

Fabio Ruini, PhD

Born: 28 August 1982, in Sassuolo (MO), Italy

Address (work):

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Academic qualifications:

June 2011 – present: Post Doctoral Research Fellow on the RCUK Cognitive Systems Foresight project *VALUE (Vision, Action, and Language Unified by Embodiment)* at the School of Computing & Mathematics, University of Plymouth, UK;

October 2007 – September 2011: PhD in Computer Science and Artificial Intelligence at the University of Plymouth, UK. Thesis title: ‘*Distributed Control for Collective Behaviour in Micro-unmanned Aerial Vehicles*’. Director of studies: Prof. Angelo Cangelosi. PhD studentship funded by the US Air Force Office of Scientific Research (AFOSR-USAF);

2004-06: Laurea Specialistica (MSc) *cum laude* in *Economics and Management of Networks and Innovation*, University of Modena and Reggio Emilia, Department of Social, Cognitive and Quantitative Sciences, Italy. Thesis title: ‘*Motivation as a determinant of artificial organisms’ behaviour: an Artificial Life’s simulation*’;

2001-04: Laurea (BSc Hons) in *Economics, Networks and Information*, University of Modena and Reggio Emilia, Department of Social, Cognitive and Quantitative Sciences.

Main research interests:

Machine learning, evolutionary robotics, neural networks, evolutionary algorithms, self-organising maps, social and cognitive modelling, multi-agent systems, swarm intelligence, artificial life, artificial intelligence applied to games of incomplete information.

Others research experience:

May 2010-September 2010: Visiting student at the *École Polytechnique Fédérale de Lausanne (EPFL)*, Lausanne, Switzerland. Affiliation with *LIS (Laboratory of Intelligent Systems)*, research supervisor: Prof. Dario Floreano;

May 2007-October 2007: Research Assistant at the *University of Plymouth*, Plymouth, UK. Affiliation with *ABC (Adaptive Behaviour and Cognition research group)*, research supervisor: Prof. Angelo Cangelosi;

October 2006-February 2007: Research Assistant at the *ISTC-CNR (Institute of Cognitive Sciences and Technologies - Italian National Research Council)*, Rome, Italy. Affiliation with *LARAL (Laboratory of Autonomous Robotics and Artificial Life)*, research supervisor: Prof. Domenico Parisi.

Publications:

Journal papers:

- Ruini, F., and Cangelosi, A. (2009). Extending the evolutionary robotics approach to flying machines: An application to MAV teams. *Neural Networks*, 22, 812-821.

Book chapters:

- Ruini, F., Cangelosi, A., Fontanari, J.F., and Perlovsky, L. (proposal submitted). Computational Intelligence Approaches to Autonomous Collective Aerial Systems for Defense and Security Applications. In: Wesolkowski, S., Bender, A., and Perlovsky, L. (eds.) *Computational Intelligence for Security and Defense Applications* (tentative title), IEEE/Wiley, Series on Computational Intelligence;
- Ruini, F., Petrosino, G. Saglimbeni, F., and Parisi, D. (2010). The strategic level and the tactical level of behaviour. In Nefti, S., and Gray, J. (Eds.), *Advances in Cognitive Systems* (pp. 271-299), Herts, UK: IET Publisher.

Conference proceedings:

- Hauert, S., Leven, S., Varga, M., Ruini, F., Cangelosi, A., Zufferey, J.C., and Floreano, D. (2011), Reynolds Flocking in Reality with Fixed-Wing Robots: Communication Range vs. maximum Turning Rate. In *Proceedings of IROS 2011, IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp. 5015-5020;
- Ruini, F., and Cangelosi, A. (2010), An Incremental Approach to the Evolutionary Design of Autonomous Controllers for Micro-unmanned Aerial Vehicles. In *Proceedings of TAROS 2010, 11th Conference Toward Autonomous Robotic Systems*, pp. 239-246;
- Ruini, F., and Cangelosi, A (2010), An Evolutionary Robotics 3D Model for Autonomous MAVs navigation, target tracking and group coordination. In *Proceedings of IJCNN 2010, International Joint Conference on Neural Networks – WCCI 2010, World Congress on Computational Intelligence*, pp. 760-767;
- Ruini, F. and Cangelosi, A. (2009). Un modello di robotica evolutiva per lo sviluppo di controller autonomi per robot volanti. In Miglino, O., Ponticorvo, M., Rega, A., and Rubinacci, F. (ed.), *Modelli, sistemi e applicazioni di Vita Artificiale e Computazione Evolutiva. Atti del VI Workshop Italiano di Vita Artificiale e Computazione Evolutiva (WIVACE 2009)*, pp. 177-185;
- Ruini F., Cangelosi, A. and Zetule, F. (2009). Individual and Cooperative Tasks performed by MAV Teams driven by Embodied Neural Network Controllers. In *Proceedings of IJCNN 2009, International Joint Conference on Neural Networks*, pp. 2717-2724;
- Ruini, F. and Cangelosi, A. (2008). Distributed Control in Multi-Agent Systems: A Preliminary Model of Autonomous MAV Swarms. In *Proceedings of FUSION 2008, the 11th International Conference on Information Fusion*, pp.1043-1050.

Peer-reviewed abstracts:

- Ruini, F. and Parisi, D. (2008). Selective attention in artificial organisms. In Bullock, S., Noble, J., Watson, R. and Bedau, M.A. (ed.), *Proceedings of ALIFE XI, the Eleventh International Conference on the Simulation and Synthesis of Living Systems*, p. 799. MIT Press, Cambridge, MA;

- Ruini, F. and Cangelosi, A. (2008). Evolutionary Algorithm Based Neural Network Controllers: an Application to MAV Swarms. In *Proceedings of WIVACE 2008, the 5th Italian Workshop on Artificial Life and Evolutionary Computation*;
- Ruini, F. and Parisi D. (2007). Vivere in un ambiente che contiene cibo e predatori. In *Proceedings of WIVACE 2007, the 4th Italian Workshop on Artificial Life and Evolutionary Computation*.

