

# Curriculum Vitae

**Fabio Morbidi**

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## Office address

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## Generalities

Birth date: August 17, 1981  
Birthplace: Siena, Italy  
Nationality: Italian  
Civil status: Single  
Military service: Exempted  
Driving licence: Italian B

## Research interests

Formation control, distributed control of multi-agent systems, geometric control theory, vision-based control, mobile robotics, medical applications of robotics.

# 1 Education

**L1 Laurea degree** (equivalent to B.S.), Magna cum Laude, Computer Engineering, specialization in Automation and Systems for Industrial Automation, University of Siena, Italy, October 20, 2003.

Thesis: *Visual Servoing for Mobile Robots based on Multiple Views Geometry*.  
Advisor Prof. Domenico Prattichizzo.

**L2 Laurea degree** (equivalent to M.S.), Magna cum Laude, Computer Engineering, specialization in Robotics and Automation, University of Siena, Italy, September 26, 2005.

Thesis: *Nonlinear localizability and Panoramic Cameras: Applications to Robot Teams*.

Advisor: Prof. Domenico Prattichizzo.

Co-Advisor: Prof. Antonio Vicino.

**Qualifying exam for engineer's profession:** Held in January 2006, University of Florence, Italy.

**Ph.D.:** In October 2005, I started my Ph.D. program in Automation and Control (cycle XXI), at Dipartimento di Ingegneria dell'Informazione, Università di Siena, Italy. I received the Ph.D. degree on March 27, 2009.

Courses attended during the Ph.D.:

- First year (summer 2006):
  - *Functional Analysis*, instructor Prof. P. Nistri.
  - *Numerical Calculus*, instructor Prof. P. Costantini.
  - *Introduction to Chaos and Applications*, instructor Prof. L. Kocarev.
  - *Dynamic Vision*, instructor Prof. F. Chaumette.
- Second year (summer 2007):
  - *Constrained Optimization*, instructor Prof. P. Palagi,
  - *Nonlinear Filtering*, instructor Prof. F. Gustafsson.
- Third year (summer 2008):
  - *Sensorimotor Computation*, instructor Prof. D. Pai.
  - *Algorithmic Distributed Robotics*, instructor Prof. E. Frazzoli.

– *Passive Systems for Robotics*, instructor Prof. E. Colgate.

**Research experience abroad:** Visiting researcher at University of California, Santa Barbara (UCSB), advisor Prof. Francesco Bullo, from October 1st 2007 to 31st March 2008. Graduate courses attended at UCSB:

- *Cooperative Control of Robotic Networks*, instructor Prof. Francesco Bullo, Fall 2007, 3 Units.
- *Introduction to Differential Geometry - Riemannian Geometry*, instructor Prof. Xianzhe Dai, Winter 2008, 4 Units.

**Current academic position:** Postdoctoral fellow at Dipartimento di Ingegneria dell'Informazione, Università di Siena, since January 1st, 2009. The position has a validity of 2 years.

**Position abroad:** Starting from October 15, 2009, I will hold a postdoc position at Department of Mechanical Engineering, Northwestern University, Evanston, IL, under the supervision of prof. Kevin Lynch.

## 2 Teaching employment

- **Teaching assistant:** Assisted in teaching the graduate course *Multivariable and Robust Control* (May-June 2006), given by Prof. A. Vicino. Total: 10 hours.
- **Instructor:** Matlab laboratory, (July 2006). Total: 20 hours.
- **Teaching assistant:** Assisted in teaching the graduate course *Robotics and Vision*, (February-April 2007), given by Prof. D. Prattichizzo. Total: 15 hours.
- **Teaching assistant:** Assisted in teaching the graduate course *Multivariable and Robust Control* (May-June 2007), given by Prof. A. Vicino. Total: 10 hours.
- **Instructor:** Matlab laboratory, (July 2007). Total 20 hours.
- **Teaching assistant:** Assisted in teaching the undergraduate course *Linear Systems* (May-June 2008), given by Prof. D. Prattichizzo. Total: 20 hours.
- **Teaching assistant:** Assisted in teaching the graduate course *Multivariable and Robust Control* (May-June 2008), given by Prof. A. Vicino. Total: 5 hours.

- **Teaching assistant:** Assisted in teaching the undergraduate course *Linear Systems* (May-June 2009), given by Prof. D. Prattichizzo. Total: 20 hours.
- **Teaching assistant:** Assisted in teaching the graduate course *Multivariable and Robust Control* (May-June 2009), given by Prof. A. Vicino. Total: 2 hours.

