

Visual Control of Locomotion: From Pedestrians to Crowds

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How would you design a vision-guided wheelchair that can maneuver through a crowded shopping mall? Really, you are designing an agent-environment interaction, in which vision must provide behaviorally-relevant information. I will approach this problem by discussing how humans visually control their locomotion in a complex, dynamic environment. Based on experiments in ambulatory VR, we are building a *pedestrian model* with visual control laws for basic behaviors such as steering, obstacle avoidance, interception, following, and pedestrian interactions. Using the model, we can predict locomotor trajectories in more complex environments, and even the collective behavior of crowds. Multi-agent simulations of the model reproduce motion-capture data on human crowds in scenarios like *Grand Central Station*, *Human Swarm*, and *Counterflow*, with just a few basic behaviors. The results demonstrate that locomotor behavior emerges on-line from the agent-environment interaction, without relying on a predictive world model or path planning.