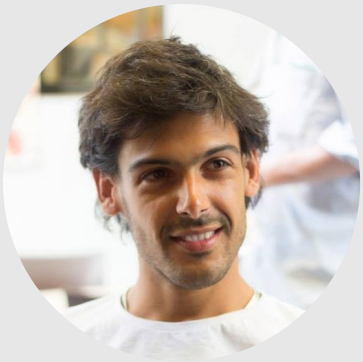

Nino Cauli

Postdoctoral researcher

17 November 1984

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Skills

General skills:

- Machine learning
- Computer Vision
- Control
- Agile software development methods

Technical skills:

- Programming languages (C, C++, Matlab, Python)
- Deep learning frameworks (PyTorch, Tensorflow)
- Robotics middlewares (ROS, YARP)
- Robotics Simulators (Gazebo and iCub Simulator)
- Computer Vision libraries (OpenCV)
- Game engines (Unreal Engine 4)
- Humanoid robots: (iCub, Sabian, Vizzy)

The skill scale is from 0 (Fundamental Awareness) to 6 (Expert).

Academic positions

since 2016 — Postdoctoral researcher — VisLab, ISR, Instituto Superior Técnico (IST), Lisbon
He is developing deep neural network systems to control robots based on camera images.

2014-2015 — Postdoctoral researcher — BioRobotics Institute, SSSA, Pisa
involved in the subproject "SP10 - Neurorobotics platform" of the Human Brain Project (HBP), contributing to develop the closed loop engine of a neurorobotic simulator.

VisLab, ISR, IST, Lisbon
Bringing on research studies on sensory prediction and anticipation on humanoid robots

2013 — Visiting researcher — VisLab, ISR, IST, Lisbon
He developed an expected perception-based control for reaching a moving target

Education

2010-2014 — Ph.D. Degree in Biorobotics cum laude — BioRobotics Institute, SSSA, Pisa
Title of the graduation thesis: "Modelling and implementation of sensory-motor anticipation: Internal Models and Expected Perception for humanoid robot".

2007-2010 — M.Sc. in Computer Science (110/110) — University of Pisa, Italy
Title of the graduation thesis: "Study and implementation of a neural networks based system to calculate the Expected Perception of the optical flow".

2003-2007 — B.Sc. in Computer Science — University of Cagliari, Italy
Title of the graduation thesis: "Gestures controlled virtual navigation".

2006 — Visiting Student — Visual Computing Lab, CRS4, Pula, Italy
He developed a 3D navigation control system based on hand gestures.

Projects involvement

2016 — Augmented Human Assistance (AHA) — CMU-Portugal
(CMUP-ERI/HCI/0046/2013)
Contribution to the implementation of a full body gesture recognition system based on Microsoft Kinect2 sensor.

2014-2015 — Human Brain Project (HBP) — H2020 FET Flagship Project
Contribution to the implementation of the closed loop engine of a neurorobotic simulator in the subproject "SP10 - Neurorobotics platform".

2009-2013 — RoboSoM "A robotic Sense of Movement" — European Commission
(ICT-2009.2.1/248366)
Contribution to the implementation of a sensory based predictive control system.

Teaching Activities

2018 — Co-supervisor M.Sc. thesis — VisLab, ISR, IST, Lisbon
on autonomous UAV navigation using vision and deep reinforcement learning.

2017-2018 — Co-supervisor M.Sc. thesis — VisLab, ISR, IST, Lisbon
on UAV autonomous landing on a mobile base using vision.

2017-2018 — Help in supervising Ph.D. thesis — VisLab, ISR, IST, Lisbon
on learning from demonstration how to clean a table using deep neural networks.

2013 — Laboratory assistant — University of Pisa, Italy
in the M.Sc. course of "Robotic Perception" at the School of Computer Science

Awards

2018 Best paper award
at IEEE International Conference on Autonomous Robot Systems and Competitions (ICARSC) 2018 with the paper: "iCub, clean the table!" A robot learning from demonstration approach using Deep Neural Networks.

Grants

since 2016 Postdoctoral research grant
IST-ID, Lisbon, Portugal

2014-2015 Postdoctoral research grant
BioRoboticsInstitute,SSSA,Pisa

2010-2013 Ph.D. scholarship
Scuola Superiore Sant'Anna, Pisa, Italy

Languages

Italian (native)

English (fluent)

Portuguese (fluent)

Personal interests

Flight:

2013 Ultralight aircraft Italian license
+/- 40 flight hours with a Tecnam p92

Sports:

since 2013 Capoeira (Graduado)

1990-2000 Artistic skating

Windsurf

Musical instruments:

Mandolin and guitar

Publications

Journal papers

[1] E. Falotico, L. Vannucci, A. Ambrosano, U. Albanese, S. Ulbrich, J. C. Vasquez Tieck, G. Hinkel, J. Kaiser, I. Peric, O. Denninger, N. Cauli, *et al.*, "Connecting artificial brains to robots in a comprehensive simulation framework: The neurorobotics platform," *Frontiers in neurorobotics*, vol. 11, p. 2, 2017.

