Title: AI, Robotics, and What Lies Ahead

Samuel Matthew:

Hello, and thank you for listening to the *AI SuccessFactors* podcast. We help enterprises adopt artificial intelligence by breaking down the process into three steps: identifying the right AI opportunity, aligning it with business value, and ensuring it supports strategic goals.

If you're a leader needing to demonstrate ROI on existing AI initiatives or secure buy-in for new ones, you're in the right place. Our mission is to empower enterprise leaders to navigate, transform, and lead through AI integration. In this show, we interview business and analytical leaders who have successfully implemented AI in their organizations.

Today on *AI SuccessFactors*, we're excited to welcome Raj Prabhakar. His impressive career includes developing over 30 robots and working on Carnegie Mellon's Moon Rover project. With a Master's in Robotics from Carnegie Mellon, Raj combines technical expertise with a visionary approach to AI. He's the Director of AI and Data Science at ServiceLink, where he leads transformative AI and automation initiatives. This episode will provide valuable insights for CXOs and enterprise leaders exploring the future of AI and robotics.

Welcome to the show, Raj!

Raj Prabhakar:

Thank you, Samuel! I'm excited to be here.

Samuel Matthew:

It's a privilege to have you. You've been involved in the creation of over 30 robots, including work on the renowned Moon Rover project at Carnegie Mellon. That's remarkable. When we consider the evolution of robotics—from the early days in the mid-1900s to today, with systems far more powerful and capable—how do you see advancements in AI shaping the future of robotics?

Raj Prabhakar:

It’s an exciting time. Robotics essentially combines sensing, processing, and action, typically using an actuator. What makes robots intelligent is the code and algorithms that process sensor data and control actions. With advancements in general AI and large language models (LLMs), robotics is evolving rapidly. We’ve moved from simple computing platforms to microcontrollers, and now, thanks to NVIDIA GPUs and other specialized hardware, we can process complex tasks like object detection directly on smaller robots. Soon, we’ll see multimodal models, like GPT-4, becoming compact enough to operate on edge devices. This progress is bringing us closer to robots that can perform various tasks, moving away from specialized, task-specific robots.

Samuel Matthew:

That’s fascinating. Could you explain how IoT and edge computing enable more efficient, responsive robotic systems? Many listeners, especially those outside manufacturing or logistics, may not be familiar with these terms.

Absolutely. In simple terms, IoT (Internet of Things) connects everyday objects to the internet, allowing them to share data—like a smartwatch tracking steps and syncing to your phone. In a business context, an IoT device in a factory might monitor furnace temperatures or soil conditions on a farm, feeding data to inform decision-making.

Edge computing involves processing data closer to its source. For example, instead of Alexa sending your question to a distant server and waiting for a response, edge computing enables it to process commands instantly. This real-time processing is crucial in applications like self-driving cars, where split-second decisions are necessary.

Samuel Matthew:

How does IoT enable robotics, especially in making systems smarter and more responsive?

Raj Prabhakar:

IoT is like a universal language that lets devices communicate. At home, for example, my smart vacuum starts cleaning only when my wife and I are away, using sensors in our phones to detect when we've left. In industrial settings, IoT allows machines to exchange information directly without human intervention, improving efficiency. And with standardization on protocols like Matter over Thread, IoT devices are becoming more compatible across industries, which is exciting.

Samuel Matthew:

That's an excellent example. With such advancements, how are AI-powered systems transforming production lines, particularly in manufacturing?

Raj Prabhakar:

AI has brought remarkable improvements. About 15 years ago, we relied on traditional machine vision to inspect products, which required specific lighting and complex setups. Today, deep learning allows us to use AI in varied conditions with fewer training samples, thanks to developments in CNNs and zero-shot learning. This lets us deploy smarter systems on production lines, where adjustments can be made by in-house engineers instead of specialized experts.

Samuel Matthew:

I see. In a time when supply chain volatility is a constant, technologies like cobots seem crucial. How have you seen cobots evolve in manufacturing?

Raj Prabhakar:

Cobots are relatively new and more affordable than traditional industrial robots, making them suitable for smaller manufacturers with variable tasks. Cobots can be taught tasks by human operators and are safer and more adaptable. They're becoming popular not only in manufacturing and logistics but also in other sectors like healthcare.

Samuel Matthew:

That’s an interesting point. Could you share some of the opportunities you see for AI and robotics in healthcare and logistics?

Raj Prabhakar:

In healthcare, cobots are already assisting with non-invasive procedures and precision surgeries, such as with the Da Vinci surgical robot. While regulations prevent fully autonomous surgical robots, we're moving towards increased autonomy. AI is also enhancing logistical efficiency, optimizing supply chains with intelligent sorting, packing, and routing.

Samuel Matthew:

The benefits are clear, but what are the biggest challenges in combining AI with robotics?

Raj Prabhakar:

One challenge is regulatory. In a past role, we worked with large floor-cleaning robots that required stringent safety certifications, as they could potentially harm someone if they malfunctioned. Ensuring these robots were safe involved extensive testing and approvals. While regulations are necessary to prevent unsafe products, they can also slow down innovation.

Samuel Matthew:

Absolutely. As AI integrates into our lives, we need robust safeguards. What measures can companies take to ensure data privacy with AI-enabled systems, particularly with robots collecting personal data?

Raj Prabhakar:

The best approach is to collect only the necessary data. For example, rather than storing exact ages, a simple “21 and above” flag might suffice. Edge computing helps by processing data locally rather than on the cloud, reducing privacy risks. Transparency with users is essential, as is working with regulators to maintain a balance between data utility and privacy.

Samuel Matthew:

Great insights. On the topic of the future, do you think we're close to achieving general-purpose robots, or will specialized robots continue to dominate?

Raj Prabhakar:

In the short term, specialized robots will still dominate. But within five years, we might see general-purpose robots capable of performing multiple tasks. Humanoid robots designed to operate in human environments could become common, though they may be costly at first. However, for industrial use, specialized robots and cobots will remain more efficient for specific tasks.

Samuel Matthew:

Exciting prospects! We're at the top of the hour. This has been a fantastic conversation. Do you have any final thoughts for CXOs and decision-makers?

Raj Prabhakar:

Yes, the future holds significant advancements in AI, particularly as it transitions from software to the physical world. AI-powered robots, cobots, and autonomous systems are on the rise, and now is the time for companies to start planning. Those who adopt these technologies will be well-positioned ahead of their competition.

Samuel Matthew:

Thank you, Raj, for sharing your journey and insights. And thank you to our listeners. If you enjoyed today's episode, please leave us a five-star review and follow us on Apple Podcasts, Google, SoundCloud, LinkedIn, Twitter, Facebook, and YouTube. Links are in the show notes or on AISuccessFactors.com. We publish episodes bi-weekly, so stay tuned for more.
