Domenico Bellomo

Post-doc

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Personal Information

Date of Birth	May 5th, 1975
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Research Interests

To gain a better understanding of the dynamics of the biochemical networks within the cell, we need to perturb the individual components of such networks, and to measure in vivo the corresponding response. I see synthetic biology primarily as a tool that can help in this effort to study the cell “from the inside”; and secondarily as a tool to re-engineer cellular functionalities according to some desired specifications. Two crucial steps in this direction are: (i) the design and experimental characterization of libraries of standard building blocks like switches, sensors, logic gates, oscillators, automata; (ii) and the development of methods for the analysis and robust design of such devices.

The latter issues are well posed only within an evolutionary perspective.

Work Experience

Jun 06–Present

Post-doc, *Delft Bioinformatics Lab and Bioprocess Technology Group, Delft University of Technology,* Delft, The Netherlands.

Research: reconstruction of metabolic networks; relation between structure and dynamics in biochemical networks; analysis, design and standardization of synthetic networks.

Other activities:

- Initiator and supervisor of 2008 and 2009 TUDelft iGEM (International Genetically Engineered Machine competition) teams.

iGEM 2008 results: golden medal for quality of work and **"Best Wiki"** prize;

iGEM 2009 results: golden medal for quality and **"Best Information Processing Project"** prize.

- Initiator and organizer of the biweekly NO-MEC meetings on metabolic networks modeling.

Apr 05–May 06 **R&D engineer**, *IHC systems B.V.* , Sliedrecht, The Netherlands.
Tasks: design of stochastic filters for on-line parameter estimation (e.g. Kalman filters, particle filters, etc.).
Completed projects: grain-size estimation in water slurry mixture, anchor position estimation, overflow losses estimation, swing speed control.

Education

Jan 01–Mar 05 **PhD in Electrical Engineering**, *Politecnico di Bari*, Bari, Italy.
Main topic: Lyapunov based design of adaptive fuzzy controllers for nonlinear servo-drives.
Secondary project: design of a decision support system for the optimization of mechanical ventilation settings, in patients affected by acute respiratory syndrome

Oct 02–Oct 03 **Visiting student**, *Delft Center for Systems and Control, Delft University of Technology,* Delft, The Netherlands.
Research subject: on line identification of fuzzy models.

Sep 94–Jul 01 **Laurea (BA & MSc) in Electrical Engineering**, *Politecnico di Bari,* Bari, Italy.
Thesis:Intelligent Control of Nonlinear Systems: a Fuzzy Logic Based Approach
Graduation mark: 110/110 cum laude

Sep 91–Aug 94 **High School,***Scientific Lyceum G. Salvemini,* Bari, Italy.
Thesis:Intelligent Control of Nonlinear Systems: a Fuzzy Logic Based Approach
Graduation mark: 60/60

Teaching Assistant Experience

- Functional Genomics & Systems Biology (MSc-level), 2009
- Advanced course in Bioinformatics (postgraduate level), 2008
- Computer-Controlled Systems (MSc-level), 2002, 2003

Recently supervised MSc projects

- B. van den Berg, (supervisors: D. Bellomo, M.J.T. Reinders), “Automated design of synthetic biological systems using standard parts”, Nov 2008- present.
- P. van Nes (supervisors: D. Bellomo, D. de Ridder and M.J.T. Reinders), “Inferring dynamic properties of metabolic networks from their structural information”, Delft University of Technology, April 4 2008.
- J. Yong-A-Poi (supervisors: E.P. van Someren, D. Bellomo and M.J.T. Reinders), “Adaptive least absolute regression network analysis improves genetic network reconstruction by employing prior knowledge”, Delft University of Technology, March 28 2008.

Selected postgraduate courses

- 5th Cytoscape public symposium and developer retreat, Amsterdam, The Netherlands, Nov 2007.
- Advanced course on applied genomics of industrial fermentation, Wageningen, The Netherlands, Oct 2006
- Genome access course, Cold Spring Harbor Laboratory, New York, Nov 2005.

