

COLLEGE OF ENGINEERING

Control Seminar



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How I Learned to Stop Worrying and Love Lifting to Infinite Dimensions



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ABSTRACT: Autonomous systems offer the promise of providing greater safety and access for people throughout the world. However, this positive impact will only be achieved if the underlying algorithms that control such systems can be certified to behave robustly. This talk will describe a pair of techniques grounded in infinite dimensional optimization to address this challenge. The first technique, which is called Reachability-based Trajectory Design, constructs a parameterized representation of the forward reachable set, which it then uses in concert with predictions to enable real-time, collision checking. This approach, which is certified to generate not-at-fault behavior, is demonstrated across a variety of different real-world platforms. The second technique is a modeling method that allows one to represent a nonlinear system as a linear system in the infinite-dimensional space of real-valued functions. By applying this modeling method, one can employ well-understood linear model predictive control techniques to robustly control nonlinear systems. The utility of this approach is verified on a soft robot control task.

BIO: Ram Vasudevan is an assistant professor in Mechanical Engineering at the University of Michigan. He received a BS in Electrical Engineering and Computer Sciences in 2006, an MS degree in Electrical Engineering in 2009, and a PhD in Electrical Engineering in 2012 all from the University of California, Berkeley. He is a recipient of the NSF Career Award in 2018 and the ONR Young Investigator Award in 2018.