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Feb. 26, 2005, 9:24PM

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Strolling robots may signal new strides for prosthetics

Latest advances let contraptions walk in a manner similar to humans

By **BRYN NELSON**
Newsday

WASHINGTON – Three new robots can walk much like a parent, child and toddler strolling through Central Park, and one requires only about the same amount of human energy to do so.

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No one would mistake these mechanical amblers for humans.

But the toy-inspired concept behind their realistic movement could prove key to a new generation of robots and more efficient prosthetic limbs, at a time when there has been a surge of leg amputations among Iraq war veterans.

Making its debut at the annual conference of the American Association for the Advancement of Science, one pint-sized robot known as "Robo-Toddler" essentially toddled down a slightly descending table, but proved a bit temperamental when coaxed to walk across a level surface.

Andy Ruina, a professor of theoretical and applied

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mechanics at Cornell University, said the mechanical concept employed in walking is akin to starting to fall and catching yourself, with gravity propelling us along.

The three round-footed robots, described in this month's issue of the journal *Science*, use small motors as gravity substitutions on level surfaces, allowing them to walk in a more human way.

Efficient walking

The research also suggests the movement of feet is key to energy-efficient walking.

"You can't know how the foot should work unless you know about its role in how all of walking works," said Steven Collins, a former undergraduate student of Ruina's who designed a child-sized "efficient walker" robot with freely moving hip and knee joints and motor-stretched springs in each leg that allow its ankles to push off the ground.

In an interview, Collins said the accumulating knowledge of the walking motion could be a boon for improving prosthetic limbs.

"Amputees use 20 to 30 percent more energy to go the same distance or speed as intact individuals," he said.

Though new prosthetics have added comfort, he said, none has solved the energy problem.

Inspired by toys

Now a graduate student at the University of Michigan, Collins said he is working toward that goal.

Inspired by late 19th-century toys that used gravity to propel themselves down a slight slope, separate groups at Cornell, MIT and at Delft University of Technology in the Netherlands arrived at more refined robots introduced last week.

Although German and Japanese-engineered robots, including the famous Honda Asimo, have been hailed for their lifelike range of motion, Ruina said the Asimo robot needs about 10 times as much energy to walk as humans.

Cornell's "efficient" robot, by contrast, requires as little as one-half the wattage of a standard fluorescent bulb.

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