Muhammad Haziq Ilham Aziz Azhar

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SUMMARY

Motivated Artificial Intelligence graduate with hands-on experience in data science, machine learning, and AIoT systems. Skilled in developing and optimizing algorithms, managing data workflows, and deploying ML models. Seeking to contribute technical expertise to innovative AI or data-driven teams.

SKILLS

Programming Languages: Python, R, C++, SQL, TypeScript, Java (Basic), JavaScript (ES6+), Bash

Machine Learning: Supervised & Unsupervised Learning, Time-Series Forecasting, Reinforcement Learning (DQN, PPO, PPO-LSTM), Hyperparameter Optimization, Feature Engineering, Model Evaluation & Fine-Tuning, Transfer Learning

Deep Learning: PyTorch, TensorFlow, Hugging Face Transformers, Vision-Language Models (VLMs), YOLO, RF-DETR, CNNs, LSTMs, Autoencoders

Natural Language Processing (NLP): Tokenization, Lemmatization & Stemming, Sentiment Analysis, Text Classification, Embeddings, Retrieval-Augmented Generation (RAG), OpenAI API, Anthropic Claude API, LangChain, AutoGen, Ollama, LoRA / PEFT

Reinforcement Learning & Simulation: Gymnasium, CARLA Simulator, MuJoCo, TensorBoard, Intrinsic Motivation (RND, ICM, DRND, NGU), Exploration Strategies (Go-Explore, BYOL-Explore)

MLOps & Deployment: Docker, Git/GitHub, CI/CD Pipelines, FastAPI, Flask, Streamlit, Model Serving, Experiment Tracking, pytest, Sentry, OpenTelemetry

Front-End Development: React.js, Next.js, HTML5, CSS3, Tailwind CSS, shadcn/ui, Framer Motion, Recharts, Plotly Dash, REST API Integration, WebSocket

Cloud & Edge Computing: AWS (S3, EC2), Azure, Alibaba Cloud, IoT/AIoT Integration (ESP32, NodeMCU)

Data Engineering & Databases: ETL Pipelines, Data Warehousing, Data Preprocessing, Pandas, NumPy, Polars, Redis, SQL, SQLite, MongoDB, Supabase, Convex

Data Visualization & Analytics: Power BI, Tableau, Matplotlib, Plotly, Seaborn, Dash

Tools & Collaboration: Slack, Linear, Microsoft Teams, VS Code, Jupyter, Excel, Google Sheets, PowerPoint, Notion

Languages: English (Fluent), Malay (Fluent)

WORK EXPERIENCE

Data Science Intern, Rosary Labs   **September 2025 - December 2025**

- Rewrote the core **pattern-matching engine**, achieving **160× speedup** in hyperparameter tuning through caching optimization, migration from **Pandas to NumPy**, and generation of large-scale synthetic positive–negative event pairs for minute-level datasets spanning **2022–2025**.
- Utilized **STUMPY** for time-series similarity search and anomaly detection, improving the stability and accuracy of correlation-based sensor monitoring.
- Designed and executed a full **object detection + VLM pipeline** for extracting engineering tags from large-scale **P&ID diagrams**, integrating **YOLO / RF-DETR** as a preprocessing stage for robust text localization.
- Led **dataset construction and annotation**, designing labeling strategies for large A1-scale engineering drawings and conducting controlled experiments to evaluate detection performance using **mAP@0.5**, precision, and recall.
- Built experimental frameworks to compare **VLM-only extraction vs. object-detection-assisted VLM workflows**, demonstrating measurable performance gains and identifying failure modes through systematic gap analysis.
- Implemented advanced post-processing including **grid-based image segmentation**, bounding-box cropping, rotation correction for vertical text, and batch inference optimization.

