

Exploring Careers in AI

John Allen

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AI CAREERS AT A GLANCE

AI-Related Job Postings

As of February 2024, 2% of total US jobs posted

**WE'RE
HIRING**
JOIN OUR TEAM

Highest-Paying Jobs in AI*

- AI Engineer: \$160,757
- Computer Vision Engineer: \$168,803
- Business Development Manager: \$196,491

Average Salary

Entry-Level
Generative
AI Engineer:
\$80,000



AI Skills Training

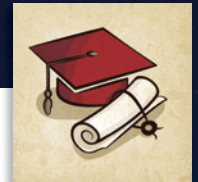
Can boost salaries
by up to 30%

Projected Growth for AI careers

21% growth by 2031

Required Degree

Typically, at least a bachelor's degree in computer science or mathematics



AI in the Workplace

As of August 2024, about 266 million companies were using or planning to use AI



Essential Characteristics for AI Workers

- Communication
- Critical thinking
- Problem-solving
- Teamwork



CHAPTER FIVE

A Bright Future for a New Technology

The Mars rover that explored the surface of the Red Planet beginning in February 2021 is called *Perseverance*. That name also fits Vandii Verma, its main architect. For more than twenty years, Verma has been designing and building robots for space exploration, especially for missions to Mars. As chief engineer for robotic operations at NASA, she employs AI at every stage of creation. In fact, AI is the main source of *Perseverance*'s ability to think, navigate, and handle samples while operating 140 million miles (225 million km) from Earth. *Percy*, as Verma and her engineers call the intrepid car-sized rover, in many ways has a mind of its own.

AI technology also allows Verma and her team to improve the rover's systems as the mission is proceeding. "While we can't upgrade the hardware while it's up there, we can upgrade the software," she says. "We've done three software upgrades since we landed. We add new capabilities, test them, and figure out how we're going to use them. That's all part of the work."³⁴ Verma says the AI upgrades help *Percy* make decisions such as what rocks are most worthy of study. AI also enables the rover to do several things at once, while also calculating the energy needed to complete each task. "So that's where I think the huge change is," she says. "The capability

and the trust are to the point where we've seen over time enough correct decisions by the AI that we are now willing to let it take control."³⁵

New Jobs Powered by Advances in AI

Operating a Mars rover like *Perseverance* seems like a dream job to many tech-oriented people. But breakthroughs in AI, like the ones Verma is making with NASA's smart rover, promise to spur all sorts of new and interesting jobs in the future. Moreover, AI advances in one industry tend to spread rapidly to others, providing even more opportunities.

