. of Electronics, Computer Science and Bioengineering. Milan, Italy, March 14th.
Luglio 2013	**Computational implications of the muscle synergy hypothesis** Imperial College of London, Human Robotics Group, Depart. of Bioengineering. London, United Kingdom, July 12th.
Maggio 2013	**Computational implications of the muscle synergy hypothesis** The Weizmann Institute of Science, Dept. of Applied Mathematics and Computer Science. Rehovot, Israel, May 7th 2013.
Giugno 2012	**Identification of effective synergies for robot control** Santa Lucia Foundation, Laboratory of Neuromotor Physiology. Rome, Italy, June 28th.

AWARDS

Marzo 2019	**Marie Skłodowka-Curie Research Fellowship, Seal of Excellence** Riconoscimento di eccellenza del progetto: "Exploiting gamma oscillations for motor recovery"
Giugno 2018	**68th Lindau Nobel Laureate Meeting on Physiology or Medicine.** Accettazione e travel award. Lindau, Germany. 24-29 June 2018.
Luglio 2015	**SNSF Advanced Postdoc Mobility Award** Finanziamento della postdoctoral fellowship (24 mesi) "SNSF Advanced Postdoc Mobility Award" bandita dalla Swiss National Science Foundation. **"**Cortical plasticity during multisensory integration and reach planning"
Feb. 2015	**ETHZ Scientific Equipment Grant** Finanziamento del progetto dal titolo "Force/torque sensors and corresponding electronics".
Aprile 2015	**NCM Scholarship.** Annual meeting of the Society for Neural Control of Movement (NCM). Accettazione e travel award. Charleston, USA. 19-24 April 2015.

Maggio 2013 **Miglior poster (secondo classificato)**.
9th Computational Motor Control Workshop, Ben-Gurion University of Negev, Beer-Sheva, Israel. May 9.

Ottobre 2009 **Borsa di studio**. Marie Curie, Initial Training Network (ITN).

COMPETENZE LINGUISTICHE

- **Inglese:** proficient scritto e orale (C1).
- **Tedesco:** livello base (A2).

COMPETENZE TECNICHE

- Elettromiografia (EMG)
- Analisi di dati cinematici
- Analisi della locomozione
- Sistemi di monitoraggio del movimento (Vicon)
- Sensoristica (sensori di forza, posizione, giroscopi, accelerometri)
- Gestione di roditori da laboratorio
- Impianto di elettrodi EMG sottocutanei in roditori (chirurgia sterile)
- Impianto di elettrodi cuff in roditori (chirurgia sterile)
- Denervazione muscolare in roditori (chirurgia sterile)
- Recisione del legamento crociato anteriore in roditori (chirurgia sterile)
- Sistemi operativi: Windows OS, Linux OS.
- Linguaggi di programmazione: C/C++, C#, Java, SQL, Python, Matlab.
- Software: Matlab, Simulink, Labview, Octave, SVN, GitHub, Inkscape.
- Hardware: Sensoristica, progammazione embedded, Vicon.

Pubblicazioni

Riviste internazionali

Alessandro C., Tafreshi A., Riener R. (2019). **Cardiovascular responses to leg muscle loading during head-down tilt at rest and after dynamic exercises.** *Scientific Reports*. 9.

Alessandro C., Rellinger B., Barroso F., Tresch M. (2018). **Adaptation after vastus lateralis denervation in rats demonstrates neural regulation of joint stresses and strains.** *eLife*. 7:e38215

Alessandro C., Barroso F., Tresch M. (2016). **Working hard to make a simple definition of synergies. Comment on: "Hand synergies: Integration of robotics and neuroscience for understanding the control of biological and artificial hands" by Marco Santello et al.** *Physics of Life Reviews*. 17:24-26.

Alessandro C., Carbajal J.P., d'Avella A. (2014). **Computational analyses of the muscle synergy hypothesis via the Dynamic Response Decomposition**. *Frontiers in Computational Neuroscience*. 7:191.

Alessandro C., Ioannis D., Nori F., Panzeri S., Berret B. (2013). **Muscle synergies in neuroscience and robotics: from input to task-space perspectives.** *Frontiers in Computational Neuroscience*. 7:43.

Wittmeier S., Alessandro C., Bascarevic N., Dalamagkidis K., Diamond A., Jäntsch M., Jovanovic K., Knight R., Gravato Marques H., Milosavljevic P., Svetozarevic P., Potkonjak V., Pfeifer R., Knoll A., Holland O. (2012). **Towards anthropomimetic robotics: development, simulation, and control of a musculoskeletal torso**. *Artificial Life*. 19(1):171-193.

Riviste (in revisione o in preparazione)

Barroso F., Alessandro C., Tresch M. **Adaptation of muscle activation after patellar loading demonstrates neural control of joint variables**. (under review at Scientific Reports).

Alessandro C., Barroso F., Prashara A., Yeh H., Tresch M. **Correlation between quadriceps muscles during locomotion in the rat**. *(in preparation)*.

Alessandro C., Barroso F., Prashara A., Yeh H., Sandercock T., Tresch M. **Joint afferent activity determines correlations between the vasti muscles in the rat**. *(in preparation)*.

Alessandro C., Barroso F., Prashara A., Yeh H., Sandercock T., Tresch M. **Role of knee joint afferent activity on rat locomotion**. *(in preparation)*.

Alessandro C., Barroso F., Prashara A., Yeh H., Tresch M. **Hindlimb muscle coordination during tradmill locomotin at different speeds and inclines in the rat**. *(in preparation)*.

Alessandro C., Barroso F., Prashara A., Yeh H., Tresch M. **Synergies in the residual space of hindlimb muscle activity in the rats**. *(in preparation)*.