### 3 Participation to International Conferences, Schools, Seminars and Colloquia

- *International Advanced School on Nonlinear Analysis of Complex Dynamical Systems*, Centro per lo studio dei sistemi complessi (CSC), Siena, November 16-18, 2005.
- *Geometric Control and Nonsmooth Analysis*, Istituto Nazionale di Alta Matematica (INDAM), Rome, June 5-9, 2006.
- *Human Brain Mapping (12<sup>th</sup> Annual Meeting)*, Florence, June 11-15, 2006.
- *Summer Ph.D. School CIRA*, Bertinoro (Fc), July 9-15, 2006. Attended courses: “Positive systems” and “Models for the control of production systems”
- *Convegno CIRA* with paper presentation, Milano, September 18-20, 2006.
- *Colloquium on Robotics and Automation*, Naples, December 18, 2006.
- IEEE International Conference on Robotics and Automation, Rome, April 2007. Presentation of two papers. Chair of the section *Adaptive Visual Servoing*.
- Robotics, Science and Systems Conference, Atlanta, GA, June 2007. Poster presentation.
- 2nd HYCON Graduate School on Hybrid Systems, Siena, July 2007.
- European Control Conference, Kos, Greece, July 2007. Presentation of two papers.
- IEEE International Conference on Decision and Control, New Orleans, LA, December 2007. Poster presentation.

- IEEE International Conference on Robotics and Automation, Pasadena, USA, May 2008. Presentation of a paper.
- IEEE International Conference on Decision and Control, Cancun, Mexico, December 2008. Presentation of a paper.
- IEEE International Conference on Robotics and Automation, Kobe, Japan, May 2009. Presentation of three papers.
- European Control Conference, Budapest, Hungary, August 2009. Presentation of a paper.

## 4 Publications

### Refereed Journal Publications

- J6. F. Morbidi, G.L. Mariottini, D. Prattichizzo, *Observer design via Immersion and Invariance for vision-based leader-follower formation control*, Automatica, accepted on September 28, 2009, to appear.
- J5. G.L. Mariottini, F. Morbidi, D. Prattichizzo, N. Vander Valk, N. Michael, G.J. Pappas, K. Daniilidis, *Vision-based Localization for Leader-Follower Formation Control*, IEEE Transactions on Robotics, accepted on July 22, 2009, to appear
- J4. L. Consolini, F. Morbidi, D. Prattichizzo, M. Tosques, *Stabilization of a hierarchical formation of unicycle robots with input constraints*, IEEE Transactions on Robotics, vol. 25, n. 5, pp. 1176-1184, October 2009.
- J3. F. Morbidi, A. Garulli, D. Prattichizzo, C. Rizzo, S. Rossi, *Application of Kalman filter to remove TMS-induced artifacts from EEG recordings*, IEEE Transactions on Control Systems Technology, vol. 16, n. 6, pp. 1360-1366, November 2008.
- J2. L. Consolini, F. Morbidi, D. Prattichizzo, M. Tosques, *Leader-Follower Formation Control of Nonholonomic Mobile Robots with Input Constraints*, Automatica, vol. 44, n. 5, pp. 1343-1349, May 2008.
- J1. F. Morbidi, A. Garulli, D. Prattichizzo, C. Rizzo, P. Manganotti, S. Rossi, *Off-line removal of TMS-induced artifacts on human electroencephalography by Kalman filter*, Journal of Neuroscience Methods, vol. 162, pp. 293-302, May 2007.

## Refereed Book Chapters

- B3. G.L. Mariottini, S. Scheggi, F. Morbidi and D. Prattichizzo, *Catadioptric Stereo with Planar Mirrors: Multiple-View Geometry and Camera Localization*, in Visual Servoing via Advanced Numerical Methods, G. Chesi and K. Hashimoto, Eds., Lecture Notes in Computer Science, Springer-Verlag, pp. 3-22, 2009.
- B2. G.L. Mariottini, S. Scheggi, F. Morbidi and D. Prattichizzo, *A Robust Uncalibrated Visual Compass Algorithm from Paracatadioptric Line Images*, in Proc. First Workshop on Omnidirectional Robot Vision, E. Menegatti and T. Pajdla, Eds., Lecture Notes in Computer Science, Springer-Verlag, pp. 242-255, November 2008.
- B1. F. Morbidi and D. Prattichizzo, *Sliding mode formation tracking control of a tractor and trailer-car system*, in Robotics: Science and Systems III, Wolfram Burgard, Oliver Brock and Cyrill Stachniss Editors, MIT press, Cambridge MA, pp. 113-120, March 2008.

