

## Trenton Eugene O'Bannon

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### EDUCATION

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#### The University of California, Berkeley - College of Computing, Data Science, and Society

Berkeley, CA

*Data Science and Computer Science Double Major B.A.*

Expected Year of Graduation: 2025

**Relevant Coursework:** Foundations of Data Science, Principles & Techniques of Data Science, Designing Information Devices & Systems I, The Structure and Interpretation of Computer Programs, Data Structures, Discrete Mathematics & Probability Theory, Econometrics, Probability for Data Science, Introduction to Artificial Intelligence, Data Engineering, Introduction to Machine Learning and Data Analytics, Great Ideas of Computer Architecture (Machine Structures), User Interface Design and Development, Introduction to Software Engineering, Designing, Visualizing and Understanding Deep Neural Networks

#### Rockhurst University - Dual Enrollment

Kansas City, MO

*College Composition I & College Composition II*

Aug 2020-May 2021

#### Missouri State University - Dual Enrollment

Springfield, MO

*Intermediate Spanish I, Intermediate Spanish II, Principles of Food Preparation*

Aug 2019-May 2020

#### University of Missouri Kansas City - Dual Enrollment

Kansas City, MO

*General Physics I, General Chemistry I, Experimental General Chemistry I lab*

Aug 2019-May 2020

#### Liberty High School - High School Diploma

Liberty, MO

*Final Unweighted GPA: 3.72*

Aug 2017-May 2021

### COMPUTER SKILLS

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**Programming Languages:** Python, Java, C, R, SQL, STATA, Scheme, JavaScript, HTML/CSS, LaTeX, MATLAB

**Frameworks & Libraries:** PyTorch, TensorFlow, Keras, NumPy, Pandas, Scikit-learn, Matplotlib, Seaborn, FastAPI, React

**Data Science & Machine Learning:** Neural networks (CNNs, LSTMs, Transformers), State-Space Models (S4, Mamba), clustering (K-means, hierarchical), supervised learning (classification, regression), causal inference (DiD, fixed effects), model evaluation (ROC/AUC, cross-validation), data visualization

**Developer Tools:** Git/GitHub, Docker, Jupyter Notebook, VS Code, IntelliJ, Spyder, Overleaf

**Cloud & Systems Experience:** Azure (storage, APIs, deployment), Linux CLI, bash scripting, containerized development pipelines

### TECHNICAL PROJECTS

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#### In-Context Learning of Finite State Machines - CS 182: Deep Learning

Dec 2025

· Evaluated neural architectures (Transformers, LSTMs, Vanilla RNNs, GRUs) on in-context learning tasks for deterministic finite automata, implementing custom models and trainers in PyTorch.

· Achieved 99.85% accuracy with LSTMs and uncovered large performance gaps (e.g., 46.2pp over RNNs) through curriculum-learning experiments, ablation studies, and a 10,000-sample evaluation framework.

#### ActionMap: Civic Engagement Web App - CS 169A: Software Engineering

Dec 2025

· Built a civic-engagement platform allowing users to track representatives and political news, contributing full-stack development in Ruby on Rails.

· Implemented Issue Classification (S5 feature) with database migrations, model validations, and forms, classifying articles into 17 political topics, supported by 60+ RSpec tests achieving 100% pass rate.

· Collaborated in an agile team using Git branching, pull requests, and code reviews to prevent merge conflicts across parallel development.

#### Dish It Out! - Cooking Assistant Web App - CS 160: User Interface Design

Dec 2025

· Designed and implemented a full-stack cooking assistant web app using React and FastAPI to generate interactive, parallelized cooking timelines.

· Built features for web scraping, recipe parsing, and history tracking, enabling users to manage ingredients and visualize multi-step cooking workflows efficiently.

#### Can DiD Be Considered Machine Learning? - Data 144: Data Mining and Analytics

Dec 2024

· Evaluated whether the Difference-in-Differences (DiD) causal inference framework can be reframed as a supervised learning problem by comparing treated vs. control counterfactual predictions across time.

· Implemented full DiD pipeline in Python (NumPy/Pandas/Scikit-learn), conducted robustness checks, and demonstrated that DiD can approximate classification-style decision boundaries under covariate shift; earned an A on the final project.

#### Diabetes Prediction Model - Ind Eng 142: Introduction to Machine Learning & Data Analysis

Dec 2024

- Built predictive models to estimate diabetes risk using clinical and lifestyle features.
- Evaluated Logistic Regression, Random Forest, Gradient Boosting, and clustering models in Python, achieving 98.94% accuracy and 99.93% ROC AUC with Gradient Boosting.

