Closing The Sim2Real Gap with Real-World Robotics

How Ambi Robotics Sorts Items It's Never "Seen" Before From Day One

ABOUT

Ambi Robotics

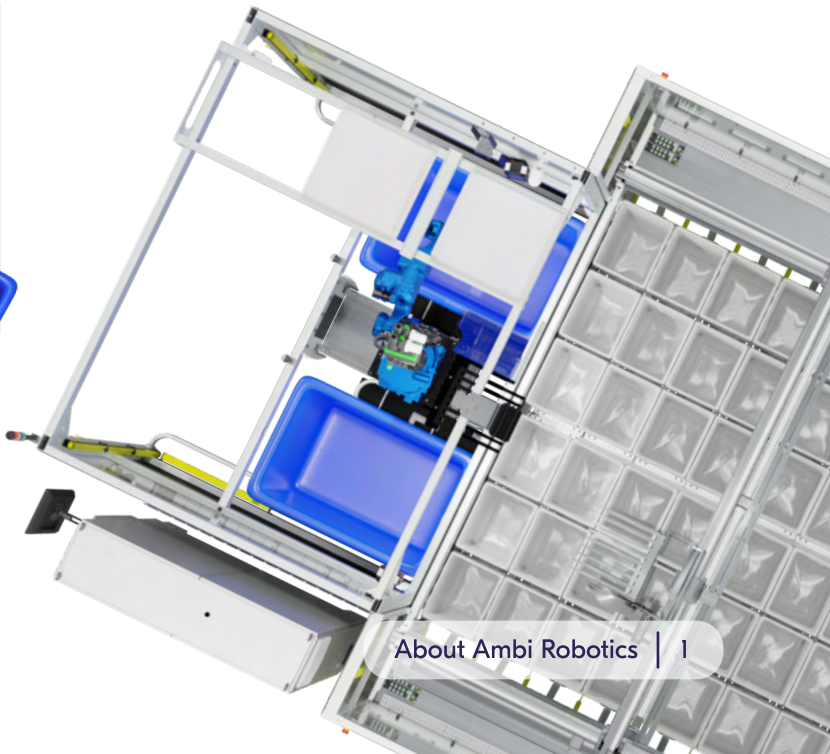
At Ambi Robotics, we are on a mission to empower people to handle more. We do this by tackling one of the most challenging tasks for a robot to perform, and something we take for granted as humans - sorting. Our AI-powered robotic systems increase the throughput and accuracy of mundane and repetitive tasks across warehouse operations. Our systems also provide access to upskilled, more meaningful jobs. We fill the critical gaps so our customers can meet the peaks in ecommerce demand.

Anyone can buy robotic hardware, but our AI technology is what sets us apart. Powered by Sim2Real AI, we have the ability to handle a wide variety of items from day one. Whereas most robotics companies collect data in the physical world, which is costly and time consuming, and can take years, our Sim2Real technology allows us to train robotic systems 10,000x faster in the virtual world and transfer that knowledge immediately to the physical world.

This allows us to configure specialized robotic systems to solve real-world problems for our customers, quickly and at lower cost.

"Ambi Robotics is clearly an innovative company. They are a customer-centered company and I feel that as a customer."

