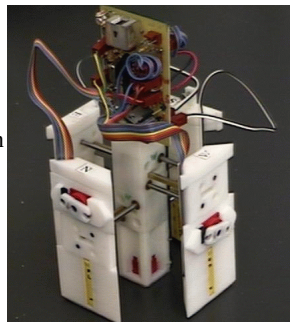
Reconfigurable Robots
Chairs: Aydan Erkmen, Pradeep Khosla

A physical implementation of the self-reconfiguring crystalline robot

Daniela Rus and Marsette Vona
Dartmouth College

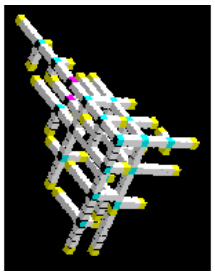
- Crystalline Robot Concept and Advantages
- Details of Robot Hardware Design
- 10 Units Built
- Experimental Procedures and Results



Emergent Structures in Modular Self-reconfigurable Robots

Hristo Bojinov, Arancha Casal and Tad Hogg
Xerox Corporation

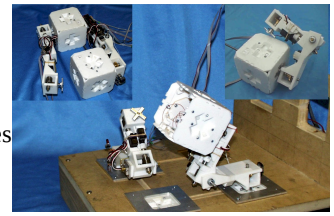
- Biologically-inspired approach to self-reconfiguration for modular metamorphic robots
- Use of local simple rules result in the
- Design and evaluation of control algorithms through simulation
- Resulting structures are of pseudo-random shape but posses desired functionality. Approach does not require a priori exact target shape description, which is of advantage in uncertain environments.



Mechatronic Design of a Modular Self-Reconfigurable Robotic System

Cem Unsal and Pradeep Khosla
Carnegie Mellon University

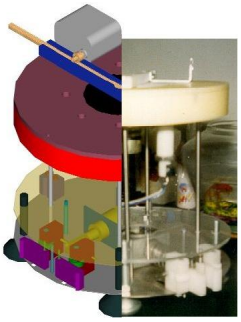
- 3-D Self-reconfiguration
- Design and Implementation of the Bipartite System
- Experiments with Prototypes
- Discussion and Concluding Remarks



Self Localization of a Holon in the Reconfiguration Task Space of a Robotic Colony

M. Durna, I. Erkmen and A. M. Erkmen
Middle East Technical University

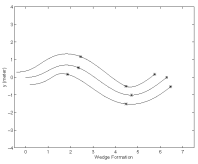
- Self-Localization of an intelligent robotic agent in a robotic colony.
- Distributed computation of a Coalition Law is proposed.
- The method is simulated.
- Localization is attained by each agent which than be used for Reconfiguration of the whole system.



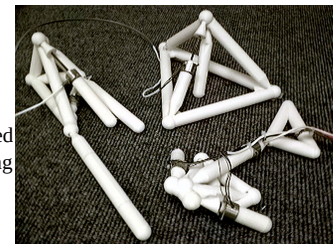
Formation Control of Autonomous Agents in 3D Workspace

W. Kang[1], N. Xi[2] and A. Sarks[3]
[1]Naval Postgraduate School, [2]Michigan State University and [3]Wright-Patterson AFB

- A general method of formation control of multi-vehicles.
- Multiple vehicle coordination and formation reconfiguration.
- Design algorithm and mobile robot simulation.
- Stability of the formation controllers.



Towards Continuously Reconfigurable Self-Designing Robotics

H. Lipson and J. B. Pollack
Brandeis University

- From Sims To Reality:
- Electro-Mechanical systems evolve in simulation for the task of locomotion
- Successful machines are replicated into reality using rapid prototyping equipment
- Robots perform and then melt for reuse