STEFANO NOLFI

EDUCATION AND RESEARCH EXPERIENCE

- **Head**, Laboratory of Artificial Life and Robotics, Institute of Cognitive Science and Technologies, National Research Council (CNR-ISTC), Rome, Italy. The Laboratory currently includes n.3 senior researchers, n.4 researchers, n.1 technician, n. 3 Post-doc, n.11Phd Students/Research Assistant, n.3 associate professors, 2002-current
- **Director**, Rome Node of the Centre for Robotics and Neural System (UOP-CRNS), University of Plymouth, U.K., 2009-current
- **Researcher Director**, Institute of Cognitive Science and Technologies, National Research Council (CNR), Rome, Italy, 2006-current
- **Senior Researcher**, Institute of Cognitive Science and Technologies, National Research Council (CNR), Rome, Italy, 2002-2005.
- **Fellow**, University of New South Wales, Canberra, Australia, November-December 2004.
- **Fellow**, Institute of Advanced Study in Berlin (Wissenschaftskolleg zu Berlin), May-July 2003.
- **Head**, Laboratory of Neural Systems and Artificial Life, Institute of Psychology, National Research Council (CNR), Rome, Italy, 1994-2002
- **Researcher**, Institute of Psychology, National Research Council (CNR), Rome, Italy, 1988-2001
- **Visiting Researcher**, SONY Computer Science Laboratory, Sony Inc., Tokyo, Japan, 1997
- **Visiting Researcher**, Laboratory of Microcomputing, Swiss Federal Institute of Technology (EPFL), Lausanne, Switzerland, 1996 & 1997
- **Research Fellow**, with Prof. Jeffrey Elman, Centre for Research in Language, University of California, San Diego, U.S.A., 1987
- **Consultant**, Voice Processing Laboratory, Olivetti S.p.A. Torino, Italy, Development of an automatic system for natural languange processing, 1987
- **Research Fellow**, with Prof. Domenico Parisi, Institute of Psychology, National Research Council (CNR), Roma, Italy, 1985-1987.
- **Laurea** (Master Degree) in Literature & Philosophy (with distinction), Thesis on "A computational model of natural language processing", University of Rome "La Sapienza", Italy, 1986

CONFERENCES ORGANIZATION

- **Chair**, Workshop on Language and Cognition in Embodied Agents, CNR-ISTC, Roma, Italy, October 9-10, 2013.
- **Member of the Program Commitee** of the International Conference on Reconfigurable Mechanisms and Robots (ReMAR 2009), London, U.K., June 22-24, 2009.
- **Member of the Program Commitee** of the IEEE Congress on Evolutionary Computation, Special Session on Evolutionary Robotics, 18-21st May, 2009, Trondheim, Norwey.

- **Member of the Program Commitee** of the IEEE Symposium on Artificial Life, March 30-April 2, 2009 Nashville, TN, USA.
- **Member of the Program Commitee** of the International Conference on the Simulation and Synthesis of Living Systems (ALIFEXI), August 5-8th 2008, Winchester, U.K.
- **Member of the Program Commitee** of the International Conference on the Simulation of Adaptive Behavior (SAB2008), 7-12 July 2008, Osaka, Japan.
- **Co-chair**, The First IEEE Symposium on Artificial Life, April 1-5, 2007, Honolulu, Hawaii, USA
- **Co-chair**, International Conference on Living Technology, Venezia, Italy, 25-26 Maggio , 2007
- **Chair** of the Ninth International Conference on Simulation of Adaptive Behavior (SAB2006), May 22-27th 2006, Italian National Research Council (CNR), Roma, Italy.
- **Member of the Program Commitee** of the International Conference on the Simulation and Synthesis of Living Systems (ALIFEX), June 3-7th 2006, Bloomington, IL, USA.
- **Member of the Program Committee** of the del "XXVII Annual Conference of the Cognitive Science Society, CogSci2005, Stresa, Italy, July 21-23.
- **Member of the Program Commitee** of The 3rd International Symposium on Autonomous Minirobots for Research and Edutainment (AMiRE 2005), September 20-22, 2005, Awara-Spa, Fukui, JAPAN
- **Member of the Program Committee** of the VIII European Conference on Artificial Life (ECAL05), 9th September 2005, University of Kent, Canterbury, Kent (UK)
- **Member of the Program Commitee** of the XXVII Annual Meeting of the Cognitive Science Society (COGSCI'2005), 21-23 July, 2005, Stresa, Italy.
- **Member of the Program Commitee** of the International Conference on Genetic and Evolutionary Computation (GECCO 2005), 25-29 June, 2005, Washington D.C., USA.
- **Member of the Program Commitee** of the Eight International Conference on the Simulation and Synthesis of Living Systems (ALIFEVIII), September 12-15th 2004, Boston, USA.
- **Member of the Program Commitee** of the International Workshop on Ant Colonies Optimization and Swarm Intelligence, 5-8 September, 2004, Bruxelles, Belgium.
- **Member of the Program Commitee** of the Eight International Conference on the Simulation of Adaptive Behavior (SAB2004), 13-17 July 2004, Los Angeles, USA.
- **Member of the Program Commitee** of the International Conference on Genetic and Evolutionary Computation (GECCO 2004), 26-30 June, 2004, Seattle, USA.
- **Member of the Program Commitee** of the *First International Workshop on Biologically Inspired Approaches to Advanced Information Technology*, Losanna, Switzerland, 29-30 Genuary 2004.
- **Member of the Program Commitee** of the *First Australian Conference on Artificial Life*. Canberra, Australia, 6-7 December 2003.
- **Co-Organizer** of the First Italian Workshop on Artificial Life, Rende, Italy, 5-6 September 2003.
- **Member of the Program Commitee** of the *International Conference on* "Genetic and Evolutionary Computation Conference (GECCO 2003)", Chicago, USA 12-16 July 2003.
- **Member of the Program Commitee** of the Second International Symposium on Autonomous Minirobots for Research and Edutainement (AMiRE 2003), 18-21 February 2003, Brisbane, Australia.
- **Member of the Program Commitee** of the Seventh International Conference on the Simulation of Adaptive Behavior (SAB2002), 4-11 August 2002, Edinburgh, U.K.
- **Member of the Program Commitee** of the *International Conference on* "Genetic and Evolutionary Computation Conference (GECCO 2002)", NewYork, July 2002.
- **Member of the Program Commitee** of the International Symposium on *Autonomous Minirobots for Research and Edutainment* (AMiRE 2001), Paderborn, Germany, October 2001.
- **Member of the Program Commitee** of the *Eight European Workshop on Learning Robots*, Prague, September 2001.

