

Walking over rough terrain requires walkers to perform a rapid visual search on the upcoming path to identify footholds to ensure safe and stable locomotion. In this talk, I will examine how vision is used to guide foot placement, and discuss how optic flow arising from self-motion may contribute to the control of locomotion through the natural world. We developed a novel apparatus to record 3D gaze and full body kinematics of walkers traversing different types of real-world rough terrain. The relationship between gaze and upcoming footholds reveals that walkers tune their gaze allocation strategy to the constraints of the terrain they are traversing in order to maintain a consistent gait control strategy that balances energetic efficiency and locomotor stability. In addition, we analyzed the head-mounted video to measure the optic flow stimulus experienced during real-world locomotion. The resulting patterns of optic flow (and the behavior of the focus of expansion) are markedly different from descriptions in the literature on the neural processing of visual self-motion. Nevertheless, there are regularities to both head-centered and retinal-centered optic flow that suggest a much richer source of information that may be used to enact fine grained control of locomotion through the natural world.