## Refereed Conference Proceedings

- C13. G. Marro, F. Morbidi, D. Prattichizzo, “*A Geometric Solution to the Cheap Spectral Factorization Problem*”, in Proc. European Control Conference, pp. 814-819, Budapest, Hungary, August 23-26, 2009.
- C12. F. Morbidi, G. Ripaccioli, D. Prattichizzo, “*On Connectivity Maintenance in Linear Cyclic Pursuit*”, in Proc. IEEE International Conference on Robotics and Automation, pp. 363-368, Kobe, Japan, May 12-17, 2009.
- C11. F. Morbidi and D. Prattichizzo, “*Range estimation from a moving camera: an I&I approach*”, in Proc. IEEE International Conference on Robotics and Automation, pp. 2810-2815, Kobe, Japan, May 12-17, 2009.
- C10. G.L. Mariottini, S. Scheggi, F. Morbidi, D. Prattichizzo, “*Planar Catadioptric Stereo: Single and Multi-View Geometry for Calibration and Localization*”, in Proc. IEEE International Conference on Robotics and Automation, pp. 1510-1515, Kobe, Japan, May 12-17, 2009.
- C9. F. Morbidi, F. Bullo, D. Prattichizzo, *On leader-follower visibility maintenance for Dubins-like vehicles via controlled invariance*, in Proc. 47th IEEE Conference on Decision and Control, pp. 1821-1826, Cancun, Mexico, 9-11 December 2008.

- C8. F. Morbidi, G.L. Mariottini, D. Prattichizzo, *Vision-based range estimation via Immersion and Invariance for robot formation control*, in Proc. of the IEEE International Conference on Robotics and Automation, pp. 504-509, Pasadena, CA, 19-23 May 2008.
- C7. L. Consolini, F. Morbidi, D. Prattichizzo, M. Tosques, *Steering hierarchical formations of unicycle robots*, in Proc. 46th IEEE Conference on Decision and Control, pp. 1410-1415, New Orleans, LA, 12-14 December 2007.
- C6. G. Marro, F. Morbidi, D. Prattichizzo,  *$H_2$ -Pseudo Optimal Model Following: A Geometric Approach*, in Proc. 3rd IFAC Symposium on System, Structure and Control, Foz do Iguaçu, Brazil, 17-19 October 2007, to appear
- C5. F. Morbidi, L. Consolini, D. Prattichizzo, M. Tosques, *Leader-Follower Formation Control as a Disturbance Decoupling Problem*, in Proc. European Control Conference, pp. 1492-1497, Kos, Greece, 2-5 July 2007.
- C4. F. Morbidi, A. Garulli, D. Prattichizzo, C. Rizzo, S. Rossi, *A Kalman filter approach to remove TMS-induced artifacts from EEG recordings*, in Proc. European Control Conference, pp. 2201-2206, Kos, Greece, 2-5 July 2007.
- C3. L. Consolini, F. Morbidi, D. Prattichizzo, M. Tosques, *A Geometric Characterization of Leader-Follower Formation Control*, in Proc. of the IEEE International Conference on Robotics and Automation, pp. 2397-2402, Rome, 10-14 April 2007.
- C2. G.L. Mariottini, F. Morbidi, D. Prattichizzo, G.J. Pappas, K. Daniilidis, *Leader-Follower Formations: Uncalibrated Vision-Based Localization and Control*, in Proc. of the IEEE International Conference on Robotics and Automation, pp. 2403-2408, Rome, 10-14 April 2007.
- C1. L. Consolini, F. Morbidi, D. Prattichizzo, M. Tosques, *On the Control of a Leader-Follower Formation of Nonholonomic Mobile Robots*, in Proc. 45th IEEE Conference on Decision and Control, pp. 5992-5997, San Diego, CA, 13-15 December 2006.

## 5 Others

### Society membership

- IEEE student member since January 2007
- Secretary of Italian Chapter of IEEE Robotics and Automation Society from October 2006,
- Member of IEEE Robotics and Automation Society (RAS).

### Activity as peer-reviewer

Peer-reviewer of several Journals in the area of Robotics, Automation and Control, Computer Vision, including *IEEE Transactions on Robotics*, *IEEE Transactions on Control Systems Technology*, *Robotics and Autonomous Systems*, *International Journal of Robotics & Automation*, *International Journal of Control*, *International Journal of Computer Vision*.

### Knowledge of foreign languages

- Italian: Mother tongue.
- English: Advanced level.
- French: Good knowledge of the spoken and written language.