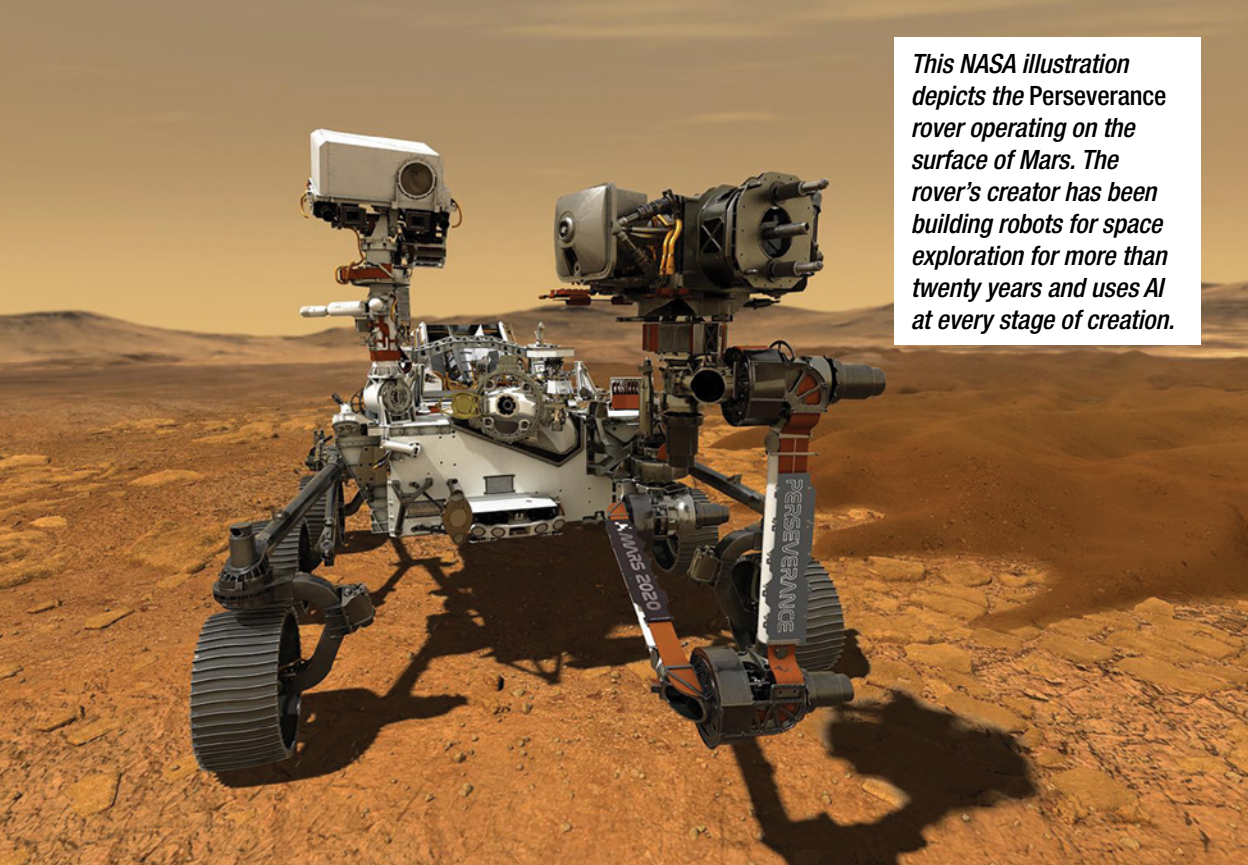
"So that's where I think the huge change is. . . . The capability and the trust are to the point where we've seen over time enough correct decisions by the AI that we are now willing to let it take control."³⁵

—Vandi Verma, chief engineer for robotic operations at NASA

An example of this is the cutting edge AI technology called digital twins. In September 2020, NASA engineers debuted *Percy's* full-size earthbound replica, named *OPTIMISM*. This digital double is designed to test all the tricky maneuvers that *Percy* must perform. For example, *OPTIMISM's* first major test was a simulated landing maneuver called Skycrane. For the test, which was conducted virtually via *OPTIMISM's* onboard computer, a supersonic parachute attached to a rocket-powered crane successfully lowered the rover to the ground by way of nylon cables. What engineers learned from the computer test was transferred to *Percy's* software. Weeks later, Verma and her team at NASA's Jet Propulsion Laboratory (JPL) held their breath as *Percy* plummeted toward the Martian landscape at high speed. They referred to the seven-minute delay in communications as the "seven minutes of terror."³⁶ But *Percy* made it through the perilous Skycrane landing on Mars with no problem.

After the Skycrane test, *OPTIMISM* made a series of trial runs on a rock-strewn California mock-up of Mars. AI-based data from these test runs helped *Percy* navigate its way over the slopes and craters of the genuine Red Planet. "The size and shape of rocks in the visual field—will they turn into obstacles or not?" says

This NASA illustration depicts the Perseverance rover operating on the surface of Mars. The rover's creator has been building robots for space exploration for more than twenty years and uses AI at every stage of creation.



Bryan Martin, flight software manager at JPL. “We test a lot of that, figure out what kinds of things to avoid. What we have safely traversed around here has informed rover drivers in planning their traverses on Mars. We’ve done so much testing on the ground we can be confident in it. It works.”³⁷

The digital twins concept works so well that it is being adopted in industries as diverse as manufacturing and health care. Manufacturers use it to test the performance of machines and equipment. Sensors powered by AI send data about each machine in real time to its digital twin. The twin can help forecast breakdowns and predict when maintenance will be required. It can also process data about force and friction that increase tool wear and then take steps to correct the problem. Companies can even create digital twins of the whole factory system. This allows engineers to monitor compliance with regulations and improve how the separate parts work together. The result is lower costs, fewer errors, and better quality.

