

# VIGNESH KARNIKA

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## PROFESSIONAL SUMMARY

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Solution architect with 14+ years building and scaling production ML, AI systems, multi-agent platforms, and real-time 3D infrastructure end-to-end. Currently Lead Architect of two flagship Streamoid platforms: **Artifax**, an AI-native design platform combining a WebGL/WASM canvas with multi-agent LLM orchestration, and **Desara**, a cloud-streamed Unreal Engine 3D design studio adopted into the London College of Fashion curriculum. Shipped enterprise AI products used by Fortune 500 retail brands including Puma, Ajio, and ABFRL. Deep expertise across ML, DL, diffusion models, GraphRag and knowledge graphs, GPU-accelerated rendering, WebRTC pixel streaming, and cloud-native distributed systems. **Published on US Patent 20240078576** for automated fashion video generation.

## CORE COMPETENCIES

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**AI/ML & Agent Systems:** Multi-Agent Systems, LangGraph, LangChain, LLM Agent Orchestration, Planner-Executor-Validator Architectures, ReAct, Tool Use, RAG Pipelines, Vector Databases, Knowledge Graphs, Context Engineering, LLM Observability(Langfuse), Diffusion Models, Stable Diffusion, LoRA, QLoRA, PEFT, SLM Fine-Tuning, Synthetic Data Generation, Computer Vision, Deep Learning

**Real-Time 3D, Rendering & Streaming:** Unreal Engine (C++), WebRTC Pixel Streaming, GPU Orchestration, DLSS, H.264/VP9 Transcoding, WebGL 2, WebAssembly (WASM), GPU-Accelerated Canvas, Spatial Indexing, Selective Forwarding Unit (SFU), Matchmaker Services

**Cloud & Distributed Systems:** AWS, GCP, Docker, Microservices, Event-Driven Architecture, MQTT, Redis Pub/Sub, WebSockets, Real-Time Collaboration, Multi-Tenant Architecture, Auto-Scaling, Horizontal Scaling, High-Availability Systems

**Languages & Frameworks:** Python, C++, Go, Node.js, JavaScript, Java,, FastAPI, Flutter, .NET, SQL, MongoDB

**Tools & Methodologies:** Git, Scrum, DevOps, CI/CD, ROS, IoT, BLE, GPS, RFID, Android SDK, iOS

## PROFESSIONAL EXPERIENCE

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**Lead Solutions Architect** Apr 2017 – Present

*Streamoid Technologies (AI for Fashion Retail) | Bengaluru, India*

### Lead Architect — Artifax (AI-Native Design Platform for Fashion Designers & Merchandisers)

- Lead architect of Artifax, an AI-native infinite canvas platform used by fashion designers and merchandisers to develop season range plans, design boards, and technical product specifications collaboratively.
- Designed the end-to-end system architecture spanning a WebGL/WASM rendering engine, a multi-agent AI orchestration layer, a real-time collaboration backbone, and a brand-aware knowledge layer owning technical direction from product concept through production rollout.
- Architected a multi-agent AI system on LangGraph,AGUI,A2UI with a planner executor validator topology, enabling designers to drive canvas operations, generative workflows, and merchandising logic through natural-language intent.
- Built a brand intelligence layer that ingests unstructured brand assets (documents, imagery, spreadsheets) into a queryable knowledge graph, providing grounded, brand-consistent context to every AI interaction across the platform.
- Engineered context management for long-running design sessions using time-decayed vector retrieval, canvas state summarization, and workspace-aware memory, keeping agent behavior coherent across multi-hour creative workflows.

- Orchestrated a multi-model inference pipeline across frontier cloud LLMs and a self-hosted fallback, abstracting providers behind a unified routing layer with full observability across intent, agent execution, and tool use.
- Designed and built a GPU-accelerated WebGL infinite canvas with WASM-backed geometry, adaptive quality profiles, and R-Tree spatial indexing, sustaining 60fps with 300+ elements on mid-range hardware.
- Architected the canvas rendering pipeline as a plugin-based registry supporting heterogeneous content (imagery, vector, type, video, tabular data, 3D), with non-destructive transforms, smart guides, and high-resolution export workflows.
- Shipped the core product surface: season range planning with BTF mix generation and brand adherence scoring, AI-assisted design boards, technical product specifications, and marketplace trend discovery with visual similarity search.
- Built the real-time collaboration backbone on a Go WebSocket layer with Redis pub/sub for horizontal scaling, multi-tenant workspace isolation, and Docker-based service orchestration across Nuxt 3, FastAPI, Go, Redis, and MongoDB.

