

Henry Yu

henry.yu094@gmail.com | hyu448@wisc.edu
[auroraarc.github.io](https://github.com/auroraarc) | [linkedin.com/in/henry-yu09](https://www.linkedin.com/in/henry-yu09)

EDUCATION

Bachelor of Science - Computer Science

University of Wisconsin - Madison

Expected Graduation: May 2027

Madison, WI

SKILLS

Languages Python | Java | C/C++

Developer Tools Git | Docker | Kubernetes | Tableau | Qiskit | AWS

Libraries Pandas | NumPy | Matplotlib | Seaborn | Scikit-learn | Pytorch

EXPERIENCE

Computational Chemistry Research Intern

Jun 2024 - Aug 2024

St. Jude Children's Research Hospital

Memphis, TN

- Gained comprehensive introduction to computational chemistry, focusing on Density Functional Theory (DFT) and its applications in molecular systems.
- Explored the integration of ML, DL, and QC techniques into traditional computational chemistry methods.
- Studied the potential of quantum algorithms to overcome limitations in classical approaches for quantum systems.

Quantum Computing Research

Sep 2023 - May 2024

Indiana University

Bloomington, IN

- Conducted in-depth analysis of qubit coherence times and gate fidelities using IBM's Qiskit, primarily correlating T1/T2 times with single and two-qubit gate error rates.
- Employed advanced data analysis techniques, including regression modeling and covariance visualizations.
- Developed innovative technical solutions, such as a quantum classifier and artificial noise models.

NOTABLE PROJECTS

Quantum Computing and ML for DFT Calculations in Proteins

Jun 2024 - present

Computational Chemistry Research Intern | Qiskit, Pytorch, Schrodinger, PySCF

Memphis, TN

- Proposed a novel hybrid quantum-classical architecture integrating quantum computing with a graph CNN-like model for enhancing DFT calculations in large molecular systems.
- Developed a point cloud representation for atomic structures, offering flexible geometric representation suited for atomic data and efficient handling of various molecular geometries.
- Conceptualized a Quantum Circuit Born Machine (QCBM) to replace the output layer, aiming to produce electronic density distributions leveraging quantum computing power.
- Explored the potential of this approach to overcome limitations in current density calculation methods, particularly for large protein systems.

Analysis of Qubit Features and Improving QML Models Using Noise

Sep 2023 - May 2024

Quantum Computing Research | Qiskit, Matplotlib, Scikit-learn

Bloomington, IN

- Conducted time series analysis and regression modeling on 7-qubit and 127-qubit systems to predict error probabilities based on qubit features.
- Analyzed noise effects on quantum machine learning models, engineering artificial noise models and benchmarking against classical classifiers.
- Discovered a potential performance enhancement through the addition of amplitude dampening error, highlighting areas for further investigation.
- Achieved R-squared score of 0.105 for 127-qubit system predictions; received recognition for outstanding research presentation.

Breaking the Cycle: Reducing Recidivism in Iowa State Prisons

Sep 2022 - Apr 2023

Quantum Computing Research | Pandas, Keras, Matplotlib

Memphis, TN

- Analyzed probability of prisoners re-offending by developing a feedforward neural network.
- Tested FNN using AUC-ROC score, SHAP analysis, multiple regressions, and Monte Carlo simulations.
- Discovered that Class A felons, on average, cost the prison approximately \$170,000.
- Placed 2nd nationwide with a publication; \$15,000 team reward.

PUBLICATIONS

- Lou Zhou, Henry Yu, Amar Kanakamedala, Jeffrey Liu, and Evan Wu, "Breaking the Cycle: Reducing Recidivism in Iowa State Prisons," 2023.2 ARCH, Education and Research Section of the Society of Actuaries.