

Paolo Frasca - Curriculum vitae et studiorum

Current Address (Work)

Gruppo IAC-CNR
c/o Dipartimento di Matematica
Università di Roma "Tor Vergata"
via della Ricerca Scientifica, 1
00133 Roma, Italy

Permanent Address (Home)

via San Sebastiano, 15
10081 Castellamonte (TO)
Italy

Born July 29, 1981
Italian

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Research interests

My research interests are in the mathematical foundations of multi-agent and networked systems: modeling, analysis, control, and optimization. I am specially interested in control problems with communication constraints, algorithms for robotic networks and sensor networks, modeling and control of natural and artificial swarms.

Current position

Postdoctoral fellow
at the *D.I.I.M.A., Università di Salerno*
and the *Istituto per le Applicazioni del Calcolo, C.N.R., Rome, Italy*
Working with: Benedetto Piccoli
Involved in the MIUR-FIRB project "INtegrated SYstems for EMERgency"

November 2008– present

Education

Ph.D. Matematica per le Scienze dell'Ingegneria March 26, 2009
Politecnico di Torino, Torino, Italy
Thesis: *Distributed optimization with communication constraints*
Advisors: Fabio Fagnani, Sandro Zampieri

(M.S.) *Laurea Specialistica, Ingegneria Matematica, cum laude* October 13, 2005
Politecnico di Torino
Thesis: *Modelli cinetici alle velocità discrete per il traffico veicolare* (in italian)
Advisor: Nicola Bellomo

(B.S.) *Laurea, Matematica per le Scienze dell'Ingegneria, cum laude* October 10, 2003
Politecnico di Torino
Thesis: *Il problema di Stokes. Spazi funzionali e formulazioni variazionali* (in italian)
Advisor: Claudio Canuto

High school degree *Maturità Classica* (score 100/100), July 2000
Liceo "C. Botta", Ivrea (TO), Italy

Visiting positions

University of California (UCSB), Santa Barbara (CA), U.S.A.
Host: Francesco Bullo

February 2008 – July 2008

DEI, Università di Padova, Italy
Host: Sandro Zampieri

September 2006

Previous positions

Ph.D. student

January 2006 – December 2008

Dipartimento di Matematica, Politecnico di Torino, Torino, Italy
supported by “Fondazione CRT - Istituto Lagrange”, through the grant “Coordinated control and identification of dynamical systems with communication constraints”

Internships

Laboratoire de Génie Mécanique de Toulouse
Institut National des Sciences Appliquées, Toulouse, France
Supervisor: M. Alain Daidié

July 2004

Further education

June 22 - June 26, 2009: CIME/NEWCOMM summer school “Mathematical Foundations of Complex Networked Information Systems”, Politecnico di Torino, Verres (AO), Italy.

October 10 - 12, 2008: workshop “Frontiers in Game Theory and Networked Control Systems”, MIT, Cambridge, MA, USA.

December 3 - December 7, 2007: workshop “Cooperative multi agent systems: distributed computation, estimation and control”, Centro “De Giorgi”, Pisa, Italy.

July 29 - August 17, 2007: SMI summer school in Probability (with prof.s Paolo Baldi and Pierre Brémaud), Cortona, Italy

January 2004 - July 2004: “Erasmus” Student Exchange Programme. *Institut National des Sciences Appliquées*, Toulouse, France

Teaching experience

I have been a Teaching Assistant for several basic and advanced calculus courses, at the Politecnico di Torino, with prof.s J. Pejsachowicz and L. Rondoni (2003-2005), L. Caire (Spring 2007), F. Pellerey (Fall 2007), and R. Camerlo (Fall 2008). In Spring 2008, teacher at the Istituto di Istruzione Superiore “F. Faccio”, Castellamonte, Italy.

Further scientific activities

Since 2007, I have been serving as a peer reviewer for the main conferences of the control community and for several journals, including: IEEE Transactions on Automatic Control, IEEE Transactions on Signal Processing, IEEE Transactions on Circuits and Systems, Systems and Control Letters, IET Control Theory & Applications, Automatica.

During the Ph.D. program, I participated to a MIUR-PRIN project coordinated by prof. A. Agrachev.

During the post-doc, I am participating to the MIUR-FIRB project “INSYEME–INtegrated SYstems for EMERgency” and to the MIUR-FIRB project “CASHMA–Context Aware Security by Hierarchical Multilevel Architectures”. I am also collaborating with “SELEX Sistemi Integrati” in an industrial research project on modelling detection of stochastic signals with radars.

