

# Kai Barker

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## EDUCATION

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**University of California, Santa Barbara**

*B.S. in Statistics and Data Science*

Expected Graduation: December 2026

GPA: 3.84

### Relevant Coursework

Machine Learning, Time Series, Regression Analysis, Stochastic Processes, Computational Science, Advanced Statistical Models, Differential Equations, Technology Management, Probability and Statistics, Problem Solving in Computer Science

## WORK EXPERIENCE

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**Foundations of Financial Technology Lab**

*Research Assistant*

September 2024- Present

Santa Barbara, CA

- Analyzed wealth inequality in cryptocurrency markets by examining 100+ million Ethereum wallets using Python
- Implemented a data cleaning pipeline to filter wallets and ensure accurate representation of market participants
- Produced comprehensive visualizations and statistical analyses using to quantify wealth distribution patterns

**Tillys (Management)**

*Assistant Store Manager*

July 2024- August 2025

Santa Barbara, CA

- Generated over \$50,000 in personal sales through customer service skills and extensive retail product knowledge
- Managed the sales floor, leading 25+ employees to meet sales goals and enhance store performance
- Assessed team strengths and areas for improvement to optimize efficiency and elevate customer experience

## PROJECTS

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**NeurIPS Ariel Data Challenge**

*Project*

July 2024- September 2025

Santa Barbara, CA

- Developed ensemble machine learning models (XGBoost + Gaussian Process Regression + Ridge) to predict exoplanet atmospheric compositions from 200+ GB of noisy spectral telescope data for ESA's Ariel mission
- Preprocessed and analyzed 14,000 messy image files across 1,100+ exoplanets, implementing advanced signal processing and noise reduction techniques for space-based observations
- Achieved GLL score of 0.311 predicting atmospheric signals and uncertainties across 283 wavelength channels

**Message Decryption using MCMC and Simulated Annealing**

*Project*

April 2025- June 2025

Santa Barbara, CA

- Implemented Metropolis-Hastings MCMC algorithm for message decryption using alphabet permutation search
- Applied simulated annealing optimization from TSP to enhance the algorithm and improve exploration of the permutation state space
- Analyzed MCMC convergence and investigated temperature scheduling strategies to balance algorithm exploration

**Statistical Modelling for NBA Player Performance**

*Project*

July 2024- October 2024

Santa Barbara, CA

- Developed machine learning models (Random Forest, XGBoost) and engineered features to predict player rebounds using time series NBA API data
- Implemented SHAP for model interpretability and feature importance analysis, significantly improving prediction accuracy over baseline models
- Processed and analyzed performance outcomes to identify trends and validate predictions against real outcomes

## SKILLS AND INTERESTS

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**Technical Skills:** Python, R, SQL, JavaScript, Java, C++, Gaussian Process Regression, XGBoost, Markov Chain Monte Carlo, Feature Engineering, Statistical Modelling, Data Pipeline Development, HTML, CSS, Typescript, Microsoft Excel, Git, API Integration, Canva, Microsoft Office Suite, Pandas, NumPy, Matplotlib, Scikit-learn

**Achievements:** HS Valedictorian, Seal of Biliteracy (Spanish), UCSB Dean's List for Academic Excellence

**Interests:** Basketball, Hiking, Camping, Cooking, Running, Rock Climbing