- **Member of the Program Commitee** of the *International Conference on Artificial Neural Networks*, Vienna, Austria, August 21-25, 2001.
- **Member of the Program Commitee** of the *Seventh International Conference on the Simulation and Synthesis of Living Systems (ALIFEVII)*, Portland, Oregon, USA, 1-6 August 2000
- **Member of the Program Commitee** of the Sixth International Conference on the Simulation of Adaptive Behavior (SAB2000), 11-15 September 2000, Paris, France.
- **Member of the Organizing Committee** of the Sixth International Conference on Intelligent Autonomous Systems, Venice, Italy, July 25-27, 2000.
- **Co-organizer** of the italian Workshop **"Giornata di Studio in Onore di Domenico Parisi"**, Rome, 17 December 1999.
- **Member of the Program Committee** of the *First International Khepera Workshop*, Paderborn, Germany, December 10-11th, 1999
- **Member of the Program Committee** of the *Fifth European on Artificial Life*, Losanna, Switzerland, September 13-17, 1999
- **Member of the Program Committee** of the *Eight European Workshop on Learning Robots*, Losanna, Switzerland, September 18th, 1999
- **Member of the Program Committee** of the *Second European Workshop on Evolutionary Robotics*, GOTEBORG, Sweden 26-29 May, 1999
- **Member of the Program Committee** of the *Sixth International Confenerce on Artificial Life*, Los Angeles, June 26-29, 1998
- **Member of the Program Committee** of the *Eight International Conference on Artificial Neural Networks*, Skoevde, Sweden, September 2-4, 1998
- **Member of the Program Committee** of the *First European Workshop on Evolutionary Robotics*, Paris, France, April 16-17, 1998
- **Member of the Program Committee** of the *Eight International Conference on Artificial Intelligence*, University of Coimbra, Coimbra, Portugal, 6-9 October, 1997
- **Member of the Program Committee** of the *Fourth European Conference on Artificial Life* (ECAL97), Brighton, UK, July 28-31, 1997
- **Co-organizer** of the Workshop on Khepera, *International Conference Practice and Future of Autonomous Agents*, Monte Verita', Ticino, Switzerland, September 23-31, 1995
- **Member of the Program Committee** of the *First International Conference From Perception to Action*, Losanna, Switzerland, September 5-9, 1994

EXPERT POSITIONS

- Expert, European Commission, ICT, Future and Emerging Technology (FET), Technology Enhanced Learning, 1999-present,
- Expert for the following PhD examination:
    8. Dr. Saufiah Abdul Rahim, A Genetically Evolved Neural Network for an Action Selection Mechanism in Behavior-Based Systems, School of Electrical, Electronic & Computer Engineering, University of Western Australia, December 2015.
    7. Dr. Peter Durr, Genetic Representation of Adaptive Neural Controllers, Swiss Federal Institute of Technology Lausanne, Ecole Polytechniques Federale de Lausanne (EPFL), November 2010.
    6. Dr. Sara Mitri, The Evolution of Communication in Robot Societies, Swiss Federal Institute of Technology Lausanne, Ecole Polytechniques Federale de Lausanne (EPFL), October, 2009.
    5. Dr. Antonio Lafusa, The emergent behaviour of self-replicating machines. Department of Computing, Macquarie University, Sydney, Australia, 2009.
    4. Dr. Andew Balaam, Exploring Developmental Dynamics in Evolved Neural Network Controllers, Department of Informatics, University of Sussex, June, 2005.
    3. Dr. Jason T.W. Teo ("Pareto Multi-Objective Evolution of Legged Embodied Organisms"), School of Computer Science, The University of New South Wales, Canberra, Australia, 2003.

