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February 18, 2005

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New Robots Approach More Humanlike Gaits

Scientists have developed three new robots that walk a lot like humans do. The androids, unveiled yesterday at the annual meeting of the American Association for the Advancement of Science in Washington, D.C., are extremely efficient, using about the same amount of energy as a person out for a stroll does.

The inspiration for the robots' novel designs came from simple toys that have been around for centuries: the force of gravity allows them walk down a shallow slope without the need for motors. Teams from the Massachusetts Institute of Technology (M.I.T.), Cornell University and Delft University of Technology in the Netherlands exploited the phenomenon, known as passive-dynamics, to build their new walkers. In order to allow them to move across flat landscapes, the scientists inserted motors that could supply power in lieu of gravity. As a result, the Cornell robot consumes about as much energy per unit weight and distance as a human does. In contrast, Honda's well-known Asimo robot requires about 10 times as much energy as a walking person. "In other robots the motors are fighting themselves," remarks Andy Ruina of Cornell.



Image: STEVEN H. COLLINS

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The novel automatons are still limited in their exploring abilities--they can't climb stairs, for instance. The M.I.T. robot, however, can teach itself to walk and adapt to changing types of terrain. Dubbed Toddler, "it is one of the first walking robots to use a learning program," says designer Russ Tedrake, "and it is the first to learn to walk without any prior information built into the controller."

A paper published today in the journal *Science* describes the three robots. Their inventors suggest that the results could have some far-reaching effects, such as informing the design of a powered prosthetic foot for amputees. Notes study co-author Steven Collins, now at the University of Michigan: "It's not exactly the same thing, but certainly the mode of thought comes from thinking about robots." --Sarah Graham

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