BIOENGINEERING RECRUITING SEMINAR

“Engineering behavior in Drosophila”

Tuesday – April 14, 2015 – 9:30 a.m.
EPFL – room SV1717a

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host: Prof. M. Lutolf

Abstract
A shared goal of neuroscience and robotics is to understand how systems can be built to move effectively through the world. Powerful new tools for reverse engineering animal behavior (e.g. genomics, optogenetics, and neural recording) and for constructing bioinspired artificial systems (e.g. compliant materials, miniaturized sensors, and neuromorphic chips) now permit a more fluid and fertile exchange between biology and robotics. For example, the fruit fly, Drosophila melanogaster, has a genome that is easily edited, a numerically small nervous system, and a remarkably complex repertoire of behaviors. This makes it ideally suited to reveal how neurons and genes orchestrate animal behavior with potentially profound impact on robotic control applications. In this talk I will describe how, with this goal in mind, I have combined experimental and computational tools to uncover design principles for Drosophila behavior. First, I will discuss how I used neural engineering to identify the sensory pathways responsible for driving enhanced, group-level responses to environmental cues. These findings make it possible to explore the neurogenetics of collective behavior with potential impact on our understanding of human crowd dynamics as well as in the control of robotic swarms. Second, I will show how I identified an unexpected link between leg adhesion and the evolution of locomotor coordination using computational and robotic approaches. These results motivate a deeper understanding of how genes shape biomechanics and animal behavior. In combination, these studies provide a glimpse of the exciting scientific opportunities at the interface between Drosophila biology and robotics.

(Dr. Ramdya is applying for a position in Bioengineering at the EPFL)

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