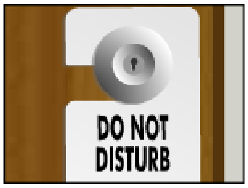


TECHNOLOGY

New muscles: faster, lighter, better?

Tuesday, December 6, 2005; Posted: 12:50 p.m. EST (17:50 GMT)

LONDON, England -- A new study has raised the potential for a new generation of robotic "artificial muscles" to be used to perform tasks currently impossible for humans, from carrying out dangerous repair work to assisting in complicated surgery.

The development could improve robots used in surgery, among other areas.

Similar devices are already being sent where it is too hot, cold, small or remote for humans, but at present their efficacy is hampered by their relatively low speed, inefficient design and limited control available to operators.

Robotic artificial muscles currently in use move 100 times slower than human muscles.

But research conducted by nuclear engineering and materials science and engineering Professor Sidney Yip and his team at MIT has raised the possibility that artificial muscles could be made that would work 1,000 times faster than their human counterparts.

The term "artificial muscles", Yip explains, refers in this case to any device that can be activated to perform a task, such as a fire alarm lever that, when pulled, triggers a sprinkler.

Yip's team add that the new devices would require virtually no extra energy to operate and would have a much simpler design, improving their ease of control.

They say the new "muscles" could be used for any number of tasks, from fixing leaking water mains to stitching together blood vessels.

The current generation of artificial muscles used to operate robotic devices are made from what are known as conjugated polymers.

"Conjugated polymers are also called conducting polymers because they can carry an electric current, just like a metal wire," said Xi Lin, a postdoctoral associate in Yip's team.

Rubber and plastic, which are conventional polymers, are insulators and do not conduct current.

But conjugated polymers can be used to manipulate the robotic device they are contained in because operators can send electric charges to specific points in the polymer chains, forcing them to activate and therefore perform their designated task.

The charge, called a soliton, is "like an ocean wave that can travel long distances without breaking up," Yip said.

The problem until now, however, has been that conducting polymers have only been made by dousing polymers in ions to expand their volume. It was thought that this process made the polymers strong, but it also made them heavy and slow.

Yip's research has shown that adding these ions is unnecessary.

Instead, Yip and his team discovered that, theoretically, shining a light of particular frequency on the conjugating polymer can force the soliton to activate.

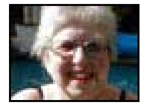
Without all those added ions, the polymer is lighter and so can bend and flex much more quickly. That makes the artificial muscle itself much quicker to activate.

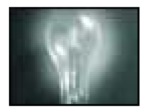
And the reduction in weight would also make the polymers -- and therefore the muscle -- more responsive and easier to control.

The research could see the technology improve to the point where scientists' hopes of a new generation of light, fast devices a reality.

This research was funded by Honda R&D Company and the Defense Advanced Research Projects Agency/Office of Naval Research.

Yip and Lin's collaborators on the work are Professor Ju Li at Ohio State University and





Professor Elisabeth Smela at the University of Maryland.

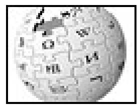
The study first appeared in the November 4 issue of the journal Physical Review Letters.

Story Tools

SAVE THIS | E-MAIL THIS
PRINT THIS | MOST POPULAR

SCI-TECH

Section Page | Video | Business 2.0



Online encyclopedia tightens rules

- **CNN/Money:** NBC TV shows coming to iTunes
- Decision on sex domain postponed
- Robotic muscles perform tasks humans cannot

TOP STORIES

Home Page | Video | Most Popular

Hussein threatens to skip court

- Christian group pleads for hostages' lives
- Military plane hits Tehran building, killing 110
- Dean: Idea U.S. will win Iraq war is 'just plain wrong'

International Edition | Languages | CNN TV | CNN International | Headline News | Transcripts | Advertise with

SEARCH | THE WEB | CNN.com | SEARCH | Powered by