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Automatic  
Control and  
Systems  
Engineering

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

### **Robust approaches to distrusted model predictive control**

**Dr Paul Trodden**

*Lecturer, Department of Automatic Control and Systems Engineering  
The University of Sheffield*

**Wednesday, 30 November 2016 at 14:00**

LT02, Sir Henry Stephenson Building

#### **Abstract**

Distributed and non-centralized forms of model predictive control have attracted attention in the past decade or so as means of controlling large-scale, interconnected systems that are subject to constraints. The idea is to decompose a system-wide optimal control / MPC problem into several smaller problems, which are implemented and solved by independent controllers local to subsystems. Applications include power systems, chemical plants, transport and utility networks, and teams of mobile robots. Unfortunately, taking a non-centralized approach to control means that significant challenges arise from what can otherwise be (if solved in a centralized manner) a relatively straightforward optimal control / MPC problem; therefore, in order that the independent decision making of controllers leads to constraint satisfaction, stability and good performance, some degree of coordination is generally needed between controllers. In this talk, I will describe a recent approach to this problem that employs concepts from robust MPC in order to guarantee feasibility and stability despite the independent decision making and dynamic interactions between subsystems. An obvious criticism of such an approach is excessive conservatism; therefore, I will present some recent developments that aim to lower conservatism while retaining the guarantees of feasibility and stability.

#### **Biography**

Dr Paul Trodden is a Lecturer in the Department of Automatic Control & Systems Engineering (ACSE), University of Sheffield. He received the MEng degree in Engineering Science from the University of Oxford in 2003, and the PhD degree from the Department of Aerospace Engineering, University of Bristol, in 2009. Prior to joining the University of Sheffield in 2012, he held post-doctoral research positions in the Department of Aerospace Engineering, University of Bristol (2009-10) and then in the School of Mathematics, University of Edinburgh, where he was a member of the Edinburgh Research Group in Optimization (ERGO) and the Edinburgh Optimization for Energy group. His research concerns the control and optimization of large-scale systems, and includes distributed and hierarchical model predictive control, optimization-based decision making for agents sharing coupled constraints, and applications of control and optimization in aerospace and power systems.

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