

Atlas (robot)

Atlas is a bipedal humanoid robot primarily developed by the American robotics company Boston Dynamics, with funding and oversight from the U.S. Defense Advanced Research Projects Agency (DARPA). The 1.8-meter (6 ft) robot is designed for a variety of search and rescue tasks, and was unveiled to the public on July 11, 2013.^[1]

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Design and development

The design and production of Atlas was overseen by the DARPA, an agency of the United States Department of Defense, in cooperation with Boston Dynamics. One of the robot's hands was developed by Sandia National Laboratories, while the other was developed by iRobot.^[2] In 2013, DARPA program manager Gill Pratt compared the prototype version of Atlas to a small child, saying that "a 1-year-old child can barely walk, a 1-year-old child falls down a lot ... this is where we are right now".^[1]

Atlas is based on Boston Dynamics' earlier PETMAN humanoid robot, and has four hydraulically-actuated limbs.^[3] Constructed of aluminum and titanium, it stands approximately 5.9 feet tall, weighs 330 pounds (150 kg), and is illuminated with blue LEDs.^{[1][3]} Atlas is equipped with two vision systems – a laser rangefinder and stereo cameras, both controlled by an off-board computer – and has hands with fine motor skill capabilities.^[3] Its limbs possess a total of 28 degrees of freedom.^{[4][3]} Atlas can navigate rough terrain and climb independently using its arms and legs, although the 2013 prototype version was tethered to an outside power supply.^[3]

In October 2013 Boston Dynamics uploaded a video showing Atlas could withstand being hit by projectiles and balance on one leg.^[5]

Atlas



Atlas robot

Manufacturer	Boston Dynamics
Year of creation	2013
Type	Humanoid robot
Purpose	Search and rescue
Derived from	PETMAN
Website	bostondynamics.com (http://www.bostondynamics.com/robot_Atlas.html)

In 2014, Atlas robots programmed by six different teams competed in the DARPA Robotics Challenge to test the robot's ability to perform various tasks, including getting in and out of a vehicle and driving it, opening a door, and using a power tool. A variety of other robots also competed. The contest was inspired by the 2011 Fukushima Daiichi nuclear disaster, and carries a USD 2 million prize for the winning team.^[1]

In the 2015 DARPA robotics finals Atlas from IHMC Robotics (named Running Man) came second behind the Korean team Kaist and their robot DRC-Hubo by a margin of six minutes, completing the entire course in a time of 50:26.^[6]

Atlas, The Next Generation

On February 23, 2016, Boston Dynamics released video^[7] of a new version Atlas robot on YouTube. The new version of Atlas is designed to operate both outdoors and inside buildings. It is specialized for mobile manipulation and is very adept at walking over a wide range of terrain, including snow, and can do back flips and cartwheels. It is electrically powered and hydraulically actuated. It uses sensors in its body and legs to balance, and it uses LIDAR and stereo sensors in its head to avoid obstacles, assess the terrain, help with navigation, and manipulate objects, even when the objects are being moved. This version of Atlas is about 175 cm (5 ft 9 in) tall (about a head shorter than the DRC Atlas) and weighs 180 lb (82 kg).

What's new, Atlas?

On November 16, 2017, Boston Dynamics released an update video^[8] of the Atlas robot to YouTube. In this video Atlas was shown jumping on boxes, turning 180 degrees while jumping and performing a backflip.

On May 10, 2018, Boston Dynamics released an update video^[9] of the Atlas robot to YouTube. In this video, Atlas was shown running across grass on an uneven terrain as well as jumping over a log lying on the grass.

On October 12, 2018, Boston Dynamics released an update video of the Atlas robot to YouTube.^[10] In this video, Atlas was shown running around while jumping over boxes.