#### **Lead Architect — Desara Platform (Cloud-Streamed Unreal Engine 3D Design Studio)**

- Architected core real-time compute platform: C++ Unreal Engine build integrated with custom Node.js signaling servers, Selective Forwarding Unit (SFU), and Matchmaker service for GPU instance routing and session lifecycle management.
- Built auto-spawn GPU orchestration with dynamic scaling and load prediction, achieving 45% higher compute utilization and supporting up to 15 concurrent design sessions on a single RTX 4090 GPU using DLSS-based AI upscaling.
- Engineered WebRTC pixel-streaming pipeline with H.264/VP9 transcoding, delivering reduced bandwidth and improved visual fidelity across variable network conditions.
- Implemented agentic editing workflows via LangGraph multi-agent orchestration, enabling designers to modify garment patterns, textures, and shapes using natural language.
- Developed silhouette classifiers, segmentation models, and garment-understanding modules powering AI-assisted 3D editing and rapid prototyping.
- Architected Vue/Nuxt frontend interfacing with pixel-streamed Unreal sessions, managing real-time controls, tool orchestration, and AI-assisted editing flows.
- Integrated into the London College of Fashion advanced digital design curriculum, currently under evaluation by global fashion brands for enterprise deployment.

#### **Lead Architect — Catalogix & Photogenix (Automated Cataloging & AI Photoshoot Platforms)**

- Designed microservices architecture serving Puma, Ajio, and ABFRL — processing millions of SKUs annually with MongoDB for schema-flexible product metadata, MQTT event streams for async feed ingestion, and distributed classifiers for tagging, visual similarity, and attribute extraction.
- Achieved 70% reduction in catalog turnaround time and 93% data accuracy by replacing manual cataloging workflows with autonomous AI-driven ingest pipelines.
- Pioneered flat-image-to-model photoshoot transformation in Photogenix using image diffusion models and custom LoRA adapters, eliminating traditional photography costs for fashion brands.
- Built synthetic image generation system that improved ML classifier accuracy and addressed training data scarcity across fashion recognition tasks.
- Mentored a core team of 6 engineers in scalable microservices design, AI classifier pipelines, and event-driven architecture, elevating system reliability.

### **Senior Android Developer** Apr 2016 – Apr 2017

*Streamoid Technologies | Bengaluru, India*

- Engineered a personalized digital wardrobe application(PIQIT) with an ML-powered recommendation engine.
- Implemented a high-scale digital news application(eenadu Android-IOS) supporting 100K+ concurrent users with 40% faster load times.

### **Android Developer** Aug 2014 – Apr 2016

*Dejaview Concepts Inc. | Bengaluru, India*

- Developed a hybrid positioning system integrating BLE, GPS, and RFID, achieving sub-meter accuracy at speeds up to 120 mph for high-velocity alpine sports tracking.
- Conducted real-world validation at Revelstoke (Canada) and The Venetian Resort (Las Vegas), demonstrating 50% accuracy improvement over GPS-only solutions.

### **IT Consultant** Apr 2013 – Aug 2014

*NuNet3 | Visakhapatnam, India*

- Developed a Kamailio-based SIP video calling solution for a “Talk to Celebrity” platform, increasing user engagement and concurrent video sessions.
- Built MDVantage, an ASP.NET health insurance solution that streamlined client interactions and reduced service delivery time.

### **Android Developer** Jun 2012 – Mar 2013

*Tvishi Tech Services | Bengaluru, India*

- Developed multiple Android applications including Paintit, a social networking app.
- Created a Unity3D promotional game for the Live-in Jeans live campaign.

## **PATENTS & PUBLICATIONS**

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- US Patent Application 20240078576 — Method and System for Automated Product Video Generation for Fashion Items (Published 2023).

## **OPEN SOURCE PROJECTS**

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### **Tools and libraries built and open-sourced for the AI developer community**

#### **A2UI Vue**

open-source Vue 3 renderer for Google’s A2UI protocol ([github.com/vkfolio/a2ui-vue](https://github.com/vkfolio/a2ui-vue))

#### **OrioSearch**

Self-hosted, Tavily-compatible web search and extraction API ([github.com/vkfolio/orio-search](https://github.com/vkfolio/orio-search))

#### **VizLang Studio**

Visual debugger for LangGraph agents, distributed as a VS Code extension

<https://marketplace.visualstudio.com/items?itemName=vkfolio.vizlang-studio>

#### **PyDebug Visualizer Helper**

VS Code extension for visualizing Python data structures during debugging

<https://marketplace.visualstudio.com/items?itemName=vigneshkarnika.pydebugvisualizerhelper>

## **CERTIFICATIONS**

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- Unreal Authorized Training Program (Game Development) — BlueStone Tech Labs, Mar 2022
- IBM Data Science Professional Certificate — IBM, Oct 2021 (Credential ID: T4ZSDX43426J)
- DeepLearning.AI TensorFlow Developer Certificate — DeepLearning.AI, Sep 2021 (Credential ID: BYKSRWDQSAD2)

## **EDUCATION**

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**Bachelor of Technology (B.Tech), Electronics and Communication Engineering**

Graduated 2011