Marc Lautenbach
CEO of Pitney Bowes



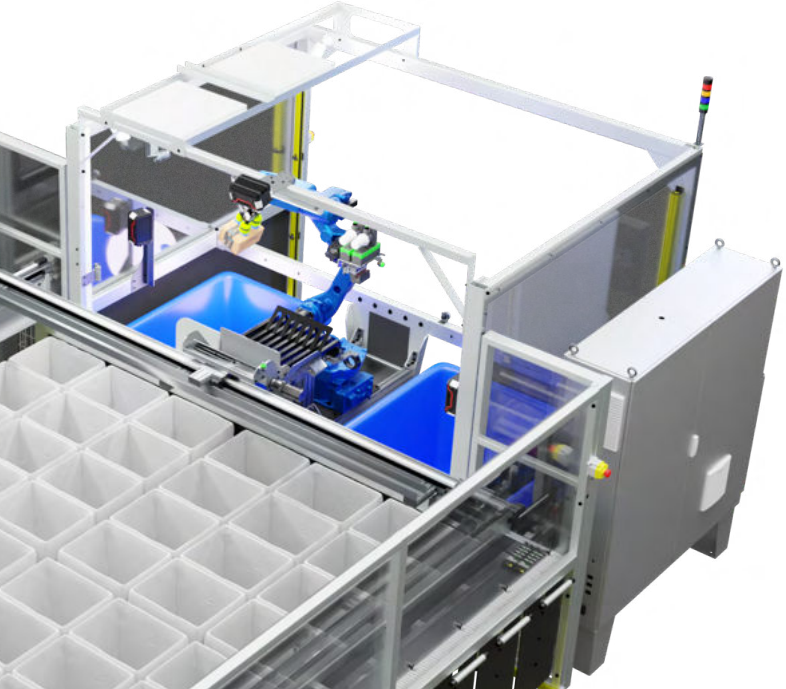
THE PROBLEM

Teaching robots to get a grip

Consider the items you may interact with on a daily basis. Maybe it's your morning cup of coffee, a bag of chips with your lunch, a bottle of water, or a tube of toothpaste? These are some examples of items that you likely pick up, hold, and interact with on a daily basis. You might even consider the act of picking these items to be brainless, but that's the thing – your brain is doing so much behind the scenes: figuring out the shape, mass, friction, known position, and more, to enable your hand to seamlessly grasp the item.

What seems so effortless and easy is actually one of the most challenging tasks to teach a robot.

While these are familiar movements and tasks humans do daily, can you imagine executing these tasks for the very first time? What if you experienced all of these interactions in a simulated world before performing them in the physical world? If that were the case, you would know exactly how to handle the objects and would successfully execute these picking and manipulation tasks from day one.



Welcome to the world of Ambi Robotics, where it's happening today.

Training takes time

The deep learning-based AI revolution enables computer algorithms to learn all kinds of tasks from image recognition, to speech recognition, to playing Atari games, and even beating human chess champions at their game. In the logistics and supply chain space, the goal is to leverage AI and robotics for tasks that elevate working conditions and empower people to handle more. So how do robots learn to pick and place anything?

Without simulation:

800,000

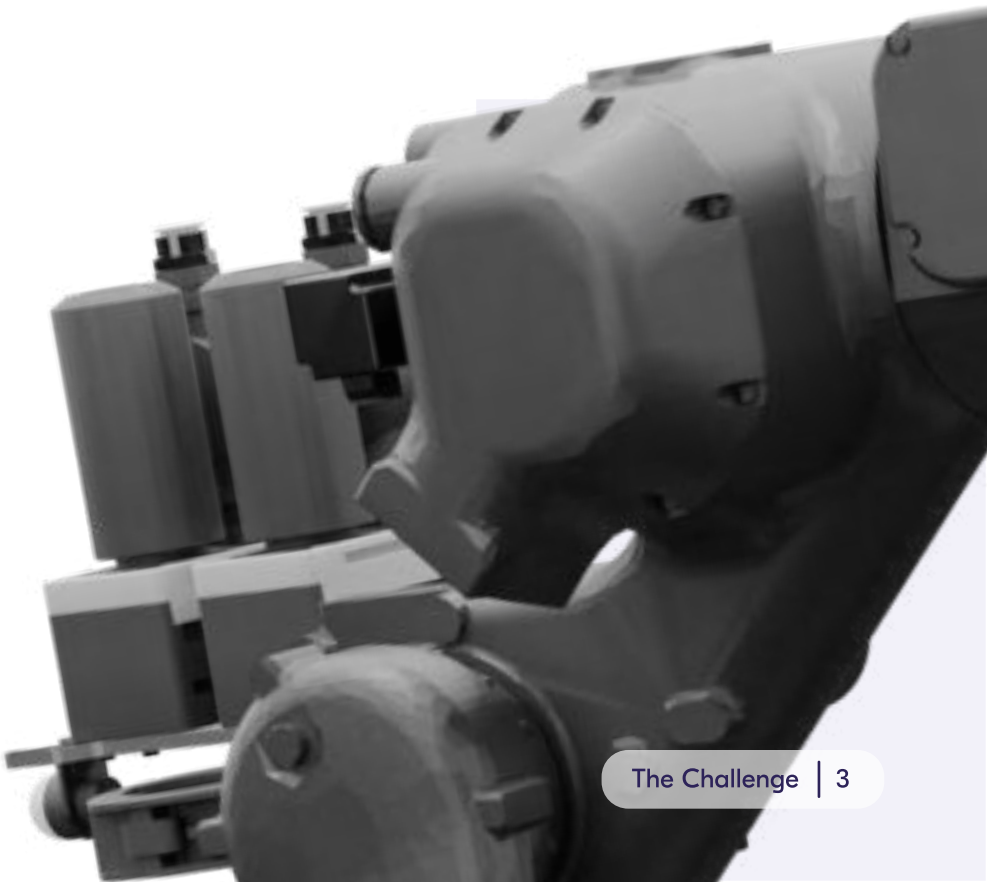
Picking attempts needed before robots can perform a pick[1]

3,000

Robot-hours of practice needed for robots to perform a pick[2]

The secret sauce: data.

