

# Dr. Kaan Demir

AI Solutions Architect | Full-Stack AI Systems Engineer | PhD

✉ demirkaan97@gmail.com | 📞 +64 27 669 2008 | 📍 Wellington, New Zealand

## Professional Profile

Full-stack AI systems architect with a PhD in Artificial Intelligence and 7+ years delivering production-grade solutions across government, consulting, and research sectors. I design and build end-to-end AI platforms-from hexagonal gateway architectures and ontology-constrained knowledge graphs through to TypeScript frontends with real-time LLM tool orchestration. Currently leading AI R&D strategy: defining evidence-based output contracts, governance frameworks, and promotion gates that take agentic prototypes to enterprise-ready products. NZ citizen with deep experience across ANZ public and private sectors.

## Technical Expertise

- **AI Architecture & Strategy:** Hexagonal/ports-and-adapters design, ML Gateway patterns, verb contract APIs, Evidence Pack frameworks, Knowledge Graph (GraphRAG) architectures, ontology-constrained generation
- **LLM Engineering & Orchestration:** Azure OpenAI, Model Context Protocol (MCP), tool calling & function orchestration, RAG, LangChain, prompt engineering, SSE streaming, multi-agent systems (AutoGen), agentic workflows
- **AI/ML Research:** Diffusers, CLIP/LoRA/VAEs, Transformers, PyTorch, fine-tuning (LoRA, SFT, RLHF, DPO), deliberative alignment, Chain-of-Thought reasoning, evolutionary computation, representation learning
- **Cloud & Infrastructure:** Azure (Container Apps, Functions, SQL Database, Service Bus, Key Vault, ACR, AI Foundry, APIM, Managed Identity), Terraform/IaC, Docker, CI/CD pipelines
- **Full-Stack Development:** TypeScript, Node.js, Express, React, Next.js, Vite, Python, REST APIs, WebSockets, async job orchestration, Chart.js
- **MLOps & Governance:** ISO 42001, policy gates & guardrails, cost telemetry, audit trails, Evidence Pack validation, Bronze/Silver/Gold promotion frameworks

## Professional Experience

### AI & Data Engineer

*DataSing NZ*

2025 – Present

- **AI Platform Architecture:** Designed and implemented a 3-lane AI delivery framework-R&D (Knowledge Graphs, Evidence Packs), Productionisation (Gateway verbs, hexagonal architecture), and Standards (agentic development playbooks, CI gates)-establishing the company's AI strategy for 2026.
- **Evidence-Based AI Systems:** Architected "Evidence Pack" output contracts ensuring every AI response includes provenance, citations, policy compliance, and audit trails-enabling SME sign-off and enterprise governance requirements.
- **LLM Tool Orchestration:** Built MCP (Model Context Protocol) servers with sophisticated tool-calling architectures enabling natural language interfaces to enterprise databases, multi-database query correlation, dynamic visualisations, and SSE streaming responses.
- **Cloud Infrastructure Engineering:** Provision secure, production-grade Azure environments (Container Apps, Functions, Service Bus, Key Vault, APIM) via Terraform IaC with Managed Identity, cost telemetry, and correlation IDs on every call.
- **Hexagonal Gateway Design:** Implemented ports-and-adapters architecture isolating LLM providers, job queues, and evidence stores behind stable verb contracts-enabling provider swaps without breaking downstream apps.
- **Agentic AI Frameworks:** Engineered async job orchestration with Python workers (Azure Functions) for CPU/IO-bound ML workloads, reducing complex document analysis from months to hours.
- **Knowledge Graph & RAG:** Building GraphRAG-style retrieval over ontology-constrained knowledge bases with versioned schemas, entity extraction, and provenance-linked evidence stores.

### Data Analyst - AI & Strategic Projects Lead

*Financial Intelligence Unit, NZ Police*

2024 – 2025

- **RAG & NLP Systems:** Built retrieval-augmented generation solutions using LangChain and HuggingFace for legislative document ingestion, entity extraction, and intelligent search.

- **AI Governance Frameworks:** Designed NLP model governance incorporating policy gates, guardrails, audit trails, and evidence-based outputs for government AI deployment.
- **ETL Performance:** Led large-scale optimisation initiative across mission-critical data pipelines serving national financial intelligence operations.
- **Strategic Leadership:** Presented AI strategy to senior governance groups, directly influencing \$M+ infrastructure investment decisions and digital transformation roadmap.
- **Cross-Sector Partnerships:** Brokered strategic HPC partnership with ESR (Institute of Environmental Science and Research) for advanced analytical capabilities.

**Senior Machine Learning Researcher (PhD)** *Victoria University of Wellington* 2021 – 2024

- **Novel AI Architectures:** Designed custom transformers, self-attention mechanisms, and disentangled autoencoders achieving state-of-the-art results in multi-label learning.
- **Publication Record:** 12 papers in top-tier AI venues (IEEE TEVC, IEEE CIM, GECCO, AJCAI); active reviewer for TEVC, TKDD, GECCO; contributor to ICLR/ICML/IJCAI discussions.
- **Applied Research Leadership:** Led multi-agency AI projects including genetic algorithm-based feature selection for marine biomass analysis with Callaghan Innovation and Plant & Food Research.
- **Teaching Leadership:** Managed 30+ tutors as Head GTA; standardised assessment processes across computer science courses.

**Research Assistant - Data Science** *Victoria University of Wellington* 2018 – 2019

- Statistical analysis and experimental methodology for mathematics and statistics research projects.

## Education

**PhD, Computer Science & Artificial Intelligence** *Victoria University of Wellington* 2021 – 2024

- Thesis: *Evolutionary Representation Learning of Structured Multi-label Data*

**BSc (Hons), Computer Science** *Victoria University of Wellington* 2020 – 2021

**BSc, Computer Science & Statistics** *Victoria University of Wellington* 2017 – 2019

## Selected Publications

- K. Demir et al., “Multi-Label Black-Box Attacks via Evolutionary Structured Many-Objective Adversarial Perturbations,” *IEEE Trans. Evolutionary Computation*, 2025.
- K. Demir et al., “Dual Sparse Structured Subspaces and Graph Regularisation for PSO-Based Multi-Label Feature Selection,” *IEEE Computational Intelligence Magazine*, 2024.
- K. Demir et al., “Co-operative Co-evolutionary Many-objective Embedded Multi-label Feature Selection,” *GECCO '23*.

## Certifications & Memberships

- IEEE Member | Microsoft Certified: Azure Fundamentals (AZ-900) - *In Progress*
- IEEE New Zealand Central Section Industry Coordinator
- NZ Citizen | Full NZ Driver’s License | Eligible for NZ Government Security Clearance

## Online Profiles

**LinkedIn**



**Google Scholar**



**Portfolio**