Alessandro C., Prashara A., Yeh H., Tresch M. **Role of knee joint afferent activity during adaptation to VL paralysis in the rat**. *(in preparation)*.

Capitoli di libri

Alessandro C., Backers N., Goebel P., Resquin F., Gonzalez J., and Osu R. (2015). **Motor Control and Learning Theories.** Eds. Jose L. Pons, Rafael Raya and Jose Gonzalez. *Emerging Therapies in Neurorehabilitation II*. Biosystems & Biorobotics. 10: 225-250.

Torricelli D., Barroso F., Coscia M., Alessandro C., Lunardini F., Esteban E. B., d'Avella A. (2015). **Muscle Synergies in the Clinical Practice: Potentials and Practical Issues.** Eds. Jose L. Pons, Rafael Raya and Jose Gonzalez. *Emerging Therapies in Neurorehabilitation II*. Biosystems & Biorobotics. 10: 251-272.

Atti di convegni (peer reviewed)

Alessandro C., Tafreshi A., Riener R. (2016). **Increasing leg blood volume during head-down tilt by performing physical exercises, a preliminary study.** The 6th IEEE International Conference on Biomedical Robotics and Biomechatronics (BioRob), Singapore, Singapore.

Vollmer A.-L., Rucinski M., Alessandro C., Wilkinson N., Navarro-Guerrero N., and Handl A. (2013). **Special Session on Training in Robotics for Development of Cognition (RobotDoC).** The 3rd Joint IEEE International Conference on Development and Learning and on Epigenetic Robotics, Osaka, Japan.

Alessandro C., Carbajal J.P., d'Avella A. (2012). **Synthesis and Adaptation of Effective Motor Synergies for the Solution of Reaching Tasks**. *Lecture Notes in Artificial Intelligence (LNAI)*. Eds. T. Ziemke, C. Balkenius, and J. Hallam (Berlin Springer-Verlag), pag. 33-43.

Alessandro C. and Nori F. (2012). **Identification of Synergies by Optimization of Trajectory Tracking Tasks.** *The Fourth IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechatronics*. Roma, Italy. June 24-27, 2012. pag. 924-930.

Mutti F., Alessandro C., Angioletti M., Bianchi A., Gini G. (2012). **Learning and evaluation of a vergence control system inspired by Hering's law.** *The Fourth IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechatronics*. Roma, Italy. June 24-27, 2012. pag. 931-936.

Kuppuswamy N., Alessandro C. (2011). **Impact of Body Parameters on Dynamic Movement Primitives for Robot Control.** *The European Future Technologies Conference and Exhibition*, FET 2011. Budapest, Hungary.

Marques G. H., Jäntsch M., Wittmeier S., Alessandro C., Lungarella M., Knight R., Holland O. (2010). **ECCE1: the first of a series of anthropomimetic musculoskeletal upper torsos**. IEEE *International Conference on Humanoid Robotics, Humanoid 2010*. Nashville, USA.

Tognetti S., Alessandro C., Bonarini A., Matteucci M. (2009). **Fundamental issues on the recognition of autonomic patterns produced by visual stimuli**. *Affective Computing and Intelligent Interaction*, ACII 2009 – 10/09/2009 Amsterdam, Netherlands.

Arena P., Fortuna L., Frasca M., Patanè L., Alessandro C., Barbagallo D. (2006). **Learning high sensors from reflexes via spiking networks in roving robots**. 8th international *IFAC symposium on robot control*, IFAC Syrco 2006, 06/08/2006 Bologna, Italy.

Abstracts (peer-reviewed)

Alessandro C., Song D., Tentler D., Prashara A., Yun-Yeh H., Barroso F., Tresch M. (2019). **Coordination between quadriceps muscles activity in rats suggests neural regulation of joint stresses and strains**. *Society for Neuroscience, 2019* (accepted)

Alessandro C., Rellinger B., Barroso F., Tresch M. (2018). **Restoration of global, but not local, kinematics after denervation of vastus lateralis in rats.** Program No. 150.08. *2018 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2018. Online

Tresch M., Alessandro C., Barroso F., Wei Q., Dhaher Y., Sandercock T., Pai D. (2018). **The nervous system activates muscles to minimize internal joint stresses: evidence from quadriceps muscle activations during motor adaptation in the rat.** 28th *NCM Annual Meeting*. Santa Fe (NM), USA. May 1-4, 2018. (Oral presentation)

Alessandro C., Rellinger B., Barroso F., Sandercock T., Tresch M. (2017). **Adaptation to quadriceps paralysis as a window into neural control of internal joint variables.** Program No. 410.03. *2017 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2017. Online

Barroso F., Alessandro C., Sandercock T., Tresch M. (2017). **Adaptations of neural control to mediolateral perturbations of the patella.** Program No. 410.02. *2017 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2016. Online.

Tresch M., Alessandro C., Barroso F. (2017). **Correlation between quadriceps muscles during locomotion in the rat**. Program No. 410.04. *2017 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2016. Online.

Alessandro C., Barroso F., Tresch M. (2016). **Role of knee joint afferents in rat locomotion**. Program No. 335.15. *2016 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2016. Online.

Alessandro C., Urselli R., Carbajal JP., Riener R. (2015). **Impact of muscle redundancy on the synergy hypothesis**. 25th *NCM Annual Meeting*. Charleston (SC), USA. April 21-24, 2015. (Oral presentation)

Alessandro Cristiano. (2010). **Movement Control of Biologically Inspired Humanoid Robots.** Marie Curie Workshop, European Science Forum, *ESOF 2010*. Turin, Italy. (Oral presentation)

Data 24/07/2019 Luogo Chicago