**Housing in Cook County** - Data C100: Principles & Techniques of Data Science Apr 2023

- Modeled housing prices across Cook County to analyze disparities between assessed value and market value.
- Developed an OLS regression model in Python/Scikit-learn and visualized discrepancies using Seaborn to identify potential assessor bias.

**World Generation** - CS 61B: Data Structures Dec 2022

- Designed a 2D tile-based world exploration engine focused on randomized map generation.
- Implemented data structures and algorithmic logic in Java to create unique, reproducible game worlds.

**Nurses' Health Study** - CS 61B: Data Structures Dec 2022

- Examined hormone replacement therapy and heart disease outcomes using data from the Nurses' Health Study.
- Applied regression modeling in Python to evaluate associations and interpret statistical significance.

**2048** - CS 61B: Data Structures Aug 2022

- Recreated the game 2048 to practice algorithm implementation and state-based logic.
- Built core game mechanics in Java, focusing on array manipulation, merging logic, and efficient data structures.

**Ants** - CS 61A: Structure and Interpretation of Computer Programs Dec 2021

- Developed a Python-based remake of Plants vs. Zombies for the course's final project.
- Implemented OOP mechanics, including ant and bee classes, game dynamics, user interaction, and level logic.

## PROFESSIONAL EXPERIENCE

**Summer Research Opportunities Program** East Lansing, MI

*Research Intern - Michigan State University - Department of Computational Mathematics, Science and Engineering* May 2025-Jul 2025

- Developed a novel framework for detecting approximate bilateral and rotational symmetry in 2D binary shapes using the Euler Characteristic Transform (ECT).
- Generated synthetic datasets (rose curves, Gielis' superformula) to evaluate symmetry behavior under controlled perturbations and shape variability.
- Computed ECTs and quantified topological differences using L1-distance curves and Fourier spectral analysis to identify symmetry axes and rotation orders.
- Built Python pipelines for image preprocessing, ECT computation, graph-based embedding, and quantitative comparison of topological signatures.
- Visualized topological summaries through polar plots, heatmaps, and spectral decompositions to interpret geometric and periodic structure.
- Presented findings at the MSU AGEP Student Success Conference (First Place), communicating methodology and implications to a multidisciplinary audience.
- Collaborated with faculty mentors through weekly seminars and one-on-one advising sessions, demonstrating strong initiative and independent problem-solving.

**Summer Research Opportunities Program** East Lansing, MI

*Research Intern - Michigan State University - Department of Economics* May 2022-Jul 2022 & May 2024-Jul 2024

- Built a tract-level longitudinal dataset of Michigan communities (ACS 2012-2022) and independently implemented difference-in-differences and fixed-effects models in R and Stata to evaluate Opportunity Zone impacts.
- Identified economically meaningful effects of the 2017 Tax Cuts and Jobs Act, including steeper declines in poverty and unemployment in OZ tracts relative to matched controls.
- Expanded and refined the project in 2024 by incorporating updated ACS data, adding demographic controls, testing for lagged effects, and running robustness checks using alternative model specifications.
- Presented findings at the Midwest Economics Association and MSU AGEP Student Success Conference, earning Second Place, and gained experience translating causal inference results for both technical and broad audiences.

**Summer Research Opportunities Program** Columbus, OH

*Research Intern - The Ohio State University Graduate School* May 2023-Feb 2024

- Developed an automated retinal vessel segmentation pipeline using Python, MATLAB, and a U-Net convolutional neural network, including custom data augmentation and preprocessing routines.
- Manually annotated retinal images to create training masks for the SWAN dataset, enabling model training in the absence of existing labels.
- Achieved high-quality vessel segmentation results that contributed to an NIH-funded study on automated ophthalmic diagnostics.
- Authored a draft research manuscript (first-author) summarizing the model architecture, methods, and clinical relevance; planned for submission pending further revisions.
- Presented results at the 2023 Consortium Research Symposium and collaborated with ophthalmologists and medical students to interpret model outputs and clinical utility.

**Berkeley Residential Life** Berkeley, CA

Gold Resident Assistant Aug 2024-May 2025

Blue Resident Assistant Aug 2023-May 2024

- Lead a team of Blue RAs by providing mentorship and guidance on program development, crisis management, and resident engagement strategies.