Using AI to Discover Cognitive Risk Factors

AI may soon play a major role in spotting risk factors for Alzheimer's disease and other forms of dementia. Scientists at the University of California, San Francisco (UCSF), have come up with a method to predict Alzheimer's disease as early as seven years before its symptoms appear. They use AI and machine learning to analyze patient records for signs of risk. "This is a first step towards using AI on routine clinical data," says the study's lead author, Alice Tang, a graduate student at the UCSF lab, "not only to identify risk as early as possible, but also to understand the biology behind it."

Quoted in Victoria Colliver, "How AI Can Help Spot Early Risk Factors for Alzheimer's Disease," UCSF, February 21, 2024. www.ucsf.edu.

In health care, digital twins have countless applications. Digital replicas of tumors enable doctors to test different treatment options and help refine surgical approaches. Dr. Caroline Chung, a radiation oncologist at MD Anderson Cancer Center in Houston, Texas, sees exciting possibilities for creating lifesaving treatments. "Digital twins of individual cells, organs or systems have the potential to inform decisions and to reduce the time and cost of discovering and developing new drugs and therapeutics,"³⁸ she says. The technology also promises to revolutionize health care systems. Hospitals, with their complex scheduling and inventory issues, can be managed more efficiently due to constant streams of data shared by the actual system and its twin. Experts say that implementing digital twin technology will create good jobs for tech workers. Those who understand how to maximize the benefits of digital twins are certain to be in high demand. Current staff at factories and hospitals that adopt digital twin technology can also thrive by upgrading their AI knowledge.

AI-Based Assistance for Elder Care

Another promising health care–related application for AI is in elder care. For seniors who spend too much time by themselves,

SOURCE NOTES

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INTERVIEW WITH A SOFTWARE DEVELOPER

Mark Hoffman is a senior software engineer and software developer with more than thirty years of experience in backend services such as database management and security service. He has worked as a staff developer at PayPal, State Street Bank, and several start-up firms. He is currently providing AI solutions as an independent software developer. He works remotely from his home in St. Petersburg, Florida, or as a “digital nomad” from various tropical locales.

Q: How did you become proficient in using AI?

A: I started to learn AI by reading a ChatGPT tutorial and watching a number of YouTube videos on the subject. After that, I experimented with a small demo program to get a better understanding of AI’s capabilities. I also read articles about the underlying technology, such as explanations of large language models (LLMs). I have continued to refine how I write my prompts for GenAI to maximize my productivity.

Q: Can you describe how you use AI during your typical workday?

A: I do not use AI every day, but I employ it quite frequently for certain tasks. For example, it is most useful when I’m starting a project or writing documentation for a project. For example, I use AI to better understand a problem that I’m working on or as an aid to write a function or set of functions for a development process that I’m unfamiliar with.

Q: What are the advantages of using AI in your work?

A: Using AI can greatly increase my productivity by significantly reducing the amount of boilerplate computer code that I have to write. Boilerplate code is the name for sections of code that are standard and repetitive and must appear in certain places in

FIND OUT MORE

Books

Steve Ballenger, *Future of Work: AI, Automation, and Employment*. Oldham, UK: Digital Phoenix Media, 2024.

Kavita Ganesan, *The Business Case for AI: A Leader's Guide to AI Strategies, Best Practices & Real-World Applications*. Salt Lake City, UT: Opinosis Analytics, 2022.

Russel Grant, *Prompt Engineering and ChatGPT: How to Easily 10X Your Productivity, Creativity, and Make More Money Without Working Harder*. Pebblefalls Publishing, 2023.

Kai-Fu Lee and Chen Qiufan, *AI 2041: Ten Visions for Our Future*. New York: Crown Currency, 2021.

Ethan Mollick, *Co-Intelligence: Living and Working with AI*. New York: Portfolio, 2024.

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Ashton Jackson, "3 Ways to Use AI Right Now to Get Ahead—If You Do, You're 'Really Going to Succeed,' Says Expert," CNBC, September 25, 2023. www.cnbc.com.

Ryan Roslansky, "The AI-Fueled Future of Work Needs Humans More than Ever," *Wired*, January 28, 2024. www.wired.com.

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Organizations and Websites

AI Job Board

<https://theaijobboard.com>

The AI Job Board promotes its website as the number one listing on the internet for jobs in artificial intelligence and machine learning. It finds

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