Speedy robot legs it to break record

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19:00 05 April 2006
NewScientist.com news service
Tom Simonite

A two-legged robot that walks at record-breaking speed has been developed by researchers from Germany and Scotland.

"RunBot" is the fastest robot on two legs – for its size. At 30 centimetres high, it can walk at a speedy 3.5 leg-lengths per second. This beats the previous record holder – MIT's "Spring Flamingo" – which is four times as tall but manages just 1.4 leg-lengths per second.

The robot is controlled by a simple program that mimics the way neurons control reflexes in humans and other animals. Unlike most other two-legged robots, RunBot has few sensors and can detect just two things – when a foot touches the ground, and when a leg swings forward.

"We wanted to show that a very simple system with a simple neuronal controller could walk in a natural manner – and fast," says Florentin Wörgötter, from the University of Göttingen in Germany, who developed RunBot along with researchers at the University of Glasgow and the University of Stirling, both in Scotland.

Two mpeg videos show RunBot walking at a steady speed and gradually learning to walk more rapidly.

Into the swing

RunBot's walking motion is initiated by a simple set of controls. When one of the robot's feet touches the ground, the opposite leg swings forward, throwing it off balance. The knee of the swinging leg bends automatically until a sensor in the hip causes it to straighten out, ready to hit the ground. When this leg touches the ground, the cycle starts again.

"Most walking robots don't work like this," Wörgötter says. "They have more complex control and monitoring over the movement of the robot."

His team mimicked biology to make their robot walk efficiently. "Humans have simple neural systems that learn a few basic modes of movement that function as reflexes," he says. "RunBot works the same, putting it on the ground triggers the reflex."

Software that mimics neuronal control allows RunBot to learn to walk more quickly. It tries different things, Wörgötter explains: "If a change doesn't help its speed, RunBot tries something else." In testing, this enabled the robot to accelerate to three times its initial speed.

RunBot currently walks around the edge of a circular room and is connected the centre of the room by a boom. But Wörgötter plans to develop a freestanding version next, and thinks it should be straightforward because the boom has only a small influence on its ability to walk.

Scalability

Russ Tedrake, from the Robot Locomotion Group at MIT, US, says RunBot demonstrates the power of modelling robots on biological systems. "It's pretty impressive, they've done a good job of creating a dynamic system," he told **New Scientist**. "It contrasts with robots that have to do unnecessary work to fight their dynamics."

Tedrake notes that robots such as Honda's Asimo have control systems that work overtime to maintain perfect balance, rather than using inertia as part of their gait.

But using a biological approach does have its disadvantages, Tedrake adds. "It seems easier to get nice walking that way," he says, "but it may not scale up – but I'll be interested to see if it does."

Journal reference: *The International Journal of Robotic Research* (vol 25, issue 3)

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