

James Bowden

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EDUCATION

California Institute of Technology

B.S. Computer Science, Data Science Minor

2019 – Jun 2023

GPA: 4.0

EXPERIENCE

Ryan Adams Group, Princeton

Jun 2022 – Present

- Reframing topology optimization of mechanical structures with deep implicit surfaces to be able to specify functional design priors
- Creating end-to-end differentiable pipeline for rational design of 2/3-D materials given arbitrary mechanical objectives, e.g., precise multi-stability in metamaterials

Katie Bouman Group, Caltech

Jan 2022 – Present

- Building from CycleGAN to exaggerate important decision features in image data for model explainability and design of models consistent with domain-expert priors

Anima Anandkumar Group, Caltech

Jan – Mar 2022

- Worked on efficiently training diffusion models by partitioning ~200K-D data in Fourier domain and hierarchically conditioning high-res. signals on lower-frequency (global) signals
- Cut diffusion sampling time from ~14hrs to ~2hrs in early tests by replacing convolutional network (“overfit” to images) with simpler MLP architectures (ReZero-net) for freq. domain

Yisong Yue Group, Caltech

Jun 2020 – Present

- Integrated Deep Kernel Learning (DKL) with BayesOpt (BO) to find global optima faster via improved model fitting on complex, high-dimensional datasets where GPs struggle
- Created “fully-Bayesian” active learning pipeline with posterior sampling methods (Thompson sampling and Monte Carlo dropout)
- Helped develop learned region-of-interest DK-BO to adaptively filter candidate datapoints
- Developing (multi-fidelity) DK-BO for real-world rational design applications including COVID antibody engineering and nanophotonics filter design in collaboration with LLNL, UChicago

Software Engineering Intern, Uber Driver Trip Pricing

Jun – Sept 2021

- Designed conditional models to increase driver offer acceptance, trip completion rates
- Pioneered geo-time embedding to create country-wide model with cold-start prediction capabilities for transfer learning

PUBLICATIONS

Learning Region of Interest for Bayesian Optimization with Adaptive Level-Set Estimation

F. Zhang, J. Song, [J. Bowden](#), A. Ladd, Y. Yue, T. Desautels, Y. Chen.

ICML ReALML Workshop 2022. <https://realworldml.github.io/files/cr/paper63.pdf>

Deep Kernel Bayesian Optimization

[J. Bowden](#), J. Song, Y. Chen, Y. Yue, T. Desautels.

Pre-print 2021. <https://www.osti.gov/biblio/1811769-deep-kernel-bayesian-optimization>

Bridge-Group: An Opt-In Recitation Section to Facilitate the Transition from CS1 to CS2

E. Gurcan, [J. Bowden](#), A. Blank.

RESPECT 2022. https://james-bowden.github.io/pages/teaching/bridge_group

AWARDS

Rypisi SURF Fellow, 2022. Awarded by the director of Caltech’s summer research program.

Associates SURF Fellow, 2020. For outstanding research in computer science.

Thermo-Fisher Scholarship, 2019. For promising biomedical researchers (1 of 6 in US).

Teaching Mode, 2018. For best research presentation in cohort of 30 students.

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TEACHING

Head TA: Data Structures/Algorithms, Caltech CS 2

Winter 2021, 22, 23

As Head TA, hired, trained, supported, managed 18 other TAs; heavily involved with course organization, vision. Wrote new assignments, held weekly office hours, led lab section. Pioneered new office hours ticketing system to improve learning outcomes. Helped organize "bridge-group", a DEI initiative to help disadvantaged students transition from CS 1 to CS 2 (poster at RESPECT 2022). *~200 students*

TA: Machine Learning Projects, Caltech CS 156b

Spring 2022, 23

Researched, chose, and setup new dataset (chest x-rays) for term-long group competition. Helped organize course and held technical office hours for teams on demand. *~80 students*

TA: Machine Learning, Caltech CS 156a

Fall 2021, 22

Held weekly office hours for first course in ML sequence. *~200 students*

TA: Intro CS, Caltech FSRI (Freshman Summer Research Institute)

Summer 2022

Held daily office hours for summer-before-college course intended to prepare students of disadvantaged backgrounds to do computational research. Helped write assignments (e.g., NLP essay scorer, autotuner; preparing submission to SIGCSE 2023). Assisted students on creative capstone projects. *~50 students*

TA: Computing Systems, Caltech CS 24

Fall 2021

Held weekly office hours for notoriously difficult, coding-intensive CS core requirement. *~100 students*

TA: Software Design, Caltech CS 3

Spring 2021

Gave weekly code reviews, taught good software development practices, held office hours. *~120 students*

TA: Intro Programming, Caltech CS 1

Fall 2020

Held weekly office hours, graded code. *~220 students*

SERVICE

Caltech CMS DEI Committee, 2022 - 23. Working to improve department treatment of identity.

Caltech Academics & Research Committee, 2021 - 22. Advocated for student interests.

SURF Ambassador, 2020 & 21. Advised, supported Caltech summer research fellows.