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## Researchers take strides toward lightening loads

By Michelle Locke  
*The Associated Press*

BERKELEY, Calif. — Move over Bionic Man and make room for BLEEX — the Berkeley Lower Extremities Exoskeleton, with strap-on robotic legs designed to turn an ordinary human into a superstrider.

Ultimately intended to help people such as soldiers or firefighters carry heavy loads for long distances, these boots are made for marching.

"The design of this exoskeleton really benefits from human intellect and the strength of the machine," said Homayoon Kazerooni, who directs the Robotics and Human Engineering Laboratory at the University of California, Berkeley.



[enlarge](#) AP

A model wears the BLEEX, or Berkeley Lower Extremities Exoskeleton.

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The exoskeleton consists of a pair of mechanical metal leg braces, a power unit and a backpack-like frame. The braces are attached to a modified pair of Army boots and are also connected, although less rigidly, to the user's legs.

More than 40 sensors and hydraulic mechanisms function like a human nervous system, constantly calculating how to distribute the weight being borne and create a minimal load for the wearer.

"There is no joystick, no keyboard, no push button to drive the device," said Kazerooni, a professor of mechanical engineering. "The pilot becomes an integral part of the exoskeleton."

In lab experiments, Kazerooni said, testers have walked around in the 100-pound exoskeleton plus a 70-pound backpack and felt as if they were

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carrying just 5 pounds.

Eventually, the device could help rescuers haul heavy equipment up high-rise buildings or turn tired troops into striding supersoldiers.

The exoskeletons "are really good, it turns out, at enabling firefighters, soldiers, post-disaster rescue crews to carry heavy loads over great distances for hours," Kazerooni said.

Video of the BLEEX in action — which can be viewed at [www.me.berkeley.edu/hel/bleex.htm](http://www.me.berkeley.edu/hel/bleex.htm) — shows a steel-spiked symbiosis of man and machine, marching about to the techno-industrial drone of grinding motors. The next steps for the BLEEX team are making the power source quieter and stronger and miniaturizing components.

BLEEX is funded by the Defense Advanced Research Projects Agency, the Pentagon research-and-development arm, and was among the projects being showcased at a DARPA technology symposium this week in Anaheim.

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