The first successful, deep convolutional neural net, was trained with more than one million images to recognize 1,000 object categories over a decade ago. Since then, data hunger has been recognized as "the Achilles' heel of deep learning." Robots can self-label training data with trial-and-error, i.e. reinforcement learning. However, this approach generally still requires an exceedingly large amount of real-world experience. This method might work reasonably well in a research environment, but it's unrealistic to imagine shipping a robot to customers and asking them to wait thousands of hours before the robot starts to function in the production environment.



[1] https://ai.googleblog.com/2016/03/deep-learning-for-robots-learning-from.html

[2] https://ai.googleblog.com/2016/03/deep-learning-for-robots-learning-from.html

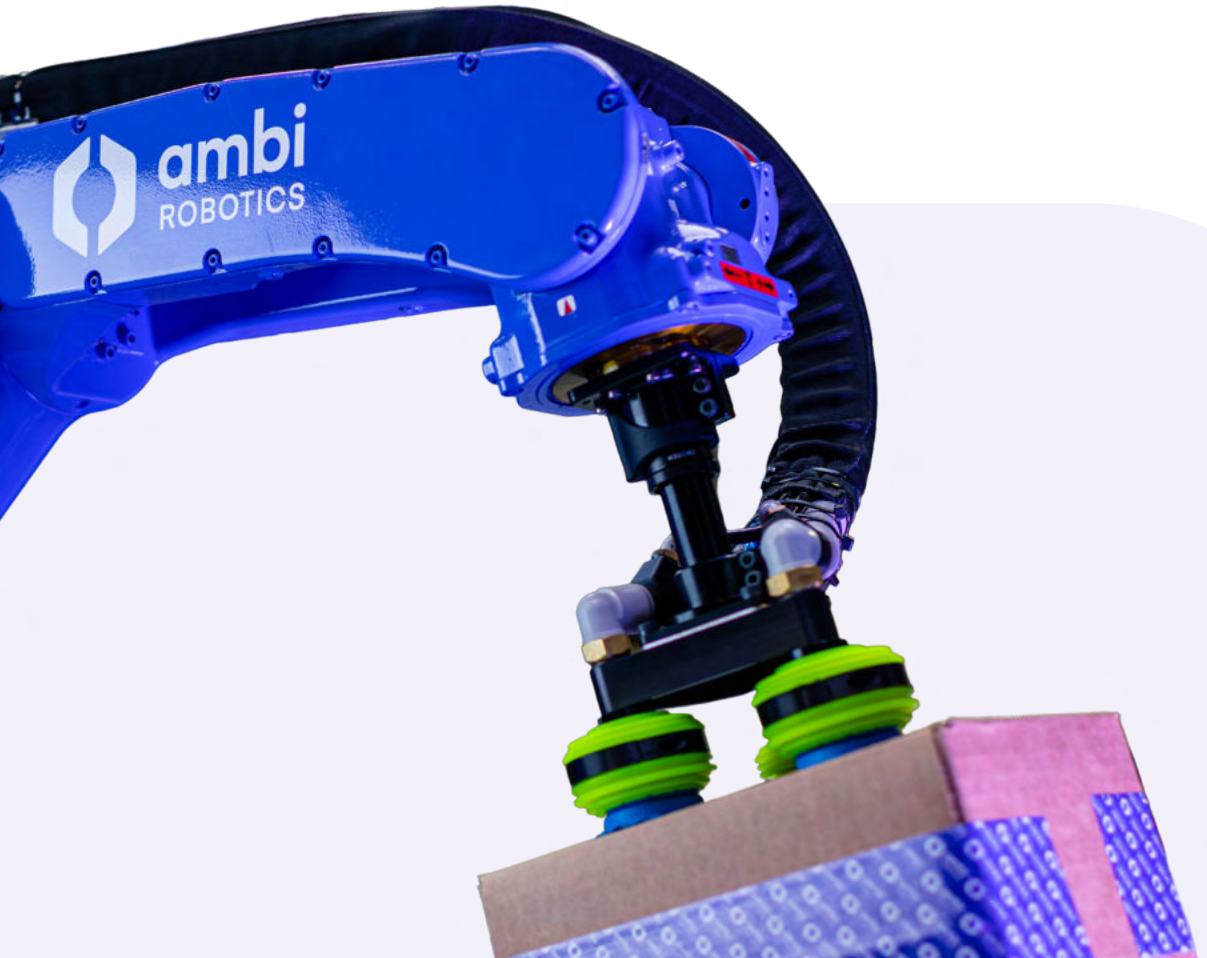
THE SOLUTION

Virtual training that's reality-ready

So, is there a way to deploy a functioning robot into the production environment on day one? As it turns out, yes, there is: if we rigorously train a robot to learn in a simulation environment. Because the environment of logistics warehouses can be well-controlled, leaving the only dynamic part to be the parcels themselves, prior to deployment we can reconstruct the entire environment within computer simulation at a reasonable degree of physical accuracy.

