Roberto Capobianco

Curriculum Vitae

Date of birth: September 5th, 1989
City: Rome, Italy
E-mail: capobianco@diag.uniroma1.it
GitHub: webrot9
LinkedIn: rcapobianco

Work Experience

Industry

Nov 2019–Today **Research Scientist (Contractor)**, *Sony AI*, Remote.
Researcher in reinforcement learning and deep learning.

Jul 2018–Today **Freelance Consultant**, Rome, Italy.
Previous clients: Altran Italy (Software Engineering), Konica Minolta Business Solutions Italy (Robotics Software Engineering), RADiCAL Solutions, LLC (Machine Learning).

Nov 2016–Nov 2019 **Research Scientist**, *Cogitai, Inc.*, Remote.
Researcher and software engineer. Fields: continual learning, reinforcement learning, deep learning, robotics. Additional tasks: technical interviewer for prospective employees.

Academia

Aug 2019–Today **Assistant Professor**, *Sapienza University of Rome*, Rome, Italy.
Courses: Probabilistic reasoning and reinforcement learning, Seminars in AI.

Feb 2018–Aug 2019 **Contract Professor**, *Sapienza University of Rome*, Rome, Italy.
Courses: Artificial intelligence & computer vision lab.; Probabilistic reasoning and reinforcement learning.

Mar 2017–Aug 2019 **Post-doc Researcher**, *Sapienza University of Rome*, Rome, Italy.
Research fields: robotics, reinforcement learning, robot learning, deep learning, semantic perception.

Education and Qualifications

Nov 2013–Feb 2017 **Ph.D. in Engineering in Computer Science**, *Sapienza University of Rome*, Rome, Italy.
Research fields: robotics, robot learning, artificial intelligence in robotics; Advisor: Prof. Daniele Nardi.

Aug 2015–March 2016 **Research Scholar**, *Robotics Institute, Carnegie Mellon University*, Pittsburgh, PA, USA.
Host: Prof. J. Andrew (Drew) Bagnell, Robotics Institute.

2013 **First Örebro Winter School on Artificial Intelligence & Robotics**, *Örebro University*, Örebro, Sweden.

2011–2013 **Master of Science in Artificial Intelligence & Robotics**, *Sapienza University of Rome*, Rome, Italy, 110/110 summa cum laude.

2008–2011 **Bachelor's Degree in Computer Engineering**, *University of Pisa*, Pisa, Italy, 109/110.

2003–2008 **High School (Humanistic) Diploma**, *Liceo Classico "Vitruvio Pollione"*, Formia (LT), Italy, 100/100.

Skills and Experience

Computing and Robotics

- Strong C, C++ and Python coding experience (examples on GitHub: ICP based laser scan matcher, control simulators with Python interface, Gaussian Mixture Models);
- Hands-on and theoretical machine learning and reinforcement learning experience;
- Daily experience using deep learning frameworks: MXNet, Tensorflow, Keras;
- Developed and tested software on Videre Erratic, KUKA YouBot, Segway RMP and NAO robots;
- Good knowledge of MATLAB, Java, Assembly, OpenGL, SQL, Bash;
- Good knowledge of robotics and computer vision libraries and tools: ROS, Gazebo, OpenCV, PCL;
- Daily use of version control software: Git and SVN;
- Experience in logic programming and ontology modeling: Prolog, OWL, Protégé;
- Knowledge of web programming languages: HTML, CSS, Javascript, PHP;
- Daily use of Unix/Linux, Windows and Robotics embedded Operating Systems;
- Good experience with Emacs, Eclipse, LaTeX, Microsoft Office, LibreOffice.

Communication

- Presented research results and projects at conferences and international events;
- Teaching experience as assistant and tutor for artificial intelligence & robotics courses;
- Good ability to write project and funding proposals (e.g., awarded research starting grant);

Teamwork

- Member of the SPQR team during RoCKIn@Work robotics competitions;
- Member of research laboratories (Ro.Co.Co, LAIRLab) and volunteering member of cultural associations;
- Good ability to adapt to multicultural environments and to live in different countries;

Organizing

- Good experience with agile working practices;

- Good experience with autonomous and remote work;
- Organizing Committee (e.g., RoCKIn) or volunteer (e.g., RSS) for local and international events;
- Regularly met research and teaching deadlines;

