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Automatic  
Control and  
Systems  
Engineering

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

## **Fast model predictive control: Theoretical challenges and application to robotics**

**Dr Matteo Rubagotti**

*Lecturer in Control Engineering, Department of Engineering  
University of Leicester, UK*

**Wednesday, 24 May 2017 at 14:00**  
LT02, Sir Henry Stephenson Building

### **Abstract**

The seminar will cover theoretical and applicative aspects of Model Predictive Control (MPC). In embedded MPC implementations, real-time constraints and limited computational resources typically limit the number of online iterations of the solver that can be performed within the sampling period. In some relevant cases, the obtained solution is always infeasible, i.e., the associated prediction of inputs and states violates the imposed inequality constraints: as a consequence, at the next sampling instant there might not exist a feasible MPC solution. The first part of the seminar will focus on this problem, and present two approaches aimed at guaranteeing recursive feasibility in the presence of inexact solvers. The second part of the seminar will instead describe recent experiences in the formulation, implementation, and experimental testing of nonlinear MPC for variable-stiffness actuated (VSA) robots. VSA robots constitute a promising framework for the future of human-robot interaction, but their control presents many challenges, due to the presence of strong nonlinearities, the need to satisfy state constraints, and the tight requirements in terms of sampling rates.

### **Biography**

Matteo Rubagotti received the B.Sc. and M.Sc. degrees in computer engineering and the Ph.D. degree in electronics, computer science, and electrical engineering from the University of Pavia, Italy, in 2004, 2006, and 2010, respectively. He was a Post-Doctoral Fellow first at the University of Trento, Italy, and then at the IMT Institute for Advanced Studies, Lucca, Italy, from 2010 to 2012. From 2012 to 2015, he was an Assistant Professor with the Department of Robotics and Mechatronics, Nazarbayev University, Astana, Kazakhstan. Since 2015 he has been a Lecturer in Control Engineering at the University of Leicester, UK. His research interests include theoretical aspects of Model Predictive Control and Sliding Mode Control, and the application of Model Predictive Control to robotics and smart buildings.

*Light refreshments will be served in the  
foyer of the Sir Henry Stephenson Building following the seminar*