

# Anthony Hitchcock Thomas

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<https://thomas9t.github.io>

## Research Appointments

### UC Berkeley

*Postdoctoral Scholar* – Redwood Center for Theoretical Neuroscience (September 2023-Present)

### Intel Research

*Summer Research Intern* – Neuromorphic Computing Group (Summer 2022)

*Summer Research Intern* – Trusted and Distributed Intelligence Group (Summer 2021)

### The Swiss Federal Institute of Technology, Lausanne (EPFL)

*Visiting PhD Student* – Lab of David Atienza (July 2019–December 2019)

## Education

### UC San Diego

*PhD - Computer Science* (September 2023)

*MS - Computer Science* (May 2019)

- **PhD Committee:** Tajana Rosing (Chair), Sanjoy Dasgupta (Co-Chair), Kamalika Chaudhury, Alexander Cloninger, Tara Javidi.
- **Dissertation Title:** *A Formal Perspective on Hyperdimensional Computing.*
- **Research Areas:** Artificial Intelligence, Random Projection, Kernel Methods, Embedded Systems.

### UC Berkeley

*BS with High Distinction - Environmental Economics and Policy (2013)* 3.9/4.00 GPA

## Grants

I have contributed significantly to the following funded projects:

- Russel Sage Foundation: *Measuring Local Area Income Using Neural Networks Trained on Satellite Imagery.*
- National Science Foundation: *Lifelong learning with hyper dimensional computing.*
- Semiconductor Research Corporation: *COCOSYS: Center for the Co-Design of Cognitive Systems.*

## Mentoring, Teaching and Service

### Mentoring

- **Undergraduates:** Namiko Matsumoto (PhD, UCSD and NSF Graduate Fellowship Recipient), Yilun Hao (MS, Stanford), Fatemeh Asgarinejad (PhD, UCSD), Dhanush Nanjunda-Reddy (MS, UCSD), Xin Sheng (MS, UCSD), Daryl Nakamoto, Lucy Lee.

### Teaching

- **Courses:** CSE 291 (Hyperdimensional Computing).
- **TA Positions:** CSE 166 (Image Processing), DSE 210 (Probability and Statistics in Python).
  - Positively recommended by 100% of students submitting evaluations.

**Reviewing:** Journal of Machine Learning Research (JMLR), Neural Computation, IEEE Transactions on Emerging Topics in Computing.

## Publications and Research

### Selected Publications

- Arman Khachiyani, **Anthony Thomas**, Huye Zhou, Gordon H Hanson, Alex Cloninger, Tajana Rosing, and Amit Khandelwal. “Using Neural Networks to Predict Micro-Spatial Economic Growth” *American Economic Review: Insights*, vol. 4, np. 4, pp 491-506, 2022.
- **Anthony Thomas**, Sanjoy Dasgupta, and Tajana Rosing. “A Theoretical Perspective on Hyperdimensional Computing” *Journal of Artificial Intelligence Research*, vol. 72, pp. 215-249, 2021.
- **Anthony Thomas**, Amir Aminifar, and David Atienza. “Noise-resilient and interpretable epileptic seizure detection” 2020 IEEE International Symposium on Circuits and Systems (ISCAS), pp. 1-5, 2020, IEEE.
- **Anthony Thomas** and Arun Kumar. “A comparative evaluation of systems for scalable linear algebra-based analytics” *Proceedings of the VLDB Endowment*, vol. 11, no. 13, pp. 2168-2182, 2018, VLDB Endowment.

## Additional Publications and Research

- **Anthony Thomas**, Sanjoy Dasgupta, Tara Javidi, and Tajana Rosing. “A Formal Perspective on Learning with Vector Symbolic Architectures” Under submission, 2023.
- **Anthony Thomas**, Behnam Khaleghi, Gopi Krishna Jha, Sanjoy Dasgupta, Nageen Himayat, Ravi Iyer, Nilesh Jain, and Tajana Rosing. “Streaming Encoding Algorithms for Scalable Hyperdimensional Computing.” arXiv preprint arXiv:2209.09868, 2022.
- Justin Morris, Hin Wai Lui, Kenneth Stewart, Behnam Khaleghi, **Anthony Thomas**, Thiago Marback, Baris Aksanli, Emre Neftci, and Tajana Rosing. “HyperSpike: HyperDimensional computing for more efficient and robust spiking neural networks.” In 2022 Design, Automation & Test in Europe Conference & Exhibition (DATE), pp. 664-669. IEEE, 2022.
- Alireza Amirshai, **Anthony Thomas**, Amir Aminifar, Tajana Rosing, and David Atienza. “M2D2: Maximum-Mean-Discrepancy Decoder for Temporal Localization of Epileptic Brain Activities.” IEEE Journal of Biomedical and Health Informatics (2022).
- Namiko Matsumoto, **Anthony Thomas**, Tara Javidi, and Tajana Rosing. ”Hyperdimensional Computing and Spectral Learning.” Association for Computing Machinery CogArch21 (2021).
- Fatemeh Asgarinejad, **Anthony Thomas**, and Tajana Rosing. “Detection of epileptic seizures from surface EEG using hyperdimensional computing.” In 2020 42nd Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC), pp. 536-540. IEEE, 2020.
- Behnam Khaleghi, Sahand Salamat, **Anthony Thomas**, Fatemeh Asgarinejad, Yeseong Kim, and Tajana Rosing. “Shearer: highly-efficient hyperdimensional computing by software-hardware enabled multifold approximation.” In Proceedings of the ACM/IEEE International Symposium on Low Power Electronics and Design, pp. 241-246. 2020.
- Justin Morris, Mohsen Imani, Samuel Bosch, **Anthony Thomas**, Helen Shu, and Tajana Rosing. “Com-  
pHD: Efficient hyperdimensional computing using model compression.” In 2019 IEEE/ACM International Symposium on Low Power Electronics and Design (ISLPED), pp. 1-6. IEEE, 2019.
- **Anthony Thomas**, Yunhui Guo, Yeseong Kim, Baris Aksanli, Arun Kumar, Tajana Rosing. “Hierarchical and distributed machine learning inference beyond the edge” 2019 IEEE 16th International Conference on Networking, Sensing and Control (ICNSC), pp. 18-23, 2019