Abstract Submitted
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Managing and capturing the physics of robotic systems JUSTIN WERFEL, Harvard University — Algorithmic and other theoretical analyses of robotic systems often use a discretized or otherwise idealized framework, while the real world is continuous-valued and noisy. This disconnect can make theoretical work sometimes problematic to apply successfully to real-world systems. One approach to bridging the separation can be to design hardware to take advantage of simple physical effects mechanically, in order to guide elements into a desired set of discrete attracting states. As a result, the system behavior can effectively approximate a discretized formalism, so that proofs based on an idealization remain directly relevant, while control can be made simpler. It is important to note, conversely, that such an approach does not make a physical instantiation unnecessary nor a purely theoretical treatment sufficient. Experiments with hardware in practice always reveal physical effects not originally accounted for in simulation or analytic modeling, which lead to unanticipated results and require nontrivial modifications to control algorithms in order to achieve desired outcomes. I will discuss these points in the context of swarm robotic systems recently developed at the Self-Organizing Systems Research Group at Harvard.

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