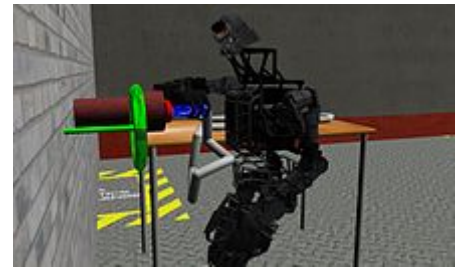
On September 24, 2019, Boston Dynamics released another update video of the Atlas robot to YouTube.^[11] In this video, Atlas was shown performing something akin to a floor routine in gymnastics. The robot demonstrates the ability to perform a handstand, somersaults, and rotations all in fluid succession. Boston Dynamics claims the robot was trained using "new techniques that streamline the development process."^[11]

Applications

Atlas is intended to aid emergency services in search and rescue operations, performing tasks such as shutting off valves, opening doors and operating powered equipment in environments where humans could not survive.^[1] The Department of Defense stated in 2013 that it had no interest in using the robot for offensive or defensive warfare.^[1]

In the 2015 Darpa competition of robotics, Atlas was able to complete all eight tasks as follows:

1. Drive a utility vehicle at the site.
2. Travel dismounted across rubble.
3. Remove debris blocking an entryway.
4. Open a door and enter a building.
5. Climb an industrial ladder and traverse an industrial walkway.
6. Use a tool to break through a concrete panel.
7. Locate and close a valve near a leaking pipe.
8. Connect a fire hose to a standpipe and turn on a valve.



An Atlas robot connects a hose to a pipe in a Gazebo computer simulation

Reactions

Atlas was unveiled to the public on July 11, 2013. *The New York Times* said that its debut was "a striking example of how computers are beginning to grow legs and move around in the physical world", describing the robot as "a giant – though shaky – step toward the long-anticipated age of humanoid robots."^[1] Gary Bradski, a specialist in artificial intelligence, declared that "a new species, *Robo sapiens*, are emerging".



Simulated image of Atlas robot climbing into a vehicle.

See also

- Robot
- Android (robot)
- ASIMO
- BigDog, a military robot built by Boston Dynamics
- HAL (robot), a powered exoskeleton for medical and emergency applications
- HRP-4C
- HUBO
- iCub
- InMoov
- Nao
- REEM
- Robonaut

References

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2. Emi Kolawole (July 12, 2013). "What if this ATLAS shrugged? — DARPA unveils new humanoid robot" (<https://www.washingtonpost.com/blogs/innovations/wp/2013/07/12/what-if-this-atlas-shrugged-darpa-unveils-new-humanoid-robot/>). *Washington Post*. Retrieved July 14, 2013.
3. Tim Hornyak (July 11, 2013). "Be afraid: DARPA unveils Terminator-like Atlas robot" (http://news.cnet.com/8301-17938_105-57593396-1/be-afraid-darpa-unveils-terminator-like-atlas-robot/). *CNET*. Retrieved July 14, 2013.

4. "Atlas robot interactive 3D animation" (<https://www.cyberbotics.com/doc/guide/atlas>). May 23, 2018. Retrieved May 23, 2018.
5. Video: Robot performs balancing act (<http://www.3news.co.nz/VIDEO-Robot-performs-balancing-act/tabid/412/articleID/316509/Default.aspx>). *3 News NZ*. 9 October 2013.
6. "Home | DRC Finals" (<https://web.archive.org/web/20160428005028/http://www.darparoboticschallenge.org/>). *www.theroboticschallenge.org*. Archived from the original (<http://www.theroboticschallenge.org/>) on April 28, 2016. Retrieved 2015-12-30.
7. BostonDynamics (February 23, 2016), *Atlas, The Next Generation* (<https://www.youtube.com/watch?v=rVlhMGQgDkY>), retrieved June 3, 2016
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10. Boston Dynamics (October 11, 2018). "Parkour Atlas" (<https://www.youtube.com/watch?v=LikxFZZO2sk>). *YouTube*. Retrieved October 11, 2018.
11. Boston Dynamics (September 24, 2019). "More Parkour Atlas" (https://www.youtube.com/watch?v=_sBBaNYex3E). *YouTube*. Retrieved September 24, 2019.

External links

- [Atlas page \(http://www.bostondynamics.com/robot_Atlas.html\)](http://www.bostondynamics.com/robot_Atlas.html) at Boston Dynamics
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