Akira Li | synthesis0x42

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About

Curious, resourceful, and lively student with passion and experience in **quantum computing research**, all things **computer science**, and bubble milk tea! Samples of my code can be found publicly hosted at `/synthesis0x42` on **GitHub**.

Skills

Languages: Python, HTML5, CSS, JavaScript, C++ (**primarily Python**). Happy to learn more as required.

Spoken Languages: English (Native), Japanese (Semi-fluent).

Developer Tools: Qiskit, LaTeX, JuPyter, NumPy, cirq, TensorFlow (learning), GitHub, GitLab, Google Colab, NeoVim, Visual Studio Code

Experience

Pre-Uni New College Strathfield, Australia
Casual marker/assistant tutor *Apr. 2024 - Aug. 2024*

- **Casual, part-time** work marking papers and assistance with **administration** of the tuition centre.
- Working in a **team environment** with tutors/teachers to foster a love of learning.

UTS Centre for Quantum Software and Information Broadway, Australia
*Research work experience - code available **here*** *Jun. 2024*

- Year 10 work experience five day research internship done under the supervision of Dr. Christina Giarmatzi, contributing to her **research in non-Markovian quantum error**.
- Created a **neural network** with an accuracy of **95+%** that would take in inputs of complex matrix **representations of quantum systems**, generate quantum state tomographies, and then output amount of **negativity** and **vonn Neumann entropy** for each system.
- Learned **TensorFlow** and **QuTiP** within a tight timeframe in order to contribute to **pioneering research in quantum error correction.**

Education

James Ruse Agricultural High School Carlingford, Australia
Year 12, Class of 2025 *Feb. 2020 - Present*

Highly competitive and academically rigorous selective high school.

- **Current HSC courses:** Science Extension, Physics, Mathematics Extension 1, English Advanced
- **Completed HSC courses (accelerated):** Software Design and Development (2023), Japanese Continuers (2024)

- **Notable co-curriculars:**
  In 2025 I am currently on the **yearbook committee**, demonstrating leadership and organisational skill to co-ordinate the yearbook.
  I frequently **volunteer** at the Sydney chapter of **Food Not Bombs**, a mutual aid organisation that helps feed people for free. I also engage in **non-violent activism**.
  I was formerly **club executive + leader** at Ruse Art Club, and stepped down to focus on study.
  In 2023, I played the a leading role in my school's musical and won the **Colin Anderson Award for Best Male Performance** in School Musical.

Qubit by Qubit's Introduction to Quantum Computing Online
Full course student *Sep. 2023 - Apr. 2024*

Received a scholarship for this in-depth online course for high school students going into quantum computing–graduated with a **final grade of 107.89%** (Americans with their extra credit...out of 100, it's a grade of **98%**).

Projects

Investigating Error Propagation within Quantum Phase Estimation
*Code available **here**, paper available **here*** *Oct. 2024 - Sep. 2025*

Independent **research project**.

- Conducted a comprehensive **literature review** to **identify research gaps**.
- Utilising the **Qiskit** library within an **interactive Python notebook**, simulates the **quantum phase estimation algorithm** with varying circuit depths and levels of depolarisation channel error.
- Analyses amount of **error propagation** by comparing **fidelity** of the resultant state to the ideal quantum state.

Quantum State Estimation with Stein Variational Gradient Descent
*Code available **here*** *Jun. 2023 - Feb. 2025*

Research project with Prof. Christopher Ferrie from University of Technology Sydney.

- Implementation and testing of **Bayesian quantum state tomography** using a variational inference algorithm that minimises KL divergence between probability distributions.
- Utilises **Qiskit** and **PyMC** libraries within an interactive Python notebook.

Personal Site
*Available at **synthesis0x42.digital*** *Jan. 2025 - Present*

It's my site. Coded entirely **by hand in HTML**, **CSS** and **JavaScript**, ZERO static site generator fluff or templating. It's **responsive** and looks good on mobile, **accessible**, uses flexbox a lot, and loads fast (because it's a static site). It also looks pretty cute if I do say so myself, but it's nothing special. Just a **lightweight landing page** that doesn't look generic.

Awards

- Awarded a grant from **Emergent Ventures** for quantum computing research. *(2025)*
- Team won **2nd place** nationally in **National Science and Engineering Challenge**. *(2023)*