

# MIT Graduate Wins \$30,000 Prize for Building Climbing Device

15 February 2007



MIT graduate student Nathan Ball, who invented a device for rapidly scaling large heights, is this year's winner of the \$30,000 Lemelson-MIT Student Prize. Photo courtesy: Lemelson MIT Program

Nathan Ball, graduate student in mechanical engineering at MIT, won this year's \$30,000 Lemelson-MIT Student Prize for invention of a device that makes the fantasy of leaping tall buildings in a single bound come close to reality.

With the help of Ball's Atlas powered rope ascender, a fully loaded firefighter could reach the top of a 30-story building in only 30 seconds, compared to the six minutes or more it often takes to trudge up stairs with 80 to 100 pounds of equipment. The device, which is the size of a hand-held power tool, can lift a 250-pound load more than 600 feet into the air at nearly 10 feet per second, all on a single battery charge.

The novel aspect of the Atlas ascender is its rope-handling mechanism. Similar to the way an anchor is raised and lowered on a ship, the device relies on the capstan effect, which produces a tighter grip each consecutive time a rope is wrapped around a cylinder. The grip continues to tighten as more

weight is applied to the line.

In his design, a standard-sized rope (between three-eighths and five-eighths of an inch in diameter) is woven between a series of specially configured rollers that sit on top of a turning spindle. As the battery-powered spindle rotates, it continuously pulls rope through the device. "We currently have three patents pending for the rope interaction and other iterations on the device," said Ball.

Ball envisions his invention having practical applications in rescue work, recreational climbing and cave exploration, as well as urban warfare situations. "It can help people complete tasks more efficiently and without depleting energy they would otherwise use climbing ladders and carrying heavy gear," he said.

Another of Ball's stand-out inventions is an improvement in the needle-free injection technology developed at MIT's BioInstrumentation Laboratory. Under the direction of his advisors Ian W. Hunter and Andrew Taberner in the BioInstrumentation Laboratory, Ball was challenged to use the lab's novel Lorentz-force actuator to create a dual-action, rapid-fire delivery technology that increased drug volume delivery.

Ball and his colleagues anticipate the needle-free injection technology, now awaiting livestock trials, having applications in animal husbandry.

Merton Flemings, director of the Lemelson-MIT Program, which sponsors the annual award, said, "His battery-powered rope ascender and needle-free injection technology both have life-saving capabilities and many commercial applications."

Ball's interest in invention does not stop with his own creations; he dedicates himself to mentoring and advising aspiring inventors. He is also involved as a technical advisor and co-host of "Design Squad," a new engineering-based reality show for

children ages 9 to 13 that will air nationally on PBS beginning this month.

More information on the Lemelson-MIT Program is online at [web.mit.edu/invent/](http://web.mit.edu/invent/)

Source: MIT

APA citation: MIT Graduate Wins \$30,000 Prize for Building Climbing Device (2007, February 15) retrieved 25 October 2020 from <https://phys.org/news/2007-02-mit-prize-climbing-device.html>

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