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Robotic Skeleton Takes Load Off Humans

by Regina Chen
Daily Cal Staff Writer

The next Bionic Man has arrived—and he's in your nearest UC Berkeley laboratory.

A UC Berkeley team of researchers has created Berkeley Lower Extremity Exoskeleton, known as BLEEX, a self-powered exoskeleton that frames the human body. With metal leg braces, a computerized power unit and a backpack-like structure, BLEEX takes most of the weight burden off its user, allowing humans to carry up to 70 pounds with very little effort.

"This is a very serious and important development in the robotics field," said mechanical engineering professor Homayoon Kazerooni, director of the Robotics and Human Engineering Laboratory. "It's probably the hardest robotics problem solved, which involves human and robotic interaction in a natural way."

The design now paves the way for scientists to create similar machines, Kazerooni said.

The exoskeleton is designed for the

SEE EXOSKELETON, PAGE 9



COURTESY: BERKELEY ROBOTICS AND HUMAN ENGINEERING LABORATORY

Berkeley Lower Extremity Exoskeleton, BLEEX, is designed to interact with the human body to distribute heavy loads up to 70 pounds onto a self-powered, 100-pound exoskeleton.

BUDGET CUTS COULD SLICE INTO CITY FIRE SERVICES

by Sam Schramski
Contributing Writer

Above the din of protests on City Hall steps, the Berkeley City Council Tuesday night listened to its departments reel off their recommendations for cuts—including the part-time shut-down of a city fire truck—that will eventually close next year's \$10 million budget gap.

The council chambers were packed with both union members and troubled citizens who voiced their concerns over the recommended cuts to fire and police services.

At the meeting, Berkeley fire Chief Reginald Garcia proposed shutting down one of the city's fire trucks for 10 hours per day next year.

The city could close down one of its two ladder trucks—out of the city's seven total fire trucks—between 8 a.m. and 6 p.m., saving the city \$500,000 next year.

But shutting down the truck, even part-time, would have consequences, Garcia said.

"There will be a definite delay in response time if this truck is shut down," Garcia said.

A city analysis showed that Berkeley faces fires intense enough to require a second ladder truck about 10 to 12 times per year. About 45 percent of

these fires occur during the times that the truck would be closed down under the proposal.

The city would contract services with nearby cities, so that if a fire grew large enough, it could call other cities in the county for assistance. But there would still be a significant delay in fire response time, said Cisco DeVries, Mayor Tom Bates' chief of staff.

If the city's budget situation worsened, a fire truck could be shut down completely, which would mean layoffs for some firefighters.

Meanwhile, as the fire department ponders dramatic cuts, the Berkeley police department is considering taking a number of cost-saving measures of its own that would save almost \$1.5 million next year. These include eliminating various police officer positions, including a sex crimes detective and a homicide detective, despite opposition from City Council members.

"There's a lot of things my constituents can stand, but they will not stand losses from fire and police," said Councilmember Betty Olds. "When somebody's dying, you want something there."

Members of the Berkeley Firefighters Association filled council chambers,

SEE FIRE, PAGE 2

Who Is Jesus?

I Think Jesus Is...

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Balloon

-- Barry Luong, Senior, EECS
bluong@berkeley.edu

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EXOSKELETON: Robot Frame Takes the Burden From Human Shoulders

FROM FRONT

user to trek long distances while carrying heavy loads. In the near future, its applications could range from medical to military purposes.

Medics could carry injured soldiers off battlefields, firefighters could lug heavy equipment up several flights of stairs, and rescue workers could bring food and emergency supplies to areas inaccessible to vehicles. Hikers could also wear the exoskeleton to make their mountain treks easier.

In experiments at UC Berkeley, a man wearing the 100-pound frame and a 70-pound backpack reported feeling like he was carrying only a few pounds.

The exoskeleton is user-friendly, and doesn't require special training,

knobs or buttons for operation. Humans provide the balance while a computer calculates how to control the frame so it moves in sync with the operator, according to Kazerooni.

The biggest challenge in building robots is understanding human movement, said Matthew Mason, professor of computer science and robotics at Carnegie Mellon University, who was part of a team that developed an origami-folding robot.

"We can build a machine that knows how to play better chess than a human but not one that moves the pieces around better," Mason said.

He added that the exoskeleton was very successful in combining the best of human and robotics research.

"I see the computer evolution as just barely starting because they're com-

pletely hindered in their abilities to interact with the real world and that's where robotics come into play," Mason said.

Before the exoskeleton could be designed, researchers analyzed the mechanics behind the basic human step for about a year. They studied the forces used by ankles and also the shock-absorbing power of knees.

UC Berkeley engineers are working on making the exoskeleton more "robust," Kazerooni said. The parts could be more compact, the engine more powerful and quiet. The frame could eventually carry up to 120 pounds.

The project was funded in 2000 by the Defense Advanced Research Projects Agency, the central research and development organization for the U.S. Department of Defense.

SLATING: Party Has Yet to Reveal Candidates Despite Looming Deadline

FROM FRONT

efficiency and participation, a small group of elected leaders who make decisions," Khan said. "They are just the growing pains of working in a broad-based coalition."

Members from the student groups felt that the process should be more open, particularly in the interviewing

process, which started months earlier, Gomez said.

"There was a lot of concern on how executives were interviewed previously and how senate candidates were chosen," Gomez said. "Not everyone was on the same page."

During the meeting, party members never even began discussing the candidates, Gomez said.

After hours of deliberation, party

members came up with a new plan that satisfied most in attendance—anyone can nominate himself and each individual member will get one vote, instead of limiting each student group to a single vote.

All CalSERVE senators who attended declined to comment on the substance of the meeting.

"We want this to stay amongst the community until the decision is final," said CalSERVE Senator Alicia Criado.

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