- Developed training materials and conducted sessions to enhance the skills of new RAs, focusing on critical areas such as emergency response, community building, and policy enforcement.
- Managed administrative responsibilities including documentation of incidents, coordination of move-in and move-out processes, and enforcement of housing policies to maintain a safe and compliant living environment.
- Fostered a supportive and inclusive residential community by organizing and executing over 10 educational and social programs aimed at promoting diversity and community engagement among residents.
- Implemented crisis response protocols to ensure resident safety, conducting over 70 wellness checks and effectively managing several emergency situations, including mental health crises.
- Facilitated conflict resolution among residents by mediating disputes and promoting a culture of respect and understanding, significantly reducing the number of behavioral incidents within the community.

**Fannie Lou Hamer Black Resource Center**

Berkeley, CA

*Program Staff*

Oct 2021-May 2025

- Staffed the Black Resource Center front desk, creating a welcoming, pro-Black environment and connecting students to campus resources and services.
- Coordinated day-to-day space logistics, including room reservations, event setup/breakdown, and maintaining kitchen, library, and study areas.
- Supported planning and execution of Black community events and programs in collaboration with AASD staff and student organizations.
- Maintained cleanliness, safety, and COVID-related protocols for the center, ensuring it remained accessible and functional for all visitors.
- Attended weekly staff meetings and trainings, contributing feedback on programming, space usage, and student needs.

**Target**

Kansas City, MO

*Produce Team Member*

Jun 2021-Feb 2024

- Unloaded daily freight, stocked and rotated produce, and maintained backroom organization to keep the sales floor full, accurate, and visually appealing.
- Monitored product freshness, temperature, and date codes to meet food safety standards and reduce waste.
- Assisted guests with questions and substitutions, providing friendly, solutions-oriented customer service in a fast-paced retail environment.
- Worked early-morning and weekend shifts as part of an inbound/general merchandise team, consistently meeting stocking and recovery goals.

**Darrell's Carpet & Upholstery Cleaning**

Liberty, MO

*Floor Technician*

Aug 2012-Aug 2021

- Clean carpet, tile, hardwood floors, and upholstery
- Manage the hoses and prepare chemicals for treatment
- Unpack and pack the cleaning van before and after jobs

**Worlds of Fun**

Kansas City, MO

*Admissions Associate*

May 2019-Aug 2020

- Manage customer assistance buildings within the park
- Ticket concessions cashier and seasonal pass sales associate
- Provided customer service to guests inside the park

LEADERSHIP AND PROFESSIONAL DEVELOPMENT

**Management Leadership for Tomorrow (MLT)**

Berkeley, CA

*Career Preparation Fellow*

Feb 2023-May 2025

- Selected for a competitive 18-month professional development fellowship for high-achieving diverse students preparing for leadership roles in industry.
- Completed rigorous business case studies tailored to future roles of interest (e.g., R&D, research strategy, and data-focused positions), including mock project proposals, product analyses, and stakeholder communication exercises.
- Participated in structured interview prep and one-on-one conversations with professionals such as R&D Chairs, Research Leads, and innovation managers: experiences that highlighted the strong value of a PhD for the research-oriented career paths I aspire to.
- Attended national conferences and workshops hosted by Deloitte, LinkedIn, Target, and other partner organizations, building skills in leadership, communication, and technical problem-solving.

**Alpha Phi Alpha Fraternity, Inc. - Alpha Epsilon Chapter**

Berkeley, CA

*Treasurer; Sergeant-at-Arms*

Mar 2022-Present

- Managed chapter finances, budgeting, and expense tracking using campus-approved financial systems.
- Oversaw member accountability, meeting procedures, and adherence to chapter and national policies.
- Collaborated with chapter leadership on campus programming and community engagement initiatives.

**Black Engineering & Science Student Association (BESSA)**

Berkeley, CA

*General Member*

Aug 2021-Present

- Participated in academic, professional, and community-based programming as part of the UC Berkeley chapter of the National Society of Black Engineers (NSBE).