Languages

Italian Mother tongue
English C2 *Certifications: FCE (B2)*
French A2

Teaching

Fall 2020–2021 **Professor, *Probabilistic Reasoning & Reinforcement Learning***, *Sapienza University of Rome*, Italy.
M.Sc. in Artificial Intelligence and Robotics

Spring 2019–2020 **Professor, *Seminars in Artificial Intelligence***, *Sapienza University of Rome*, Italy.
M.Sc. in Artificial Intelligence and Robotics

Fall 2019–2020 **Professor, *Probabilistic Reasoning & Reinforcement Learning***, *Sapienza University of Rome*, Italy.
M.Sc. in Artificial Intelligence and Robotics

Fall 2018–2019 **Professor, *Probabilistic Reasoning & Reinforcement Learning***, *Sapienza University of Rome*, Italy.
M.Sc. in Artificial Intelligence and Robotics

Spring 2018–2019 **Professor, *Artificial Intelligence & Computer Vision Lab.***, *Sapienza University of Rome*, Italy.
B.Eng. Computer Engineering

Spring 2015 **Teaching Assistant, *Artificial Intelligence II***, *Sapienza University of Rome*, Italy.

Fall 2014 **Teaching Assistant, *Robot Programming***, *Sapienza University of Rome*, Italy.

Spring 2014 **Teaching Assistant, *Artificial Intelligence II***, *Sapienza University of Rome*, Italy.

Spring 2014 **Tutor, *Seminars on Artificial Intelligence and Robotics***, *Sapienza University of Rome*, Italy.

Scientific Activities

Research Interests Robot Learning, Reinforcement Learning, Deep Learning, Robot Control, Mobile Robotics.

Publications

[1] Francesco Riccio, Roberto Capobianco, and Daniele Nardi. Loop: Iterative learning for optimistic planning on robots. *Robotics and Autonomous Systems*, 136:103693, 2021.

[2] Varun Kompella, Roberto Capobianco, Stacy Jong, Jonathan Browne, Spencer Fox, Lauren Meyers, Peter Wurman, and Peter Stone. Reinforcement learning for optimization of COVID-19 mitigation policies. In *AAAI Fall Symposium on AI for Social Good*, November 2020.

[3] Biagio La Rosa, Roberto Capobianco, and Daniele Nardi. Explainable inference on sequential data via memory-tracking. In *Proceedings of the 29th International Joint Conference on Artificial Intelligence (IJCAI)* ***(12.6% acceptance rate)***, 2020.

[4] Francesco Riccio, Roberto Capobianco, and Daniele Nardi. Guess: Generative modeling of unknown environments and spatial abstraction for robots. In *Proc. of the 19th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2020.

[5] Jim Martin Catacora Ocana, Francesco Riccio, Roberto Capobianco, and Daniele Nardi. Cooperative multi-agent deep reinforcement learning in soccer domains. In *Proceedings of the 18th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, pages 1865–1867, 2019.

[6] Jim Martin Catacora Ocana, Francesco Riccio, Roberto Capobianco, and Daniele Nardi. Cooperative multi-agent deep reinforcement learning in a 2 versus 2 free-kick task. In *Proceedings of the 23rd International RoboCup Symposium*, 2019.

[7] José V. Jaramillo, Francesco Riccio, Roberto Capobianco, and Daniele Nardi. S-ave: Semantic active vision exploration and mapping of indoor environments for mobile robots. In *to appear in the ceur proceedings of the 6th Italian Workshop on Artificial Intelligence and Robotics at AI*IA 2019.*, AIRO '2019, 2019.

[8] Roberto Capobianco, Francesco Riccio, and Daniele Nardi. Hi-val: Iterative learning of hierarchical value functions for policy generation. In *Intelligent Autonomous Systems 15*, 2018.

[9] Maria Teresa Lazaro, Roberto Capobianco, and Giorgio Grisetti. Efficient long-term mapping in dynamic environments. In *Proc. of the IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*, 2018.

[10] Francesco Riccio, Roberto Capobianco, and Daniele Nardi. Q-CP: Learning action values for cooperative planning. In *2018 IEEE International Conference on Robotics and Automation (ICRA)*, 2018.

[11] Francesco Riccio, Roberto Capobianco, and Daniele Nardi. DOP: Deep optimistic planning with approximate value function evaluation. In *Proceedings of the 2018 International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2018.

