

# Henry Yu

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## 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

- Analyzed coherence times over 127 qubits using IBM's Qiskit, and found a high correlation between T1/T2 times and single and two-qubit gate error rates.
- Employed advanced data analysis techniques, including regression modeling and covariance visualizations, over a collective seven years' worth of data.
- 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, attempting to improve DFT calculation efficiency by 9x.
- Developed a point cloud representation for atomic structures, increasing the flexibility of geometric data handling for structures potentially up to millions of densities or atoms.
- 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.
- Engineered artificial noise models, achieving 10% improvement over classical classifiers in noise-resilient prediction accuracy.
- 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

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.