2. Dr. Joseba Urzelai, ("Evolutionary and Adaptive Robots: Evolution of Adaptation mechanisms for Autonomous Agents"), Department Informatique, Ecole Polytechnique, Lausanne, Switzerland, July 4, 2000
1. Dr. Francesco Mondada, ("Autonomous Mobile Robotics"), Department Informatique, Ecole Polytechnique, Lausanne, Switzerland, December 6, 1996

EDITORIAL ACTIVITIES

- **Associate Editor,** *Adaptive Behavior Journal*, Sage Press, *2007-present*
- **Associate Editor** of the *Connection Science* Journal, (Taylor & Francis Press), *2013-present*
- **Associate Editor** of the *Frontiers Journal on Evolutionary Robotics*, *2014-present*
- **Member** of the Editorial Board of the International *Journal of Advanced Robotic Systems, 2004-present*
- **Member** of the Editorial Advisory Board of the *Journal of Behavioral Robotics*, Versita Press, 2009-present
- **Member** of the Editorial Board of the Journal *Theory in Biosciences*, Springer, 2010-present
- **Member** of the Editorial Board of the Journal Swarm Intelligence, Springer, 2013-present
- **Member** of the Editorial Board of the John Benjamins Book Series on Interaction Studies, 2010-present
- **Member** of the Editorial Board of the Open Access Journal in Computer Science, PeerJ Publisher, from 2015.
- **Member** of the Editorial Board of the International Journal Robotics*, 2018-present*
- **Member of** *the Autonomous Mental Development Technical Committee (AMDTC) of the Computational Intelligence Society (CIS) of the Institute of Electrical and Electronic Engineers, Inc. (IEEE), 2012-present.*

RESEARCH PROJECTS

- **Principal Investigator** of the CNR-ISTC-LARAL node, Horizon 2020 European Project "Managing active and healthy aging with use of caring service robots (MARIO)", ICT: Service robotics within assisted living environments. Contract n. 643808, from 01/02/2015 to 31/01/2018. CNR-ISTC Budget 506,804 €
- **Coordinator** of European Science Foundation Project "Hierarchical Heterogeneous Swarm (H2Swarm)"*,* ESF-2010-1010, From 1/09/2011 to 31/08/2014. Overall budget 1,577,560 €, CNR-ISTC Budget 200,000 €
- **Principal Investigator** of the CNR-ISTC node, Integrated European Project on Transfer of Action and Language Knowledge in Robots (I-TALK), Contract n. 214668, from 01/03/2008 to 28/02/2012. CNR-ISTC Budget 1,322,854 €
- **Principal Investigator** of the CNR-ISTC node, European Project on "Towards Humanoid Robotic Swarms (**SWARMANOID**)*,* IST-022888, From 10/10/2006 to 01/10/2010. CNR-ISTC Budget 468,546 €
- **Coordinator** of European Integrated Project on "Embodied and Communicating Agents (**ECAgents**)*,* IST-2004-001940, From 13/02/2004 to 12/08/2008. Overall budget 7,115,589 €, CNR-ISTC Budget 1,352,681 €
- **Principal Investigator** of the CNR-ISTC node, European Project on "Swarms of Self-Assembling Artifacts (**SWARM-BOTS**)*,"* IST-2000-31010, 2001-2006. CNR-ISTC Budget 421,546 €
- **Principal Investigator**, CNR-ISTC node, Italian Project on "*Action and perception in the construction of the cognitive world"*, Grant RBNE01SZB4 from the FIRB/MIUR, 2003-2006.
- **Principal Investigator**, CNR-ISTC node, Italian Project on "*Multiagent system with fixed and mobile robot platforms (ROBOCARE)"*, MIUR, Italy, 2002-2006.

TRAINING & RESEARCH SUPERVISION

10 **Postdoc**, Alessandra Vitanza, Luca Simione, Gianluca Massera, Gianluca Baldassarre, Marco Mirolli, Vito Trianni, Elio Tuci, Davide Marocco, Onofrio Gigliotta, Anne Spallanzani

10 **PhD students** (8 completed), Nicola Milano, Jônata Tyska Carvalho, Paolo Pagliuca, Tomassino Ferrauto, Giuseppe Morlino, Gianluca Massera, MariaGiovanna Mazzapioda, Onofrio Gigliotta, Alberto Acerbi, Davide Marocco.

22 **Master students** (21 completed), Stefano Tisio, Manlio Valenti, Gabriele Carboni, Tobias Leugger, Rick Janssen, Francesca Pettine, Fabio Ticconi, Jakub Czerwonko, Andrew Szabados, Francesco Pugliese, Mariagiovanna Mazzapioda, Gianluca Massera, Tomassino Ferrauto, Claudio Martella, Joachim de Greef, Guido de Croon, Solaiman Shokur, Raffaele Bianco, Cristina Massari, Louis Foucart, Plinio Conti, Anna Cristina Massari.

