

# Michael Psenka

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## About Me

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I'm a 2nd year PhD student at EECS/BAIR, UC Berkeley, advised by Prof. Yi Ma and Prof. Shankar Sastry. My research focuses on principled methods for **unsupervised representation learning** and the **geometry of data**. While my experience is in vision and robotic control, I'm interested in any domain of representation learning. My goal is to make AI that's more easily deployable by everyone: (i) no hyperparameters to tune (these can be adaptively learned from data!), (ii) no extensive data labeling requirements, and (iii) model interpretability, enabling a broader audience to harness the power that modern 2D vision/NLP has achieved for their own use case.

## Education

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### University of California, Berkeley

MS/PhD in Electrical Engineering and Computer Science

Berkeley, CA

Sept 2021 - Current

- **Coursework:** nonlinear systems, 3D vision, high-dim data analysis, research-to-startup seminar
- GPA: 4.0/4.0

### Princeton University

BA in Mathematics, certificates in Applied Math and Computer Science

Princeton, NJ

Sept 2017 - June 2021

- **CS Coursework:** machine learning, deep learning, weakly supervised learning, reinforcement learning, information theory, complexity theory
- **Math Coursework:** probability theory, stochastic calculus, real/complex analysis, representation theory, geometric PDE, general relativity
- GPA: 3.6/4.0

## Work Experience

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### Co-Head instructor

University of California, Berkeley

Berkeley, CA

June 2022 - Aug 2022

- Organized and taught lectures for CS 70, and undergraduate class for discrete math and probability theory
- [Link to class page](#)

### Undergraduate researcher

Stanford University

Palo Alto, CA

June 2020 - Aug 2020

- Worked with Dr. Tolga Birdal on a novel approach to multi-view reconstruction in computer vision that bypasses pairwise view registration

### Undergraduate researcher

Princeton University

Princeton, NJ

June 2019 - Aug 2019

- Worked with Prof. Nicolas Boumal funded by the National Science Foundation through award DMS-1719558
- Successfully developed a state-of-the-art method for computing analytic Hessians and second order optimization over tensor train manifolds

### Software engineer

Moovila, Inc.

Charleston, SC

June 2018 - Aug 2018, '17, '16

- Developed a machine learning algorithm for workplace analytics, and improved search engine for quicker and more robust search
- Worked through a patent application, co-inventor in patent for proprietary software
- Worked closely with dev team, participating in stand-up and sprints regularly

## Publications & Workshop Proceedings

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M. Psenka, D. Pai, V. Raman, S. Sastry, and Y. Ma (2022). **Representation Learning through Manifold Flattening and Reconstruction**. *submitted to SLOWDNN 2022*. [Link to paper](#).

D. Pai, M. Psenka, C.-Y. Chiu, M. Wu, E. Dobriban, and Y. Ma (2022). **Pursuit of a discriminative representation for multiple subspaces via sequential games**. *submitted to Journal of the Franklin Institute*. [Link to paper](#).

X. Dai, S. Tong, M. Li, Z. Wu, M. Psenka, K. H. R. Chan, P. Zhai, Y. Yu, X. Yuan, H.-Y. Shum, et al. (2022). **CTRL: Closed-Loop Transcription to an LDR via Minimizing Rate Reduction**. *Entropy*. [Link to paper](#).

R. Arbon, M. Mannan, M. Psenka, and S. Ragavan (2022). **A Proof of The Triangular Ashbaugh-Benguria-Payne-Pólya-Weinberger Inequality**. *Journal of Spectral Theory*. [Link to paper](#).

M. Psenka and N. Boumal (2020). **Second-order optimization for tensors with fixed tensor-train rank**. *OPT2020 NeurIPS Workshop*. [Link to paper](#).

M. Psenka, T. Birdal, and L. Guibas (2020). **Reconstruction Without Registration**. *IROS2020 geometric methods workshop*. [Link to paper](#).

## Skills

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**Programming** Python (pytorch, JAX, numpy), C#, C, MATLAB, Java, HTML/CSS, JavaScript

**Miscellaneous** Linux, Shell,  $\text{\LaTeX}$ , Git, AWS, Web3

## Awards

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| 2020 | <b>Peter A. Greenberg '77 Memorial Prize</b> , awarded for outstanding accomplishments in Mathematics by juniors. Won for solving an open problem in spectral geometry   | <i>Princeton</i> |
| 2018 | <b>Manfred Pyka Memorial Prize</b> , awarded to outstanding Physics undergraduates who have shown excellence in course work and promise in independent research  | <i>Princeton</i> |
| 2018 | <b>HackPrinceton First Place</b> , won first place at intercollegiate hackathon for developing A.I.D.A.N., a chatbot that lets users interact with their dataset with statistical and machine learning tools. <a href="#">Link to project.</a> | <i>Princeton</i> |
| 2021 | <b>Sigma Xi Honors Society</b> , academic honors society for scientific research   | <i>Princeton</i> |

## Interests

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| <b>Piano</b>                      | Played since I was 3. Grew up mostly classical, got into jazz playing at restaurants in middle/high school.   |
| <b>Princeton Pianist Ensemble</b> | College pianist group, focus on ensemble performance, all pieces arranged in-house.<br>Charity performances, performed in a virtual concert during quarantine ( <a href="#">link</a> ). |
| <b>Music production</b>           | Look at that, three hobbies for the price of one, so much personality   |
| <b>Games</b>                      | Smash bros, chess, or anything in between; always up to learn a new game  |
| <b>Snowboarding</b>               | The more trees, the better  |