Dean Foulds

Data Scientist & ML Engineer

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PERSONAL STATEMENT

I approach data science as a problem solver first — applying mathematical rigour and scientific methodology to untangle complex, high-stakes systems. My career spans over a decade across aerospace, motorsport, and subsea infrastructure: environments where disciplined thinking and verifiable results are not optional, and where the gap between a good model and a correct one genuinely matters.

I hold a BSc (Hons) in Mathematics and Physics from the Open University and an Airline Transport Pilot's Licence — qualifications that reflect a consistent drive toward precision in high-stakes environments. I specialise in the rapid deployment of agentic AI systems, JAX-based ML pipelines, and formal proof verification in Lean 4 and Mathlib, with over 30 machine-verified proofs currently applied to live production aerospace risk models alongside GARCH and MCMC systems. I have taped out two chips in silicon via Tiny Tapeout, spanning binary neural network inference and systolic accelerator design. I consistently deliver functional autonomous systems within 8–12 weeks, typically achieving ROI improvements of 15–30% above projections — not through shortcuts, but through the kind of mathematical clarity that makes complex systems tractable.

TECHNICAL SKILLS

CATEGORY	SKILLS
Languages & Frameworks	Python · Lean 4 / Mathlib · JAX / NumPyro · TensorFlow · PyTorch · Polars · Verilog / HDL · LaTeX · Ruby
Cloud & Infrastructure	AWS SageMaker · Lambda · EMR · Google Vertex AI · BigQuery · Cloud Functions · Docker · Terraform
ML & Mathematics	MCMC Modelling · GARCH · Monte Carlo · Statistical Learning · Agentic AI · LangChain / LangGraph · SPC
Engineering	Six Sigma DMAIC · FMEA / PPAP · Lean Manufacturing · A/B Testing · Agile / Scrum · CAD (Fusion 360 / Creo)

NOTABLE PROJECTS

Risk Algorithm – Aircraft Parts · AJW Aerospace / Personal Portfolio · 2025–Present

- Production ML pipeline combining GARCH volatility modelling and MCMC inference (Python, JAX) for aircraft parts pricing, with core mathematical proofs verified in Lean 4 and Mathlib — covering volatility theory, pricing guardrails, and market propagation via the Banach fixed-point theorem.
- Demonstrates probabilistic inference paired with machine-checked correctness in a live commercial system. Proofs at deanfoulds.xyz/projects/lean_projects.

Lean 4 Theorem Proving · Personal Portfolio · 2024–Present

- Over 30 machine-verified proofs in Lean 4 and Mathlib spanning number theory, real analysis, algebra, and combinatorics — co-located with production engineering projects as correctness guarantees rather than academic exercises.

Systolic BNN Accelerator (v2) & 16-Neuron BNN · Tiny Tapeout · 2024–2025

- Two chips taped out in silicon: a 16-neuron BNN achieving single-cycle 8-bit inference with no CPU or software, and a redesigned v2 systolic accelerator with XNOR dot product engine, signed bias, and balanced popcount tree.

MCMC Model Training Pipeline · Personal Portfolio · 2023–Present

- Full MCMC model training pipeline with continuous retraining, visualisations, and predictions-vs-actuals analysis — built to production standard with reproducible results and systematic validation.

AMP Statistical Process Control · Personal Portfolio · 2023

- ML-driven SPC system for predictive analytics and process monitoring, applying statistical learning theory to detect drift and anomalies before they propagate to defects.

DSF Talk Explorer · Personal Portfolio · 2024–Present

- Agentic LLM application powered by a Neo4j graph database for natural language querying of Data Science Festival London talks — speaker, topic, and event data structured as a knowledge graph with a mobile-first interface.

Bioinformatics – Squamous Cell Carcinoma · Personal Portfolio · 2023

- Computational analysis of squamous cell carcinoma using Python and Jupyter, applying data science methodology to genomic and clinical data to surface statistically significant patterns.

WORK EXPERIENCE

Data Scientist · AJW Aerospace · Apr 2025 – Present · Sussex

- Designed and deployed autonomous agentic AI systems within 8–12 week cycles, consistently achieving ROI improvements of 15–30% above projections.
- Architected end-to-end ML pipelines on AWS and Google Cloud; developed Lean 4 / Mathlib proofs co-located with production risk models, providing machine-verified correctness on live pricing algorithms.
- Applied Monte Carlo simulation, DCF analysis, MCMC modelling, and decision theory frameworks for risk assessment and strategic decision-making.

Data Scientist & ML Engineer · ASN Submarine Cables · Dec 2023 – Apr 2025 · London

- Converted corrective to predictive maintenance using ML failure prediction and machine vision anomaly detection, measurably reducing unplanned downtime across fibre optic and laser manufacturing cells.
- Applied SPC and MCMC-based predictive models to reduce defect escape rates; led Kaizen events improving cell KPIs measured by DPMO via DMAIC and 8D problem-solving.

Aeronautical Engineering Lecturer (Contract) · East Surrey College · Mar 2022 – Dec 2023 · Redhill

- Delivered mathematics, physics, Python, CAD, and Six Sigma DMAIC; designed hands-on VSM and SPC exercises for aerospace engineering students.

Complex Data Analysis · McLaren Racing · Mar 2020 – Dec 2021 · Woking

- Implemented SPC and predictive ML models to reduce manufacturing defects; led FMEA, PPAP, and A/B testing protocols across vehicle production lines using Python, MATLAB, and Octave.

Quality Engineer · PGT Ceewrite Precision · May 2015 – Dec 2019 · Mitcham, Surrey

- Document and tooling design approvals; customer representative during audits maintaining TL9000 compliance. DMAIC and 8D root cause analysis driving sustained process improvements and reduced NPI lead times.

Quality Engineer & Mechanical Inspector · Ametek Aerospace · Oct 2013 – Mar 2015 · London

- EASA Part 145/21 and FAR Part 145 compliance; CMM inspections of aerospace and medical instruments, zero non-conformance escapes to customer.

Contract Project Manager · Eaton Aerospace · Feb 2007 – Apr 2010 · Fareham

- Managed £5M+ programmes (Eurofighter Typhoon, Tornado); used earned value techniques to convert a two-month delay into a two-month early delivery. Led teams of up to 30.

First Officer / Flight Test Engineer · Skybus / BASCO · 2006 – 2013 · Cornwall & Bournemouth

- DHC6 island discipline First Officer; NPI lead on military sensor manufacturing project overseeing a team of 10 and engineering group of 20+.

EDUCATION & CERTIFICATIONS

QUALIFICATION	INSTITUTION	YEAR
Professional Machine Learning Engineer	Google	2024
Quantum Information	IBM	2024
Certificate of Higher Education — Subjects Allied to Medicine	Birkbeck, University of London	2022
Data Science and Machine Learning	Kaggle	2021
Machine Learning	Stanford University (Coursera)	2020
BSc (Hons) Mathematics and Physics	Open University	2018
Ruby Programming	Le Wagon	2016
Deutsch Sprachkurs A1–B1	Goethe Institut	2015
Prince2 Agile · PMI CAPM	Learning People	2013
ATPL & Flight Instructor Rating	BCFT	2006
HND Motor Vehicle Mechanical & Electrical Engineering	Mid-Kent College	2001

Languages: English (native) · French · German · **Portfolio:** deanfoulds.xyz · **GitHub:** github.com/Dean-Foulds