LECTURING

- **Associate Professor,** Undergraduate course on *Behavioral and Cognitive Robotics,* Innopolis University, Russia, 2019
- **Associate Professor,** Undergraduate course on *Evolutionary Robotics,* "Università della Calabria", Rende (CS), Italy, 2000/2001 & 2003/2004
- **Associate Professor,** Undergraduate course on *Psychology,* University "LUMSA", Roma, Italy, 2000/2001, 2001/2002 & 2002/2003
- **Associate Professor,** Undergraduate course on *Educational Technologies*, University of L'Aquila, Italy, 1998/1999 & 1999/2000
- **Associate Professor,** Undergraduate course on Artificial Neural Networks, University "LUMSA", Roma, Italy, 1998/1999
- **Associate Professor,** Undergraduate course on *Computer Science*, University of L'Aquila, Italy, 1998/1999

PUBLICATIONS IN ENGLISH

BOOKS

1. Nolfi S., and Floreano D. (2000, 2001). *Evolutionary Robotics: The Biology, Intelligence, and Technology of Self-Organizing Machines.* Cambridge, MA: MIT Press/Bradford Books

EDITED VOLUMES

5. Liò P., Miglino O., Nicosia G., Nolfi S. and Pavone M. (2013). *Advances in Artificial Life, Proceedings of the Twelfth European Conference on the Synthesis and Simulation of Living Systems (ECAL 2013).* Cambridge, MA: MIT Press.
4. Nolfi S., Mirolli M. (2010). *Evolution of Communication and Language in Embodied Agents.* Berlin: Springer Verlag.
3. Nolfi S., Ikegami T., Tani J. (2008). *Special Issue on Behavior and Mind as a Complex Adaptive System.* Adaptive Behaviour. Sage Press.
2. Nolfi S., Baldassarre G., Calabretta R., Hallam J., Marocco D., Miglino O., Meyer J-A, Parisi D. (2006). *From animals to animats 9: Proceedings of the Ninth International Conference on Simulation of Adaptive Behaviour.* LNAI. Volume 4095. Berlin, Germany: Springer Verlag.
1. Nolfi S. (2004). *Special Issue on Evolutionary Robotics: Looking forward.* Connection Science. Taylor & Francis Press.

JOURNALS

81. Pagliuca P. and Nolfi S. (2019). Robust optimization through neuroevolution. PLoS ONE 14(3): e0213193.
80. Pezzulo G. and Nolfi S. (2019). Making the environment an informative place: A conceptual analysis of epistemic policies and sensorimotor coordination. Entropy 2019, 21(4), 350; doi:10.3390/e21040350
79. Milano N., Carvalho J.T. and Nolfi S. (2019). Moderate environmental variation across generations promotes the evolution of robust solutions. Artificial Life, 24 (4) 277-295.
79. Milano N., Pagliuca P. and Nolfi S. (2019). Robustness, evolvability and phenotypic complexity: insights from evolving digital circuits. Evolutionary Intelligence, (12) 1: 83-95.
78. Milano N., Pagliuca P. and Nolfi S. (2018). Robustness, Evolvability and Phenotypic Complexity: Insights from Evolving Digital Circuits PLoS ONE. 11(8): e0160679.
77. Pagliuca P., Milano N. and Nolfi S. (2018). Maximizing adaptive power in neuroevolution. PLoS ONE 13(7): e0198788.
76. Andre' J.B., Nolfi S. (2016). Evolutionary robotics simulations help explain why reciprocity is rare in nature. Scientific Reports. 6:32785
75. Simeone L., Nolfi S. (2016). The emergence of selective attention through probabilistic associations between stimuli and actions, PLoS ONE. 11(7): e0166174.
74. Milano N., Nolfi S. (2016). Robustness to faults promotes evolvability: Insights from evolving digital circuits, PLoS ONE. 11(7): e0158627.
73. Carvalho J.T., Nolfi S. (2016). Cognitive offloading does not prevent but rather promotes cognitive development, PLoS ONE. 11(8): e0160679.
72. Carvalho J.T., Nolfi S. (2016). Behavioural plasticity in evolving robots. Theory in Biosciences: 1–16.
71. Janssen R., Nolfi S., Haselager P, Sprinkhuizen-Kuyper I. (2016). Cyclic incrementality in competitive coevolution: Evolvability through pseudo-baldwinian switching genes. Artificial Life, (22) 3:319-351.
70. Lyon C., Nehaniv V., Sounders J., Belpaeme T., Bisio A., Fischer K., Forster F., Lehmann H., Metta G., Mahan V., Morse A., Nolfi S., Nolfi F., Rohlfing K., Sciutti A., Tani J., Wrede B., Zeschel A., and Cangelosi A. (2016). Embodied Language Learning and Cognitive Bootstrapping: Methods and Design Principles. International Journal of Advanced Robotic Systems, 13: 105.
69. Pagliuca P., Nolfi S. (2015). Integrating learning by experience and demonstration in autonomous robots. Adaptive Behavior, 1-15.