Computing and communication skills

Native Italian speaker, fluent in English and French.

Significant experience in programming (Matlab, C, Mathematica, Java) and L^AT_EX typesetting.

PUBLICATIONS

Submitted Papers

- Francesco Bullo, Ruggero Carli, and Paolo Frasca. Gossip coverage control for robotic networks: dynamical systems on the space of partitions. Submitted, Dec. 2009
- Ruggero Carli, Giacomo Como, Paolo Frasca, and Federica Garin. Distributed averaging on digital noisy networks. Submitted, Oct. 2009
- Emiliano Cristiani, Paolo Frasca, and Benedetto Piccoli. Effects of anisotropic interactions on the structure of animal groups. Submitted, July 2009

Journal Papers

- Ruggero Carli, Fabio Fagnani, Paolo Frasca, and Sandro Zampieri. Gossip consensus algorithms via quantized communication. *Automatica*. doi:10.1016/j.automatica.2009.10.032. To appear (Submitted Jan. 2009)
- Paolo Frasca, Paolo Mason, and Benedetto Piccoli. Detection of Gaussian signals via hexagonal sensor networks. *International Journal of Mathematical Modelling and Numerical Optimisation*, 1 (1-2), pp. 39-55, 2009
- Paolo Frasca, Ruggero Carli, Fabio Fagnani, and Sandro Zampieri. Average consensus on networks with quantized communication. *International Journal of Robust and NonLinear Control*, 19 (16), pp. 1787-1816, 2009
- Vincenzo Coscia, Marcello Delitala, and Paolo Frasca. On the mathematical theory of vehicular traffic flow II: Discrete velocity kinetic models. *International Journal of Non-Linear Mechanics*, 42 (3), pp. 411-421, 2007

Proceedings of International Conferences (Refereed)

- Joseph W. Durham, Ruggero Carli, Paolo Frasca, and Francesco Bullo. Discrete partitioning and coverage control with gossip communication. *ASME Dynamic Systems and Control Conference*, Hollywood, CA, Oct. 2009
- Ruggero Carli, Giacomo Como, Paolo Frasca, and Federica Garin. Average consensus on digital noisy networks. *IFAC Workshop on Estimation and Control of Networked Systems*, Venice, Italy, Sep. 2009
- Paolo Frasca, Ruggero Carli, Francesco Bullo. Multiagent coverage algorithms with gossip communication: Control systems on the space of partitions. *American Control Conference*, St. Louis, MO, June 2009
- Paolo Frasca, Ruggero Carli, Fabio Fagnani, and Sandro Zampieri. Average consensus by gossip algorithms with quantized communication. (Invited paper) *IEEE Conference on Decision and Control*, Cancun, Mexico, Dec. 2008
- Ruggero Carli, Fabio Fagnani, Paolo Frasca, and Sandro Zampieri. The quantization error in the average consensus problem. *Mediterranean Conference on Control and Automation*, Ajaccio, France, June 2008

- Ruggero Carli, Fabio Fagnani, Paolo Frasca, and Sandro Zampieri. A probabilistic analysis of the average consensus algorithm with quantized communication. *IFAC World Congress*, Seoul, Korea, Aug. 2008
- Ruggero Carli, Fabio Fagnani, Paolo Frasca, Tom Taylor, and Sandro Zampieri. Average consensus on networks with transmission noise or quantization. *European Control Conference*, Kos, Greece, July 2007
- Ruggero Carli, Fabio Fagnani, Paolo Frasca, and Sandro Zampieri. Efficient quantized techniques for consensus algorithms. *Workshop on Networked Control System: Tolerant to Faults*, Nancy, France, June 2007

Recognition: based on *Google Scholar* data collected on October 30, 2009, the above publications have earned 71 citations, giving an h-index equal to 5.

Invited seminars

- “Average consensus with communication constraints”. Meeting on mathematical control theory: controllability, optimization, stability. DIMAT, Politecnico di Torino, April 20-21, 2009
- “Gossip coverage control”. DEI, Università di Padova, Sept. 2008
- “Quantized Gossip Consensus”. Mathematics and Cognition Seminar, Arizona State University, Tempe (AZ), April 15, 2008

Scientific communications & national conferences

- “Mathematical issues of distributed complex systems”. M. Anile SIMAI workshop, Roma, Oct. 9, 2009
- “Agreement on networks”. V Séminaire Transalpin de Physique, Torino, Feb. 2007

Rome, December 29, 2009