Computer skills

Tools: Latex, Office Packages MATLAB, COPASI, CellNetAnalyzer, Genedata, LabVIEW, dSPACE

Languages: C, C++ Platforms Windows, Linux

Wet-Lab literacy: Plasmid mini-prep, restriction and ligation (Bio-Brick standards), competent cells transformation, gel electrophoresis, PCR.

Languages

Italian	Fluent My native language.
English	Fluent Speaking, reading, and writing.
Dutch	Intermediate Delftse methode beginners course: 94/100
German	Basic Reading

Hobbies

Reading all kind of popular science books, novels, poetry and techno-thrillers; theater; music; traveling; playing soccer, swimming, table-tennis

Publications

Systems and Synthetic Biology

[1b] O. M. J. A Stassen, R. J. J. Jorna, B. A. van den Berg, R. Haghi, F. Ehtemam, S. M. Flipse, J. A Kiers, M. J. L de Groot, I. E. Nikerel, D. Bellomo,“Toward tunable RNA thermo-switches for temperature dependent gene expression”, to be submitted.

[2b] F. Menolascina, D. Bellomo, T. Maiwald, V. Bevilacqua, C. Ciminelli, A. Paradiso, and S. Tommasi, “Developing optimal input design strategies in cancer systems biology with applications to micro-fluidic device engineering”, BMC Bioinformatics 2009, in press

[3b] P. van Nes, D. Bellomo, M.J.T. Reinders and D. de Ridder, “Stability from structure: metabolic networks are unlike other biological networks”, EURASIP Journal on Bioinformatics and Systems Biology, vol. 2009, pp. Article ID 630695,

2009.

[4b] D. Bellomo, D. de Ridder, S. Rossell, P.J.T. Verheijen, M.J.T. Reinders and J.J. Heijnen, “Identifying the regulatory structure of metabolic networks: a constrained optimization approach”, Proceedings of the 14th annual conference of the Advanced School for Computing and Imaging, pp. 250-257, 2008.

[5b] D. Bellomo, P. van Nes, M.J.T. Reinders and D. de Ridder, “Stability cannot be derived from local structure in biochemical network”, Proceedings of the 3rd international conference on bio-inspired models of network, information, and computing systems, ICST, Gent, Belgium, 2008.

[6b] D. Bellomo, D. de Ridder, J.J. Heijnen, M. J.T. Reinders, W. A. van Winden, P.J.T. Verheijen, “Identifiability of metabolic networks in pulse experiments”, Proceedings of the 13th annual conference of the Advanced School for Computing and Imaging, 2007.

Systems and Control Theory

[1c] D. Bellomo, D. Naso, R. Babuška, “Adaptive fuzzy control of a non-linear servo-drive: theory and experimental results”, Engineering Applications of Artificial Intelligence, vol. 21, no. 6, September 2008.

[2c] D. Bellomo, Babuška R., Naso, D., “Adaptive fuzzy control for speed-reference tracking in nonlinear servo drives”, Proceeding of 14th IFAC Symposium on System Identification, March 29-31, 2006, Newcastle, Australia.

[3c] D. Bellomo, Naso, D., Babuška R., “Experimental comparison of adaptive fuzzy controllers”, Proceeding of FuzzIEEE 2005, Conference on Fuzzy systems , May 22-25, Reno, Nevada, USA.

[4c] D. Bellomo, D. Naso, B. Turchiano, R. Babuška, “Composite adaptation in adaptive fuzzy control”, Proceedings of 16th IFAC World Congress, Prague, Czech Republic, July 4 to July 8, 2005

[5c] D. Bellomo, D. Naso, R. Babuška, “Parameter convergence in adaptive fuzzy control”, Proceedings of the 1st International Conference on Informatics in Control, Automation and Robotics, vol.2, 25-28 August 2004, Setubal, Portugal.

[6c] D. Bellomo, D. Naso, B. Turchiano, “Improving genetic algorithms: an approach based on multi-elitism and Lamarckian mutation”, Proceedings of 2002 IEEE International Conference on Systems, Man and Cybernetics, Vol. 4, 6-9 Oct. 2002.

References

1) Dr. Ir. Dick de Ridder
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2) Prof. Dr. Robert Babuška
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