68. Lio P, Miglino O., Nicosia G., Nolfi S., Pavone M. (2015). Advances in artificial life: Synthesis and simulation of living systems, Artificial Life, 21 (4): 397-397.
67. Simione L., Nolfi S. (2015). Selection-for-action emerges in neural networks trained to learn spatial associations between stimuli and actions. Cognitive Processing, 16 (1): 393-397.
66. Morlino G., Gianelli C., Borghi A., Nolfi S. (2015). Learning to manipulate and categorize in human and artificial agents. Cognitive Science, (39) 1: 39-64.
65. Gigliotta O., Mirolli M., Nolfi S. (2014). Communication based dynamic role allocations in a group of homogeneous robots. Natural Computing 13: 391-402.
64. Haasdijk, E., Bredeche, N., Nolfi, S., Eiben, A.E. (2014). Evolutionary Robotics. Evolutionary Intelligence, 7 (2): 69-70.
63. Simione L., Nolfi S. (2014). The role of selective attention and action selection in the development of multiple action capabilities. Connection Science, 26 (4): 389-402.
62. Massera G., Ferrauto T., Gigliotta O., Nolfi S. (2014). Designing adaptive humanoid robots through the FARSA open-source framework. Adaptive Behavior, 22 (3):255-265.
61. Broz F., Nehaniv C.L., Belpaeme T., Bisio A., Dautenhahn K., Fadiga L., Ferrauto T., Fischer K., F. Förster, Gigliotta O., Griffiths S., Lehmann H., Lohan C.S., Lyon S., Marocco D., Massera G., Metta G., Mohan V., Morse A., Nolfi S., Nori F., Peniak M., Pitsch K., Rohlfing K.J., Sagerer G., Sato Y., Saunders J., Schillingmann L., Sciutti A., Tikhanoff V., Wrede B., Zeschel A., and Cangelosi A. (2014). The ITALK Project: A Developmental Robotics Approach to the Study of Individual, Social, and Linguistic Learning. Topics in Cognitive Science, 1-11.
60. Savastano P., Nolfi S. (2013). A robotic model of reaching and grasping development. IEEE Transactions on Autonomous Mental Development, (5) 4: 326-336.
59. Petrosino G., Parisi D. Nolfi S. (2013). Selective attention enables action selection: evidence from evolutionary robotics experiments. Adaptive Behavior, (21) 5: 356-370.
58. Dorigo M., D. Floreano, L. M. Gambardella, F. Mondada, S. Nolfi, T. Baaboura, M. Birattari, M. Bonani, M. Brambilla, A. Brutschy, D. Burnier, A. Campo, A. L. Christensen, A. Decugnière, G. Di Caro, F. Ducatelle, E. Ferrante, A. Förster, J. Guzzi, V. Longchamp, S. Magnenat, J. Martinez Gonzales, N. Mathews, M. Montes de Oca, R. O'Grady, C. Pinciroli, G. Pini, P. Rétornaz, J. Roberts, V. Sperati, T. Stirling, A. Stranieri, T. Stützle, V. Trianni, E. Tuci, A. E. Turgut, and F. Vaussard (2013). Swarmanoid: A Novel Concept for the Study of Heterogeneous Robotic Swarms. IEEE Robotics & Automation Magazine, 20(4): 60–71.
57. Nolfi S. (2012). Co-evolving predator and prey robots. Adaptive Behavior, 20 (1):10-15.
56. Morlino G., Giannelli C., Borghi A. and Nolfi S. (2012). Category learning through action: a study with human and artificial agents. Cognitive Processing, 13 (1): s47-s48.
55. Gigliotta O., Pezzulo G. Nolfi S. (2011). Evolution of a predictive internal model in an embodied and situated agent. Theory in Biosciences, vol. 130(4), pp. 259-276.
54. Tuci E., Ferrauto T., Zeschel A., Massera G., Nolfi S. (2011). An Experiment on behaviour generalisation and the emergence of linguistic compositionality in evolving robots, IEEE Transactions on Autonomous Mental Development, (3) 2: 176-189.
53. Uno R., Marocco D., Nolfi S., Ikegami T. (2011). Emergence of proto-sentences in artificial communicating systems, IEEE Transactions on Autonomous Mental Development, (3) 2: 146-153.
52. Sperati V., Trianni V., Nolfi S. (2011) Self-Organised Path Formation in a Swarm of Robots. Swarm Intelligence, 5:97–119.
51. Trianni V. and S. Nolfi. (2011). Engineering the evolution of self-organizing behaviors in swarm robotics: A case study. Artificial Life, 17(3):183-202.
50. Pezzulo G., Baldassarre G., Cesta A., Nolfi S. (2011). Research on cognitive robotics at the Institute of Cognitive Sciences and Technologies, National Research Council of Italy. Cognitive Processing, vol. 12 pp. 367-374.
49. Cangelosi A., Metta G., Sagerer G., Nolfi S., Nehaniv C., Fischer K., Tani J., Belpaeme T., Sandini G., Fadiga L., Wrede B., Rohlfing k., Tuci E., Dautenhahn K., Saunders J., Zeschel A. (2010). Integration of action and language knowledge: A roadmap for development robotics. IEEE Transactions on Autonomous Mental Development (TAMD), vol. 2, n. 3, pp. 167-195.
48. Massera G., Tuci E., Ferrauto T., Nolfi S. (2010). The Facilitatory Role of Linguistic Instructions on Developing Manipulation Skills, IEEE Computational Intelligence Magazine, vol. 5, n. 3, pp. 33-42. PDF
47. Mirolli M., Ferrauto T., Nolfi S.(2010). Categorisation through Evidence Accumulation in an Active Vision System, Connection Science, vol. 22, n. 4, pp. 331-354.