[12] Roberto Capobianco. *Interactive Generation and Learning of Semantic-Driven Robot Behaviors*. PhD thesis, Sapienza University of Rome, 2017.

[13] Luca Iocchi, Gerhard K. Kraetzschmar, Daniele Nardi, Pedro U Lima, Pedro Miraldo, Emanuele Bastianelli, and Roberto Capobianco. Rockin@home: Domestic robots challenge. In *RoCKIn - Benchmarking Through Robot Competitions*, chapter 03. InTech, Rijeka, 2017.

[14] Roberto Capobianco, Guglielmo Gemignani, Luca Iocchi, Daniele Nardi, Francesco Riccio, and Andrea Vanzo. Contexts for symbiotic autonomy: Semantic mapping, task teaching and social robotics. In *AAAI Symbiotic Cognitive Systems Workshop*, 2016.

[15] Guglielmo Gemignani, Roberto Capobianco, Emanuele Bastianelli, Domenico Bloisi, Luca Iocchi, and Daniele Nardi. Living with robots: Interactive environmental knowledge acquisition. *Robotics and Autonomous Systems (RAS)*, 78:1–16, 2016.

[16] Francesco Riccio, Roberto Capobianco, Marc Hanheide, and Daniele Nardi. STAM: A framework for spatio-temporal affordance maps. In *Proceedings of the 2016 Modelling and Simulation for Autonomous Systems (MESAS'16) Workshop*, 2016.

[17] Francesco Riccio, Roberto Capobianco, and Daniele Nardi. Using monte carlo search with data aggregation to improve robot soccer policies. In *Proceedings of the 20th International RoboCup Symposium*, 2016.

[18] Francesco Riccio, Roberto Capobianco, and Daniele Nardi. Using spatio-temporal affordances to represent robot action semantics. In *Workshop on Machine Learning Methods for High-Level Cognitive Capabilities in Robotics at IROS 2016*, 2016.

[19] Francesco Riccio, Roberto Capobianco, and Daniele Nardi. Learning human-robot handovers through π-STAM: Policy improvement with spatio-temporal affordance maps. In *IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS-2016)*, 2016.

[20] Wen Sun, Roberto Capobianco, Geoff J. Gordon, James A. Bagnell, and Byron Boots. Learning to smooth with bidirectional predictive state inference machines. In *Proceedings of the 32nd Conference on Uncertainty in Artificial Intelligence (UAI-2016)*, 2016.

[21] Arun Venkatraman, Roberto Capobianco, Lerrel Pinto, Martial Hebert, Daniele Nardi, and James A. Bagnell. Improved learning of dynamics models for control. In *The 15th International Symposium on Experimental Robotics (ISER-2016)*, 2016.

[22] Roberto Capobianco, Jacopo Serafin, Johann Dichtl, Giorgio Grisetti, Luca Iocchi, and Daniele Nardi. A proposal for semantic map representation and evaluation. In *Mobile Robots (ECMR), 2015 European Conference on*, pages 1–6. IEEE, 2015.

[23] Guglielmo Gemignani, Roberto Capobianco, and Daniele Nardi. Approaching qualitative spatial reasoning about distances and directions in robotics. In *AI*IA 2015 Advances in Artificial Intelligence*, pages 452–464. Springer International Publishing, 2015.

[24] Roberto Capobianco, Guglielmo Gemignani, Domenico Bloisi, Daniele Nardi, and Luca Iocchi. Automatic extraction of structural representations of environments. In *Intelligent Autonomous Systems 13*, pages 721–733. Springer International Publishing, 2014.

[25] Roberto Capobianco. Robust and incremental robot learning by imitation. In *Second Doctoral Workshop in Artificial Intelligence*, volume 1334, pages 82–91, 2014.

[26] Roberto Capobianco, Guglielmo Gemignani, Daniele Nardi, Domenico Bloisi, and Luca Iocchi. Knowledge-based reasoning on semantic maps. In *Knowledge Representation and Reasoning in Robotics, AAAI Spring Symposium 2014*, 2014.

[27] Guglielmo Gemignani, Daniele Nardi, Domenico Bloisi, Roberto Capobianco, and Luca Iocchi. Interactive semantic mapping: Experimental evaluation. In *Experimental Robotics - The 14th International Symposium on Experimental Robotics (ISER-2014)*, pages 339–355. Springer International Publishing, 2014.