"That's the core of AmbiOS, our advanced operating system that leverages proprietary simulation-to-reality (Sim2Real) technology."

Jeff Mahler
CTO & Co-Founder
of Ambi Robotics



Up to 80%

Throughput improvement with Ambi Robotics' AI-powered automated systems

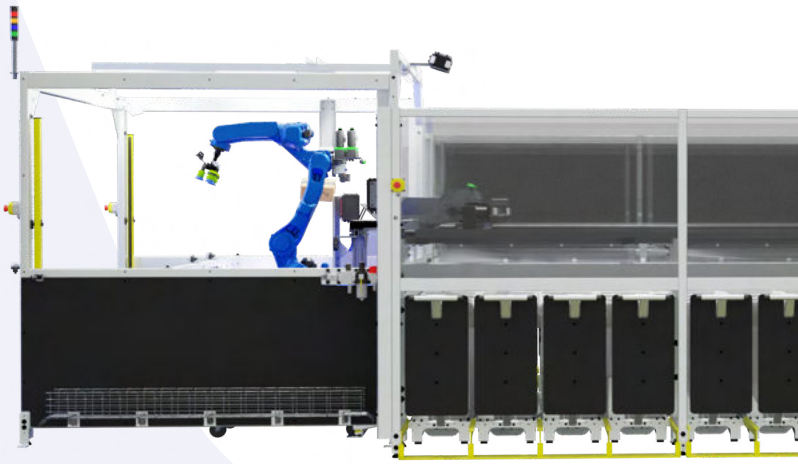
More than 99%

Out-of-bin accuracy and uptime while sorting more than 325 parcels per hour

The 1st

Full-stack solution that can train a robot to pick up essentially anything on day one

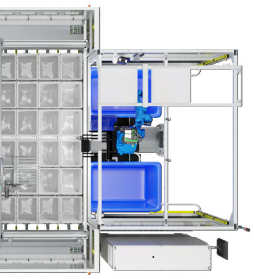
About AmbiOS



Our propietary operating system, AmbiOS, trains robots to pick in simulation, almost like playing a video game. To better simulate real-world conditions, AmbiOS features:

- A vast simulation library that has a large diversity of items modeled and tested for real-world accuracy
- Wide-ranging randomization and variety of items in simulation to make real-world challenges seem tame by comparison
- 3D modeling that takes into consideration geometry and camera "noise" issues that can be especially problematic in real-world settings
- A precision metric that helps measure picking effectiveness and helps identify the best grasp for any given item
- The ability to teach robots how to effectively handle deformable items like poly bags

The experiences learned in simulation transfer reasonably well to the real world, both in the research environment and in our current production environment, thus closing the Sim2Real gap.



Close your Sim2Real gap & scale up with Ambi Robotics

Ambi Robotics provides supply chain solutions that combine adaptable AI and robotic dexterity to support the world's most dependable enterprises. We offer advanced AI-powered robotic systems like our AmbiSort parcel sorting systems and AmbiOS - both of which are already deeply deployed helping shippers scale, grow, and deliver optimal outcomes. **We believe in a future where robots work hard so humans can work smart.**

Today, our AI-enabled sortation systems:

- **Empower autonomous operations on day one** thanks to our advanced simulation training that closes the Sim2Real gap
- **Operate without an active uplink.** Our systems run regardless of networking issues and bandwidth limitations
- **Allow humans to focus on exciting & engaging work,** not on repetitive, fatigue-inducing tasks
- **Unlock ROI quickly** through our Robotics-as-a-Service (RaaS) business model, designed to reduce operating costs from day one
- **Enable change for good.** Our supply chain experts help you rethink processes and redesign your operations to leverage the power of automation. Our human-centric robotic systems enable your associates to handle more

ambi ROBOTICS

Ready To Handle More?

Our process sortation experts can help you find the right mix of tools, techniques, and teamwork to help you overcome obstacles and optimize opportunities that grow your business.

Let's talk and see how we can help you

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