

Reading Comprehension and Analysis

Read the passage below carefully and answer the questions that follow.

TEN YEARS AGO, at the DARPA Robotics Challenge (DRC) Trial event near Miami, I watched the most advanced humanoid robots ever built struggle their way through a scenario inspired by the Fukushima nuclear disaster. A team of experienced engineers controlled each robot, and overhead safety tethers kept them from falling over. The robots had to demonstrate mobility, sensing, and manipulation—which, with painful slowness, they did.

These robots were clearly research projects, but DARPA has a history of catalyzing technology with a long-term view. The DARPA Grand and Urban Challenges for autonomous vehicles, in 2005 and 2007, formed the foundation for today's autonomous taxis. So, after DRC ended in 2015 with several of the robots successfully completing the entire final scenario, the obvious question was: When would humanoid robots make the transition from research project to a commercial product?

The answer seems to be 2024, when a handful of well-funded companies will be deploying their robots in commercial pilot projects to figure out whether humanoids are really ready to get to work.

One of the robots that made an appearance at the DRC Finals in 2015 was called ATRIAS, developed by Jonathan Hurst at the Oregon State University Dynamic Robotics Laboratory. In 2015, Hurst cofounded Agility Robotics to turn ATRIAS into a human-centric, multipurpose, and practical robot called Digit. Approximately the same size as a human, Digit stands 1.75 meters tall (about 5 feet, 8 inches), weighs 65 kilograms (about 140 pounds), and can lift 16 kg (about 35 pounds). Agility is now preparing to produce a commercial version of Digit at massive scale, and the company sees its first opportunity in the logistics industry, where it will start doing some of the jobs where humans are essentially acting like robots already.

Are humanoid robots useful?

"We spent a long time working with potential customers to find a use case where our technology can provide real value, while also being scalable and profitable," Hurst says. "For us, right now, that use case is moving e-commerce totes." Totes are standardized containers that warehouses use to store and transport items. As items enter or leave the warehouse, empty totes need to be continuously moved from place to place. It's a vital job, and even in highly automated warehouses, much of that job is done by humans.

Agility says that in the United States, there are currently several million people working at tote-handling tasks, and logistics companies are having trouble keeping positions filled, because in some markets there are simply not enough workers available. Furthermore, the work tends to be dull, repetitive, and stressful on the body. "The people doing these jobs are basically doing robotic jobs," says Hurst, and Agility argues that these people would be much better off doing work that's more suited to their strengths. "What we're going to have is a shifting of the human workforce into a more supervisory role," explains Damion Shelton, Agility Robotics' CEO. "We're trying to build something that works with people," Hurst adds. "We want humans for their judgment, creativity, and decision-making, using our robots as tools to do their jobs faster and more efficiently."

For Digit to be an effective warehouse tool, it has to be capable, reliable, safe, and financially sustainable for both Agility and its customers. Agility is confident that all of this is possible, citing Digit's potential relative to the cost and performance of human workers. "What we're encouraging people to think about," says Shelton, "is how much they could be saving per hour by being able to allocate their human capital elsewhere in the building." Shelton estimates that a typical large logistics company spends at least US \$30 per employee-hour for labor, including benefits and overhead. The employee, of course, receives much less than that.

Section A: Multiple Choice

1. What was the DARPA Robotics Challenge inspired by?
 - a) A natural disaster in Japan
 - b) Autonomous vehicle technology
 - c) The need for better warehouse automation
 - d) Advances in artificial intelligence
2. When is it expected that humanoid robots will transition to commercial products?
 - a) 2015
 - b) 2024
 - c) 2030
 - d) 2007
3. What is the primary initial use case for Agility Robotics' Digit?
 - a) Healthcare assistance
 - b) Autonomous taxis
 - c) Moving e-commerce totes
 - d) Educational purposes
4. What is a significant challenge that logistics companies face according to Agility?
 - a) High costs of technology
 - b) Insufficient workers for certain tasks
 - c) Inadequate storage space
 - d) Complex regulatory requirements

Section B: Short Answer

1. Describe the physical characteristics of the Digit robot.
2. What are some of the potential benefits of using robots like Digit in warehouses?

3. Explain the impact of DARPA's past challenges on today's technology.

Section C: Essay

1. Discuss the potential societal impacts of replacing human workers with robots in the logistics industry. Consider both positive and negative aspects.