

UQ Control Theory Workshop
Tuesday, 3 November 2015
Priestly Building 67-442, [St. Lucia Campus, UQ](#)

Organized by [Hanna Kurniawati](#) and [Yoni Nazarathy](#)

Schedule:

08:50 - 09:00 Opening and coffee
09:00 - 09:25 [Hanna Kurniawati](#)
09:25 Short break
09:30 - 09:55 [Yasin Abbasi](#)
09:55 - 10:20 [Diane Donovan](#)
10:20 Long break (+ discussion)
10:50 - 11:15 [Yoni Nazarathy](#)
11:15 - 11:40 [Surya Singh](#)
11:40 Short break
11:45 - 12:10 [Patrick O'Callaghan](#)
12:10 - 12:35 [Michael Kearney](#)
12:35 Lunch (+ discussion)

Hanna Kurniawati

Title: **Practical POMDP Solvers for Robotics Problems**

Abstract:

To operate reliably, autonomous robots must be able to make decisions that take into account the various types of uncertainty affecting its system and operating environments. The Partially Observable Markov Decision Process (POMDP) offers a principled approach for such decision-making capabilities. However, its high computational complexity has caused this approach to be deemed impractical for robotics problems. In this talk, I will discuss some of our work in enabling POMDPs to become more practical in robotics. I will also discuss our more recent work in alleviating the high computational complexity of solving (approximately) POMDP problems with continuous action space.

Yasin Abbasi

Title: **A Fast and Reliable Policy Improvement Algorithm**

Abstract:

We introduce a simple, efficient method that improves stochastic policies for Markov decision processes. The computational complexity is the same as that of the value estimation problem. We prove that when the value estimation error is small, this method gives an improvement in performance that increases with certain variance properties of the initial policy and transition dynamics. Performance in numerical experiments compares favorably with previous policy improvement algorithms.

Diane Donovan

Title: **Mathematical Connections:-Modelling, Experimental Design & Analysis**

Abstract:

A brief survey some recent work that crosses the boundaries of pure mathematics, experimental statistics and mathematical modelling. I will give a gentle introduction to both the discrete and continuous mathematical structures we are using to study to problems arising in natural resources industries. Part of the focus will be on space filling experimental designs, leading to a discussion of mathematical modelling using orthogonal polynomials.

Yoni Nazarathy

Title: **The Challenge of Stabilizing Control for Queueing**

Systems with Unobservable Server States

Abstract:

We address the problem of stabilizing control for complex queueing systems where servers follow unobservable Markovian environments. The controller needs to assign servers to queues without full information about the servers' states. A control challenge is to devise a policy that matches servers to queues in a way that takes state estimates into account and updates these estimates in the best way possible. Maximally attainable stability regions are non-trivial.

Surya Singh

Title: **Symmetric Insights About Motion: Exploiting continuous symmetry for fast motion correction**

Abstract:

For a trajectory or motion, we will introduce an approach that exploits kinematic symmetries to simplify regulation and make tracking faster and more accurate. We will illustrate this with a simple non-holonomic robot and discuss how this might inform a design approach that can respond in a more natural way that avoids unnecessary action and reduces the likelihood of saturation and violating constraints. We conclude with a discussion on applications -- Might $SO(n)$ be the next thing for ESSO?

Patrick O'Callaghan

Title: Chinese walls: **An application of Malliavin calculus to unawareness**

Abstract: TBA

Michael Kearney

Title: TBA

Abstract: TBA