Jack Duggan

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Education

Bachelor of Computer Science (Honours) *Expected Nov 2027*
University of Adelaide, Major in Artificial Intelligence

Work Experience

Software Engineer, SAGE Automation, Adelaide Jul 2023 - Present

- Increased traffic throughput by 25% between Mascot and the CBD during major roadworks by modelling the road network flow and optimising traffic signal timings.
- Improved train carriage loading efficiency and speed by building a machine-vision system to automatically identify carriage models and available capacity.
- Worked as sole SWE on team to broaden the range and increase value proposition of projects.

Electrical Engineering Internship, SAGE Automation, Adelaide Feb 2023 - Jun 2023

- Designed and implemented an ultrasonic sensing system to track pedestrian movement, and built a full-stack analytics platform for data visualisation and operational decision-making.
- Used partial string matching algorithm along with machine vision to create an autonomous one-lane bridge crossing.
- Designed physical power and heartbeat monitor for mission critical hardware to improve device up-time by 20%.

Personal Projects

Order Book and Stock Exchange

- Built a functional exchange supporting order placement, modification, deletion and matching across multiple traders and tickers
- Achieved rate of 5M ops/sec in hot path using lock-free SPSC queues for TCP order flow, and efficient data structures to store orders

Hash Map

- Outperformed std::unordered_map by over 400% across all benchmarks by using open-addressing for cache locality and C++ concepts to specialise on key types
- Control groups and SIMD instructions were then used to provide simultaneous searching of 16 values at once.

Multi-Objective Particle Swarm Optimiser

- Generated Pareto-optimal frontier of stock portfolios balancing variance and returns by building a multi-objective particle swarm optimiser.
- Velocity inversion was used to maintain reasonable search bounds, and multi-threading was utilised to accelerate computationally intensive simulation.

Extracurricular

Open Source Team, Computer Science Club *2026*
Open Source Officer

RSP x AUCPL Competetive Programming Competition *2026*
placed 3rd out of 45 times

Technical Skills

Languages: C++, C, Python, JavaScript, TypeScript, SQL
Frameworks & Tools: Node.js, Express, Vue.js, REST APIs, PyTorch