Abstract: Robots are increasingly becoming a part of our daily lives, from the automated vacuum cleaners in our homes to the rovers exploring Mars. However, while recent years have seen dramatic progress in the development of affordable, general-purpose robot hardware, the capabilities of that hardware far exceed our ability to write software to adequately control.

The key challenge here is one of abstraction. Generally capable behavior requires high-level reasoning and planning, but perception and actuation must ultimately be performed using noisy, high-bandwidth, low-level sensors and effectors. I will describe recent research that uses hierarchical reinforcement learning as a basis for constructing robot control hierarchies through the use of learned motor controllers, or skills.

The first part of my talk will address autonomous robot skill acquisition. I will demonstrate a robot system that learns to complete a task, and then extracts components of its solution as reusable skills, which it deploys to quickly solve a second task. The second part will briefly focus on practical methods for acquiring skill control policies, through the use human demonstration and active learning. Finally, I will present new results establishing a link between the skills available to a robot and the abstract representations it should use to plan with them. I will discuss the implications of these results for building true action hierarchies for reinforcement learning problems.

Biography: George Konidaris is an Assistant Professor of Computer Science and Electrical and Computer Engineering at Duke University. He holds a BScHons from the University of the Witwatersrand, an MSc from the University of Edinburgh, and a PhD from the University of Massachusetts Amherst. Prior to joining Duke, he was a postdoctoral researcher at MIT. He is a recipient of a 2015 DARPA Young Faculty Award.