46. Tuci E., Massera G., Nolfi S. (2010). Active categorical perception of object shapes in a simulated anthropomorphic robotic arm, IEEE Transaction on Evolutionary Computation, vol. 14, issue 6, pp. 885-899.

45. Trianni T., Nolfi S. (2009). Self-organising sync in a robotic swarm: A dynamical system view. IEEE Transactions on Evolutionary Computation, 13(4): 722-741

44. Baldassarre, G., Nolfi, S. (2009). Strengths and synergies of evolved and designed controllers: a study within collective robotics. Journal of Artificial Intelligence. Vol. 173, pp. 857-875

43. Sperati V., Trianni V., and Nolfi S. (2008). Evolving coordinated group behaviour thorugh maximization of mean mutual information. Swarm Intelligence Journal, Special Issue on Swarm Robotics, vol. 2, num 2-4, pp. 73-95.

42. Nolfi S., Ikegami T., and Tani J. (2008). Behavior and mind as a complex adaptive system, Adaptive Behavior, 16: 101-103.

41. Miglino O., Gigliotta O., Ponticorvo M., Nolfi S. (2008). Breedbot: an evolutionary robotics application in digital content, The Electronic Library, vol. 26, n. 3, pp. 363-373.

40. Gigliotta O., Nolfi S. (2008). On the Coupling Between Agent Internal and Agent/Environmental Dynamics: Development of Spatial Representations in Evolving Autonomous Robots, Adaptive Behavior, 16: 148-165, pdf

39. Massera G., A. Cangelosi & S. Nolfi (2007). Evolution of Prehension Ability in an Anthropomorphic Neurorobotic Arm, Frontiers in Neurobotics, 1(4):1-9. pdf, electronic supplementary material

38. Baldassarre G., Trianni V., Bonani M., Mondada F., Dorigo M., Nolfi S. (2007). Self-organised coordinated motion in groups of physically connected robots. IEEE Transactions on Systems, Man, and Cybernetics, 37 (1): 224-239.

37. Marocco D. & Nolfi S. (2007). Emergence of communication in embodied agents evolved for the ability to solve a collective navigation problem. Connection Science, 19 (1): 53-74.

36. Baldassarre G., Parisi D., Nolfi S. (2006). Distributed Coordination of Simulated Robots Based on Self-Organisation, *Artificial Life*, 12 (3): 289-311.

35. Nolfi S. (2006). Behaviour as a complex adaptive system: On the role of self-organization in the development of individual and collective behaviour. *Complexus*, 2 (3-4):195-203.

34. Trianni V., Nolfi S. & Dorigo M. (2006). Cooperative hole-avoidance in a swarm-bot, *Robotics & Autonomous Systems,* 54 (2): 97-103.

33. Nolfi S. (2005). Emergence of Communication in Embodied Agents: Co-Adapting Communicative and Non-Communicative Behaviours. Connection Science, 17 (3-4): 231-248.

32. Mondada F., Gambardella L.M, Floreano D., and Nolfi S., Deneubourg J.L., Dorigo M. (2005).The Cooperation of Swarm-bots: Physical Interactions in Collective Robotics. IEEE Robotics & Automation Magazine, 12 (2): 21-28.

31. Bianco R., Nolfi S. (2004). Toward open-ended evolutionary robotics: evolving elementary robotic units able to self-assemble and self-reproduce. *Connection Science*, 4: 227-248.

30. Bianco R., Nolfi S. (2004). Evolving the neural controller for a robotic arm able to grasp objects on the basis of tactile sensors. *Adaptive Behavior*, 12(1): 37-45.

29. Nolfi S. (2004). Evolutionary Robotics: Looking Forward. *Connection Science*, 4: 223-225.

28. Dorigo M., Trianni V., Sahin E., Gross R., Labella T. H., Baldassarre G., Nolfi S., Deneubourg J.-L., Mondada F., Floreano D., Gambardella L. M. (2004). Evolving self-organizing behaviors for a swarmbot. *Autonomous Robots*, 17(2-3): 223-245.

27. Mondada F., Pettinaro G., Guigrard A., Kwee I., Floreano D., Denebourg J-L, Nolfi S., Gambardella L.M., Dorigo M. (2004). Swarm-bot: A new distributed robotic concept. *Autonomous Robots*. vol. 17 (2-3), pp. 193-221.

26. Marocco D., Cangelosi A., Nolfi S. (2003), The emergence of communication in evolutionary robots. *Philosophical Transactions of the Royal Society London - A,* 361: 2397-2421.

25. Nolfi S., Denebourg J-L, Floreano D., Gambardella L., Mondada F., Dorigo M. (2003). Swarm-Bots: Swarm of Mobile Robots able to Self-Assemble and Self-Organize. *Ercim News*, 53:25-26.

