"Towards Autonomy with Safety Guarantee and Resource Efficiency"
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Abstract: We are witnessing a new era of autonomy – from robot vacuum cleaners in the houses, to autonomous cars in the streets, to delivery drones in the sky, to exploration rovers on Mars. Autonomy of those robotic systems involves control at different layers, which include the planning layer producing mission sequences, the trajectory layer synthesizing an optimal reference trajectory, and the feedback layer generating the feedback control law. In this talk, I will discuss my research that aims to achieve the autonomy of robotic systems in a provably safe and energy-efficient fashion. I will first describe a provably safe optimization-based feedback control framework that is able to dynamically balance control objectives and safety constraints, and show its application to autonomous driving systems. Then I will discuss a matrix-based, state-space framework for finite state machines that are used to model the high-level decision-making process, and show how such modeling can be used to verify the stability of constrained switching systems whose switching signals are constrained by finite state machines. Finally, I will talk about periodic event-triggered control design for nonlinear systems with the aim of mitigating unnecessary waste of resources, where convex optimization is used to determine the sampling interval and the triggering rules.

Bio: Xiangru Xu is a postdoc in Autonomous Control Lab in the Department of Aeronautics & Astronautics at the University of Washington, Seattle, WA. Prior to joining UofWashington, he was a research fellow in the Department of Electrical Engineering & Computer Science at the University of Michigan, Ann Arbor, MI. Xiangru received his B.Sc. in applied mathematics from Beijing Normal University and Ph.D. in control from Chinese Academy of Sciences. His research is primarily in optimization-based control and nonlinear control, with applications to robotic and autonomous systems.

Date: Monday, Feb. 4th   **Time: 3PM**
Place: CB 114   **Contact: Dr. Alexandre Martin 257-4462**

Meet the speaker and have refreshments
Attendance open to all interested persons

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