Howard Cheung

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Education

University of Warwick — Coventry, West Midlands, UK
Bachelor of Science (BSc) in Computer Science — *Sep. 2023 – Jul. 2026*

- Achieved First Class Honours in Year 1 (81%) and Year 2 (78%).
- Relevant Modules: Data Structures & Algorithms, Functional Programming (Haskell), Computer Organisation & Architecture, OS & Computer Networks, Cyber Security, Databases, AI & ML, Formal Languages & Automata Theory.

Queen Ethelburga's Collegiate — York, North Yorkshire, UK
*A-Levels: A*A*A*A*A* including Maths and Further Maths, GCSEs: 9999998876* — *Sep. 2018 – Jun. 2023*

Experience

Undergraduate Researcher (URSS) — Coventry, West Midlands, UK
University of Warwick — *Jun. 2025 – Oct. 2025*

- Proposed and secured independent research funding to investigate quantum cryptography under Dr. Matthias C. Caro.
- Self-learned quantum information theory (density matrices, entanglement, general measurements) and explored quantum cryptographic protocols including quantum OTP, secret sharing, BB84 QKD, and secure multi-party protocols.
- Formulated and analysed a tolerant identity test for maximally entangled states, establishing a local, fully classical framework for verifying quantum entanglement inspired by the BB84 protocol.
- Generalised the framework to multi-pair systems (non-i.i.d.) and evaluated its noise tolerance and theoretical limits.
- Maintained a public blog to document conceptual insights and mathematical intuitions for outreach.

Information Technology Trainee — Cotai, Macau
Wynn Palace — *Sep. 2024*

- Adapted quickly across 9 IT teams, learning key roles, showcasing fast learning and strong communication skills.
- Conducted Intelligent Document Processing (IDP) to automate the extraction of key transaction data from ∼2000 scanned slips using private cloud AI solutions.
- Assisted the cybersecurity team with vulnerability scans using Tenable, automated logs via Splunk, and enforced data loss protection (DLP) for ∼2500 employees across 10+ departments.
- Automated data retrieval in Genesis Customer Management (GCM) system with a UFT script, streamlining reporting for ∼150 guests.

Recent Projects

Connect-N AI | *Python, Matplotlib* — *Nov. 2024 – Jan. 2025*

- Implemented a minimax AI for a generalised Connect-4 game; optimised with α-β pruning and centre-first move ordering and achieved a 98.6% reduction in nodes expanded and 74× faster runtime at depth 8.
- Designed a heuristic evaluation function combining central-column weighting, window-based streak analysis, and threat penalisation, producing stronger mid-game plays and faster cut-offs.
- Benchmarked node-expansion, pruning efficiency, and win-rate across varying board sizes and search depths, validating scalability to larger game variants.

Crisis Compass: Disaster Response Platform | *Flask, Python, Fetch.ai, SQLite, Geopandas* — *Oct. 2024*

- Collaborated in a team of 4 to build an AI-powered platform in a 25-hour hackathon, matching community donations with victims' needs in real time using Fetch.ai's uAgents and a SQLite database for location-based resource allocation.
- Enabled victims to enter location and resource needs for more immediate help, integrating a geolocation AI agent with Google Places API via Fetch.ai agents to locate nearby resources instantly.
- Awarded Smartest AI Agent Prize at WHACK 2024 (sponsored by Fetch.ai), impressing 6 judges out of ∼40 teams.

MoodyBlue: News and Sentiment Analyser | *Flask, HTML, CSS, JavaScript* — *Aug. 2024 – Sep. 2024*

- Built a full-stack web application for real-time trading analysis of ∼1,000 major stocks and indices in the US market, using Flask for back-end services and HTML, CSS, and JavaScript for the front-end.
- Utilised GDELT to aggregate 50+ relevant global news articles, preprocessed them using newspaper3k, and analysed the data with the OpenAI API to generate sentiment scores for each article as well as an overall lateral analysis.
- Created a total weighted sentiment score formula based on the relevance, professionalism, and credibility of each article, providing comprehensive sentiment insights for users.

Warwick+ Movie Database | *Java, LaTeX* — *Feb. 2024 – Mar. 2024*

- Developed 5 custom data structures (AVL tree, array list, hash map, doubly linked list, and hash set) from scratch.
- Implemented ∼70 functions for data manipulation with the custom data structures on ∼20,000 movie records, passing 152 unit tests to validate functionality, performance, and edge case handling.
- Produced a 32-page report detailing the design decisions, structure, and optimisations, with a focus on asymptotic analysis and object-oriented programming (OOP) principles. Achieved a final grade of 81%.

Technical Skills

Languages: Java, C, C++, Haskell, Python, SQL, HTML, CSS, JavaScript, Prolog, LaTeX, Markdown
Frameworks: LLVM, Flask, JUnit, WordPress, Hugo, PaperMod
APIs: OpenAI, Alpha Vantage, GDELT, Google Places (Fetch.ai), Geolocation AI (Fetch.ai)
Developer Tools: Git, GitHub, VS Code, Visual Studio, PyCharm, IntelliJ IDEA, Eclipse
Libraries: pandas, NumPy, Matplotlib, newspaper3k, base (Haskell), megaparsec

Extracurriculars and Awards

Smartest AI Agent Prize, Warwick Hackathon (WHACK) Oct. 2024
Awarded for Crisis Compass, a disaster response platform linking resources to urgent needs.

Warwick Cantonese Society Marketing Team Oct. 2023 – Dec. 2023
Designed and produced Instagram reels and posts to boost engagement for society events.

Top of Year Maths Award Jun. 2023
Ranked #1 in cohort of ∼250 in Maths at Queen Ethelburga's College during A-Levels.

UKMT Senior Maths Challenge Oct. 2022 – Nov. 2022
Achieved Gold for top performance and earned Merit in the follow-up Senior Kangaroo round.