24. Baldassarre G., Nolfi S., Parisi D. (2003). Evolving mobile robots able to display collective behaviour. *Artificial Life*, 9: 255-267.

23. Nolfi S. (2002). Evolving robots able to self-localize in the environment: The importance of viewing cognition as the result of processes occurring at different time scales. *Connection Science* (14) 3:231-244.

22. Nolfi S. & Marocco D. (2002). Evolving robots able to visually discriminate between objects with different sizes. *International Journal of Robotics and Automation* (17) 4:163-170.

21. Nolfi S. (2002). Power and Limits of Reactive Agents. *Neurocomputing*, 42:119-145.
20. Nolfi S. & Floreano D. (2002). Synthesis of autonomous robots through evolution. *Trends in Cognitive Science*,(6) 1, 31-37.
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TALKS AND SEMINARS

INVITED TALKS IN INTERNATIONAL CONFERENCES

Evolution of Collective Behavior in Robots (**keynote talk**) NGV Conference, Netherland Society for Behavioural Biology, Egmond aan Zee, Holland, 28-30 November, 2018.

Evolutionary Robotics: Behavior and Cognition as Complex Adaptive Systems (**keynote talk**). International Conference on Cognitive Sciences and Technology. 16-18 August 2018, Beijing, China.

Evolution of Communication and Language in Robots (**keynote talk**). International Conference on Cognitive Sciences and Technology. 16-18 August 2018, Beijing, China.

Evolution, Innovations, Evolvability (**keynote talk**). The 14th International Conference on the Simulation of Adaptive Behavior (SAB2016) 23-26 August 2016, Aberystwyth, UK

On the Role of Environmental Variation and Phenotypic Organization in Artificial Evolution (**invited talk**). International Workshop on "Evolving Plasticity in Natural and Artificial Systems", Center for Interdisciplinary Research, University of Bielefeld, Germany, 5-7 September 2016

On the role of the Multi-Level and Multi-Scale Organization of Behaviour: Evidences from Evolutionary Robotics Experiments (**invited talk**). Universita' della Svizzera Italiana, Lugano, Switzerland, 23 September 2014.

Exploring the Complex Adaptive System Nature of Behavior and Cognition Through Evolutionary Robotics Experiments (**invited talk**), ISIR - Institut des Systèmes Intelligents et de Robotique, University Paris 6, 21 May 2014.

Behaviour and Cognition as a Complex Adaptive System (**invited talk**). Workshop Anthropos Techne'. Agropoli (SA), Italy, 16-21 June 2014.

Complexity Engineering, (**invited talk**), Phd Course Great Ideas in ICT, 12 June 2014, University of Roma "La Sapienza", Roma, Italy.

Evolution/Development of Communication and Language in Embodied Agents. (**invited talk**). SmartData International Symposium: Privacy meets Evolutionary Robotics: Protecting our Freedoms with Virtual Tools. University of Toronto, Canada, 14-16 May 2012.

Co-development of Action and Language in Robots. (**invited talk**). Workshop on Bootstrapping, grounding and learning of communication systems in humans and robots. Bordeaux, France, 19 May 2011.

Emergence of Communication in Evolving Robots. (**invited talk**). UQAM Summer School on The Origins of Language. Montreal, Canada 21-30 June 2010.

Co-development of behavioural and cognitive skills (**invited talk**). Integration and Transfer of Action and Language Workshop. September 22-24, 2008, Roma. Italy.

Behaviour and Cognition as a Complex Adaptive System: Insights from Evolutionary Robotics Experiments. (invited talk). VIII German Workshop on Artificial Life, Leipzig, Germany, July 30-August 1, 2008.

Behaviour and Cognition as a Complex Adaptive System: Insights from Evolutionary Robotics Experiments. (**invited plenary talk**) The European Conference on Evolutionary Computation (Evostar 2008), Napoli, Italy, March 26-28, 2008.

Behaviour as a complex Adaptive System. (**invited talk**) International Conference on Living Technology, Venezia, Italy, May 25-26, 2007

On the relation between cognition and behaviour: An embodied perspective. (**invited talk**) Second Meeting of the European Network for the Advancement of Artificial Cognitive Systems, Monaco, Germany, January 11-12, 2007

Neural network models of Categorization. (**invited talk**) International Summer School on "Neural network models of perception, action and embodied knowledge" Department of Psychology, University of Bologna, Italy. July 13–19, 2005

Behaviour as a Complex Adaptive System. (**invited talk**) International School on Semiotic Dynamics, Language and Complexity, Erice (Sicily, Italy). December 12-15, 2005.

Evolving Swarm-bots (**invited plenary talk**) International Conference on Complex Systems (ICCS2004), Boston, USA, 16-21 May 2004.

Evolutionary Robotics: Exploring the full power of self-organization (**invited plenary talk**) The First Australian Conference on Artificial Life (ACAL 2003), Canberra, Australia, 6-7 December 2003.

