

Mirko Ferrati



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EDUCATION AND TRAINING

Degree **Doctorate in Robotics** Oct 2012 - Jul 2016

Research Center E.Piaggio, University of Pisa [www.centropiaggio.unipi.it]

Dissertation Title Distributed Planning for Legged and Mobile Robots

Research and development of applications for trajectory planning and control of industrial robotic arms and humanoid robots. I developed C++ applications for low level hardware interfaces, kinematic control and motion planning, using YARP/ROS frameworks. I also developed novel coordination algorithms based on inter-robot wireless communication for path planning of multiple mobile robots.

Degree **Master in Robotics and Control Engineering** Feb 2010 - Oct 2012

Graduation Mark 110/110 cum laude: full honors

University of Pisa [<http://www.unipi.it>]

Thesis title Multi-agent collaborative protocol on Time Expanded Networks

I developed a new algorithm that reduces energy consumption of autonomous vehicles by optimizing the traffic flow on the streets

Degree **Bachelor's in Computer Engineering** Sep 2006 - Feb 2010

Graduation Mark 110/110 cum laude: full honors

University of Pisa [<http://www.unipi.it>]

Thesis title Reactive Behaviors for an autonomous robot in an unknown environment (Supervisor: P. Vilella) [<http://www.youtube.com/watch?v=57TKmCoCYWc>]

Student of the Sant'Anna School of Advanced Studies Oct 2006 - Sep 2012

Holding a full scholarship won in a national competition (11 scholarships , 227 participants) [<http://www.sssup.it>].

The courses taken are complementary to the ones offered by the University of Pisa and deepen particular topics: Mathematics, Computer Science (parallel computing, physical modeling/simulation, wireless sensor networks, real-time operating systems, real-time networks, algorithm complexity, neural networks), Automation.

PROFESSIONAL SKILLS AND COMPETENCES

Programming skills Languages: C++, Java, Python
IDE & Tools: Eclipse, Visual Studio, Kdevelop, Valgrind
Libraries: Boost, STL, Qt, OpenGL
Team development: Svn, Git, Doxygen

Robotics and Automation skills Software: ROS, YARP, Gazebo, PCL, OpenCV
Systems: Mobile robots, Humanoid robots, Industrial arms, Robotic hands, μ -controllers
Simulation and numerical analysis: Matlab, Simulink, Mathematica

Other skills Database: Mysql, SqlLite
Web design: Html5, Javascript

PROJECTS AND WORKING EXPERIENCE

Software architect for Walk-Man robot

Jan 2014 - Jun 2015

Darpa Robotics Challenge [www.theroboticschallenge.com]

Design, development and maintenance of the software architecture of the humanoid robot Walk-man [www.walk-man.eu].

The architecture was developed and used by a team of 15 robotics engineers in preparation for the Darpa Robotics Challenge. Development of many parts of the software modules: planning, operator GUI, network communication, low level actuators firmware communication, robot abstraction layer, whole body controllers.

Developer of a semantic planner for multiple end-effector manipulation

Mar 2015 - Sep 2015

Research and development of a semantic planner to coordinate a sequence of grasps and movements of multiple end-effector in order to manipulate an object. The planner is designed to work in smart factories and industries with collaborative robots. Kuka lightweight arms were used to test the planner.

Cloud System Engineer at Tagetik [www.tagetik.com]

Sep 2011 - Sep 2012

Development of a cloud management Java application and port of Tagetik On-Premise software to Microsoft Azure virtual machines. Such application port required to understand the whole Tagetik system and go learn new knowledge, like c# programming, cloud systems and Java web servers.

Visiting Student at Multimedia laboratory [gr-lsm.epfl.ch]

Aug 2010 - Sep 2010

École polytechnique fédérale de Lausanne, Lausanne, Switzerland

Development of a novel heuristic for a cache-aware optimized scheduler by graph inspection. Despite the short time, I managed to fit in the laboratory team and complete the project successfully.

