

Guest Lecture  
**Ian Mitchell, UBC**

**Date:** Jan. 23  
**Time:** 12:30  
**Location:** AQ 5030



**Title:** Improvements in robust model checking for human-in-the-loop shared control of continuous state systems.

**Abstract:** Recent demonstrations of continuous state reachability in thousands of dimensions are impressive, but to maximize control authority while ensuring safety for human-in-the-loop robotic or cyber-physical systems we need not just to identify the existence of a safe trajectory, but to characterize the set of safe controls. In the first part of the talk I will describe two algorithms for constructing under-approximations of robust controlled invariant or viable sets of uncertain linear systems. Time permitting, I will also describe a class of methods that account for runtime state uncertainty. Examples are drawn from the domains of automated anesthesia, quadrotors and smart wheelchairs.

**Bio:** Ian M. Mitchell completed his doctoral work in engineering at Stanford University in 2002, spent a year as a postdoctoral researcher at the University of California at Berkeley, and is now a Professor of Computer Science at the University of British Columbia in Vancouver. He is the author of the Toolbox of Level Set Methods, the first publicly available high accuracy implementation of solvers for dynamic implicit surfaces and the time dependent Hamilton-Jacobi equation that works in arbitrary dimension. His current research emphasizes control and planning in cyber-physical and robotic systems with a focus on safety of human-in-the-loop designs. He also studies development of algorithms and software for differential equations, formal verification, assistive technology and reproducible research.