

## Article abstract

*Nature Physics*

Published online: 17 January 2010 | doi:10.1038/nphys1508

# Self-organized adaptation of a simple neural circuit enables complex robot behaviour

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**Controlling sensori-motor systems in higher animals or complex robots is a challenging combinatorial problem, because many sensory signals need to be simultaneously coordinated into a broad behavioural spectrum. To rapidly interact with the environment, this control needs to be fast and adaptive. Present robotic solutions operate with limited autonomy and are mostly restricted to few behavioural patterns. Here we introduce chaos control as a new strategy to generate complex behaviour of an autonomous robot. In the presented system, 18 sensors drive 18 motors by means of a simple neural control circuit, thereby generating 11 basic behavioural patterns (for example, orienting, taxis, self-protection and various gaits) and their combinations. The control signal quickly and reversibly adapts to new situations and also enables learning and synaptic long-term storage of behaviourally useful motor responses. Thus, such neural control provides a powerful yet simple way to self-organize versatile behaviours in autonomous agents with many degrees of freedom.**

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**Nature Physics**

ISSN 1745-2473

EISSN 1745-2481

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