Internship at Gustavo Stefanini laboratory [www.cgsrobotics.it]

Feb 2009 - Oct 2009

Development of an autonomous robot architecture with gps navigation and obstacles avoidance. Me and my team took part in the robotour competition [<http://robotika.cz/competitions/robotour/en>]

video: <http://youtu.be/xrLirfICPus>

Other projects

2006-2009

- Hardware and software project of an autonomous underwater vehicle for water pollution monitoring at the Research Center on Marine Robots of Livorno [<http://www.mrc.sssup.it>]
- Development of a usb graphic card on an Altera Fpga for Altera Innovate competition [www.innovateitaly.com]
- Sysadmin of the intranet facilities and computers on behalf of the students of the Scuola Superiore Sant'Anna
- Implementation of a text-based discrete simulator (similar to Simulink) for a class on advanced c++ programming (templates, patterns, software design)
- Implementation of a chat client/server running on FreeBSD/Linux

PERSONAL INTERESTS

Attended a 4-full-day course on Management and Organizational Behavior from *Challenge Learning Italia*

Personal interests

I am interested in scheduling, statistics, optimization.

I like coding for fun, spending weekends in European cities, doing math competitions and playing both strategic and simulation video-games.

Other experiences

I gave public speeches and took part in the organization of university orientation events. These events took place in various Italian cities and some of them were organized with only three days of notice. Their duration ranged from one to seven days, with hundreds to thousands of high school students attending.

Driving license

Italian car driver license

- Title** The Walk-Man Robot Software Architecture
M. Ferrati, Settimi, A., Muratore, L., Tsagarakis, N., Natale, L., and Pallottino, L.
Frontiers in Robotics and AI, 2016
- Title** ASCARI: a component based simulator for distributed mobile robot systems
M. Ferrati, Settimi, A., and Pallottino, L.
Modelling & Simulation for Autonomous Systems - MESAS2014, Rome, 5-6 May 2014, , vol. Lecture Notes in Computer Science, Volume 8906, pp. 152-163. 2014
- Title** A time expanded network based algorithm for safe and efficient distributed multi-agent coordination
M. Ferrati and Pallottino, L.
IEEE Conference on Decision and Control, Florence, Italy, 2013
- Title** On the Problem of Moving Objects With Autonomous Robots: A Unifying High-Level Planning Approach
H. Marino, Ferrati, M., Settimi, A., Rosales, C., and Gabiccini, M.
IEEE ROBOTICS AND AUTOMATION LETTERS, vol. 1, no. 1, pp. 469-476, 2016
- Title** Manipulation Framework for Compliant Humanoid COMAN: Application to a Valve Turning Task
A. Ajoudani, Lee, J., Rocchi, A., Ferrati, M., E. Hoffman, M., Settimi, A., Caldwell, D. G., Bicchi, A., and Tsagarakis, N. G.
IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS 2014), Madrid, Spain, November 18 - 20, 2014
- Title** Upper-body Impedance Control with an Intuitive Stiffness Emulation for a Door Opening Task
J. Lee, Ajoudani, A., E. Hoffman, M., Rocchi, A., Settimi, A., Ferrati, M., Bicchi, A., Tsagarakis, N. G., and Caldwell, D. G.
IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS 2014), Madrid, Spain, November 18 - 20, 2014
- Title** A modular approach for remote operation of humanoid robots in search and rescue scenarios
A. Settimi, Pavan, C., Varricchio, V., Ferrati, M., Mingo, E., Rocchi, A., Melo, K., Tsagarakis, N. G., and Bicchi, A.
Modelling & Simulation for Autonomous Systems MESAS2014, Rome, 5-6 May, 2014
- Title** Yarp Based Plugins for Gazebo Simulator
E. Mingo, Traversaro, S., Rocchi, A., Ferrati, M., Settimi, A., Romano, F., Natale, L., Bicchi, A., Nori, F., and Tsagarakis, N. G.
Modelling & Simulation for Autonomous Systems MESAS2014, Rome, 5-6 May, 2014