The Importance of Viewing Cognition as the Emergent Result of Dynamical Processes Occurring at Different Time Scales. (**invited talk**) The Third International Symposium on Human and Artificial Intelligence Systems, Fukui, Japan, 6-7 December, 2002.

Toward the Synthesis of Embodied and Situated Agents. (**invited talk**) International Colloquium on Cognition, Meaning and Complexity. Self-Organization in Cognitive Systems, Roma. June 14-15, 2002.

Evolutionary Robotics: Beyond Reactive Intelligence. (**invited talk**) International Conference on Evolution and Neural Control of Autonomous Systems, Jena, December 1-2, 2000.

Power and Limits of Reactive Intelligence. (**invited talk**) International Colloquium on Language and Cognition: An Interdisciplinary Approach, Roma. May 18-20, 1999.

Evolutionary Robotics: Exploiting the power of self-organization. (**invited talk**) First International USA-Italy Conference on Applied Neural and Cognitive Sciences, Boston, MA: USA. October 3-6, 1999.

Developing robots through artificial evolution. (**invited talk**) *First International Khepera Workshop.* Heinz Nixdorf Institute, Paderborn, Germany. December 10-11, 1999.

Evolutionary Robotics: Exploring the full power of self-organization. (**invited talk**) International Colloquium on Fluxes of Thought: Self-organizing Dynamics and Semantic Structures in Biological and Cognitive Systems, Rome, 25-27th June, 1998.

Adaptation is more powerful than decomposition and integration: Experimental evidences from evolutionary robotics, (**talk in invited section)**, *IEEE World Congress on Computational Intelligence (FUZZ-IEEE'98)*, Anchorage, Alaska, 4-9th May, 1998

Evolutionary Robotics: Exploiting the full power of Self-Organization, (**invited talk),** *Second Internation Workshop on Self-Learning Robots and Biorobotics*, Institution of Electrical Engineers (IEE) Seminar Savoy Place, London: February, 12th, 1998

Evolving non-trivial behavior on autonomous robots: Adaptation is more powerful than decomposition and integration, (**invited talk**), *International Workshop on Artificial Life and Adaptive Robots*, University of Aarhus, Denmark, 29-30th January, 1998

Neural Networks in an Artificial Life perspective, (**talk in invited session),** *7th International Conference on Artificial Neural Networks*, EPFL, Lausanne, Switzerland, 8-10th October, 1997

The adaptive advantage of recombination: the role of modularity, (**talk in invited session),** *International Workshop on Sexual Reproduction and Biodiversity: From Biology to informatics*, Fribourg, Switzerland, 1-3 October 1997

God Save the Red Queen! Competition in co-evolutionary robotics. (**talk in invited session).** *Second International conference on Genetic Programming,* Stanford University - Stanford, California, U.S.A., 13-16th July, 1997

Evolving non-trivial behavior on autonomous robots: Adaptation is more powerful than decomposition and integration. (**invited talk**) *The 5th International Conference on Evolutionary Robotics*, Canadian Embassy in Tokyo, Japan, April 17-18, 1997

Evolving non-trivial behaviors on real robots: a garbage collecting robot (**invited talk**) *IEE Workshop on Self Learning Robots*, London 12th February, 1995

Phenotypic Plasticity in Evolving Neural Networks (**invited talk**) International *Conference From Perception to Action*, Losanna, September 5-9, 1994

Learning, Behavior and Evolution (**invited talk**) *First European Conference on Artificial Life*, Parigi, 1991

TUTORIALS

Evolutionary Robotics, IEEE Congress on Evolutionary Computation, Cancun, Mexico, 20 June 2013.

Adaptive Robotics: Behaviour and Cognition as Complex Adaptive Systems, The Fourth International Conference on Advanced Cognitive Technologies and Applications, Nizza, 22-27 July 2012.

Adaptive Robotics: Behaviour and Cognition as Complex Adaptive Systems, Spring School on Interdisciplinary Methods for Cognitive Robotics, Collegium Budapest, Budapest, 2-4 May 2011.

Adaptive Robotics. Tutorial. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2010), Taipei (Taiwan), 18st October, 2010.

Behaviour as a complex Adaptive System: Evolution of coordinated and communicative behaviours, International Summer School on Collective Robotics, Lisboa, August 27-31, 2007

Behaviour as a Complex Adaptive System: Insights from Evolutionary Robotics Experiments. IEEE Symposium series on Computational Intelligence, April 1, 2007

Evolutionary Robotics. NTU, Singapore, 2 November, 2002.
Evolutionary Robotics. Orchard Hotel Singapore, Singapore, 31 October and 1 November, 2002.
Evolutionary Robotics. Century Novotel, Kuala Lampur, Malaysia, 29-30 October, 2002.
Evolutionary Robotics. *VI International Conference on Simulation of Adaptive Behavior and IV International Conference on Parallel Problem Solving from Nature*, Paris, September 10, 2000
Evolutionary Robotics. Fifth European Conference on Artificial Life, Losanna, Switzerland, September 13, 1999
Evolutionary Robotics: Exploring the full power of self-organization. 8th International Conference on Artificial Neural Networks", Skoevde, Sweden, September 1, 1998

Roma 18 November 2019

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