

Seminar Labex MS2T
“Control of Technological Systems of Systems”

<http://www.utc.fr/labexms2t/>

Alcherio Martinoli

Professor at the Ecole Polytechnique Federale de Lausanne and
Director of Distributed Intelligent Systems and Algorithms Laboratory (DISAL).



22 January 2013– 03:30 p.m

Université de Technologie de Compiègne
C221 Room - Centre de recherche de Royallieu
rue Personne de Roberval
60200 Compiègne

Distributed Sensing using Resource-Constrained Multi-Robot Systems

Abstract:

Technological advances in communication, embedded computing, energy storage, sensors and actuators enable an increasingly ubiquitous deployment of distributed, mobile, robotic systems in the real world. Several of the potential applications for multi-robot systems are concerned with distributed sensing and can be casted as search or coverage problems. In this seminar, I will describe the outcome of two recent PhD theses that followed a similar approach for tackling these two partially overlapping classes of problems. In particular, I will outline similarities in their overall approach, describe some of their developed methods, and support the discussion with their specific cases studies, one concerned with distributed odor localization and the other with distributed coverage of a jet turbine. Both case studies were characterized by different constraints (e.g., mechatronic volume, hardware and software resources) and sensing modalities (e.g., olfaction, vision) of the single robotic node, various team sizes, and different mission details (e.g., performance metrics, environmental peculiarities). I will in particular emphasize how often several extremely interesting search and coverage algorithms achieve substantially deteriorated performances when deployed on real, noisy, resource-limited, distributed platforms. Finally, I will conclude my seminar with some of the lessons we learned from these two PhD theses and extrapolate some hints for future research directions in distributed sensing.

Short Bio:



Alcherio Martinoli has a Master in Electrical Engineering from the Swiss Federal Institute of Technology in Zurich (ETHZ), and a Ph.D. in Computer Science from the Swiss Federal Institute of Technology in Lausanne (EPFL). He has more than fifteen years expertise in the area of robotics and intelligent systems, including one year of research activities at the ETHZ, one year at a Spanish Research Council institute in Madrid, Spain, and more than three years at the California Institute of Technology, Pasadena, U.S.A. In August 2003, he joined EPFL as Swiss National Science Foundation junior professor at the School of Computer and Communication Sciences and in May 2008 he became Associate Professor at the School of Architecture, Civil and Environmental

Engineering where he is leading the Distributed Intelligent Systems and Algorithms Laboratory (DISAL), a unit belonging to the Environmental Engineering Institute. His research interests focus on techniques to design, control, model, and optimize distributed, intelligent systems, including multi-robot systems, sensor and actuator networks, and intelligent vehicles. Among the recent achievements, Prof. Martinoli has received from the EPFL General Student Association the 2006 Best Teacher Award for Computer and Communication Sciences, has co-authored a paper on system identification methods for swarm robotic systems recipient of the Best Paper Award at the Distributed Autonomous Robotic Systems Symposium 2006, and another paper on the social integration of miniature robots into cockroach societies appeared on Science in 2007.