PHYSICAL ARTIFICIAL LIFE
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At the MIT Artificial Intelligence Laboratory we have been building prototype artificial creatures, electromechanical machines which are able to operate autonomously in unstructured domains. The goal is to eventually build machines that can survive for months at a time in natural and man-made environments performing useful or pleasing tasks without human interference.

Our artificial creatures have ranged in size from 50 kilograms down to 50 grams, although we have also built motors as small as 200 micrometers in diameter in preparation for building artificial creatures in the millimeter size range.

A key advance was the development of behaviour-based methods for building the intelligence of these creatures. Inspired by evolution we incrementally build parallel layers of intelligence, each linking sensors to actuators. The result is a network of simple computational elements. The layers directly implement action patterns, and traditionally studied aspects such as perception, planning, and reasoning, are produced as an emergent property of the networks. We have built insect-like six legged robots which can walk over rough terrain, visually based robots which can navigate indoors giving crude tours of our laboratory to visitors, vacuum cleaning robots, a soda-can collecting robot, and a large collection of identical robots programmed in ways similar to insects that live in colonies.

The results are robots which have life-like attributes and point the way for future generations of artificial creatures.