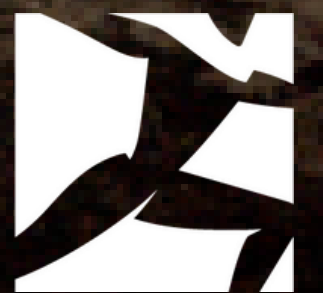# Your Guide to Spot in Academia and Research

The next generation of mobility, sensing, and manipulation is here.

Boston Dynamics

Accelerate your research and development, enhance student recruitment, and unlock opportunities for new curricula and teaching methodologies with Spot.

Spot's mobility, paired with its open platform for sensing and manipulation, offers the flexibility you need for research and education. With out-of-the-box functionality, Spot can handle its own mobility, autonomy, and navigation while researchers and developers augment the robot in the area of innovation most interesting to them.

Spot's features serve research efforts across a wide range of industries. From construction to manufacturing, energy & utilities, oil & gas, and more, Spot is jumpstarting research developments and improving safety and efficiency on real-world sites.

BostonDynamics

Cross-Functional Research Applications

Academia
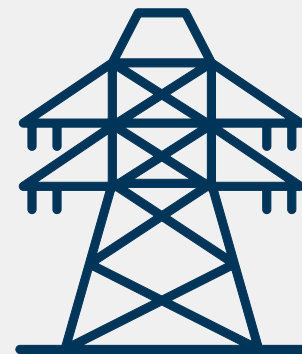
Manufacturing

Mining

Oil & Gas

**Energy & Utilities**

Construction

Automate sensing and inspection, capture limitless data, and explore without boundaries.

Spot's unique out-of-the-box capabilities, paired with its extensive API, are creating value at universities and on industrial sites across the globe. Whether you're a university looking for a new teaching tool or a research group supporting a commercial entity, Spot is proving to be a valuable resource to teams around the world.

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What Sets Spot Apart
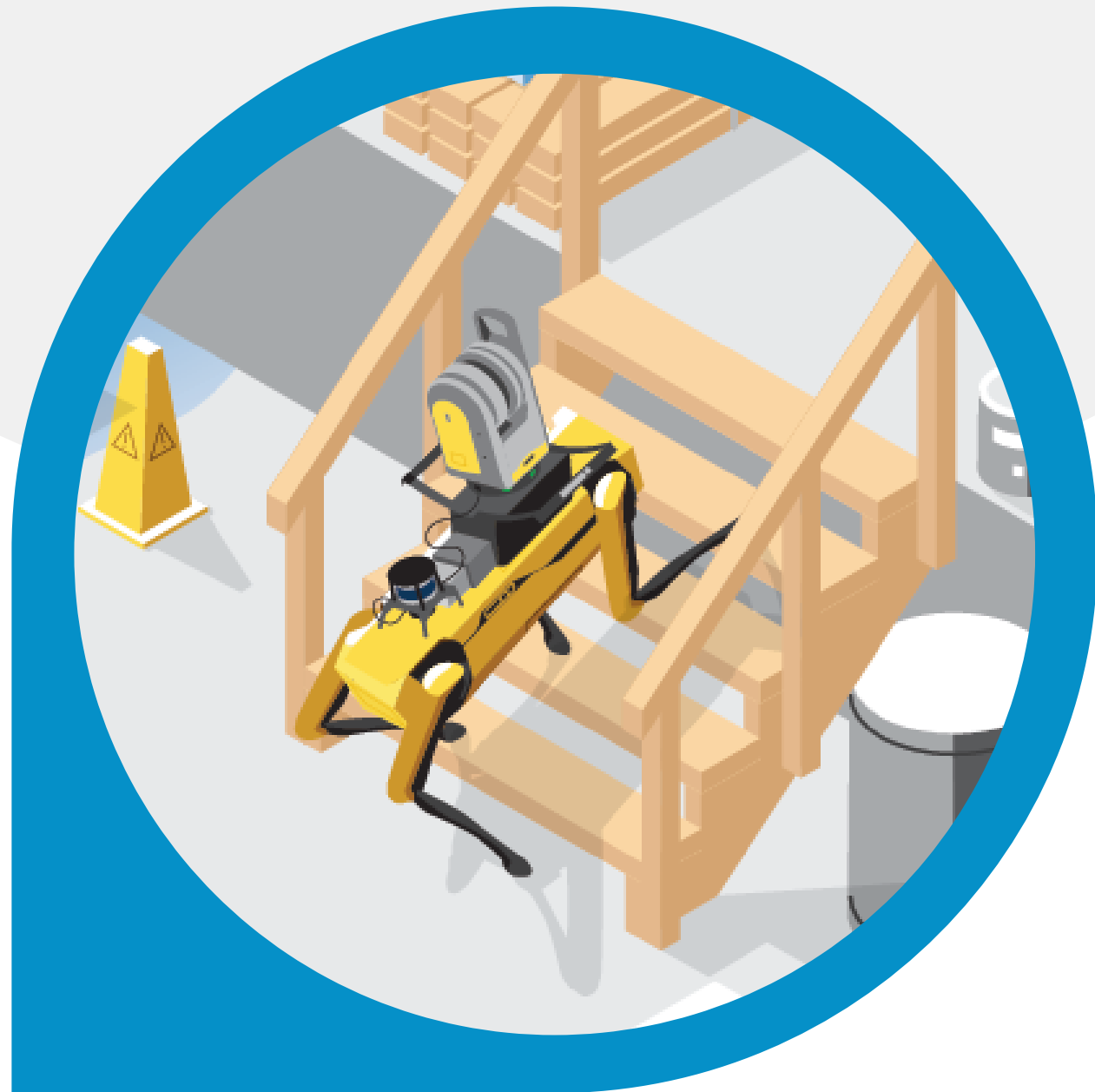
World-Class Mobility

