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The Department of Automatic Control & Systems Engineering
is pleased to announce the following joint seminar:

Planning Under Uncertainty and Robot Task Plan Performance Evaluation

Professor Pedro U Lima

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Thursday, 16 February 2017 at 13:45

LT014, Mappin Mining Block (entrance via the car park)

Abstract

My talk will be split in two parts. I will start by highlighting the research activities of the Intelligent Robots and Systems group that I coordinate at ISR/IST, illustrated by some short videos. Then I will switch to more focused material on formal approaches to planning under uncertainty and quantitative analysis of robot task plan performance.

Robotics needs systematic approaches to task modeling and planning, supported by formal methods, so as to enable stating performance bounds and several properties of a plan to carry out a task. Despite their theoretical nature, such formal approaches are crucial to ensure practical (often non-intuitive) results when applied to real robot systems, that scale up well with the several dimensions (e.g., number of robots, state space size) of the problem at hand. In this talk I will cover research developed by past PhD students, showing our perspective on how to deal with some of these issues. Topics will include the use of i) Petri nets for qualitative and quantitative modeling and analysis of robot tasks, task plan representation and (supervised) execution; ii) (partially observable) Markov decision processes (POMDPs) to model and solve problems of sequential decision-making under uncertainty; and iii) a blending of the two previous approaches: event-driven asynchronous POMDPs. Results of applying all these techniques to real systems composed of multiple networked mobile robots and static sensors will be shown.

Biography

Pedro U. Lima (Ph.D., Associate Professor) received the Licenciatura (5 years) and M.Sc degrees in Electrical and Computer Engineering at Instituto Superior Técnico (IST) in 1984 and 1989, respectively, and the Ph.D. (1994) in Electrical Engineering at the Rensselaer Polytechnic Institute, NY, USA. Currently, he is a Professor at IST, Universidade de Lisboa, and a researcher of the Institute for Systems and Robotics (ISR), where he is the coordinator of the Intelligent Robots and Systems group. He is the co-author of two books, and member of the Editorial Board of the Elsevier's Journal of Robotics and Autonomous Systems. His research interests lie in the areas of discrete event models of robot tasks and planning under uncertainty, with applications to networked robot systems. He has supervised successfully 16 PhD students since 2002, and currently (co-)supervises another 4 PhD students.

Pedro Lima is a Trustee of the RoboCup Federation, and was the General Chair of RoboCup2004, held in Lisbon. He was President and founding member of the Portuguese Robotics Society, was National Delegate to EU and ESA Space Robotics programs and was awarded a 6-month Chair of Excellence at the Universidad Carlos III de Madrid, Spain in 2010. He has been very active in EU research projects and was the Coordinator of the FP7 Coordination Action RoCKIn and member of the Advisory Board of the Mohamed Bin Zayed International Robotics Challenge (MBZIRC), whose first edition will take place in the United Arab Emirates in February 2017.

He has also been very active in the promotion of Science and Technology to the society, through the organization of Robotics events in Portugal, including the Portuguese Robotics Open since 2001.