



**Tuesday, February 28, 2017  
4:30 PM Computer Science 105**

## **Towards a Theory of Safe and Interactive Autonomy**

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Today's society is rapidly advancing towards cyber-physical systems (CPS) that interact and collaborate with humans, e.g., semi-autonomous vehicles interacting with drivers and pedestrians, medical robots used in collaboration with doctors, or service robots interacting with their users in smart homes. The safety-critical nature of these systems requires us to provide provably correct guarantees about their performance in interaction with humans. The goal of my research is to enable such human-cyber-physical systems (h-CPS) to be safe and interactive. I aim to develop a formalism for design of algorithms and mathematical models that facilitate correct-by-construction control for *safe and interactive autonomy*.

In this talk, I will first discuss *interactive autonomy*, where we use algorithmic human-robot interaction to be mindful of the effects of autonomous systems on humans, and further leverage these effects for better safety, efficiency, coordination, and estimation. I will then talk about *safe autonomy*, where we provide correctness guarantees, while taking into account the uncertainty arising from the environment. Further, I will discuss a diagnosis and repair algorithm for systematic transfer of control to the human in unrealizable settings. While the algorithms and techniques introduced can be applied to many h-CPS applications, in this talk, I will focus on the implications of my work for semi-autonomous driving.

Dorsa Sadigh is a Ph.D. candidate in the Electrical Engineering and Computer Sciences department at UC Berkeley. Her research interests lie in the intersection of control theory, formal methods, and human-robot interactions. Specifically, she works on developing a unifying framework for safe and interactive autonomy. Dorsa received her B.S. from Berkeley EECS in 2012. She was awarded the NDSEG and NSF graduate research fellowships in 2013. She was the recipient of the 2016 Leon O. Chua department award and the 2011 Arthur M. Hopkin department award for achievement in the field of nonlinear science, and she received the Google Anita Borg Scholarship in 2016.

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