- Engaged with peer mentoring networks and industry outreach events to support the success of Black students in STEM.
- Ron Brown Leaders Network** Kansas City, MO  
*Captain* Jun 2021-Present
- Led service initiatives and supported peer leadership development within a national community of high-achieving students.
  - Coordinated local programming and communication for regional members.
- Velociti, Inc.** Kansas City, KS  
*Corporate Technology Intern* Oct 2020-Nov 2020
- Shadowed software, logistics, and operations teams to learn how enterprise mobile applications are configured and deployed for clients.
  - Participated in daily Agile-style team meetings and observed cross-functional product development processes.
  - Developed early skills in project management, technical communication, and collaborative problem solving.
- Northland Regional Chamber of Commerce - Youth Leadership Program** Kansas City, MO  
*Participant* Jan 2020-May 2020
- Completed a semester-long civic leadership program focused on community engagement, public speaking, and local government operations.
- University of Missouri-Kansas City School of Medicine - Saturday Academy** Kansas City, MO  
*Participant* Sept 2019-May 2021
- Engaged in STEM enrichment, academic seminars, and hands-on workshops designed to develop foundational skills for careers in health and science.
- Sam Graves Leadership Academy** Springfield, MO  
*Participant* Dec 2019
- Selected to participate in a congressional youth leadership seminar focused on civic responsibility and professional development.

## PRESENTATIONS

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- AGEP Student Success Conference** East Lansing, MI  
*Poster Presentation, "Quantifying Approximate Symmetry Using the Euler Characteristic Transform"* Oct 2025
- Mid-Michigan Symposium for Undergraduate Research Experiences** East Lansing, MI  
*Poster Presentation, "Quantifying Approximate Symmetry Using the Euler Characteristic Transform"* Jul 2025
- Midwest Economics Association Conference** Kansas City, MO  
*Oral Presentation, "Impact of Opportunity Zones in Michigan"* Mar 2024
- AGEP Student Success Conference** East Lansing, MI  
*Poster Presentation, "Impact of Opportunity Zones in Michigan"* Oct 2024
- Mid-Michigan Symposium for Undergraduate Research Experiences** East Lansing, MI  
*Poster Presentation, "Impact of Opportunity Zones in Michigan"* Jul 2024
- 2023 Consortium Research Symposium** Columbus, OH  
*Oral Presentation, "Retinal Vessel Segmentation on SWAN Fundus Images"* Jul 2023
- 2023 Consortium Research Symposium** Columbus, OH  
*Poster Presentation, "Automated Retinal Vessel Segmentation of SWAN Fundus Images"* Jul 2023
- Mid-Michigan Symposium for Undergraduate Research Experiences** East Lansing, MI  
*Oral Presentation, "Impact of Opportunity Zones in Michigan"* Jul 2022

## AWARDS AND SCHOLARSHIPS

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- First Place In-Person Undergraduate Poster Presentation** East Lansing, MI  
 "Quantifying Approximate Symmetry Using the Euler Characteristic Transform" AGEP Student Success Conference October 2025
- Second Place In-Person Undergraduate Poster Presentation** East Lansing, MI  
 "Impact of Opportunity Zones in Michigan" AGEP Student Success Conference October 2024
- Liberty Rotary Club Community Leadership Scholarship Recipient** July 2021
- Northland Regional Chamber of Commerce Excellence in Education Scholarship Recipient** June 2021
- Brandon C. Fautleroy-McDowell Scholarship Recipient** June 2021
- Delta Sigma Theta Cotillion 2021 Scholarship Recipient** May 2021
- University of California African American Initiative Scholarship (AAI) Scholarship Recipient** August 2020
- 3rd National ProStart "Show Us Your Skills" Competition** August 2020
- 7th Missouri ProStart Invitational Culinary Competition** February 2020

## VOLUNTEER EXPERIENCE

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### **Harvesters The Community Food Network**

*Volunteer 150+ hours*

· Sorted, packaged, and distributed food for regional hunger-relief programs, contributing to weekly shipments supporting thousands of families across Kansas City.

Kansas City, MO

August 2020-Present

### **Mid-Continent Public Library Reading Boosters Program**

*Reading Tutor 40+ hours*

· Provided one-on-one literacy support to early elementary students, improving reading fluency and comprehension through structured tutoring sessions.

Liberty, MO

August 2020-May 2021

### **Lee's Summit Cares**

*Volunteer 10+ hours*

· Supported youth wellness and community outreach initiatives by assisting with workshop preparation, event coordination, and family-resource distribution.

Lee's Summit, MO

January 2021-May 2021

### **Community Connect**

Volunteer 4+ hours

· Staffed the National Alliance on Mental Illness (NAMI) table at a community health fair, providing visitors with mental-health resources and information on local support programs.

Kansas City, KS

March 2021