Swarms of Self-assembling Robots

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Abstract. In this talk I present recent research in swarm robotics, the discipline that studies robotic systems composed of swarms of robots tightly interacting and cooperating to reach their goals. In particular, I will present a new type of robot, called swarm-bot, and the results of a number of experiments run with it. A swarm-bot [4,7] is an artifact composed of a swarm of assembled s-bots. The s-bots are mobile robots capable of connecting to, and disconnecting from, other s-bots. In the swarm-bot form, the s-bots are attached to each other and, when needed, become a single robotic system that can move and change its shape. S-bots have relatively simple sensors and motors and limited computational capabilities. A swarm-bot can solve problems that cannot be solved by s-bots alone. In the talk, I first describe the s-bots hardware and the methodology we followed to develop algorithms for their control. Then I illustrate the capabilities of the swarm-bot robotic system by showing video recordings of some of the many experiments we performed to study coordinated movement [1], path formation [8], collective transport [5], shape formation [2,3], and other collective behaviors [6,9,10].

Keywords: swarm robotics, swarm-bot, s-bots.

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