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## Teaching Portfolio

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I have 10 years experience in teaching basic and advanced classes in Robotics, Artificial Intelligence and Fundamentals of Informatics. In my career as researcher and docent I have supervised more than 30 M.S. and B.S theses and guided several robotics projects at the Artificial Intelligence and Robotics Laboratory (AIRLAB) in Politecnico di Milano. During many hours of teaching activities I had the opportunity to interact with students having different backgrounds, capabilities, and interests. According to my experience, independent from the individual talent, creativity and logical/mathematical capabilities, the achievement and performances of a student drastically depends on her/his internal motivation. It is one of my major goals to support and promote this motivation while teaching.

For two academic years, I had the opportunity to teach fundamentals of informatics at the first year of mechanical engineering in Politecnico di Milano as contract professor. The classes were composed of up to 140 students, this demanded for a systematic and well organized teaching activity, starting from slides preparation, availability for personal colloquium, exercises, exams, etc.

What I have learned when I was teaching in such large classes was the fact that keeping the attention of the students was only possible if I was able to involve them actively in the field of study.

In supervising students during bachelor or master theses I realized that a good balance of guidance and personal creativity and autonomy is essential to increase the self confidence of students and allow them to achieve the optimal result.

The mode of teaching and learning is currently changing very rapidly in our society, this is due to the fact that more and more information is everyday available at our fingertips. It is now possible to follow classes online from the best universities and professors all over the world, we can access instantaneously to immense libraries of books and scientific publications. However, I still think that a direct contact with the students and an active interaction with them is crucial to complete their formation and their personal development.

My expertise covers the following topics:

**Basic Robotics:** Robotics History, Basics of Linear Algebra, Homogeneous Coordinates, Direct/Inverse Kinematics, Trajectories Planning (Cartesian space, joint space), Sensors and Actuators for Robotics, Manipulators Static/Dynamic Models, Manipulators Control, Mobile Robots Architectures (wheels, legs), Control of Mobile Robots, Fundamentals of Stereo-Vision.

**Advanced Robotics:** Introduction to Humanoid Robotics, Design and Control of Anthropomorphic Arms, Design of Locomotion Systems based on Legs, BioInspired Control Strategies for Mobile Robots, Control Systems based on Neural Networks.

**Fundamentals of Informatics:** Introduction and History of Informatics, Calculator Architecture, Algorithms, Information Representation, Introduction to Operative System functions. Program Language (C): Data types (numbers, characters, strings, vectors, structures, pointers), Conditions, Cycles, Standard C libraries, Functions, Data Structures (lists, trees ..), Files.

All of these topics are covered by proper didactic material (e.g. slides, references, movies, programs) already prepared for lectures I have given in the past and updated regularly. Further details and the original slides presented during the lessons are available in the **Teach** section of my personal website <http://www.robocys.com/indice.html>.

In the following a complete list of classes I taught as teaching assistant and contract professor is provided. Furthermore, a list of specialized seminars I gave in different institutions is added.

#### **Teaching Experiences as a Contract Professor:**

1. Contract Professor: Fundamentals in Informatics Class, Mechanical Engineering, First Semester, Academic Year. 2004/2005, Politecnico di Milano.
2. Contract Professor: Fundamentals in Informatics Class, Mechanical Engineering, First Semester Academic Year 2005/2006, Politecnico di Milano.
3. Contract Professor: Robotics Project Class, Informatics Engineering, First Semester Academic Year 2005/2006, Politecnico di Milano.
4. Contract Professor: Robotics Project Class, Informatics Engineering, Second Semester Academic Year 2006/2007, Politecnico di Milano.
5. Contract Professor: Robotics Project Class, Informatics Engineering, Second Semester Academic Year 2007/2008, Politecnico di Milano.

