

MODEL. SIMULATE. INNOVATE: DRIVING AMAZON'S FULFILLMENT DESIGN THROUGH SIMULATION

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ABSTRACT

This talk explores how simulation serves as the digital backbone enabling innovation across Amazon's fulfillment design and operations. We will discuss the mission of the simulation organization to virtually experiment, validate, and optimize complex fulfillment concepts before they are physically realized. As automation complexity grows, traditional design approaches face critical challenges in predicting system interactions, throughput impacts, and operational resilience. Simulation bridges this gap by offering a controlled yet high-fidelity environment to model, test, and refine designs at scale. The talk will walk through a range of real-world applications of simulation across the end-to-end fulfillment ecosystem spanning site-level process design, automation system validation, network and traffic flow planning, and real-time digital twin development. We will highlight how simulation-driven insights are informing key design decisions, driving process innovation, and accelerating strategic initiatives across diverse site types and automation technologies. Finally, we will reflect on the challenges and future vision for simulation to advance toward intelligent, adaptive models that mirror real-world operations in real time. Through this journey, we will see how simulation is not merely a design tool but a strategic enabler to innovate faster, smarter, and virtually, to build the fulfillment network of the future.

SPEAKER BIOGRAPHY

GANESH NANAWARE is a Senior Manager of Simulation Research, AI, and Data Science within Amazon's Worldwide Design Engineering organization. With dual master's degrees in mechanical engineering and business administration, he leads teams that leverage Agentic AI, advanced simulation, and machine learning to design complex, scalable systems driving innovation and exceptional customer experiences. Ganesh's career spans leadership roles across multiple Fortune 500 companies, where he has delivered transformative innovations in design, automation, and data driven processes. He has published extensively in industry conferences and holds patents for his simulation-driven design work. A key contributor to Amazon's simulation community, Ganesh founded the Annual Amazon Fulfillment Simulation Symposium, bringing together scientists to share insights on simulation-driven innovation across the fulfillment supply chain. His leadership has been instrumental in shaping the vision for Amazon's global simulation science community, advancing the frontiers of simulation science and AI-driven design.