

Synthesis for Robots: Guarantees and Feedback for Complex Behaviors

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Bowen Hall Rm 222



Hadas Kress-Gazit
Associate Professor
Cornell University

Getting a robot to perform a complex task, for example completing the DARPA Robotics Challenge, typically requires a team of engineers who program the robot in a time consuming and error prone process and who validate the resulting robot behavior through testing in different environments. The vision of synthesis for robotics is to bypass the manual programming and testing cycle by enabling users to provide specifications – what the robot should do – and automatically generating, from the specification, robot control that provides guarantees for the robot's behavior.

In this talk I will describe the work done in my group towards realizing the synthesis vision. I will discuss what it means to provide guarantees for physical robots, types of feedback we can generate, specification formalisms that we use and our approach to synthesis for different robotic systems such as modular robots and multi robot systems.

Hadas Kress-Gazit is an Associate Professor at the Sibley School of Mechanical and Aerospace Engineering at Cornell University. She received her Ph.D. in Electrical and Systems Engineering from the University of Pennsylvania in 2008 and has been at Cornell since 2009. Her research focuses on formal methods for robotics and automation and more specifically on synthesis for robotics -automatically creating verifiable robot controllers for complex high-level tasks. Her group explores different types of robotic systems including modular robots, soft robots and swarms and synthesizes (pun intended) ideas from different communities such as robotics, formal methods, control, hybrid systems and computational linguistics. She received an NSF CAREER award in 2010, a DARPA Young Faculty Award in 2012 and the Fiona Ip Li '78 and Donald Li '75 Excellence in teaching award in 2013.