



# XICINCO 2012

9<sup>th</sup> International Conference on  
Informatics in Control, Automation and Robotics

## Final Program and Book of Abstracts

Rome, Italy  
28 - 31 July, 2012

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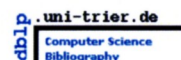
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Paper 330  
11:30 - 13:00 Room Madrid  
Parallel Session 6a - Robotics and Automation

**Robot-Dog – Human Interaction in Urban Search and Rescue Scenarios  
Improving the Efficiency of Rescue Teams in Hazardous Environments**

Anna Bosch, Xavier Cufi, Josep Ll. De la Rosa and Albert Figueras

*University of Girona, Girona, Spain*

**Keywords:** Robot-Dog – Human Interaction, Autonomous Robot, Cognitive Systems, Improving Efficiency of Search and Rescue Teams, Trained Dogs.

**Abstract:** After a natural urban disaster the interior of the rubble is often where the majority of victims are located. Mortality rates increases and peaks after 48 hours, so it is of major importance to have fast and effective search and rescue teams. Nowadays, the rescue and exploration teams normally use dogs as a companion to find victims. Trained dogs are very helpful in these situations since their high mobility, speed and detection capacity. However they need constant instructions and supervision, they can be in danger in some situations and they are not able to collect precise data from the environment. Instead of trying to build competing devices, the COMPANIONS project looks at cooperation between natural and artificial creatures and in particular robots and dogs. This is rather new ground for research, where all the dog shortcomings can be complemented with autonomous robots with cognitive abilities able to cooperate with dogs and humans in search and rescue environments. The aim of the project is to analyse how a team of agents (robots-dogs-humans in this case) can cooperate and interact during search and rescue. Research will be towards a new rescue scenario composed that will allow: (i) to empower the best characteristics of all the involved agents and to minimize the worst ones; (ii) provide the fundamental tools for enabling these three agents to work in a cooperative and efficient way in rescue missions; and (iii) and to lengthen the human-dog link by allowing the exploration combining mobile robots and trained dogs with more distant and safer human intervention in the dangerous rescue scenes. The main challenge will be the dog-robot interaction: to give visual cognitive and reasoning abilities to the robot in order to let him autonomously interact and cooperate with the dog according its behaviour and the environment conditions; and to specifically train a dog to correctly accept and interact the robot (in charge of an expert dog training company).

Paper 184  
11:30 - 13:00 Room Dali  
Parallel Session 6 - Signal Processing, Sensors, Systems Modelling and Control

**Adaptive Data Update Management in Sensor Networks**

C. M. Krishna

*University of Massachusetts at Amherst, Amherst, U.S.A.*

**Keywords:** Sensor Networks, Energy-aware Computing, Energy Harvesting, Accuracy Balancing.

**Abstract:** Transmitting messages is by far the most energy-intensive thing that most sensors do. We consider the problem of a sensor which regularly senses some parameter in its operating environment. Based on the value it knows to have been estimated at the base station (or other central information collation station) for that parameter, the actual sensed value, its remaining energy levels, and other quantities such as the time-to-go in the mission (if limited) or the anticipated energy inflow (if energy harvesting is used), it decides whether that sensed value is worth transmitting. We present heuristics to make this decision and evaluate their performance.

Paper 214  
11:30 - 13:00 Room Dali  
Parallel Session 6 - Signal Processing, Sensors, Systems Modelling and Control

**Hyper-elastic Pressure Sensors  
Temperature Dependence of Piezoresistivity of  
Polyisoprene – Nanostructured Carbon  
Composite**

Juris Zavickis, Maris Knite, Artis Linarts and Raimonds Orlovs

*Riga Technical University, Riga, Latvia*

**Keywords:** Temperature Dependence, Piezoresistivity, Polyisoprene, Carbon Black, Composite.

**Abstract:** Our previous efforts revealed polyisoprene-nanostructured carbon composite as prospective sensitive material for elaboration of entirely hyper-elastic piezoresistive pressure sensor element. In this article we investigate the temperature dependence on initial electrical resistivity as well as piezoresistive properties of such material and self-elaborated hyper-elastic pressure sensing element. Certain conclusions about the effect of temperature on electroconductive structure and piezoresistivity are made.