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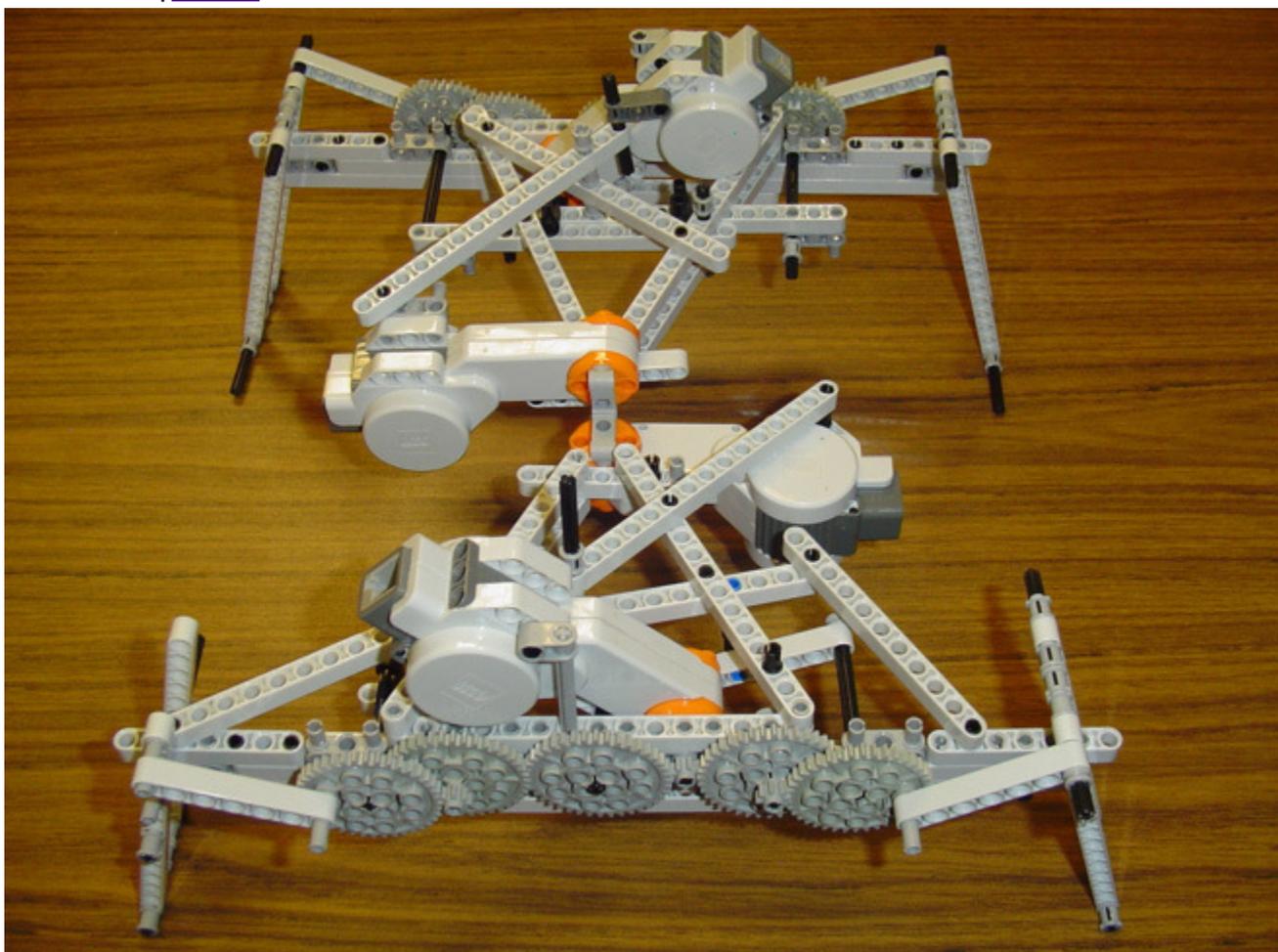
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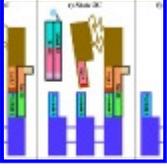
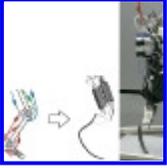
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Robots Evolve More Natural Ways of Walking

By [Dylan Tweney](#)  January 26, 2011 | 7:00 am | Categories: [R&D and Inventions](#)

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Robots that look like oversized hockey pucks, dune buggies or refrigerators may be practical for cleaning floors, exploring Mars or dispensing beer, but it's the walking robots that capture our imagination.

The trick is making them use their legs to walk efficiently, not like stiff-legged metal monsters out of a 1950s B movie.

A new computer simulation by a Vermont researcher shows how robots might learn to walk better by starting on their bellies, the same way animals evolved.

For the simulation, Josh Bongard created [virtual robots that could change their shapes over time](#).

The robots started with snakelike bodies. His simulation applied different movement algorithms to the robots' segmented spines. If the algorithms were successful at moving the robots closer to a target, they'd be used in the next iteration. If not, they'd be thrown away.

In each iteration, successful algorithms would be tested alongside slightly modified versions. After many iterations, the robots had evolved effective movement patterns and were able to slither rapidly towards the goal.

Then Bongard added legs.

As the legs slowly grew, the simulation evolved from slithering to walking. What's more, it learned how to walk much more quickly than simulations that had legs from the very start.

"You can think of the changing bodies of these robots as training wheels," says Bongard, who teaches an evolutionary robotics course at University of Vermont, where he is an assistant professor. The slowly-growing legs allowed the algorithms, or "controllers" in robotics parlance, to deal with one problem at a time: first wiggling, then balance.

The result is a much more natural gait, too.

"The walking controllers are a little different than what we've seen before," says Bongard. "The quadruped uses its spine a lot more, to sort of throw its legs forward. That's much more natural, the way that four-legged animals like dogs walk."

It's difficult to make robots change their bodies or grow legs in the physical world, but Bongard built a proof of concept using Lego Mindstorms.

This robot (shown above) has a simple jointed spine and four legs. At first, an added brace keeps the legs splayed out to the sides, like a lizard's, then gradually pulls them together, eventually allowing the robot to stand up on its legs.

The prototype shows that a similar evolutionary process could be used to develop effective walking gaits in real robots, Bongard says.

Photo credit: Josh Bongard

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Dylan Tweney is a senior editor at Wired.com and publisher of [tinywords](#), the world's smallest magazine.

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This learning approach is probably the best since as designers its how each of us mastered our own balance. We each learned to walk. Then we had to learn to walk and carry water and not spill it or walk and drink it without choking. Balancing ourselves and balancing what we're doing with what we're carrying, from a computational standpoint is probably quite a long ways off. Ideally robots won't have to worry about over estimating their ability, resulting in dropped and broken belongings, characteristic of us going about our lives on a daily basis. They can just blame their designers.

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**RevMannix** 5 hours ago

This is just the beginning....right now, they're evolving motor skills...next thing they're evolving thought, then....us.

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**Daniell** 4 hours ago [in reply to RevMannix](#)

They're already amongst us, although they haven't developed capable thought yet.

Have you seen the one they call Sarah Palin?

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**frantaylor** 2 hours ago [in reply to Daniell](#)

You are mistaken. They used to be humans but were genetically damaged, and now they are regressing. In a few generations their eventual reptilian form will develop.

1 person liked this.

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gggeeeuuug.....*shudder*

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