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# Robot Shatters Mechanical Speed-Walking Record

Friday, April 28, 2006  
By **Corey Binns**



**A simple-minded, two-legged robot named RunBot can't run. But boy, can it walk!**

The 1-foot tall European speed demon moves at 3.5 leg-lengths per second.

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That's the equivalent of a human walking almost 10 feet per second; and more than twice as fast as its closest running mate, **Spring Flamingo**, who hails from the **Massachusetts Institute of Technology**.

"There are a few principles which come together here which make this design more efficient than former ones," said computational neuroscientist Florentin Worgotter of the **University of Gottingen** in Germany.

## Small brain, big step

Like a speed-walking human, RunBot's knees remain relatively straight. Its winning clip comes from taking lots of long strides that swing from the hips, which bend more than the knees.

The research team also designed a simple neural network to mimic human neurons.

*(Story continues below)*

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Two sensors act like neurons to control the robot's hip "muscles" or motors. The hip sensors tell the hip motors to make fast, long strides.

Meanwhile, knee "neurons" keep the knee "muscles" stiff for most of the gait cycle, so they don't bend much at high velocities.

"When it walks slowly, the knees bend a lot — when it walks fast they don't," Worgotter said.

Sensors on the soles of RunBot's feet measure when they come into contact with the ground.

As soon as one leg touches the ground, that foot sensor triggers a reflex to move the other leg, and the cycle continues.

The robot's small curved feet easily roll it forward, maintain its balance, and also facilitate the machine's hustle.

## Self-motivation

The automated ambler applies self-driven tactics to reach such top speeds.

Its motors are turned off for about a quarter of every gait cycle. At that time, the robot uses nothing but its own momentum to move. It falls forward, catching itself on its outstretched swinging leg, at which point the motors rev again.

At present the robot walks in circles, attached to a boom in the center of a round room, which only minimally helps balance the bot, according to Worgotter.

Despite RunBot's self-motivation, its gold-medal walk is also its major weakness.

"Literally, currently the guy is not 'running' but instead it walks very fast. This is because in any given gait cycle, there is always the one or the other foot touching the ground. For true 'running' there must be moments when the robot is airborne and both feet are off the ground," Worgotter told LiveScience.

"This is a very difficult stability problem," he added, "and that's what we are after at the moment."

The robot research team was made up of scientists from the University of Gottingen, as well as the University of Glasgow and the University of Stirling in Scotland. Their findings were published in the March issue of the **International Journal of Robotics Research**.

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