



# The Case for Investing in Humanoid Robots

By Kenneth Wilber

Humanoid robots are no longer a distant concept, but rather a rapidly materializing reality. With recent advancements in artificial intelligence, the case for investing in general-purpose humanoid robots is stronger than ever. In this post, I'll explore when and why general-purpose robots offer greater value than specialized ones, why now is the perfect time to invest, and why the humanoid form is the ideal design for a general-purpose robot. We'll also look at the leading companies driving innovation in this space and assess the potential risks, making a compelling case for why this emerging technology presents an unparalleled opportunity for forward-thinking investors.

## General-Purpose Robots vs. Specific-Purpose Robots: Why Choose One?

Today, we employ robots to assemble products in factories, mow lawns, wash dishes, and open doors. Rather than considering these devices as mere "tools" or "appliances," I would categorize them under the broader term of *specific-purpose robots*. While both specific-purpose and general-purpose robots will play important roles in the future, it's worth considering how tasks should be divided between these two robotic paradigms.

First, let's separate the concepts of general-purpose software and general-purpose hardware. To better understand the landscape, we can visualize this by creating a matrix where one axis represents specific-purpose versus general-purpose software, and the other axis represents

specific-purpose versus general-purpose hardware. This matrix outlines the possible combinations of software and hardware used to automate physical tasks:

specific-purpose software specific-purpose hardware  tool	specific-purpose software general-purpose hardware  general-purpose robots that work only in demos
general-purpose software specific-purpose hardware  smart tool	general-purpose software general-purpose hardware  general-purpose robots

Up until today, we've been confined almost entirely to the top row of this matrix. Almost every product we use daily is manufactured in factories utilizing machines that combine specific-purpose software with specific-purpose hardware—the top-left quadrant of our matrix. We've also glimpsed what might be possible with general-purpose robots, but so far only in highly controlled environments and for specific tasks.

Clearly, some tasks are already effectively addressed using solutions from the top row, making bottom-row solutions less practical or economical. For example, dedicating a general-purpose robot to automatically sew textiles or open doors would be inefficient when specialized machines or simple mechanisms perform these tasks adequately.

However, other tasks have remained elusive to automation for various reasons. Some have not been automated due to their complexity; tasks like folding laundry, although straightforward for humans, present significant challenges for machines. Others haven't been automated because of high downtime—a robot dedicated solely to folding laundry might sit idle for days between laundry cycles. Additionally, certain tasks haven't been automated because the cost doesn't justify the benefit; for instance, most people don't regularly clean their windows or dust their shelves, but if automating these tasks became more affordable, they might reconsider.

All of these barriers could be overcome by adopting solutions that utilize general-purpose software and hardware. General-purpose robots, equipped with advanced software and adaptable hardware, can adjust to a wide range of tasks, overcoming the limitations of their specific-purpose counterparts. By leveraging machine learning and artificial intelligence, these robots can learn from their environment and improve over time, handling complex tasks

like folding laundry or cleaning varied surfaces that were previously too intricate or economically unfeasible to automate.

Moreover, general-purpose robots can efficiently manage downtime by performing multiple tasks. Instead of remaining idle while waiting for the next laundry cycle, a general-purpose robot can switch to dusting shelves, cleaning windows, or even preparing a meal. This multitasking ability not only maximizes the utility of the robot but also enhances its value to users, as one device can replace several single-purpose appliances.

## Why Now is the Right Time to Invest

A general-purpose robot can be defined as one capable of performing a wide range of tasks typically handled by humans, without being specifically designed or modified for any particular task. Since Boston Dynamics introduced [Atlas](#), their humanoid robot, and [Spot](#), their quadruped, it has become evident that the primary challenge with general-purpose robots lies not in hardware but in software. While Atlas and Spot are remarkable feats of engineering, they require specific programming for each task and lack the adaptability to handle a wide range of activities autonomously. To be truly general-purpose, a robot must understand humans in the way we evolved to communicate: speech.

For years, the question of how to create a robot that understands human commands and performs complex physical tasks effectively was met with a simple answer: it wasn't possible. However, with the advent of large language models (LLMs), this barrier is rapidly dissolving. LLMs enable robots to process and understand natural language commands, bridging the gap between human intent and robotic execution. This leap has thrown open the technological floodgates, making this the perfect moment to invest in the burgeoning field of general-purpose robots.

