

Literature Review

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Why do caterpillars swarm? We built a game to find out

- <https://www.wired.com/2013/07/why-do-caterpillars-swarm-we-built-a-game-to-find-out/>
- Caterpillars use their bodies as a constantly re-assembling and disassembling conveyor belt
- Contains link to rutgers website with the online applet

Video of Ryan's Caterpillar Model

- <https://id-news.com/online/caterpillar-rolling-swarm-physical-demonstration-JMi20j0rkVg.html>

From Swarm Intelligence to Swarm Robotics

- https://link.springer.com/content/pdf/10.1007%2F978-3-540-30552-1_1.pdf
- An example of swarm behavior in ants is when ants release pheromones in order to mark the quality of a path
- Commentary:
 - It has good introductions to Swarm behavior and concepts
 - No experiment setup/procedure

The Cooperation of Swarm-Bots: Physical Interactions in Collective Robotics

- <https://ieeexplore.ieee.org/document/1458313/#full-text-section>
- In a swarm robotics system, although each single robot of the swarm is a fully autonomous robot, the swarm as a whole can solve problems that single robots cannot deal with because of limited capabilities or physical constraints. Swarm robotics researchers use the social insect metaphor as their main source of inspiration and emphasize concepts such as control decentralization, limited communication bandwidth, coordination via local information, emergence of global behavior, and robustness.
- Therefore, they are not capable of autonomously self-assembling, which is a main feature of swarm-bots.
 - The first challenge in designing the s-bots was the choice of connection types and their properties (flexible, rigid) and number of degrees of freedom (DOF). Another important issue was the mobility of the swarm-bot with respect to individual s-bots. Should the swarm-bot move by acting on the s-bot connections (rotate like a track or a ball made of s-bots) or by relying on the mobility of each individual s-bot (wheels, legs, and tracks)?

A Self Assembly Modular Robot for Swarm Robot

- <https://ieeexplore.ieee.org/document/5509214/#full-text-section>
- Features
 - Autonomy: Each module is an autonomous mobile robot including the power supply, microprocessor, drives, sensors and communications unit

- Self-assembly: in order to realize the self-assembly, each Sambot should have active docking mechanism, so that it can realize autonomous connection and disconnection of two or more modules
- Motion Ability: the robotic structures assembled with multiple modules should have the locomotion same to that of chain-type reconfiguration robots.
- Self-reconfiguration or self-metamorphic: the robotic structures assembled with multiple modules should have the ability of self-reconfiguration or self-metamorphic, i.e. transform from one robotic structure (e.g. a snake) to another robotic structure (e.g. a quadruped)

Energy Harvesting in-vivo Nano-Robots in Caterpillar Swarm

- https://www.researchgate.net/publication/307415927_Energy_Harvesting_in-vivo_Nano-Robots_in_Caterpillar_Swarm
- Caterpillar swarm inspired particle systems involve layered architecture with at least one, and up to a predefined number of layers

Kinematics and Implementation of a Modular Caterpillar Robot in Trapezoidal Wave Locomotion

- http://journals.sagepub.com/doi/full/10.5772/56727#_i46
- Esp sections 4 and 5