Amir Tavahin

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Summary

Machine Learning Engineer with a strong record in building real-time, explainable AI systems across domains including cybersecurity, healthcare, and 3D printing. Skilled in developing and deploying deep learning models using Python, PyTorch, TensorFlow, and Scikit-learn, with moderate knowledge of SHAP, LIME, and molecular simulation tools like CHARMM-GUI. Experienced in NLP, computer vision, and anomaly detection, with end-to-end ownership of ML pipelines and MLOps workflows. Recent projects include a SYN flood attack detector and AI for drug-bound DAT state classification. Enthusiastic about applying ML to solve real-world problems with measurable impact on efficiency, accuracy, and safety.

Education

MSc Computer Science (Artificial Intelligence) – *Brunel University, London*
Graduated with Merit
BSc Computer Science (Artificial Intelligence) – *Brunel University, London*
Graduated with First Class Honors, July 2024
Key modules:

- Cybersecurity: Developed AI-driven threat detection, improving accuracy by 30%
- Artificial Intelligence: Built "Perseus," an AI model for SYN flood detection, reducing false positives by 93%.
- Network Computing: Created real-time socket-based parking entry system, increasing efficiency by 40%.

AWS-Certified Cloud Practitioner (CLF-C02) - Ongoing

Technical Skills

- Programming: Python, JavaScript, R, SQL, SPSS.
- Frameworks & Libraries: PyTorch, TensorFlow, Keras, Scikit-learn, XGBoost, OpenCV, YOLO, NLTK etc.
- Data & Visualisation: Pandas, NumPy, Matplotlib, Seaborn, Tableau, Power BI.
- Model Interpretability: SHAP, LIME, Aggregate LIME, Grad-CAM, Integrated Gradients.
- Simulation & Molecular Tools: CHARMM-GUI, ACEMD, HTMD, MD.
- Tools & Systems: Git, GitHub, REST APIs, Raspberry Pi, Kali Linux, HPC, GPU.

Projects

Perseus SYN Flood Detection

- Designed and implemented ML-based SYN flood attack detection in real-time.
- Developed T-Shark pipeline analysing over 700k+ network packets, blocking malicious IPs with 85% efficiency.
- Optimised model inference, increasing resource efficiency by 30%.

NLP-Based Sentiment Analysis

- Built AI-powered sentiment classifier processing 100,000+ Amazon reviews with 87% accuracy.
- Utilised TF-IDF & LSTM-based model, optimising word embeddings for better results.
- Visualised sentiment insights using Matplotlib, improving business decision-making strategies.

Computer Vision: Real-Time Face Tracker

- Developed real-time face detection using VGG16, achieving 92% accuracy.
- Optimised video processing pipeline, increasing FPS by 45%.
- Fine-tuned CNN model for accurate bounding box predictions.

Fraud Detection using autoencoder

- Trained unsupervised anomaly detection model achieving 90%+ precision in fraud detection.
- Implemented real-time financial transaction monitoring using PyTorch & Scikit-Learn.
- Reduced false positives by 25% using threshold-based fine-tuning.

Multi-Modal Molecular Toxicity Prediction

- Designed multi-modal fusion system predicting toxicity across 12 biological assays.
- Developed cross-attention architecture combining ChemBERTa, GIN, and temperature-scaled ensemble heads.

- Achieved 0.606 AP on top assays with 67% variance reduction.

GAN-Based Fashion Image Generation

- Built GAN-based model for synthetic fashion image generation.
- Improved visual quality by 60%, training adversarial networks for realistic outputs.
- Reduced training time by 40% using early stopping & progressive learning.

Work Experience

Research Assistant – AI for Drug Discovery

Brunel University | Jan 2025 - Present

- Analysed molecular dynamics (MD) simulations to map conformational transitions and residue-level interactions in drug-bound DAT systems, including inward-, outward-facing states.
- Curated a multi-drug dataset integrating time-dependent structural features and residue contact patterns from all simulated systems.
- Built and trained machine learning and deep learning models to classify DAT-bound conformations at different time-frames (ns) across drug types, Current accuracy of 78% using Mini-Rocket.
- Applied SHAP, LIME, and custom aggregate-LIME methods to interpret model outputs, identifying key residues driving conformation shifts and supporting downstream drug mechanism insights.

DefectEye- AI for 3D Printer Defect Detection (Freelance)

Remote | Nov 2024- Aug 2025

- Developing an end-to-end deep learning model using YOLOv11 to detect 3D printing defects such as spaghetti failures in real time.
- Optimising model deployment on Raspberry Pi, achieving 64% accuracy at the current stage, with ongoing improvements to reach 80%+ for real-time defect detection.
- Implementing automated defect classification, reducing print failure rates and material waste by an estimated 30%.
- Working on real-time efficiency improvements, integrating AI-powered monitoring systems to enhance print success rates and reduce manual supervision by 50%.

Hydroponic Livestock Feed System- AI powered Farm Automation

Remote | Oct 2024 – Present

- Designing an automated hydroponic system enabling year-round self-sufficient livestock feed production, reducing annual feed costs by 40-60% whilst eliminating dependency on imported animal feed.
- Building hybrid ESP32-Raspberry Pi IoT architecture with Wi-Fi-connected real-time monitoring dashboard featuring sensor gauges, manual controls, and automated threshold alerts.
- Currently prototyping with a local farmer using modular sensor integration, intelligent power distribution, and real-time data pipelines.
- Integrating LLM-based intelligence agent for predictive system recommendations and autonomous crop optimisation.

Inferential Futures- Student Ambassador

London | Sep 2024- Present

- Promoted AI-focused events, engaging with UK-based student tech communities.
- Led discussions on AI ethics, model interpretability, and real-world ML applications.
- Developing an LLM-powered chatbot to connect students with companies based on meaningful interactions, providing a more personalised and effective job-matching system than LinkedIn.
- Working on optimising the chatbot's recommendation algorithm, ensuring better career opportunities by understanding user intent and engagement patterns