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Robots can sense environs, change gait

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LONDON: Simple insects, which can crawl uphill or downhill with their six legs, have inspired scientists to invest robots with similar skills. The walking robot, depending on the situation, can flexibly and autonomously switch between different gaits.

A small and simple network with just a few connections can create very diverse movement patterns, say researchers from Bernstein Centre for Computational Neuroscience, Germany. In humans and animals, movements like walking or breathing are controlled by small neural (nerve, brain cell) circuits called "central pattern generators" (CPG). Scientists have been using this principle in the development of walking machines. To date, typically one separate CPG was needed for every gait.

The robot receives information about its environment via several sensors — about whether there is an obstacle in front of it or whether it is to climb a slope. Based on this information, it selects the CPG controlling the gait that is appropriate to the situation.

The robot developed by BCCN now manages the same task with only one CPG that generates entirely different gaits and which can switch between these gaits in a flexible manner. This CPG is a tiny network consisting of two circuit elements.

The secret of its functioning lies in the so-called "chaos control". If uncontrolled, the CPG produces a chaotic activity pattern. This activity, however, can very easily be controlled by the sensor inputs into periodic patterns that determine the gait.

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