#### **Teaching Experiences as an Assistant Professor:**

1. Teaching Assistant: Fundamentals in Informatics Class, Prof. Distante, Politecnico di Milano (Bovisa), 16 hours, First Semester, 2001/2002.
2. Teaching Assistant: Java Lessons Class, Prof. Cugola, Politecnico di Milano, Corso di Laurea in Disegno Industriale, 16 hours, First Semester, 2001/2002.
3. Teaching Assistant: Robotics A, Prof.ssa Gini, Politecnico di Milano, Campus Leonardo, 10 hours, First Semester, 2001/2002.
4. Teaching Assistant: Robotics A, Prof.ssa Gini, Politecnico di Milano, Campus Leonardo, 5 hours, First Semester, 2002/2003.
5. Teaching Assistant: Robotics, Prof.ssa Gini, Politecnico di Milano, Cam-

- pus Leonardo, 20 hours, Second Semester, 2002/2003.
6. Teaching Assistant: Robotics A, Prof.ssa Gini, Politecnico di Milano, Campus Leonardo, 30 hours, First Semester, 2003/2004
  7. Teaching Assistant: Robotics, Prof. Caglioti, Politecnico di Milano, Sede Como, 10 hours, First Semester, 2004/2005.
  8. Teaching Assistant: Robotics, Prof.ssa Gini, Politecnico di Milano, Campus Leonardo, 20 hours, Second Semester, 2004/2005.
  9. Teaching Assistant: Robotics 2, Prof.ssa Gini, Politecnico di Milano, Campus Leonardo, 16 hours, Second Semester, 2004/2005.
  10. Teaching Assistant: Robotics, Prof. Caglioti, Politecnico di Milano, Sede Como, 10 hours, First Semester, 2005/2006.
  11. Teaching Assistant: Robotics Prof.ssa Gini, Politecnico di Milano, Campus Leonardo, 20 hours, Second Semester, 2005/2006.
  12. Teaching Assistant: Robotics 2, Prof.ssa Gini, Politecnico di Milano, Campus Leonardo, 16 hours, Second Semester, 2006/2007.
  13. Teaching Assistant: Robotics Prof.ssa Gini, Politecnico di Milano, Campus Leonardo, 20 hours, Second Semester, 2005/2006.
  14. Teaching Assistant: Robotics 2, Prof.ssa Gini, Politecnico di Milano, Campus Leonardo, 16 hours, Second Semester, 2005/2007.
  15. Teaching Assistant: Robotics 4, Prof Frank Kirchner, Bremen University, 2 hours, Second Semester, 2008/2009.
  16. Teaching Assistant: Robotics 4, Prof Frank Kirchner, Bremen University, 2 hours, Second Semester, 2009/2010.
  17. Teaching Assistant: Robotics 4, Prof Frank Kirchner, Bremen University, 4 hours, Second Semester, 2010/2011

#### **Seminars as a Speaker:**

1. *Blackfingers Sviluppo di una mano artificiale per Robot Umanoidi*, Seminar organized by ENEA-MURST, Sirio Project, 2001.
2. "Develop of an Electro-tactile and Force Stimulator Interface for application in Virtual Reality" 12/09/2002 at DEI, Politecnico di Milano.
3. *Blackfingers, hand development for humanoid robots* 10/10/2002 at Electrical and Computer Engineering, Portland State University.
4. *Human-Like Reflex Control for an Artificial Hand* 22/11/2002 at the System Science Department, Portland State University.
5. *Blackfinger: una mano robotica, ispirata alla biologia* 20/01/2004 at Dipartimento di Scienze dell'Informazione, Università degli Studi di Milano
6. *MaximumOne: an Anthropomorphic Arm with a Bio-Inspired Control System*, 12/03/2007 at l'Istituto Dalle Molle di Studi sull'Intelligenza Artificiale (IDSIA), Lugano.
7. *MaximumOne: an Anthropomorphic Arm with a Bio-Inspired Control System*, DFKI-Lab Bremen, Germany 5/09/2007.

8. *BioInspired Robotic Systems Design and Control*, IYTE (Izmir Institute of Technology), Department of Computer Engineering 12-13/05/2010 , Turkey.