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Automatic  
Control and  
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Engineering

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

**Multi-Robot Systems**  
**A Case Study on Search: From Theory to System**

**Dr Andreas Kolling**  
*Department of Automatic Control and Systems Engineering*  
*The University of Sheffield*

**Wednesday, 20<sup>th</sup> November 2013 at 14:00**  
LT02, Sir Henry Stephenson Building

**Abstract**

For more than a decade we have been waiting for the robot revolution to produce robots that take over all our household chores and work for us on fields and factories alike. In the meantime there has been a separate emerging trend in robotics towards large-scale systems composed of much simpler but interconnected robots solving a wide range of complex tasks. Such kinds of systems are now surveilling vast landscapes for environmental monitoring and are carrying shelves in huge warehouses. They are automating hospitals and integrate into existing factories with increasing ease. In this talk we will examine the challenges of designing such multi-robot systems from theoretical foundations up to real systems. Particular emphasis will be placed on large-scale robotic search, a problem which we will relate to game theory, computational geometry, control theory, human-robot interaction and finally present several implementations of prototype search systems. One of these systems successfully executed a search with detection guarantees for lost hikers in a 700,000 square meter hilly terrain. The experiences made from the development of these prototypes triggered new research questions regarding the integration of complex technologies into one reliable large-scale robotic system, especially the consideration of human capabilities as a bridge technology. We will outline the research challenges that remain to be addressed to enable a utilization of the full power of multi-robot systems and how to extend current results to new application domains such as logistics.

**Biography**

Dr. Andreas Kolling joined the department of Automatic Control & Systems Engineering as a Lecturer in October 2013. He previously held postdoctoral positions at the Robotics Institute, Carnegie Mellon University, Pittsburgh, U.S., and Linköping University, Sweden. He completed his PhD in 2009 in Electrical Engineering and Computer Science at the University of California, U.S. He studies the design of multi-robot systems with an application-centric and interdisciplinary approach encompassing robotics, computer science, human-robot interaction, and cognitive science.