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Intrinsically Motivated Behavior in Embodied Robot Systems

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ABSTRACT OF THE TALK

In this talk I will discuss my doctoral research conducted at the Laboratory for Perceptual Robotics at the University of Massachusetts Amherst.
This work brings into alignment two disparate ideas in the robotics literature---embodiment and intrinsic motivation. Embodiment, or more specifically, embodied cognition, suggests that the nature of intelligence is inherently and inseparably grounded in an organism's physical body. Psychological theories of intrinsic motivation suggest that there exist internal drives favoring open-ended cognitive development and exploration. Although more specific definitions of either topic are generally not agreed upon, I propose that a consideration of their conjunction can provide a new perspective on each.

The research presented in this talk builds upon a computational framework for cognitive development called the "control basis" created at the Laboratory for Perceptual Robotics. This framework proposes that behavior result from the assembly of an organism's sensory and motor resources into state and action spaces that can be explored autonomously. I extend this work to show how an intrinsic reward framework called the "Multi-Modal Imperative" can lead to the open-ended development of robust hierarchical behavior and affordance-based memory structures for a bimanual robot, Dexter. Such accumulation of skill over the long term by a single robot is a novel contribution that has yet to have been demonstrated in the literature.