- Designed a scalable **ML inference architecture**, proposing separation of RF-DETR into a standalone inference service (RunPod serverless), enabling efficient batching, reduced memory footprint, and faster system startup via **lazy-loading**.
- Diagnosed and resolved **Redis OOM bottlenecks**, profiling and optimizing memory-intensive functions to improve backend reliability and throughput.
- Built and automated **data preprocessing pipelines**, accelerating model training, evaluation, and deployment cycles.
- Enhanced **unit and synthetic test suites**, significantly improving test reliability, coverage, and reproducibility of ML experiments.
- Developed **client-facing web applications** using **React.js**, delivering intuitive data visualization and analytics interfaces for real-world users.
- Optimized algorithmic logic across production systems, reducing runtime errors and improving overall system stability and maintainability.
- Collaborated closely with researchers and product engineers, contributing to experiment design, performance analysis, documentation, and production deployment.

PROJECT

Cognitive Temporal Reinforcement Learning with Surprise-Based Learning Rate Modulation
- Developed a biologically-inspired reinforcement learning system that adapts learning rates based on environmental surprise, drawing from neuroscience theories of temporal perception.
- Implemented a forward prediction model using PyTorch to compute prediction errors, integrated Pearce-Hall associability theory for temporal smoothing, and modulated PPO (Proximal Policy Optimization) learning rates via Stable-Baselines3 on Gymnasium's LunarLander-v3 environment, achieving a 14.8% performance improvement over baseline with reduced learning variance.

Curiosity-Driven Exploration Framework for Sparse Reward Environments in Reinforcement Learning
- Developed a comprehensive reinforcement learning research framework implementing 20+ state-of-the-art intrinsic motivation methods for solving hard exploration problems in sparse reward environments.
- Implemented prediction-based curiosity (RND, ICM, DRND from ICML 2024, NGU, BYOL-Explore), count-based methods (SimHash, Go-Explore), skill discovery algorithms (DIAYN, DADS), multi-agent curiosity systems, and LLM-guided exploration using PyTorch and Stable-Baselines3, with custom Gymnasium environments (DeceptiveMaze, KeyDoor, MontezumaLite) for benchmarking exploration efficiency.

Smart Street Object Detection Using Artificial Intelligence of Things (AIOT)
- Developed an AI-powered system to detect and classify street objects in real time using computer vision and IoT technologies.
- Utilized Roboflow for dataset preparation, YOLOv8 for object detection, and deployed the model on ESP32-CAM using Google Colab for training and optimization, enhancing road safety through smart urban monitoring.

Optimizing User Allocation to the Tower Using Cuckoo Search Algorithm
- Developed a metaheuristic-based solution to optimize user-to-tower allocation in cellular networks by focusing on two key performance metrics, signal strength and user proximity to towers.
- Leveraged the Cuckoo Search Algorithm to maximize signal reliability and minimize user-to-tower distance (within a range of 1 to 10 towers), aiming to enhance network efficiency, reduce signal attenuation, and improve overall service quality and user satisfaction.

EDUCATION

Universiti Teknologi MARA (UiTM)   **Shah Alam, Selangor**

Bachelor of Information Systems (Hons.) Intelligent System Engineering   October 2022 - February 2026

- Cumulative GPA: 3.64
- Dean's List recipient for 6 consecutive semesters in recognition of academic excellence.
- Head of Entrepreneurial Exco for the Artificial Intelligence Society (AIS) UiTM.
- Final Year Project : Smart Street Object Detection using Artificial Intelligence of Things (AIOT)

ACTIVITIES

Artificial Intelligence Society (AIS)

Head of Entrepreneurship

- ProSolve National 2025 – Served as Head of Sponsorship, leading a team that successfully secured up to RM11,000 in sponsorship for a national-level competitive programming event involving universities across Malaysia.
- AI Tech Talk & Learning Revolution at UiTM – Acted as Vice Program Director for a campus-based industry talk in collaboration with ASUS Malaysia, bridging academic interests with real-world applications in AI and innovation.

CERTIFICATIONS AND QUALIFICATIONS

- Microsoft Certified: Azure Data Fundamentals.
- Asia Pacific University of Technology and Innovation Certified Analyzing Data with PowerBI.
- Jazro's Certified Robotic Tutor
- Completion of Cisco's Introduction to Internet of Things.
- Completion of Oracle Academy's Database Programming with SQL.
- Completion of Oracle Academy's Database Design.

REFERENCES

Available upon request