## The Humanoid Form: Why It's the Best Fit

Let's design a general-purpose robot from the ground up. To interact with the world effectively, the robot needs a means to engage with physical objects. Given that our world is built by humans, for humans, the robot should have hands similar in size and shape to ours. To move these hands around, it needs arms. Since many tasks require the use of both hands, the robot should have two arms connected by a torso.

Mobility is another crucial factor. Wheels would be the simplest, but they perform poorly on stairs, terrain, or any surface that isn't a clean floor. Legs, therefore, are a better option. One leg would require constant hopping, and three or four legs, while stable, would add unnecessary bulk and cost. Two legs strike the perfect balance, allowing for a stable gait without compromising too much on size or cost.

With two arms, a torso, and two legs, we've essentially created a humanoid robot. The head might now seem optional, but it serves as a valuable sentry point, allowing for an unobstructed, potentially 360-degree view. Moreover, a head enhances the robot's human-like appearance, making it more approachable.

Finally, the humanoid form enables robots [to learn by observing humans](#). After all, humans have spent millions of years perfecting precise, efficient movements. A humanoid robot can emulate these movements to perform tasks more effectively.

## The ROI Potential of General-Purpose Robots

Imagine a general-purpose robot that can work around the clock, 24 hours a day, every day of the year. Over a single year, that's 8,760 hours of work. Over ten years, it's 175,200 hours. In Connecticut, where the minimum wage is \$15.69 per hour, this equates to \$2,748,888 in value. Even if we conservatively estimate the value at \$1 million to account for downtime, maintenance, and other factors, the potential ROI is staggering.

This means that any general-purpose robot that can be mass-produced at a reasonable price could offer an off-the-charts ROI for customers and investors alike.

Given these arguments, it seems inevitable that humanoid robots will become a significant part of the workforce. The question now is not if, but when.

## Key Players: Figure vs. Tesla

The current frontrunner in this space appears to be Figure, a rapidly evolving startup backed by prominent investors such as Jeff Bezos, Nvidia, Microsoft, and OpenAI. [A recent video](#) on their YouTube channel showcases their Figure 01 humanoid robot performing physical tasks in response to real-time speech commands. This capability is a critical milestone toward making these robots truly general-purpose.

[Tesla's Optimus robot](#) is also a major contender. While Tesla lags behind in speech interpretation, Optimus boasts impressive hardware and incredible potential for rapid growth. Tesla's recent developments with Grok, their AI supercomputer, and the creation of X AI, a dedicated AI research team, are expected to enhance the speech interpretation ability of Optimus, helping them close the software gap.

But here's the real kicker: Figure may be the first, but Tesla's mass-production capabilities may ultimately make it the winner in this race. With a proven track record of scaling complex technologies like electric vehicles, Tesla has the infrastructure and expertise to produce humanoid robots at scale, driving down costs and accelerating market adoption.

Humanoid robots are poised to redefine the workforce, with advancements in AI and scalable production making this the ideal time to invest. Companies like Figure and Tesla are leading this charge, each with unique strengths that will shape the future of this technology. The question for investors isn't whether to invest, but how to position themselves to capitalize on this impending revolution.

## Understanding the Risks

1. **The technology is never fully realized:** The likelihood of this scenario is extremely low, as I would argue that we are already seeing the technology materialize. A clear example is Figure's recent [Speech-to-Speech Reasoning Demo](#).
2. **Investing in the wrong company:** While the industry as a whole is almost certain to see explosive growth, there's always a risk that the company you pick may not be the one to capitalize on it.
3. **Social resistance:** Resistance to automation and robotics, especially in terms of job displacement, is likely to grow. While the introduction of humanoid robots into the workforce will certainly trigger strong social reactions, I doubt it will significantly disrupt the inevitable growth of the humanoid robotics industry. Initially, these robots might not replace as many human jobs as you'd think. Instead, they could fulfill new jobs that didn't exist given the expense of human labor. For example, most people in America don't have a maid service or a gardener or a private chef, but maybe they would if a robot could do it for cheaper.

## Final Thoughts

The rise of humanoid robots signals a transformative shift in technology, offering unparalleled versatility and cost-efficiency over specialized machines. With AI advancements enabling robots to perform complex tasks, and companies like Figure and Tesla driving innovation, the timing for investment has never been better. The potential for significant returns, combined with their broad applicability across industries, makes this a once-in-a-lifetime opportunity for savvy investors. While there are risks, the rapid progress suggests humanoid robots will soon become an integral part of the workforce.