Toy-Based Robots Walk More Efficiently -Report

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By Maggie Fox, Health and Science Correspondent

WASHINGTON (Reuters) - Simple robots that toddle along like an old-fashioned child's toy offer a more realistic and efficient model of human walking than more sophisticated models, researchers said on Thursday.

They hope their back-to-basics approach can be used not only to design more efficient robots, but also prosthetics for injured patients and amputees, and to understand better how people walk.

The idea is based on "passive-dynamic walkers" -- devices that can walk down a slight slope using only gravity and carefully balanced, pendulum-like legs.

These unpowered walkers can produce a surprisingly human-like gait, three separate teams of researchers report in this week's issue of the journal Science.

Adding a tiny bit of power, as much as is used by a small fluorescent light bulb, allows an element of control for the walker to make more than a few steps and adjust to differing terrain, including level ground.

"We can let the mechanics take care of a lot of the motion as opposed to motors," Andy Ruina of Cornell University in New York, who helped design one of the robot walkers.

It gives a more realistic gait than fully powered robots, and is much more energy-efficient -- which will save batteries in the long run.

"For a robot to ever be practical it has to be able to run for a while," Ruina told a news conference sponsored by the American Association for the Advancement of Science.

The concept is simple, said Ruina -- the legs act like sticks attached to hinges, and swing back and forth with a pendulum motion. The concept has been used for more than 100 years to design toys that will "walk" down a slope with no propulsion.

"Mainstream" robots, on the other hand, have every movement carefully controlled and powered.

Steven Collins of Cornell, who is now at the University of Michigan, added a tiny bit of motorized propulsion at the robot's ankles. "At each step it pushes off with its back foot," Collins said.

"This is similar to how we think people walk."

Adding a hinged knee allows the robot to clear obstacles or step uphill.

Martijn Wisse of the Delft University of Technology in the Netherlands added pneumatic powering to simulate muscles in the legs of his robot, which uses very similar principles.

And Russ Tedrake of the Massachusetts Institute of Technology added a little computer to his model.

"We call him 'Toddler' because he 'learns' how to walk," Tedrake told the news conference.

"It can walk on a variety of terrains ... It evaluates how it is walking and adjusts," he said.

The concepts can be applied to better prosthetics such as artificial legs, Tedrake said. "If we understand how humans move, we can develop more advanced rehabilitation," he said.