[2] G. Hinkel, H. Groenda, S. Krach, L. Vannucci, O. Denninger, N. Cauli, S. Ulbrich, A. Roennau, E. Falotico, M.-O. Gewaltig, *et al.*, "A framework for coupled simulations of robots and spiking neuronal networks," *Journal of Intelligent & Robotic Systems*, vol. 85, no. 1, pp. 71–91, 2017.

[3] E. Falotico, N. Cauli, P. Kryczka, K. Hashimoto, A. Berthoz, A. Takanishi, P. Dario, and C. Laschi, "Head stabilization in a humanoid robot: models and implementations," *Autonomous Robots*, vol. 41, no. 2, pp. 349–365, 2017.

[4] N. Cauli, E. Falotico, A. Bernardino, J. Santos-Victor, and C. Laschi, "Correcting for changes: expected perception-based control for reaching a moving target," *IEEE Robotics & Automation Magazine*, vol. 23, no. 1, pp. 63–70, 2016.

Conference papers

[5] N. Cauli, P. Vicente, J. Kim, B. Damas, A. Bernardino, F. Cavallo, and J. Santos-Victor, "Autonomous table-cleaning from kinesthetic demonstrations using Deep Learning," in *Joint IEEE International Conference on Development and Learning (ICDL) and Epigenetic Robotics (EpiRob)*, IEEE, 2018.

[6] J. Kim, N. Cauli, P. Vicente, B. Damas, F. Cavallo, and J. Santos-Victor, ""iCub, clean the table!" A robot learning from demonstration approach using deep neural networks," in *Autonomous Robot Systems and Competitions (ICARSC), 2018 IEEE International Conference on*, pp. 3–9, IEEE, 2018.

[7] L. Vannucci, A. Ambrosano, N. Cauli, U. Albanese, E. Falotico, S. Ulbrich, L. Pfotzer, G. Hinkel, O. Denninger, D. Peppicelli, *et al.*, "A visual tracking model implemented on the iCub robot as a use case for a novel neurorobotic toolkit integrating brain and physics simulation.," in *Humanoids*, pp. 1179–1184, 2015.

[8] G. Hinkel, H. Groenda, L. Vannucci, O. Denninger, N. Cauli, and S. Ulbrich, "A Domain-Specific Language (DSL) for Integrating Neuronal Networks in Robot Control. In 2015 Joint MORSE," in *VAO Workshop on Model-Driven Robot Software Engineering and View-based Software-Engineering*, 2015.

[9] L. Vannucci, N. Cauli, E. Falotico, A. Bernardino, and C. Laschi, "Adaptive visual pursuit involving eye-head coordination and prediction of the target motion," in *Proceedings of the 14th IEEE-RAS International Conference on Humanoid Robots (Humanoids)*, pp. 541–546, 2014.

[10] N. Cauli, E. Falotico, A. Bernardino, J. Santos-Victor, and C. Laschi, "A robotic implementation of a reaching model based an a bio-inspired sensory anticipation system: the Expected Perception," in *IV Congresso Gruppo Nazionale Bioingegneria (GNB)*, 2014.

[11] E. Falotico, N. Cauli, K. Hashimoto, P. Kryczka, A. Takanishi, P. Dario, A. Berthoz, and C. Laschi, "Head stabilization based on a feedback error learning in a humanoid robot," in *RO-MAN, 2012 IEEE*, pp. 449–454, IEEE, 2012.

[12] N. Moutinho, N. Cauli, E. Falotico, R. Ferreira, J. Gaspar, A. Bernardino, J. Santos-Victor, P. Dario, and C. Laschi, "An expected perception architecture using visual 3d reconstruction for a humanoid robot," in *Intelligent Robots and Systems (IROS), 2011 IEEE/RSJ International Conference on*, pp. 4826–4831, IEEE, 2011.

Under review papers

[13] J. Kim, N. Cauli, P. Vicente, B. Damas, A. Bernardino, J. Santos-Victor, and F. Cavallo, "Cleaning tasks knowledge transfer between heterogeneous robots: a deep learning approach," *Journal of Intelligent & Robotic Systems*, 2018.