

VASANTHAKUMAR KALAIKKOVAN, M.S.

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SUMMARY

Seasoned Simulation and Digital Twin Architect with 12+ years of software engineering experience building real-time 3D, XR, robotic simulation, & manufacturing visualization platforms across Unity C#, Unreal Engine C++, Omniverse Isaac Sim, and Python. Experienced in transforming ambiguous R&D, factory, robotics, and AI/ML workflow goals into modular architectures, scalable data pipelines, reusable APIs, and production-ready simulation systems. Strong background in synchronized camera/sensor pipelines, pose telemetry, large-scale simulation workflows, performance optimization, cross-functional technical leadership, & mentoring engineering teams toward reusable standards and reliable delivery.

CORE SKILLS (COMPETENCIES + TECHNICAL)

Digital Twin & Simulation Architecture: Manufacturing digital twins, robotic simulation, large-scale simulation workflows, plant/factory visualization, modular simulation systems, operational twin workflows, deterministic update loops, scenario prototyping, workflow automation prototyping.

Real-Time 3D, Robotics & Simulation Platforms: Unity 3D C# architecture, Unreal Engine C++, NVIDIA Omniverse Isaac Sim, Webots, Genesis, Vuforia, WebGL, real-time visualization, iOS/Android deployment, VR/MR headset.

Sensor, Camera & AI/ML Data Pipelines: Real-time camera/sensor pipelines, synchronized RGB/RGB-D image streams, pose telemetry, camera transforms, frame metadata, timestamp alignment, simulation-to-image data generation, repeatable AI/ML and VLM/VLA training datasets.

Robotics Integration & Middleware: ROS 2 integration, gRPC-based simulation data exchange, robotic-agent telemetry, camera/agent pose streaming, observation payloads, simulation-to-robotics communication pipelines.

APIs, Data Contracts & Data Systems: Modular APIs, reusable data contracts, scalable data schemas, SQL Server, SQLite, Postgres, PTC ThingWorx, telemetry pipelines, structured simulation metadata, data integration patterns.

Programming & Platform Engineering: C#, C++, Python, Linux, Git, GPU-enabled simulation workflows, GPU optimization, NVIDIA RTX 5080/5090-class workstation environments, Kubernetes/Docker exposure, CI/CD-minded delivery, debugging at scale, system design, code reviews, Agile/Scrum delivery.

Architecture Leadership & Delivery: Reference architecture patterns, technical roadmap planning, reusable frameworks and components, engineering standards, mentoring, cross-functional collaboration, stakeholder/vendor alignment, translating ambiguous R&D and product goals into prototype and production-ready simulation systems.

PROFESSIONAL EXPERIENCE

webAI - Austin, TX

Aug 2025 - Present

Staff R&D Software Engineer – Simulation

- Lead the current UE simulation project used to generate training observations for VLM/VLA workflows, connecting Webots robotic/agent simulation with UE rendering, synchronized camera outputs, and ROS 2 data exchange through gRPC calls.
- Ingest camera/agent position and rotation telemetry, convert it into Unreal camera views, and produce aligned RGB/RGB-D image streams, timestamps, pose metadata, camera intrinsics, and observation payloads for repeatable model training.
- Designed a modular pose-to-pixels and gRPC/Python data path with reusable contracts, frame metadata, camera transforms, image encoding, capture cadence, and ROS 2 integration for simulation-to-robotics workflows.
- Optimize large-scale simulation and image-capture workflows across GPU rendering, GPU optimization, frame pacing, visual fidelity, throughput, and Linux packaged-build constraints on NVIDIA RTX 5080/5090-class environments.
- Partner on a digital twin prototype using Unity 3D C# for food-industry process automation, translating ambiguous operational goals into simulation-backed workflow design and stakeholder-facing visualization.

General Motors - Austin, TX

Jan 2023 - Aug 2025

XR Architect

- Designed and delivered manufacturing XR inspection experiences using Unity, C#, and Vuforia for iPad and Android tablets, with emphasis on usability, maintainability, and performance under deployment constraints.
- Developed manufacturing digital twin experiences leveraging NVIDIA Omniverse and streaming workflows to mobile devices, enabling interactive visualization of plant and operational scenarios.
- Defined reusable architecture patterns for real-time 3D workflows, including interaction models, device-specific rendering constraints, deployment guardrails, and profiling-led optimization practices.
- Partnered with manufacturing, product, engineering, and vendor stakeholders to translate plant-floor requirements into technical designs, prototypes, and roadmap-ready implementation plans.
- Mentored engineers and contributed to technical standards through design guidance, code reviews, architecture reviews, and structured knowledge sharing.

Applied Materials - Austin, TX

Aug 2020 - Jan 2023

Virtual Reality Solution Architect

- Architected mixed reality and VR manufacturing solutions in Unreal Engine, integrating manufacturing data into immersive experiences that improved operational context and decision-making.
- Established technical roadmaps with product and operations teams, converting early-stage concepts into iterative releases and production-ready deployments.
- Diagnosed and eliminated performance bottlenecks across rendering, lighting, and runtime workflows while preserving visual fidelity in demanding real-time environments.
- Created development tooling and editor automation to accelerate environment setup, lighting workflows, and team productivity across repeated simulation/XR delivery streams.
- Recognized by senior leadership for innovative XR solutions across multiple manufacturing initiatives.

Applied Materials - India

May 2018 - Aug 2020

Senior Software Engineer

- Developed a reusable Unity/C# VR application framework compatible across HTC Vive/Cosmos headset families, improving portability, maintainability, and delivery consistency.
- Implemented reusable rendering techniques, optimization patterns, and component templates to meet performance targets across diverse hardware platforms. Served as Unity subject-matter expert, mentoring engineers and standardizing coding conventions, reusable components, and project templates to reduce rework.

Sify Technologies - India

Jun 2017 - May 2018

Software Engineer

- Delivered cross-platform AR/VR applications for mobile devices, applying 3D math, performance constraints, and stakeholder requirements to produce stable interactive experiences. Optimized rendering and asset pipelines including textures, meshes, and LODs to maintain smooth mobile AR/VR performance under compute and memory limits.

Cognizant - India

Nov 2015 - Jun 2017

Programmer Analyst

- Designed and optimized interactive 3D/game levels using rendering and lighting best practices to improve runtime performance and visual quality. Built rapid VR prototypes and resolved gameplay/rendering defects end-to-end, improving build stability for internal reviews and client demonstrations.

EDUCATION

M.S., Data Science — Bellevue University, Nebraska, USA (2022)

B.E., Electrical and Electronics Engineering — Anna University, India (2015)