[28] Emanuele Bastianelli, Domenico Bloisi, Roberto Capobianco, Fabrizio Cossu, Guglielmo Gemignani, Luca Iocchi, and Daniele Nardi. On-line semantic mapping. In *Advanced Robotics (ICAR), 2013 16th International Conference on*, pages 1–6. IEEE, 2013.

[29] Emanuele Bastianelli, Domenico Bloisi, Roberto Capobianco, Guglielmo Gemignani, Luca Iocchi, and Daniele Nardi. Knowledge representation for robots through human-robot interaction. In *Knowledge Representation and Reasoning in Robotics Workshop at ICLP 2013*, 2013.

International Events

2019 **Organizer, *Workshop on Evaluation and Benchmarking of Human-Centered AI Systems***, *2019*, Milton Keynes, UK.
2019 **Technical Committee**, *SciRoc Challenge 2019*, Milton Keynes, UK.
2018 **Presenter, *2018 Int. Conf. on Autonomous Agents and Multiagent Systems***, *AAMAS 2018*, Stockholm, Sweden.
2017 **Teacher, *The 4th Lucia PhD School on "Artificial Intelligence and Robotics"***, Lisbon, Portugal.
2017 **Teacher, *The 4th Lucia PhD School on "Artificial Intelligence and Robotics"***, Lisbon, Portugal.
2016 **Presenter, *2016 IEEE-RAS Int. Conf. on Humanoid Robots***, *Humanoids 2016*, Cancun, Mexico.
2016 **Presenter, *15th International Symposium on Experimental Robotics***, *ISER 2016*, Tokyo, Japan.
2016 **Presenter, *AAAI Robotics Fellowship***, *AAAI 2016*, Phoenix, AZ, USA.
2016 **Presenter, *AAAI Workshop on Symbiotic Cognitive Systems***, *AAAI 2016*, Phoenix, AZ, USA.
2015 **Invited Speaker, *Digital Signal Processing Day***, Mexico City, Mexico.
2015 **Invited Speaker, *RoCKIn Workshop***, Mexico City, Mexico.
2015 **Volunteer, *2015 Robotics: Science and Systems Conference***, *RSS 2015*, Rome, Italy.
2015 **Local Committee, *RoCKIn Camp 2015***, *RoCKIn@Work Challenge*, Peccioli, Italy.
2014 **Presenter, *AI*IA Doctoral Consortium 2014***, *XIII AI*IA Symposium on AI*, Pisa, Italy.
2014 **Organizing Committee, *RoCKIn 2014***, *RoCKIn@Work Challenge*, Toulouse, France.
2014 **Participant, *RoCKIn 2014***, *RoCKIn@Work Challenge*, Toulouse, France.
2014 **Presenter, *IAS-13***, *13th International Conference on Intelligent Autonomous Systems*, Padua, Italy.
2014 **Participant, *RoCKIn Camp 2014***, *RoCKIn@Work Challenge*, Rome, Italy.

Reviewer

Journals RAS (Special Issue), TCDS, RA-L.
Conferences IJCAI, ECAI, AAAI, ICRA, IROS, ECMR, RO-MAN.

Grants, Awards and Fellowships

2016 **AAAI Robotics Fellowship**, *AAAI*, Phoenix, AZ, USA.
2015 **Research Starting Grant**, *Sapienza University of Rome*, Italy.
2014 **Excellence Award**, *Sapienza University of Rome*, Italy.
Top 2% Graduate Students in Academic Year 2012/2013
2014 **First Place, Computer Vision track**, *RoCKIn Camp 2014, RoCKIn@Work Challenge*, Rome, Italy.
2013 **Three Years Ph.D. Fellowship**, *Sapienza University of Rome*, Italy.
2012–2013 **Excellence Program**, *Sapienza University of Rome*, Italy.

References

Daniele Nardi
Department of Computer, Control and Management Engineering
Sapienza University of Rome
Via Ariosto, 25
00185 Rome, Italy
✉ nardi@dis.uniroma1.it

J. Andrew (Drew) Bagnell
Robotics Institute
Carnegie Mellon University
5000 Forbes Avenue
Pittsburgh, PA 15213, USA
✉ dbagnell@ri.cmu.edu

Giorgio Grisetti
Department of Computer, Control and Management Engineering
Sapienza University of Rome
Via Ariosto, 25
00185 Rome, Italy
✉ grisetti@dis.uniroma1.it

Rome, March 16, 2021

Roberto Capobianco