Seminars and posters presentations:

'Autonomous controllers based on neural networks for Micro-unmanned Aerial Vehicles: an Evolutionary Robotics approach' (poster session during the inaugural meeting of the Centre for Robotics and Neural Systems, Plymouth, UK, 27th November 2009);

'Distributed Control in Multi-Agent Systems: a Preliminary Model of Autonomous Micro-unmanned Aerial Vehicles (MAV) Swarms' (*Robotic Future: The Robotics and Intelligent Systems Seminar Series*, Plymouth, UK, 7th March 2008);

'Communication and Distributed Control in Multi-Agent Systems: Preliminary Model of Micro-unmanned Aerial Vehicle (MAV) Swarms' (4th euCognition six-monthly meeting, Venice, Italy, 10th-11th January 2008).

Grants:

University of Plymouth, Apple ARTS program, participation in the preparation of the funded proposal (£15,000);

Artificial Life XI, travel bursary to attend the 11th International Conference on the Simulation and Synthesis of Living Systems, in Winchester, UK (£500);

euCognition, Network Action 097-3, grant for a 5-month research/exchange visit at the University of Plymouth, UK (€5,300);

University of Modena and Reggio Emilia, travel grant for participating to Seminars on Social Network Analysis, in Irvine (CA), USA (€1,800);

University of Modena and Reggio Emilia, travel grant for participating to 41st School of Mathematics "G. Stampacchia", in Erice, Italy (€1,000).

Referee activities:

AFRICON 2011 – IEEE/IES African Conference (Livingstone, Zambia, September 2011);

IJCNN 2011 – International Joint Conference on Neural Networks (San Jose, CA, August 2011);

IROS 2011 – IEEE/RSJ International Conference on Intelligent Robots and Systems (San Francisco, CA, September 2011);

ICRA 2011 – IEEE International Conference on Robotics and Automation (Shanghai, China, May 2010);

WCCI 2010 – IEEE World Congress on Computational Intelligence (Barcelona, Spain, July 2010);

IJCNN 2009 - International Joint Conference on Neural Networks (Atlanta, GA, June 2009);

Bentham Science Publishers (reviews provided for various scientific e-book proposals).

Teaching and work experiences:

2010-present: content manager for the AI*IA (*Associazione Italiana per l'Intelligenza Artificiale*) Facebook page and Twitter channel;

2008-09: temporary lecturer for the module Tech044 (*Introduction to Computer Systems*), University of Plymouth;

2007-09: teaching assistant for the class in '*Laboratory of Informatics II*', University of Modena and Reggio Emilia;

2006-08: teaching assistant for the class in '*Laboratory of Informatics I*', University of Modena and Reggio Emilia;

2006-09: teaching assistant for the class in '*Economic history*', University of Modena and Reggio Emilia;

2004-06: teaching assistant for the class in '*Methods for database's management*', University of Modena and Reggio Emilia;

2004-05: *technological tutor* for the On Line Master programme in '*Finance and Managements Control*', University of Modena and Reggio Emilia;

2003-09: teaching assistant for the class in '*History of Communication and Information*', University of Modena and Reggio Emilia;

2003-07: *web staff's* member for the web portal '*Dolly*', University of Modena and Reggio Emilia;

2002-04: *technological tutor* for the EU's programme '*E³: E-technology, E-context, e-Early learning*', Istituto Comprensivo "M.E. Lepido", Reggio Emilia.

Computer science skills:

Operating systems used: Mac OS X (since 10.4), Microsoft Windows (since 3.0), Linux (mainly Debian and Ubuntu distributions), MS-DOS (since 3.20);

Programming languages: C, C++, Visual Basic 6.0, PHP 3/4, Turbo Pascal/Delphi;

GUI-based and graphical applications development: Qt 4.x, Irrlicht 3D engine;

Web design: HTML, CSS, web sites usability-related issues;

Databases: MySQL (within an Apache/MySQL/PHP integration), Microsoft Access;

Grid systems: XGrid, Sun Grid Engine.

Professional memberships:

Member of IEEE (*Institute of Electrical and Electronics Engineers*), IEEE Computational Intelligence Society, INNS (*International Neural Network Society*), EUCogII (*2nd European Network for the Advancement of Artificial Cognitive Systems, Interaction and Robotics*), AI*IA (*Associazione Italiana per l'Intelligenza Artificiale*).

Others conferences, seminars series and workshops attended:

29th February 2010: EUCogII six-monthly meeting, Zurich, Switzerland;

30th March – 1st April 2009: 24th *International Conference on Unmanned Air Vehicle Systems*, Bristol, UK;

27th February 2008: RUSI (Royal United Services Institute for Defence and Security Studies) hosted event, *The Ethics of Autonomous Military Systems*, London, UK;

13th-17th September 2006: *WIVA3, the Third Italian Workshop on Artificial Life*, Siena, Italy;

18th-29th October 2004: *Seminars on Social Network Analysis*, Institute of Mathematical and Behavioural Sciences, University of California at Irvine, Irvine, CA;

2nd-9th July 2004: *Workshop on "Evolution and Computation"*, 41st School of Mathematics "G. Stampacchia", Centre for Scientific Culture "E. Majorana", Erice, Italy.

Last update: 22nd November 2011