Explore unstructured terrain with unprecedented mobility, going where wheeled robots and drones cannot. Spot cruises over loose gravel, grass, curbs, and stairs by automatically engaging gaits designed to optimize stability.

Unmatched Customizability

Spot can be easily customized for a variety of applications. Our API enables developers to create custom controls and integrations, while the robot's mounting rails and payload ports facilitate easy attachment and integration of outside hardware.

Ease of Use

Put Spot to use out of the box with its easy-to-learn tablet controller or develop a custom application with Spot's API. Get started with Spot in under an hour, with comprehensive support and training offerings to help you scale.

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Research Beyond the Lab with Virginia Tech

Through a partnership with a private construction management company, Virginia Tech researchers are exploring how Spot can improve operations at construction sites.

Kereshmeh Afsari, an assistant professor in the Myers-Lawson School of Construction at Virginia Tech, along with her team of researchers and Professor Walid Thabet, were among the first to field test Spot. They partnered with Procon Consulting to bring the robot to three of the university's construction projects, where they spent months testing inspection capabilities in real-world conditions.

"The question we wanted to answer was whether this new technology could help to perform regular data collection with a 360-degree camera," Asfari says. "We wanted to see if we could save human workers time, so that they can focus on more strategic jobs."

Existing monitoring processes typically fail to keep up with the pace of construction—leaving building owners and operators without important as-built data about their projects. However, with Spot taking pictures on a regular basis, the team achieved better measurements on a more consistent schedule.

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Multitude of Developer Access Points

Autonomy

Spot comes with Autowalk, a feature that allows users to record and replay autonomous missions. For even more sophisticated autonomy solutions, developers have access to the broader autonomous navigation API that Autowalk is built on.

Sensor Integration

Payloads can add additional sensing, communication, and control capabilities beyond what the base Spot platform provides. Our developer documentation covers the mechanical, electrical, and software interfaces that Spot supports in order for you to customize the robot for your needs.

Manipulation

The Spot Arm add-on allows the robot to interact with the world around it. Through the intuitive tablet interface or the API, users can choose from manual, semi-automated, or fully automated arm actions, such as maneuvering or inspecting objects with the gripper, turning valves, flipping levers, and opening doors.

Data Analysis

Spot's sensors collect data that can be processed on or off robot. Integrate third-party computer vision models, enterprise asset management (EAM) systems, and more.

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CASE STUDY

Going Deeper with Luleå University of Technology

A partnership between university robotics researchers and one of Europe's largest mining companies is helping Spot to unlock new capabilities.

Deep into the 600 kilometers of tunnels that weave their way through the world's largest underground iron mine, Spot carefully navigates newly blasted areas. Equipped with gas sensors and a lidar scanner, the robot's movements are controlled by an operator miles away. This scenario is actively playing out at Luossavaara-Kiirunavaara AB's (LKAB) Kiruna mine, thanks to a partnership between the mining company and researchers at Luleå University of Technology (LTU) in Sweden.

For the LTU researchers, the partnership with LKAB offers the ability to break free from the walls of academia and push their field forward through the rigors of a real-world setting. For LKAB, that accelerated adoption – and technical expertise from the LTU team – has already resulted in a number of practical applications. For one, Spot is helping to produce digital twins, or three-dimensional maps, of the mining tunnels using lidar scanning. The robot has also become an integral part of routine inspections and monitoring. Spot has even given LKAB the ability to inspect portions of the mine that were previously considered too difficult to access.

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Get started with Spot today.

Contact our sales team to learn more about how you can implement agile mobile robots at your institution: www.bostondynamics.com/spot-sales

Visit our website at www.bostondynamics.com

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